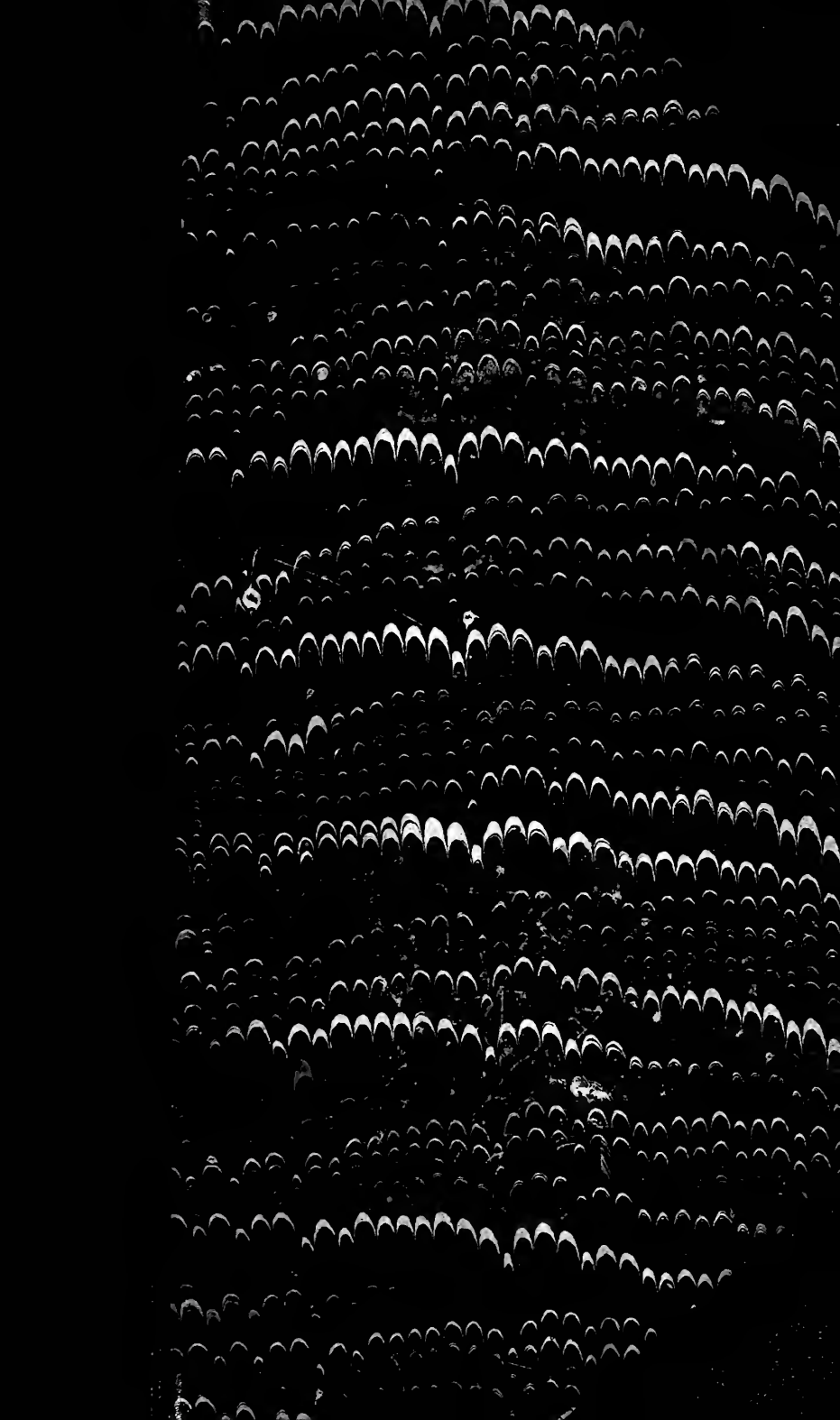

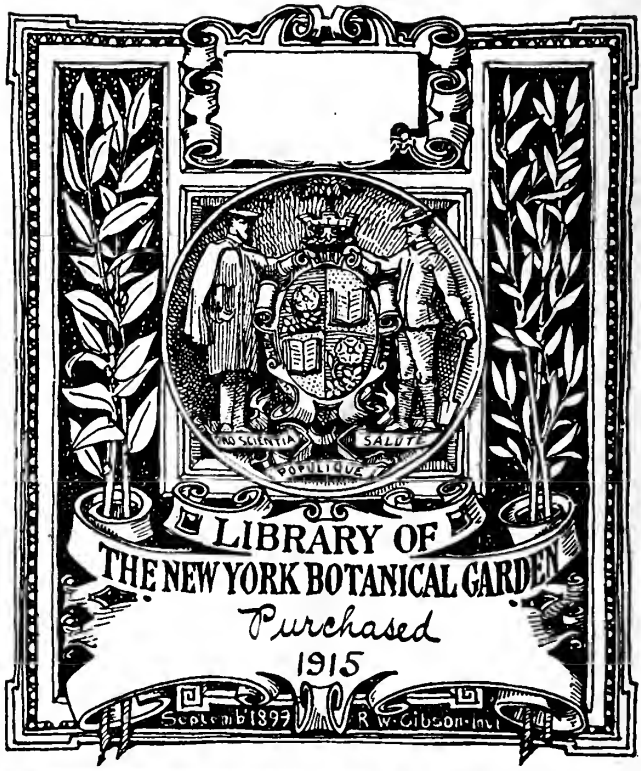
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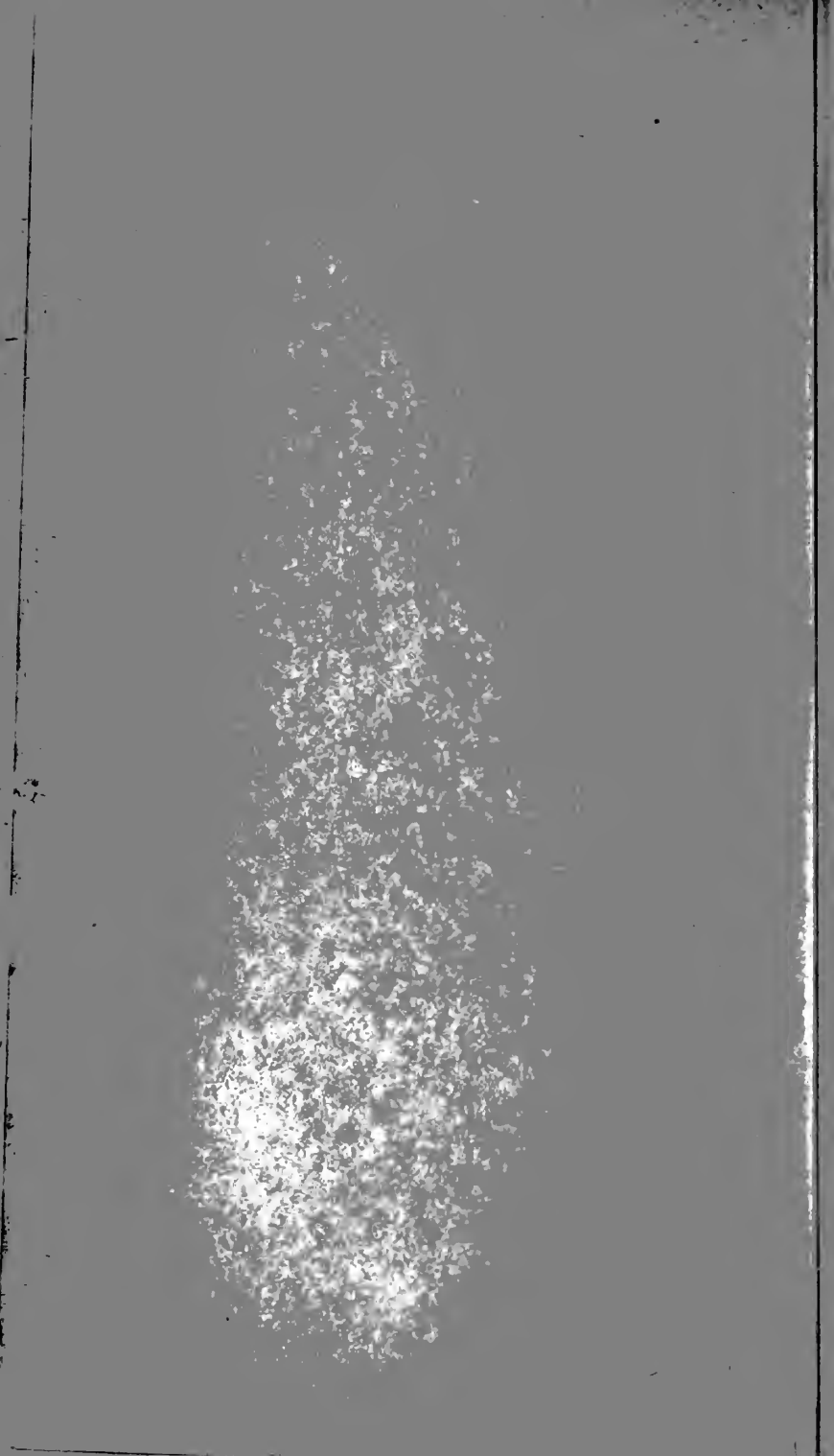

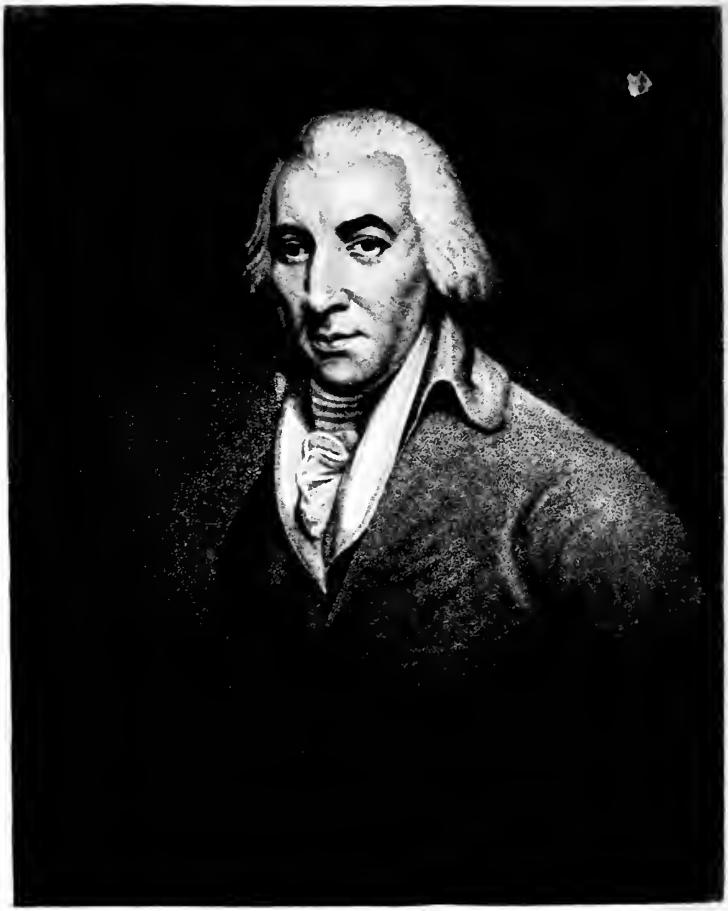

Arthur Young, F.R.S.
Secretary to the Board of Agriculture.
Born Sept. 7. 1741. Died April 12. 1820.

THE

JOURNAL

OF THE

ROYAL AGRICULTURAL SOCIETY

OF ENGLAND.

Third Series.

VOLUME THE FOURTH.

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1893.

Extract from the Society's Bye-Laws

(*Dating from the Foundation of the Society*):—

"The Society will not be responsible for the accuracy of the statements or conclusions contained in the several papers in the Journal, the authors themselves being solely responsible."

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JOURNAL

OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

ARTHUR YOUNG.

More than a century and a half ago the distinguished and singular man whose name is the heading of this paper was born in the house of Mrs. Kinnon, the celebrated midwife to Queen Caroline, in Clifford Street, London. His father, the Rev. Arthur Young, D.D., was a fair example of the pluralist of his time; for while he was a prebendary of Canterbury he was rector of Exning, near Newmarket, as well as, for forty years, of Bradfield-Combust and Bradfield-St.-Clare, and added to these duties and responsibilities the distinction of becoming chaplain to Arthur Onslow, Speaker of the House of Commons. He is described as an intelligent scholar and an active magistrate, and Speaker Onslow at the request of the prebendary and chaplain stood godfather to his child, who after him was named Arthur. His other godfather was the Bishop of Lincoln. He did not discredit the expectations founded on such an unquestionable introduction to the Church.

His mother, who married in 1725, was Anna Lucretia, daughter of John Cousmaker, Esq. Three children were the fruit of the marriage: John, D.D., prebendary of Worcester and Fellow of Eton; a mighty hunter, who, on a horse borrowed of Lord Hinchinbroke, broke his neck while following the hounds with his late Majesty King George the Third. He was a worthy brother of our Arthur, having the reputation of being a fearless and independent divine, a straight man, true to his cloth and calling. It is known that, having accepted the invitation of a certain Suffolk duke to dinner, and riding thither to dress in

the house, he found himself, on going to take his place at the table, in the company of a London lady of notoriety, fair and audacious, it is true, but of blemished reputation. Without a moment's indecision, and deaf to the entreaties and explanations of his host, he left the hall for the stable, mounted his horse, and galloped off home—a divine of the last century, in evening dress. It is not out of place to mention these incidents as indicating the quality of blood that ran in Arthur's veins. After John came a daughter, Elizabeth Mary, who married, and died before her father. The next child was Arthur, the subject of this memoir,[1] born September 7, 1741.

In 1748, being then seven years of age, his education began at a school at Lavenham, six miles from home. There he stayed ten years, till 1758, when he was, at his mother's desire, placed in the house of Messrs. Robertson, merchants, of King's Lynn, devoting his time with avidity to reading and dancing.

At seventeen his first work appeared in the form of a political pamphlet, *The Theatre of the Present War in America*, for which the London bookseller allowed him ten pounds in books. After this there came from his pen four novels—*The Fair American; Sir Charles Beaufort; Lucy Watson;* and *Julia Benson, or, The Innocent Sufferer*. In 1759 his father died, and about 1761 apparently, his skill at chess was the means of introducing him to the notice of Sir Charles Howard, K.B., who offered him a pair of colours in his own regiment. His mother, however, interposed; and the idea of entering any profession seems never afterwards to have been seriously entertained. Again he took up his pen, and started *The Universal Museum*, which Dr. Johnson persuaded him to abandon at the sixth number. He had been living with his uncle in London, but in 1763 he returned to his mother at Bradfield, without any pursuit or profession.

His whole income during his mother's life was derived from a copyhold farm of twenty acres, and, once settled under his mother's roof, an offer she made him of the cultivation of a farm of eighty acres of which she held the lease, fixed the lines of his future career, and Arthur Young embarked as a farmer. As such he would probably never have been heard of as practically skilful, theoretically profound, or financially successful. But the conduct, or rather misconduct, of his business made him conversant with the methods and practices adopted by farmers about him, and with the recognised rules of management of land

[1] The picture which appears as the frontispiece to this article is from a portrait of Arthur Young published in the *European Magazine* of July 23, 1795, and is after a picture by J. Rising.

and farm-stock. It placed him in a position, which no mere literary study could have done, to appreciate and criticise the defects of national or local systems of agriculture, as well as to comprehend the principles insisted on and put in practice by the great improvers of British husbandry. The enthusiasm and genius of the man were brought into play, and he found no difficulty in adding to his splendid mastery of the English language the clearest possible technical treatment of agricultural subjects.

Beyond this his head was always nearer the ground than the skies. He was no "mooner." He understood first principles, and, having mastered them, they became with him fixed principles. Though his talents, vivacity, and manners were a passport to intimacy with men of rank and position as well as of intellect, this intercourse never seems to have enticed him from association with persons of the middle and lower classes and from the closest observation and study of their pursuits, habits of life, industries, and means, as well as of the intolerable laws and customs under which the lives of so many in England, in Ireland especially, and on the Continent, were made hard and miserable.

A severe political economist, he denounced with unshaken constancy and with unanswerable proofs statutes and institutions which were then, and are not unfrequently even now, regarded as beneficial.

First in the ranks of writers on husbandry and rural economy, he was as complete a failure as a farmer. He makes no secret of his practical inferiority—and he did not mistake his incapacity. In the business of farming, indeed, many are the examples of brilliant conceptions in the study and conspicuous blundering in the field. In the present day, more even than at the commencement of the century, quackery in the disguise of science prances and parades on the made-up advertising jade in heroic style; while poor time-worn practice, plodding along on the lines of honest study and experience, sometimes scarcely meets with the respect it deserves.

At twenty-four years of age Arthur Young married Martha Allen of King's Lynn. A tablet in Bradfield Church informs us that she was born in 1740 and died in 1815, and that she was "the great granddaughter of John Allen, Esq., of Lyng House in the county of Norfolk, the first person, according to the Count De Boulainvilliers, who there used marl."

She was attractive and accomplished, but the marriage turned out an unhappy one. Dying five years before her husband, it is fair to assume that it was with his sanction that the monument is silent on the point of her merits as wife, mother, or

neighbour, and by his special instructions that the opportunity was not lost of preserving under the protection of the church an authentic register of the discovery of the virtue of marl as a top-dressing. Does not the rhyming proverb still run—

> "Clay upon sand maketh good land,
> Sand upon clay throws your money away."

The genius of Agriculture did not die out of the family in the person of Arthur Young, but passed on to his only son, who died in 1827, in the 57th year of his age, at Kaffa, in the Crimea, "near to which"—so the monumental inscription runs—"at a village called Karagos, he possessed an estate of ten thousand acres, purchased by him in the year 1810, after drawing up a statistical and agricultural survey of the Government of Moscow, by the appointment of Alexander, Emperor of Russia, in 1805."

There was among other children a favourite daughter, whose death is thus recorded on a tablet in the vestry of the church:—"To the memory of Martha Anne Young, youngest daughter of Arthur Young. Born May 6, 1783; died July 13, 1797. 'Pray, for me, Papa, Amen!' Her last words."

From this date Arthur Young turned his thoughts to religious subjects and to the question of the condition of the soul in a future state of existence, entering into a correspondence with some of the most eminent divines. The publication of Wilberforce's *Practical Christianity*, concurrently with the death of his daughter, seemed, Dr. Paris says, "to settle his conflicting opinions, and established in his mind a true reliance upon Divine mercy, which cheered him in his latter days of darkness and infirmity." William Wilberforce as an acquaintance seems to have had considerable influence with Arthur Young. There is still in existence a certain snuff box of his, from which the diamonds that once adorned it were, it is said, plucked out and passed as a tribute to the fund raised by his friend for the suppression of slavery. They were replaced by a gilt beading or moulding. This snuff box was sent by Count Rostopchin, Governor of Moscow, to Arthur Young with a letter dated Woronovo, June 18th, 1804; and how it reached him will be seen from the following extract from his diary:—

"*October* 17, 1804, *Bradfield.*—Mr. Imirenove came last night to dinner, with Count Rostopchin's snuff box. It is turned in his own oak, lined with gold, and has a tablet containing the representation of a building dedicated to me; the inscription, in Russian, 'A pupil to his master,' set round with sixty-six diamonds. Query? Should not such toys be turned into money

and given to the poor? He was Prime Minister, and has 50,000*l.* English money per annum."

Arthur Young's earliest contribution to agricultural literature was made a year after he commenced farming, and appeared as letters in a periodical, with the title of "Museum Rusticum," which were, by the persuasion of the Rev. Walter Harte, the tutor of Mr. Stanhope (Lord Chesterfield's son), collected under the head of "Sylvæ" as an appendix to the new publication, *The Farmer's Letters*, 1767.

In this year, 1767, he undertook the management of a farm of three hundred acres at Samford Hall in Essex. Finding it a losing affair after a five years' tenancy, he paid a farmer 100*l.* to take it off his hands, who thereupon realised a fortune on it. But during these five years he engaged in various experiments, the results of which were carefully noted, and in 1770 they were published in two quarto volumes, under the title of *A Course of Experimental Agriculture*. Young was also then engaged in writing his *Political Essays*, which were not, however, published until 1772. Subsequently, acting under the advice of a Suffolk bailiff, he took a farm of one hundred acres in Hertfordshire. Master and man were both deceived by forming their opinion of its quality on a view made in a very favourable season. This enterprise was more discouraging than that at Samford Hall had been. "I know not what epithet" (Arthur Young says) "to give this soil. Sterility falls short of the idea—a hungry vitriolic gravel. I occupied for nine years the *jaws of a wolf*. A nabob's fortune would sink in the attempt to raise good arable crops upon any extent in such a country. . . . I hardly wonder at a losing account after fate had fixed me upon land calculated to swallow without return all that folly or imprudence could bestow upon it."

In 1773 Arthur Young was elected chairman of the Committee of Agriculture in the Society of Arts.

In the meeting-room of the Society, on the wall behind the chair, is a cartoon (by Sir James Barry, R.A.) in which he is represented at the extreme left of the picture as receiving a medal from Lord Romney, the President of the Society; and the annals of the Society show that he received no less than three of these gold medals and one of silver for his achievements in practical agriculture.

About this time, in order to increase his limited means, he undertook to report the debates in Parliament for the *Morning Post*. During several years, after these weekly labours he walked each Saturday evening to his farm at North Mimms, seventeen miles from London, returning every Monday morn

ing. "I worked," he says, "more like a coal-heaver, though without his reward, than a man acting on a predominant impulse."

He has, however, left a memorandum which states that between 1766 and 1775 he received for his works 3,000*l.* In this nine years' interval, moreover, some of his most famous works were published, such as *The Farmer's Letters; The Southern, the Northern, and the Eastern Tours; Political Arithmetic;* and *Proposals for Numbering the People*, as well as *Political Essays concerning the Present State of the British Empire.* He told Dr. Paris that by far the most useful feature of his *Tours* was the practical information they gave on the important subject of correct courses of crops, on which all preceding writers had been silent.

In his *Political Arithmetic*, 1774, which was soon translated into several foreign languages, Arthur Young remarks on the general advantages enjoyed by the nation, and still the existence of large tracts under culture inferior to that of other parts; he thinks this must convince every spectator of the importance of spreading the knowledge of what is good. It was this idea which urged him to undertake the *Tours.* He says the improvements wanting are "the spreading of knowledge of good courses of crops so as utterly to banish fallows, which is effected by the introduction of turnips, beans, peas, tares, clover, &c., as preparations for white corn; covered drains; manuring with marl, chalk, and clay; watering meadows; the culture of carrots, cabbages, potatoes, saintfoin, and lucerne; performing works of tillage with no more cattle than necessary; the use of oxen in harness; an almost general reform in implements; the introduction of the drill husbandry for beans; and the culture of madder-wood, liquorice, hemp, and flax on suitable lands." But above these and all other circumstances he names the bringing into culture of the waste lands.

In 1776 and 1777, assisted by letters of introduction from Lord Shelburne and Mr. Burke, he made his tour of Ireland. Landing at Dublin, he was received by Col. Burke (afterwards Lord Conyngham), aide-de-camp to Lord Harcourt, then Lord-Lieutenant, who carried him to his Excellency's villa at St. Woolstan and made arrangements for his tour.

From 1777 to 1779 he remained in Ireland, acting as agent to Lord Kingsbury. In this way, and with these advantages, he collected the material for his work produced under the title of *The Tour in Ireland*, with the general observations on the present state of that kingdom made in the years 1776, 1777, 1778, and brought down to the end of 1779.

It was at Lord Shelburne's house he became intimate with Dr. Priestley, and so acquired a taste for pneumatic chemistry. In his forcible and witty mode of expressing himself he says, "I have been engaged in examining air, to be sure—I have been washing fixed air and hanging it out to dry."

He was now a Fellow of the Royal Society, an Honorary Member of the learned Societies of Dublin, York, and Manchester, the Economical Society of Berne, the Palatine Academy of Agriculture at Mannheim, and the Physical Society of Zurich. His literary ability and authority as an agricultural observer and critic were universally acknowledged. Still he was wholly unable to turn his extensive knowledge to profitable account, even on the very limited area of a hundred-acre farm. Probably his imagination, acted on by the varied lights in which agriculture in many countries came under his notice, outran his means and power for effective administration and unfitted him for plodding processes and the monotonous routine of business, for the neglect of which nothing compensates where the end is money profit. If it be true that he who would make farming pay must ever bear in mind that it is a business of small economies, it is not difficult to imagine how such a man as Arthur Young entirely failed in the occupation. He cared for none of these things.

His vivacity, his buoyant spirit, the sort of muscular irritability that ever kept him on the move, his eagerness to study new methods and to compare new things with old, the ardour with which he demolished antiquated prejudices and practices and insisted on substituting methods and doctrines entirely at variance with the gospel of centuries, his love of gaiety and bright society, his very converse with men of science and statesmen, themselves far ahead of the times, unfitted him for the cautious and monotonous undertakings of a practical farmer. And still, his life for a time and his occupation being that of a farmer, he had been forced into their circumstances, had shared their difficulties, had felt the effect of the obstacles which legislation and old customs placed in their paths, inspiring him with a burning zeal for measures of reform. Thus we hear without surprise that he was the first person to introduce the cultivation of artificial grasses, collecting the seed by his own hand and sowing it. It was Arthur Young who brought more especially into notice among the grasses cocksfoot and crested dogstail, and who laid such stress on scientific courses in husbandry. Very early in life, during his residence at Lynn, his time seems to have been divided between dancing and reading; and so, being possessed of more than the ordinary share of

personal attractions, he was a welcome guest at every entertainment.

An attack of hæmorrhage from the lungs caused him to stay at Bath for a time in 1761, and one can understand how joyously he would have entered into the round of pleasure and excitement of which that city was then the centre. But even there his skill as a chess-player gave proof of the reflective and studious order of his nature.

We have an amusing picture left us of Arthur Young in early life, by a clever and vivacious young lady—one among his numerous admirers.

It was headed as she wrote it, "My own portrait," and her manuscript is endorsed in Arthur Young's own handwriting, "Peggy's wit: her portrait of me, supposed by myself." Thus it runs:—

"I came into the world a fine thriving boy, and thus gave an early promise of becoming in due time what is called a proper-looking, handsome man—such, at least, my glass told me—and I was not disposed to quarrel with it as a flatterer. My height was above the middling stature, being about five feet ten, the then standard of perfection; but, as an act of degeneration has since taken place, what would now be condemned as gigantic, out of nature, horrid. There was, however, something in my air and figure *imposant* and sufficiently attractive to secure as much of the notice and attention of the part of the creation I most worshipped as was necessary to feed and satisfy my *amour propre*. My eyes were of the hawk kind, *Piercers*, looking into and through the thoughts of men and the hearts of women; a nose somewhat long, perhaps, but of an aquiline form, and in good harmony with its companions the mouth and chin; the general outline or contour of the face not bad; my countenance, 'the index of the mind,' full of fire, of animation, of expression; and if my smiles were pleasing my frowns were horrible.

"So much for my exterior, and now a few words to give my character.

"Bold, ardent, impetuous, enthusiastic, and gentle, it was difficult to dissect or analyse any part of it; the lion and the lamb had so whimsically blended themselves in aid of the whole, that it seemed impossible to dissolve the union, although the first upon most occasions asserted its superiority. All that my mind fixed upon it *grasped*. My energies were not to be controlled; they burst the bonds of difficulty and opinion; what I chose to be *I was*. I quitted my study only to take the field. It was my passion, my pursuit; but, far from straightening my scythe into a sword, I bent my sword into a sickle.

"I invoked Ceres. I hailed her as my goddess. I sacrificed at her shrine. She smiled. I succeeded. My ambition now mounted aloft, now tore up the earth; I became the ploughshare of Great Britain, and if harrowed by Envy in the end was rolled smooth by Fame. The exuberance of my knowledge burst forth in annals inscribed to my goddess; my discoveries gained me applause, my experiments admiration and wonder. I dibbled wheat. I scalded hogs. I yoked asses. I animated oats, and measured counties as other men measure tapes!

"My temper was sweetly mutable, now grave, now gay; not an iota of *sans souci* about me. Apathy I abhorred. Enthusiasm I adored, no matter how she assailed me; assume what shape she would, she was my idol still, and whether I toiled for Church and State, whether I was at the feet of my mistress or scraping my own at her door, all, all was with enthusiasm! And now, my fair and partial friends, such as I am, behold me. My wild oats are sown; no dibbling here, but dash, to the right and to the left, to the east and to the west. Should a few weeds of still lurking vanity spring up, *out* with them; tear them up by the roots, lest they overrun the canvas and destroy the likeness of the original."

The *Annals of Agriculture* consisted of articles and papers entrusted to Arthur Young as editor for publication, while some were from his own pen. Among those contributing was his late Majesty King George the Third, who, writing under the sobriquet of Ralph Robinson, sent a description of Mr. Ducket's farm at Petersham. The King thanked Arthur Young on the terrace at Windsor Castle for the pleasure he received in reading the *Annals*; upon which the Queen observed that her Majesty never travelled without a volume of the *Annals* in the carriage. The first volume was published in 1784.

In 1787 he received from Mons. Lazouski at Paris, who had formerly accompanied the two sons of the Duke de Liancourt to England in order to derive the benefit of Arthur Young's instruction, a pressing invitation to join the Count de la Rochefoucauld in a tour to the Pyrenees. This, Arthur Young says, touched a string tremulous to vibrate. He had indeed, for some time, been anxious for an opportunity of visiting France. He lost no time in making the tour, returning to England in the winter in order that on behalf of Suffolk he might oppose the Wool Bill, just as Sir Joseph Banks acted for the county of Lincoln. Their view was, and no doubt a correct one, that the provisions of the Bill were injurious to the interest of the wool-growers, and, under the pretence of protecting the revenue, were framed for the special benefit of the manufacturers, and were at variance with sound principles of political economy. He so far succeeded

that he was burnt in effigy at Norwich, and for this honour was congratulated by Sir Joseph Banks. In the following July he made his second journey, with no companion, through France. It was on horseback, and though his mare fell blind he persevered, travelled with her 1,700 miles, and brought her back to end her days at Bradfield. The third tour in France was carried out in 1789 in a horse chaise.

Between the commencement of the first and the completion of the third tour, events having the most momentous consequences, some fulfilled, some to come, startled Europe and the world. In Arthur Young's first acquaintance with the circumstances of the French peasantry, and the relations between them and the seigneurs, he found ample justification for the revolt of dependence; but the completeness of the Revolution, the unrelenting severity of the revenge, turned the apologiser into the denouncer, and carried him over to the other side. And so we find him in 1793 bringing out *The Example of France a Warning to Britain.* Votes of thanks such as never had greeted his agricultural books poured in from all parts of the kingdom. Accusations of inconsistency, however, accompanied these compliments, the hot compliments of political impulse. We have his defence in his own words:—"The Revolution *before* August 10 was as different from the Revolution after that day as light from darkness; as clearly distinct on principle and practice as liberty and slavery. For the same man, therefore, to approve of both, he must either be uncandid or changeable; uncandid in his approbation before that period, changeable in his approbation after it." It was in this political pamphlet that he advocated the establishment of a horse militia (a force afterwards called the Yeomanry Cavalry), "a militia rank and file of property." He speaks of "the necessity of property securing itself by being armed in a militia," "a regiment of a thousand cavalry in every county of moderate extent, just disciplined enough to obey orders and keep their ranks." Effect having been given to these recommendations, he enrolled himself without delay as a private in a corps established near Bury St. Edmunds, under Lord Broome, afterwards Marquis Cornwallis.

Shortly after this he bought 4,400 acres of waste in Yorkshire, to give practical illustration, it may be presumed, of his views and opinions on the advantage of such an enterprise in the reclamation of waste.

In 1793, however, Sir John Sinclair's exertions were rewarded by the establishment of the Board of Agriculture. Young was so convinced of the fruitlessness of these efforts that he backed his opinion with a bet—*The Annals of Agriculture*

against *Sinclair's Statistical Account of Scotland.* On Sinclair informing him that in consequence of an appointment with Mr. Pitt he might expect to lose, and had better send his books to the binder, Young wrote as follows :—"You are going to Mr. Pitt and I am to lose the wager; when you come from Mr. Pitt I shall have won it. Pray don't give Ministers more credit than they deserve. In manufactures and commerce you may bet securely, but they never did and never will do anything for the plough. Your Board of Agriculture will be in the moon. If on earth remember I am to be the Secretary." His bet was lost; Sir John Sinclair became the first President, with Young as Secretary to the Board, at a salary of 400*l.* a year[1] and a house found. The Board was established, with the King for its founder and patron.

In the following year he engaged with this Board to draw up the County Reports, and he furnished those for the counties of Suffolk, Lincoln, Norfolk, Hertford, Essex, Oxford, as well as a general report on enclosures. In 1796 he paid Mr. Burke a visit at Beaconsfield.

In 1808 a great calamity befell him in his sight failing from cataract, and his misery was aggravated by an attack of stone. These two diseases, blindness and stone, were the two of which during life he had always had the greatest horror. Still he rose every morning at five o'clock, and his diary bears testimony to the religious spirit in which he combated the evil propensities of human nature. It is a record of one of the most interesting and remarkable phases of a very remarkable life; but these spiritual struggles are not matters for public observation.

The letters from his Excellency General Washington, to Arthur Young, Esq., F.R.S., published in London in 1801, commenced in August 1786. Washington, writing from New York and Philadelphia, August 1791, signs himself "George Washington." On September 24, 1791, he writes from York Town, Pennsylvania, and signs "The President of the United States."

His letters, the last of which is dated December 12, 1793, are those of a practical farmer and improver, though Washing-

[1] Amongst the curiosities preserved in the house of the Royal Agricultural Society is the pass-book, from the year 1793 to 1804, of the Board of Agriculture with the banking firm of Pybus, Call, Grant & Hale—subsequently merged in Herries, Farquhar, & Co. The financial transactions of the Board were not very numerous, as one pass-book of ordinary size sufficed for eleven years. It appears from this record that Arthur Young's salary of 400*l.* a year was paid half-yearly in March and September from 1794 to 1800, and afterwards quarterly at the usual periods.—E. C.

ton says he never possessed much skill in the art, which had been among the most favourite amusements of his life. He describes the agriculture of the United States as unproductive to the practitioners and ruinous to the landowners (a condition of things not yet much improved), and he embraces with avidity Young's offer to supply him with "men, cattle, tools, seeds, or anything else that may add to my rural amusements." Young suggested the publication of extracts from the Washington correspondence in *The Annals*; to this the President replies, "I am afraid it might be imputed to me as a piece of ostentation if my name should appear in the work. . . . I wish most devoutly to glide silently and unnoticed through the remainder of my life." (December 4, 1788.)

In 1808, when the loss of sight rendered his services at the Board of Agriculture unavailable, Young received the compliments of the Board in the form of a gold medal for long and faithful service to agriculture; and now, though his digestion became disordered and his sight was gone, he heard the different new works read to him, and he engaged in the preparation for the press of an enormous work on the elements and practice of agriculture, containing experiments and observations made during fifty years. A condensed manuscript transcription was prepared, in ten volumes, by Mr. Walpole de St. Croix, who with his brother is buried in Bradfield Churchyard.

In the preface to this great unpublished work Young says: "I cannot but esteem the period in which I have farmed and given an almost exclusive attention to husbandry, extending to half a century, as by far the most interesting in the progress of that art. The gentlemen who then practised agriculture with attention were unknown to each other beyond the limits of their respective districts; the taste itself was but in its infancy, nor was much public attention excited till I published the *Southern, Northern, and Eastern Tours*, works which at that time were very generally read. Since then the fashion of agriculture has been rapidly establishing itself, and has done more to enrich the kingdom and build its prosperity on a sound basis than perhaps all other causes put together. This noble spirit of individuals may be said to have done the whole; for it is within this period that the political economy of the legislation changed its system. The commercial system became predominant in Parliament, and gradually gave such a preponderance to the profit of trading capital as greatly to retard investments in the agriculture of the kingdom. Notwithstanding the operation of such a manifest evil, husbandry has upon the whole made great progress, which

I attribute to no cause so much as that of attracting the attention of such a multitude of enlightened minds, diffusing knowledge among their tenantry and animating with rural energy all cultivators of the earth."

At nearly eighty years of age his course was run, and he died in London on April 12, 1820. Buried at Bradfield, the inscription on the tablet erected to his memory by his son makes a truthful reference to his character in these words:— "In agriculture and political economy pre-eminent; distinguished for publick virtue, private worth, and the strict performance of every moral duty; above all a faithful but humble disciple of that blessed Redeemer on whose atoning blood alone he relied for salvation.

"His natural genius, cultivated talents, and benevolent exertions were disinterestedly and successfully devoted to the promotion of the statistical, commercial, moral, and religious interests of his country."

A memoir of his life, thus brought down to the grave of Arthur Young, still requires some mention to be added of his writings, especially such as relate to Agriculture. Of his *Tours*, the Southern Tour of six weeks was the first published, in the form of *Letters to a Friend*. In the introduction the writer says, "This is the first attempt ever made in England to lay any account of her agriculture, taken on the spot, before the public;" the design being to display the real riches of the country; to discover the rental, value, stock in husbandry, labour, prices, &c., of the kingdom; to bring local practices, which are found highly advantageous, into general notice, so that "the farmers in one place should grow rich by methods which would enrich their brethren in another, but remain quite unknown." His view is that the country abounds in gentlemen farmers whose ideas are more enlarged, and whose practice is founded less on prejudice than is the case with the common farmers, upon which class he is somewhat unfairly severe. He goes on: "All the well-known capital strokes of husbandry are traced accurately to gentlemen. From whence comes the introduction of turnips in England? But from Tull. Who introduced clover? But Sir Richard Weston. Marling in Norfolk is owing to Lord Townshend and Mr. Allen." He declares, however, that the professed design of his sketches is husbandry. He started from Wells towards Lynn, moving "rather in a zigzag manner, crossing the country more than once." There is soon a minute description of Holkham, its plantations,

approaches, the architecture and arrangement of the hall, with the dimensions of the rooms.

In examining the pictures he says he will rely on his readers' candour, and express to them nothing but his own feelings. He will not be guided by the dictates of common fame. Excellent sense. So, therefore, without more ado, he proceeds to pass judgment on the works of the great masters as he took them in order. P. Cortona's "Jacob and Esau" he declares "dark and disagreeable." Of Rubens's "Flight into Egypt" his description is, "A good picture, but the figures disagreeable, especially Mary's, who is a female mountain. The drawing appears to be bad." One wonders what was left to make of it "a good picture." Claude Lorraine, "Pegasus," "Argus," "Apollo keeping Sheep," and so on.

In Norfolk farms are large, rents low, though the large farmers, paying from 300*l.* to 900*l.* a year, make a great secret of their rents. He thinks, however, they run from 2*s.* 6*d.* to 6*s.* an acre. Marl is the great foundation of their wealth, applied at the rate of 100 loads per acre, costing 25*s.* for digging and 30*s.* for hauling. The crop after this, four quarters of wheat and five of barley. The turnips are fed off with sheep, and the surplus is expended in fatting Scotch cattle by stall-feeding. Where the marl is worn out the farmers have "latterly got into a method of manuring with oil-cakes for their winter corn, which they import from Holland and spread on their fields, at the expense of about 15*s.* an acre." Wheat he prices at 30*s.*, barley at 16*s.*, oats at 12*s.*, peas at 24*s.* per quarter. He did not find a sprig of lucerne on the fields of a common farmer.

Labourers 1*s.* a day in winter, 1*s.* 2*d.* in spring. In harvest 2*l.* 12*s.* 6*d.* or 3*l.* for the harvest, besides meat, drink, and lodging. It lasts from a month to six weeks. Turnip-hoeing 3*s.* first time, 2*s.* second. Bread 2*d.*, butter 6*d.*, mutton 4*d.*, beef 4*d.*, veal 3½*d.*, candles 7*d.* per lb.

The road into Bury lies for some miles over a wild heath, overrun with bushes, whins, and brake, but with a soil which "would if cultivated produce corn in plenty."

The tour was continued through Suffolk, Essex, Kent, Middlesex, Oxfordshire, Gloucestershire, Monmouthshire, and Glamorganshire. A very considerable portion of this volume is taken up with descriptions of the most famous family seats and their contents. He even devotes several pages to a description of Northumberland House in London. The village industries are not forgotten, but very carefully recorded; the condition of the roads, the causes influencing prices, and a variety of observations of value to the political economist or historian.

It is the variety of subjects so graphically dealt with that gives the book all the charm one finds in travelling through a new country. The whole scene and economy of rural life are opened out, and the mind of the reader is relieved by the freedom with which the author describes the pursuits of the people, their homes and industries, with the features of the country modified and marked by the operations of husbandry, and the residences and conspicuous improvements of the landowners.

The three Tours, *Southern*, *Northern*, and *Eastern*, were translated into Russian by the express command of the Empress Catherine, who at the same time sent several young Russians to reside with the Bradfield tenantry for instruction in English agriculture. Prince Potemkin afterwards sent two of his own young men for the same purpose, while others came from the Marquis La Fayette.

The six weeks' tour produced such a sensation that he was pressed to visit other districts, and in 1768 he started on his six months' Northern tour, which appeared in four volumes, "containing an account of the present state of agriculture, manufactures, and population in several counties of this kingdom." In the preface he says that private business carrying him into the South of Wales gave birth to the six weeks' tour, which he wrote chiefly for amusement on the road, not being sensible that the papers might be of use till he "sat down to consider them."

Before commencing his new journey he advertised his intentions in the London papers, requesting such of the nobility, gentry, farmers, and others as were acquainted with any particular improvements, &c., in the agriculture of the counties to give him information, with exact directions to the places where such improvements are carried on.

The effect of this intimation did not come up to his expectations, but, he adds, "unremitted industry made some amends for the want of better advantages, and the loss of such intelligence as gentlemen alone can give was compensated by application to farmers." Spending, however, the race week in the city of York brought him the acquaintance of several gentlemen famous for their love of agriculture and the uncommon spirit with which they practised it, who received him with much politeness and furnished him with intelligence which proved the most valuable part of the work. This tour, he adds, "is useful in proportion to the value of my authorities. Common farmers have given me very sensible accounts of common practices, but few of them enter into the spirit of such an undertaking." Some were jealous, none try experiments, but in all these points he declares that he "found many gentlemen extremely satisfactory."

He thinks it necessary to apologise for the introduction of so many descriptions of houses, paintings, parks, lakes, &c. Though having little to do with agriculture, there is, he insists, nevertheless, a utility in their being known; and they exhibit productions that speak a wealth, a refinement, a taste, which only great and luxurious nations can know. For many hundred miles he complains that he had nothing but provincial weights and measures, all having to be reduced to the common standard. His business was likewise so very unusual that some art was requisite to obtain information. A profusion of outlay was necessary to gain his ends, and he declares he was forced to make more than one honest farmer drunk before he could get sober, unprejudiced intelligence. Some he suspected of hoaxing him, but he always on such occasions repeated his inquiries till he gained the truth. In giving a list of those who assisted him he says no apology is wanting for joining peers with farmers in the same page; adding, "He who is the best farmer is with me the greatest man." He covered above 2,500 miles in this tour. Young was no friend to the fox-hunter, as witness the following, from vol. v., p. 32, of the *Annals of Agriculture*:

> But as leaping impracticable ditches is a part of the glory of a fox-hunter, should that agreeable friend to the farmer unfortunately cross the ground, it must be carefully examined, and those divisions that are trampled struck out of the experiment for the year. The same attention must be used if other noxious animals by accident break in.

This is not the place to enter upon the detailed information the work conveys. As in all Arthur Young's writings, he gives the fullest information on produce, prices, provisions, population, roads, poor-rates, wages, cost of labour, implements, course of cropping, and the general character of the manufactures, and he remarks on the exodus of the country population into the manufacturing towns, which seems to have been as noticeable in his days as at the present time, but which he says can be easily explained, and, as a natural consequence of a demand for labour with profitable employment, should not be checked or regretted.

The nineteenth letter in the *Northern Tour* is devoted entirely to a description of the completed portions of the Duke of Bridgwater's canal from Worsley to Manchester, and the projected continuation from Manchester to Liverpool. He made his visit over the "navigation" or canal in a pleasure-boat drawn by a horse, and is surprised that the town of Manchester did not then possess one boat for the accommodation of its inhabitants. "For want of one," he says, "you may very probably wait a day or two." While waiting for his boat he visited the canal works at Manchester. There is an excellent map of the line of the

canal, and the letter has many illustrations of scenes on the canal and the mechanical appliances invented by Brindley for its construction and service, to which is added a very clear account of the driving the canal on the same level into the ramifications of the Duke's coal-mines, and the method of conveying the coal in boats out of the mine, whence they were drawn by mules along the canal to Manchester.

He considers the Duke's scheme for carrying his canal for 500 yards across the Mersey on its way to Liverpool, if executed, the greatest work that ever yet was thought of; exceeding the noblest works of the Romans when masters of the world; or the legendary tales even of Semiramis herself. The experience and mechanical power, however, now at the disposal of engineers, with the aid of abundant public capital, such as Brindley and his Duke had not the slightest share in, enable them to attempt the construction of a sea way to Manchester, with an extent of works which from their point of view dwarfs the effort of the Duke's great engineer, the projector of the artificial waterways so soon to open up and develop the wealth of our country. But the genius of these two men was after all of the higher order, their conceptions were entirely original and lofty, and their achievements productive of effects in the social advance of the nation to which the application of steam on railways must after all be regarded as secondary. There were intellectual giants then in our old country—Brindley, Wedgwood, Watt, Bramah, Priestley, Smeaton, Banks, Adam Smith, Malthus, Howard, Jenner, Wesley, Nelson, Cook, Sam. Johnson, Burns, and Scott. The name of Arthur Young may be fitly added to the number of the famous dead of those days. Let those who question his title to such a distinction study the second part of the *Tour in Ireland*, and the second part of the *Travels in France*, to learn how far in advance of the prevalent ideas of the time Young's intellect bore him, and with what mastery of our language he could unfold his vivid imaginations to the reader.

The Eastern tour was made in 1770 and published in 1771 as a *Register of a Journey through various Counties of the Kingdom to Enquire into the State of Agriculture, etc.* Again his intention to make this tour was previously advertised, and resulted in his receiving numerous letters and very important communications. He had evidently been annoyed by the reviewers of his previous writings, and says: "A writer on husbandry should be tried by a jury of real farmers, instead of which he often falls into the hands of a motley crew who endeavour to become important by abuse." He claims to be qualified as a writer on agriculture by his having

pursued it as a calling, and takes some trouble to reply to the various objections raised against his literary works.

In 1778 his *Tour in Ireland* appeared. He had landed in Dublin in June 1776, after a tedious passage of twenty-four hours. In that town, to quote from a paper read at the Farmers' Club in April 1882, he found fish and poultry plentiful and cheap, good lodgings almost as dear as in London, with no idea of cleanliness. He notices the great improvement of grass land made by the application of limestone gravel, the cutting of straw into chaff, and the ploughing of fallows in autumn. Ploughing is done by oxen, four in a plough. The cottars give six pounds an acre for land dunged for potatoes. At Slaine farmers burn their straw, for which they deserve to be hanged; though within the last fifty years of Queen Victoria's reign this same practice was pursued by English farmers with their long stubbles left after reaping. Lord Longford tells him that the poor have generally such abundance of potatoes as to command a bellyful; flax enough for all their linen; most of them a cow or two; all of them a pig, and numbers of poultry; fuel in plenty. Numbers are supported on lake fish, for which five hundred children may be seen fishing at the same time. They spin wool enough for their own clothes. Reverse the picture. They are ill-clothed; accounts are kept with the labourers which leave them very little cash for their year's services; they lay hands on all sorts of irons, hinges, chains, locks, keys; gates are cut to pieces; trees as big as a man's body, ten men's work to move, gone in a night. They bring up their children to "hoking" potatoes artfully, raising them, culling the best tubers, and then replanting them.

The cropping around Enniskillen is potatoes, barley, oats, oats, oats, and six years' ley. A schedule of 11,000 acres of Lord Enniskillen's lands shows the rise of rents between 1730 and 1770 to be from 931*l.* old to 3,807*l.* new rents, all within a period of fifty years. In Cavan they very commonly plough with their horses drawing by the tail; "nothing can put them beside it." The people he finds in better circumstances than twenty years back, and more industrious, though now they only work to eat. Live stock have been improved by a bull and a tup bought of Mr. Bakewell. In the Barony of Costello in Mayo there is not a post-house, a market town, or a justice of the peace. There is not a tree in the whole Barony of Ennis. In Tipperary the farms were large, commonly 3,000 or 4,000 acres, and rose up to 10,000; the rent of them was 10,000*l.* Dancing is very general among the poor; dancing masters of their own rank travel with a blind piper or fiddler from cabin

to cabin, their pay 6*d.* a quarter. "It is an absolute system of education." Pigs and children roll about so much alike that you must look twice before the human face divine is confessed. "I believe," Young says, "there are more pigs in Mitchelstown than human beings, yet propagation is the only trade that flourished here for years. The small tenants are uncommon masters of the art of overcoming difficulties by patience and contrivance. The recompense for labour is the means of living; that is to say, in England *money*, in Ireland *land* or commodities. Lime is the great manure; for limestone is plentiful, with peats at hand for fuel. Wool, on an average of sixteen years to 1779, had made 13*s.* 8*d.* per sixteen pounds, against 9*s.* 3*d.* in Lincolnshire, the sheep being better, the supply limited owing to breaking up sheepwalks, and the price of spinning being half what it was in England. In the common Irish, what struck Young most was "their vivacity and a great and eloquent volubility of speech; one would think they could take snuff and talk without tiring till doomsday. Warm friends and revengeful enemies, they have such a notion of honour that neither threat nor reward would induce them to betray the secret and person of a man, though an oppressor, whose property they would plunder without ceremony. Hard drinkers, and quarrelsome, great liars, but civil, submissive, and obedient."

The years of Young's tour in France are ever memorable in history. He landed at Calais, May 15, 1787. On June 17, 1789, the Tiers Etat, superseding the authority of the States-General, constituted themselves the National Assembly. Before that year closed the Bastille had fallen, the property of the clergy was confiscated, and the emigration of the nobility commenced.

"It is a revolt," said the King. "No, Sire," replied the Duke de Liancourt, "it is a revolution." The opportunity for reform has gone by and the dreadful shadow of the guillotine was on the point of obscuring the fading splendour of royalty. Before Young left Paris, January 30, 1790, he sees the King, and Queen, and the Dauphin of France actual prisoners at the Tuileries: "the most extraordinary sight, that either French or English eyes could ever behold in Paris."

After passing Payrac he meets many beggars, and notices that all the country girls and women are without shoes or stockings and the ploughmen at their work have neither sabots nor feet to their stockings. It reminded him of the misery of Ireland. On July 24, in Languedoc all the villages and towns are alive with the treading out of the corn. Great numbers of horses and mules are driven in a trot round a centre, a woman holding the reins, and another or a girl or two with whips

drive; other parties are dressing, by throwing the corn in the air for the wind to blow away the chaff.

In the Gironde he finds oxen ploughing between the rows of vines (as is done at this day), and says it was this operation which gave Jethro Tull the idea of horse-hoeing corn.

About Montgeron (Seine-et-Oise) it is all open fields which produce corn, and partridges to eat it, for the number is enormous—on an average a covey of birds to every two acres, and more on favourite spots. He visits Madame du Pont, sister to the Duchess de Liancourt, and finds, to his surprise, a great farmer. "A French lady young enough to enjoy all the pleasures of Paris, living in the country and minding her farm, was an unlooked-for spectacle. She has probably more lucerne than any other person in Europe—250 arpents."

On October 13 he is in Paris again, and calling on Mr. Cook, who is "there with his drill plough waiting for weather to show its performance to the Duke of Orleans; a French idea improving France by drilling." The finest thing he had yet seen in Paris, Young says, is the Halle-aux-Blés—or corn-market. The gallery is 150 yards round, the diameter as many feet; it is as light as if suspended by the fairies. In the ground area wheat, peas, beans, lentils, are stored and sold. In the surrounding divisions, flour on wooden stands.

A few days after this he visits Mons. Lomond, who in electricity has made a wonderful discovery. "You write two or three words on a paper; he takes it with him into a room and turns a machine inclosed in a cylindrical case, at the top of which is an electrometer or small, fine pith ball; a wire connects with a similar cylinder and electrometer in a distant apartment; and his wife, by remarking the corresponding motions of the ball, writes down the words they indicate, from which, it appears, he has formed an alphabet of motions." The length of the wire was found to make no difference. At Charenton, near Paris, he sees *l'École Vétérinaire* and the farm of the Royal Society of Agriculture. At the school there were about 100 *élèves* from different parts of the kingdom, as well as from every country in Europe *except England*; a strange exception, he remarks, "considering how grossly ignorant our farriers are." He finds the farms in a condition he had rather forget than describe.

The Duke de la Rochefoucauld at his château having ordered his steward to furnish Young with all the information he needed, Young observes that "at an English nobleman's there would have been three or four farmers asked to meet me, who would have dined with the family amongst the ladies of the first rank." Not so in France; and he adds, "The nobility in France have

no more idea of practising agriculture and making it an object of conversation, except on the mere theory, than of any other object most remote from their habits and pursuits."

On his third journey, in 1789, he finds on June 10 "that everything conspires to render the present period in France critical; the want of bread is terrible. Accounts arrive every moment from the provinces of riots and disturbances, and calling in the military to preserve the peace of the markets; $2\frac{1}{2}d.$ a pound for white bread, and $2d.$ for the common sort eaten by the poor, are rates beyond their faculties, and occasion great misery." After being present and consulted at a meeting of the Royal Society of Agriculture, he says, "I am never present at any Societies of Agriculture, either in France or England, but I am much in doubt with myself whether they do most good or mischief." He seems to think the perfect example of good husbandry in the culture of a large farm might be more useful, but then "Query, whether many good cooks would not spoil a good dish."

He looks for a course of crops in France in vain; "They sow white corn twice, thrice, and even four times in succession."

At the Royal Society of Agriculture he votes with the rest for the electing of General Washington as honorary member, on Young's assurance that the General was an excellent farmer. The next day he inspects the Society's farm and their preparations for turnips, and remarks, "What a sad thing for philosophical husbandmen that God Almighty created such a thing as couch!"

At Nangis (Seine-et-Marne), the magistrates—such is the insufficiency of food—have ordered that no person should be allowed to buy more than two bushels of wheat at a market, to prevent monopolising; and he saw the wheat sold out under this regulation, with a party of dragoons drawn up before the market cross to prevent violence.

In July 1789 he meets at an inn a seigneur, his wife and family, three servants and an infant, escaped from his château, half naked, at night; the family valued and esteemed by their neighbours, and no oppression to provoke their enmity. His reflection is that a real system of liberty might have been secured without the *regeneration* of fire and sword, plunder and bloodshed.

He urged Mons. de Mirveau, the first chemist of France, to apply his science experimentally to agriculture. Mirveau chilled him by replying that he had no time for such inquiries. Thereupon Young laid down the maxim that in any branch of experimental philosophy reputation can only be sustained by experiment. To the truth of this maxim Rothamsted bears

testimony in our time. Estates were being given away rather than sold, and the *métayers* were so miserably poor it was impossible for them to cultivate well. He says he could have spent a month in the Bourbonnois looking at estates to be sold. He heard there were 6,000 under offer in France, and then avows his love of a policy that inspires such confidence as to give value to land, and renders men so comfortable on their estates as to make the sale of them the last of their ideas. He had serious thoughts of settling in France in order to farm there, but apprehended he might be purchasing a share in a civil war, and his ardent hopes were damped by a variable land tax, and a prohibition of the export of wool. He visited the once residence of Olivir de Serres, the great parent of French agriculture, with that sort of veneration "which those only can feel who have addicted themselves strongly to some predominant pursuit, and find it in such moments indulged in its most exquisite feelings. Two hundred years after his exertions, let me" (he says) "do honour to his memory." (*Travels*, vol. i. p. 183, ed. 1794.)

With these passages reference to the agricultural writings of Arthur Young must close. A few remarks, however, on his views as a political economist (though again partly a transcription) should be added. They seem, whenever cheap benevolence and easy concession to noisy clamour are the fashion, to be of special value and importance. Strength, Young says, depends on nourishment, and a Government is rotten that strikes a palsy into all the lower and productive classes to favour those whose only merit is consumption. He adds that the wisest dispensation of money among the poor, not earned by industry, always creates a dependence, and consequently becomes in such a proportion the origin of the evil that is to be cured. For the like reason he considers hospitals are equal nuisances; they are attended by a similar effect, and he declared the amount of human wretchedness in England to be quadrupled by the expenditure of the poor-rate.

On questions of home or international trade, on commerce, on monopolies, on religious bigotry, on class arrogance or ignorance, on endowed charities, on the law of settlement, on taxation direct or indirect, on bounties and drawbacks, he seems to have reached truths not so much by slow reasoning as by flashes of instinct. He is never pedantic or pompous; his sentences are full of vigour, and follow each other page after page in the most natural manner imaginable. Though best known by repute as an agriculturist, he spent much of his active life, at home and abroad, as an intimate with men of genius and position, who valued his society and understood his ability; and,

being always diligent and eager to profit by this intercourse and every other access to information, he has left us, in his writings, beyond their agricultural scope, a view of the condition, habits, and pursuits of the people of all classes in his day, such as has scarcely a parallel in English literature.

ALBERT PELL.

TAXATION ON LAND.

IN view of the present state of agriculture, it seems that one of the questions affecting it which needs a minute and critical examination is that relating to the entire system of taxation. It appears also from the freely expressed opinions at large representative gatherings of those interested in the subject, that the time is ripe for a thorough inquiry. Hence, I hope that the few facts and brief remarks, which are now submitted, may be of some service. They will by no means deal exhaustively with such a many-sided question, but this is hardly necessary for the present purpose, which is to convey to the agricultural taxpayer, in a manner that he will best understand, information respecting the nature of the burdens he bears in the matter of taxation.

THE POOR RATE.

The most prominent charge upon land and other forms of real property is, of course, the poor rate. In remote times the idea prevailed—and it was put into practice—that every person should contribute to the maintenance of the poor according to his means. This principle was adopted by the legislature to this extent, that it became a fundamental feature in the important Poor Law Act of the 43 Eliz., that not only every occupier of real property should contribute, but every *inhabitant*, and thus *personal* property, that is to say stock in trade, and other like property in the parish, was made to bear its proper share of the burden. The principles of this Act remain intact at the present time, with the very important exception that personalty has ceased to contribute; that, no matter how wealthy or able to take his share a parishioner may be, he is not called upon to pay anything beyond the rateable value of the property he occupies, which may be nothing more than a small house assessed at a few pounds. But it was not until the year 1840 that personal property was actually relieved by statute of its liability, and its exemption is annually confirmed under the Expiring Laws' Continuance Acts.

This redemption of personalty from its liability shows that there has been a radical change in the law which demands serious consideration at the present period, especially when it is borne in mind that fresh charges have been, time after time, heaped upon what was once a poor rate pure and simple, until its designation has become a complete misnomer. Perhaps no better reasons can be given for introducing this reform, at the expense of real property-holders, than those surmised in the historical introduction to *Castle on Rating*, where it is stated that "either from the difficulty of assessing personal property, or from the still popular principle of throwing all burdens upon land, a custom sprang up in many parishes of not assessing this class of property." These remarks were made in 1886, but surely if our resources enable us to raise and collect taxes on personal property for imperial purposes, no difficulty need arise for the collection of local rates. It is probable that, had it not been for the well-known apathy in more prosperous times of the agricultural classes in respect of matters which affected their interests, this custom would never have existed. I have observed within the last few years the same want of self-assertion on the part of farmers on the Assessment Committees of Boards of Guardians (where small towns are incorporated in Unions with agricultural parishes), and found that a few dominant members, representing the assessment of house-property, have persistently refused to bring down the assessment of farms in the Union to such values as the law directed. This was in one instance carried to such an extent as to materially interfere with the letting value of property under my management, and I was obliged to take action to protect the landlord's interests.

But supposing, for the sake of argument, that it was possible to prove that no injustice or hardship to owners and occupiers of real property existed by the exclusion of personal property from its share of the burden, there yet remain to be considered the rules by which the assessments are made, as between the different classes of occupiers. Does the governing principle of the law, as it now stands, apportion the burden fairly between occupiers who live upon their means or earn incomes from trade and occupy houses, and the other class of occupiers who earn their living from the land? If a fair apportionment of the burden is understood to mean that each person should pay according to his means, the present system is radically wrong, and very unjust. The income of a farmer is approximately estimated, for income tax purposes, at half the rent of the land he occupies. This is not very wide of the mark for an average

estimate; at least it was not so in the more flourishing times. A farmer, therefore, who pays a rent of 300*l.* a year, may be supposed to earn an income, or a profit, of 150*l.* a year. What does he contribute to the poor rate? He would be rated (if fairly dealt with) at the amount of his rent, less the tithe (if any), and the statutory deductions for repairs, &c., which total up usually to about 10 per cent. If the tithe was redeemed he would not be so fortunate; but presuming that this is not the case, the net rateable value of the farm would be about 200*l.* The rate in the pound naturally varies according to locality, and an estimate of 2*s.* 6*d.* for the year is a low average. A farmer, therefore, earning 150*l.* a year, would contribute 25*l.* a year to the poor rate.

Let us contrast this with the case of persons of independent means, and with village tradesmen of various kinds, innkeepers and others, earning incomes of 150*l.* a year, numerous examples of which will occur to anyone. Such persons would occupy houses and premises rented at, say, from 20*l.* to 35*l.* a year, or on the average 28*l.*, and be rated at about 24*l.*, which sum at 2*s.* 6*d.* in the pound would give 3*l.* as their annual contribution to the rate. Under the existing law, therefore, a farmer pays to the poor rate about eight times as much as private residents or tradesmen earning similar incomes.

Other examples might be given by comparing the incomes of larger farmers with those of professional men, or smaller ones with artisans, with a like result; but the one adduced is sufficient to illustrate the present system. There is, however, a curious result in the case of the assessment of clergymen's incomes, as compared with those of other professional men. If a rector, whose income is derived from tithe, receives 400*l.* a year as his earnings from that source, he would be assessed to the poor rate upon this sum, less statutory deductions, which would, in ordinary cases, reduce it to a rateable value of about 320*l.* This figure at 2*s.* 6*d.* in the pound would give 40*l.* a year as the rector's contribution to the rate, and if he occupied a house rated at 40*l.*, the amount of the burden would be 45*l.* a year. But a doctor, veterinary surgeon, or land agent, earning an income of 400*l.* a year, would escape with a payment to the rate of 5*l.* only in respect of the occupation of the house he lived in.

The Land Tax.

Let us next consider the nature and incidence of the Land Tax: a few words will suffice. It appears to have had its origin in the reign of Henry II., and was subsequently, at one time, levied at 4*s.* in the pound on land, and at 2*s.* 8*d.* on

personal property. Later on it was imposed, as a uniform rate, on both real and personal property; but in the latter part of the last century personalty became irregularly assessed, and in the year 1833 it was entirely exonerated and freed from liability. In this feature it resembles the poor rate, as personalty in respect of the rate escaped liability seven years later, in 1840. Here is further material for consideration, but I will reserve comment upon the subject until it shall have been seen what a glance at the income tax will reveal. It may be stated, however, that the amount of the tax is extremely variable. A fixed annual sum or quota was apportioned to, and made payable by, each parish, to the imperial funds, subject to powers of redemption. If properly assessed, the tax is levied on the same principle as the poor rate, and it follows that, where the rateable value of parishes has increased, by building or otherwise, the rate in the pound is diminished in some cases until it becomes a mere fraction; but in parishes which have not increased in value it may be 1*s.* in the pound or upwards.

The Property Tax.

The third, and remaining, tax on land, for our consideration, is the Property Tax. It is, as we know, levied on all classes of incomes, including those from personal property, and in this respect therefore it differs from the poor rate and land tax. So far there is nothing in the principle for the agricultural community to complain of; but it is necessary to compare the rules for assessing incomes from real property with those in operation for the assessment of incomes from trade and personalty, before it can be seen whether the burden is equitably borne or not. The tax, as we now know it, dates from 1842. The rule for assessing trade and professional incomes under Schedule D is to charge them on the actual profits realised. From gross profits, deductions are allowed for every conceivable payment legitimately incurred in earning the income, and these extend to rent, rates, and taxes on business premises; to all labour, materials, and utensils used in the concern; and bad debts, and losses, are allowed to figure in the account. Poundage being collected only on the net profit, trade incomes are thus, undeniably, well taken care of, and the same may be said of other incomes arising from various investments. This is quite as it should be; but when we consider that incomes from land, and other real property, assessed under Schedule A, are charged practically upon their gross value, while those for trade, under Schedule D, are charged on their net value, there is serious cause for reflection. Land

tax is really the only deduction made (with slight exceptions for public drainage works, losses by storms, &c.), from the rents of real property in order to arrive at their net value, as tithe is a separate and distinct property, and the owner of it bears the tax.

In order, therefore, to appreciate the effect of these different rules of assessment, we must ascertain the difference between the gross income from landed property, which is practically what the owner pays the tax upon, and the net income he receives after he has paid all the expenses necessary to keep the property in a condition to maintain its rent. This difference, in the golden days of prosperity, was a considerable one, but it is far greater now, and varies of necessity very considerably. So far as my own somewhat extended experience guides me, I should say that this difference would average at least 25 per cent. It thus appears that incomes from landed and other real property are charged by rules which make the burden fall at least one-fourth heavier than it falls on trade, and other incomes, which are chargeable under different and more favourable rules; and the difference is accentuated by the fact that incomes from land are seriously diminishing, while those from other sources are increasing. The value of lands assessed in the United Kingdom to the tax was, in 1879–80, 69,500,000*l.*, whereas in 1891–92 the value had fallen to 57,500,000*l.* But the profits of trade have advanced from 490,000,000*l.* in 1876 to 587,000,000*l.* in 1890–91, an increase of nearly 100,000,000*l.*

Conclusions and Suggestions.

This brief outline of the manner in which land is affected by the present system of local and imperial taxation consists mainly of facts which are recorded in the statutes themselves, and which cannot be refuted. Unnecessary detail has been avoided, and it must, I think, be granted that a case has been presented which justifies the immediate attention of the agricultural community. Some of the points involved appear at first sight to concern landlords only, but in reality the whole subject is important alike to owners, tenants, and labourers. I am ready to admit, to the fullest extent, that poor rate, although by law an occupier's tax, is in effect a charge upon ownership, because it is immaterial to a tenant, if he makes up his mind that a farm is worth 25*s.* an acre, whether he pays 22*s.* to his landlord and 3*s.* for rates, or whether he pays 25*s.* to his landlord and lets him pay the rates. But the point I submit for consideration is this; that every penny which is put upon land by way of taxation, is of the nature of a tax upon the raw material which

owners, occupiers, and labourers use to obtain a livelihood. It is within the mark to say that every pound which is paid as rent throughout the country is taxed locally and imperially to the extent of four shillings, or 20 per cent.; and rent, which is the owner's income, is thus reduced to the extent of one-fifth by taxation; whilst, in addition to this, no deductions are allowed from the property tax to reduce the gross to net income, in the case of income from land, whereas it is allowed for trade. On the other hand, incomes from professions, trade, and personal property, are taxed only for imperial purposes now at 6*d.* in the pound, and pay nothing whatever to the poor rate except on the rent of houses and premises occupied; and as many incomes of 1,000*l.* a year are either made or enjoyed on premises rated at 50*l.*, with a payment of 6*l.* 5*s.* to the union, which is 1½*d.* in the pound on such incomes, it follows that the total which they pay locally and imperially is only 7½*d.* in the pound, as against the 4*s.* in the pound paid in respect of land.

If these conclusions are sound, or even partially sound, it is a very serious matter for agriculture. We often hear that rents must still come down—perhaps they must; but would not owners be in a better position to grant such further reductions out of their diminishing incomes if they were relieved of a portion of the 20 per cent. which they now pay for taxes? Landlords' incomes are so diminished that numbers of them cannot afford to live on their estates; farmers, many of them, have reached, and others are approaching bankruptcy; labourers are insufficiently employed; and this, in an appreciable measure, is brought about by the inequality and injustice of the present system of taxation. The same defects have no doubt materially contributed to the extinction of the old yeoman farmers who, being occupiers and owners, have had to bear the whole of the 20 per cent. burden; and it is difficult to conceive how others are to be reared to take their place, by the aid of the legislature, with such a load to bear. If a skilled workman can earn from 30*s.* to 40*s.* a week, and pay about 20*s.* a year to the poor rate in respect of the house he occupies, it is no inducement to him to change his occupation for small ownership if he finds that, directly he steps upon the land, his burden of taxation is multiplied by eight on a similar income. What special benefits does the poor rate confer upon farmers, beyond those conferred upon tradesmen and private residents, that its operation should be so grossly unequal? It provides for poor relief, police, highway, sanitary, and education expenses, the benefit from which accrues to all classes alike, and the farmer has no monopoly. It is not an inherited burden on land, more than upon that share of personalty, which has become

free; but, even if it were so, it does not follow that it should be perpetually borne, as it now is, if injustice is shown to exist. At any rate, sanitary and education charges are too modern to have become inherited.

In conclusion, I submit that the position and prospects of all landowners, farmers, and farm labourers, are affected to a serious extent by the operation of an unequal and unjust system of local and imperial taxation. It is difficult to conceive why personal property should have been permitted to throw off its share of the burden, as it has done; and it is worthy of note that this came about just at the time (within a year or so) when the Corn Laws were repealed. At the moment, therefore, when the British farmer was divested of his weapon of protection, and told that he must meet the competition of the whole world unaided, except by his own energy, skill, and powers of endurance, he was handicapped in the race by his friends at home, who weighted him heavily with the burdens that they removed from their own shoulders. If the agricultural classes, as a body, have not perceived that such was the case, the sooner they do so and seek relief from an unjust system the better it will be for them. The question was prominently and forcibly, in some of its aspects, put before the members of the Agricultural Conference held in London in December 1892; but it is a many-sided one, and requires to be put, again and again, through every possible channel. The need for this is the greater because the principles of few subjects are so difficult to understand as those relating to taxation. Very little, comparatively, is known even of the ordinary rules for obtaining proper assessments under the laws as they now exist; and many just causes of appeal before Assessment Committees and Commissioners of Taxes are lost because they are not properly stated. As such is the case, there is an excuse for the general and fundamental principles of the same laws being imperfectly understood. But this defect must be remedied by giving publicity to the system; as the true road to real progress and reform, such as is here needed, is through an awakening of the public conscience.

Examination of Existing Assessments.

In the meantime, while waiting for the benefit of some radical alteration in the present system, it will be well to make the best of the existing situation, and examine the assessments now pertaining. Rents have been lowered, remissions have been given, and the Assessment Committees of Boards of Guardians, particularly where they are dominated by prominent members repre-

senting the interests of occupiers of houses in the small towns frequently incorporated in Unions with agricultural parishes, have been reluctant to reduce rateable values accordingly. In addition to this, the remissions of rent which have been given have often entitled owners and tenants to the statutory privileges accorded under the Income Tax Acts without their being aware of it; and there are other points which many individual taxpayers have never understood, and consequently they have taken no advantage of them. With a view, therefore, of helping owners and occupiers of land who are not in a position to judge whether they are fairly assessed, and of aiding others who cannot properly place their cases, when they feel aggrieved, before the authorities, the following information on the subject is submitted in the hope that it may serve a useful purpose.

Assessment to the Poor Rate.—The poor rate bears its name, apparently for the want of a better one, to indicate that it includes, not only expenses for the poor, but those incurred for sanitary and county expenses, and frequently also for highway and School Board maintenance. When the demand for a rate is sent, it ought to state how much in the pound is wanted under each head, but this is frequently omitted.

Every occupier pays upon what is termed the net rateable value, and the principles upon which this should be ascertained are these: the rent should be taken as the gross value, but it must be a full rent, such as a responsible tenant would give from year to year. Most persons are paying such full rents, and will consequently claim to have them adopted for poor rate values; but there are some exceptions, of course, and the law allows assessments to be made on the basis of a higher and also a lower rent than is actually paid, if the rent does not represent the true value. From this rent, as the gross value, should be deducted (1) the amount of tithe rent-charge; (2) the average cost of such repairs as the landlord is required to make to keep the premises in a state to command the rent; and (3) the cost of insurance. The sum which remains after these deductions are made from the rent represents the annual or net rateable value of the property for assessment. As regards the amount of these reductions, the tithe can of course be ascertained from the landlord or his agent; but the practice in regard to the insurance and repairs, in most unions, is to make a uniform rate of allowance to cover them, according to the class of property. For instance, it may be 5 per cent. for land without buildings; 10 per cent. for land with buildings; 15 per cent. for buildings alone; and it is generally more on cottage property. These allowances, whatever the custom may be, are easily ascertained

from the overseers, and a farmer may thus ascertain if he is properly assessed or not.

Such briefly, and in ordinary cases, are the principles which the law requires overseers and Assessment Committees to adopt for ascertaining the net rateable value of property. But there are, occasionally, special circumstances in connection with rents. When a farm is let at an ascending rent, or at a rent which varies, it is the usual plan to strike an average for several years. In cases where landlords have remitted a portion of the rent as a percentage from time to time, rather than lower the rent, it is clear that, when this occurs with a certain amount of regularity, the abatement should be taken into account, as the law requires that the farm should be charged upon *what it is worth to let*. This view, although it has been concurred in by an eminent counsel, some Assessment Committees are reluctant to adopt, whereas others have agreed to it, and it might be worth while for a body of tenantry to combine, and bear the expense of an appeal to Sessions if they are refused; but, as the cost of legal assistance would be considerable, it would hardly be desirable for a single occupier to proceed unless his case involved a considerable overcharge.

Woods and underwoods are frequently very considerably overrated. Their value should be taken to be what they are worth to let to a tenant who would keep up fences, plant up vacancies, pay tenants' rates and taxes, and generally keep the woods in such condition as will enable them to bear their rent. In the case of underwoods, these deductions bring down the rateable value frequently to two or three shillings per acre, if properly worked out; but if the sporting right goes with the occupation of the woods, its value should be added; if it is severed, it must be separately assessed. Woods, i.e., land occupied by timber, is rateable only as land in its natural and unimproved condition; and as all kinds of rough hillsides, dingles, and other unprofitable land are devoted to timber, its value is very little. There is sometimes a good deal of difficulty in inducing the rating authorities to make due allowance for the expenses on woods, and I have recently been engaged in a case where a mixed class of woods had for years been rated at 16*s*. per acre. I offered to pay at the rate of 6*s*. 6*d*., but the Board appointed a surveyor, and he has valued them at 8*s*. per acre, which is, nevertheless, much more than their actual value.

Tithes should also be rated at what they are worth to let. From their existing annual value should be deducted the amount paid yearly on the tithe for poor rate, and for Income Tax, Schedule B; for the cost of collection incurred or estimated;

and for average losses and legal expenses, as all these would have to be borne by a tenant who rented the tithes; and there are further deductions allowed for ecclesiastical dues to reduce the gross amount to the net rateable value.

I now come to the question of appeal against the poor rate. It should be understood that a ratepayer can not only appeal against his own assessment if he thinks it too high, but he can appeal against that of any other person's if he believes the same to be too low. This is perfectly just, because, if A, on a low assessment, pays less than his share, B, who pays on a proper assessment, has to pay an increase in the pound to make up the deficiency. If a man is under-assessed, and pays less than his share to the common fund, to the injustice of his neighbours, I certainly see no reason why those who are paying the deficiency should not appeal, as the law allows them, for the inequality to be remedied.

In making an appeal, notice in writing should be given to the overseers, and to the clerk to the Assessment Committee, stating the grounds on which it is made; but the required relief is sometimes difficult to obtain. It often happens that appellants are at a great disadvantage, from the want of knowledge to present their cases properly; but every ratepayer ought to know that he can now employ any competent person to represent him, as his agent, to conduct his case for him. This privilege has often been refused, but by a recent decision in the High Court, it can no longer be denied to any ratepayer. It is seldom that an Assessment Committee refuses to accord justice when a case is intelligibly presented; but I have met with one gross abuse of authority, where a leading section of Guardians, representing the interests of house-property owners in a small town, forming part of a union with agricultural parishes, would not make reductions on farm assessments which were notoriously too high. The reason was evident, and the evil went on for years, until one of the guardians in the Union begged me to seek election and take his place on the Board, and I succeeded in obtaining a sweeping remedy for the agriculturists. This particular guardian's own case was the worst, and I obtained a reduction of his assessment from 370*l.* to 240*l.* As the rates were about 4*s.* 6*d.* in the pound, he saved nearly 30*l.* a year; but the case of this Union is quite an exceptional one, so far as my experience goes.

It is sometimes argued that if all the farms in a parish are assessed alike too high, no injustice to individuals arises, because, if a reduction was made all round, a higher rate would be necessary to raise the money required from the parish. This is a very

plausible argument, but a very erroneous one, because only a small proportion of the money raised in a parish is required to meet the actual parochial charges. The greater share, perhaps ninepence out of every shilling, goes into the common fund of the Union to meet common charges, and therefore, the higher the total assessment of a parish is, the more it contributes to the general fund for the common charges; and if it is really too high it pays more than its fair share.

I do not believe in having agricultural parishes valued for assessment purposes, as it is costly, and leads to numbers of troublesome appeals. Rents are generally easily ascertained, and if they are fair ones, they form a better basis for poor-rate purposes than any valuation. It is scarcely necessary to refer to the procedure for appeal to Quarter Sessions, as when matters reach this stage legal assistance is almost absolutely necessary.

Land tax, when properly assessed, should be collected on an equal pound rate for all properties unredeemed, and the amounts are generally taken from the gross poor-rate column. It is important therefore for landlords to see that their tenants are not assessed too high for the poor rate.

Assessment to the Income Tax.—Soon after April 5 this year, every occupier of land will receive a form of return from the revenue authorities to fill up for the assessment under Schedules A and B. These returns are usually made once in three years, but it is five years since the last returns were required. Thus a good opportunity is now offered of remedying any discrepancies by making a careful return with a view of escaping the trouble of an appeal. Later on in the year every occupier will receive a notice stating the amount the property is assessed at, under both schedules, and notifying also a day on which he can appeal if he is aggrieved; and should he let this pass he will have to pay on the assessment whether it is correct or not, and defer his appeal until the next year. A careful perusal of the form is therefore necessary, and although the information given on it for his guidance is rather meagre, no confusion or mistakes need arise in the assessment if the return is properly filled in, either for the landlord's tax, Schedule A, or for Schedule B; and it should be borne in mind that, if a tenant pays too much under Schedule A, his landlord is not bound to allow him more than the proper amount.

Where premises are let to a tenant, the value to Schedule A is understood to be the yearly rent of the same (less the tithe and land tax, if any); but this rent must be a full rent, each party bearing his own lawful burdens in respect of rates and taxes and other expenses. Where premises are in the occupa-

tion of the owner, the revenue authorities usually refer to the poor rate for the value. There is, however, a further deduction allowed in both cases in respect of any public drainage rate, and for sea walls.

The income of an occupier under Schedule B is reckoned for tax purposes at one-half his rent (less one-eighth); and if half the rent is under 150*l.*, and he has no other source of income, he is totally exempt from the tax, because all incomes are exempt which are under 150*l.* But if half the rent amounts to any sum between 150*l.* and 400*l.*, an abatement of 120*l.* can be deducted, and payment made on the balance. An abatement is allowed also, on *all* incomes, for the amount of annual insurance premiums paid on the life of any person assessed to the tax, or that of his wife. These two abatements must be claimed in the respective places set out for the purpose, on the form of return for the tax; but it is important to know that, if the tax-payer has omitted to claim these abatements, he can do so at any time within three years. This is too often lost sight of.

Occupiers of land, who have no other source of income, can therefore easily ascertain what their assessments ought to be; but it must be borne in mind that before a person can claim exemption from the tax because his income is under 150*l.*, he must show that neither he nor his wife has any other source of income which, if added to half his rent, would exceed that sum. For instance, if half the rent which an occupier paid amounted to 100*l.*, and either he or his wife had an income from trade, rents of property, or money invested, amounting to 60*l.*, he would not be exempt. He would be assessed under the various schedules at 160*l.*, but he could claim the abatement of 120*l.*, and pay on 40*l.* The same principle applies where similar combined profits bring an income up to 400*l.* or over, and prevents the abatement being claimed.

These are the general rules applicable to farm assessments, and for ascertaining the two kinds of abatement which can be claimed at the time the assessment is made. There are, however, sources of relief to which farmers are entitled when profits fall short of the amount at which they have been assessed. These cannot usually be ascertained and claimed until the tax has been paid.

One of these operates as follows:—If a landlord makes an abatement of rent on account of agricultural depression, he can claim repayment of the ownership tax, on the amount of rent remitted. In the same way the tenant, if he has paid the tax, can claim repayment of the tax on half the amount of the abatement; and if the abatement allowed him brings half his rent to

less than 150*l.*, he can claim repayment of the whole of the tax he has paid, as the income is then low enough to become totally exempt from taxation.

In the same way it is possible that incomes which have amounted to 400*l.* and over may be brought below that sum, so that the abatement of 120*l.* can be claimed, and repayment of the tax on it will follow (which at sixpence in the pound is 3*l.*), in addition to that on half the amount of rent remitted.

Another means of relief allows an occupier of land, who finds that at the end of the year of assessment his profits have fallen short of the amount at which he was assessed, to appeal to the Commissioners for an abatement and repayment of the tax overpaid. And if this abatement is allowed, and operates in the way I have shown, by bringing the income to less than 150*l.*, or under 400*l.*, total exemption, or the right to the abatement of 120*l.*, as the case may be, will follow in the same way. The Income Tax Acts have allowed this system of relief, but it has been so little availed of as to be practically unknown, and possibly this is the reason why a section of the Act of 1890 provides for the same thing, as though it had not hitherto existed.

A further system of relief was introduced a year or two ago, which induced some occupiers, no doubt, to think that a fresh concession was being made of considerable service when profits fell short. This was the privilege given to occupiers to estimate their profits and return them under Schedule D if they preferred it, instead of paying one-half their rent. But this concession was scarcely needed, as they had already got the power under Schedule B, as previously remarked, of appealing when profits fell short of assessment, and it is very unaccountable that it has been so little known and availed of. It is as follows:[1] If at the end of any year of assessment any occupier of land, occupying the same for purposes of husbandry only, who has been assessed in that year under Schedule B in respect of such land, finds and satisfies the Commissioners that his profits from the occupation during the said year fell short of the sum upon which the assessment was made, the Commissioners may cause an abatement to be made from the amount of the assessment; and if the applicant satisfies the Commissioners that his income from every source is under 150*l.*, he is entitled to total exemption. Owners who are occupiers can also obtain this relief; and in a case in which I was concerned a year or two since for an owner, the whole amount paid under Schedule B was remitted.

[1] The several Acts of Parliament which relate to this source of relief are 14 & 15 Vic. c. 12, 16 & 17 Vic. c. 34, 43 & 44 Vic. c. 20.

A similar remission under Schedule A would have followed if no sum towards rent had been earned. Notice of the claim should be sent to the Surveyor of Taxes for the district.

It only remains to refer to the method of making the claims for repayment of the tax. If a person finds that he has omitted to claim the abatement of tax on the 120*l.* allowed to be deducted on incomes under 400*l.*, he should write to the "Chief Examiner of Claims, Somerset House, London," for the necessary forms, No. 40a, one for each year in which it occurs; but the claim must be made within three years of the end of the year of assessment to which the claim relates. These at 6*d.* in the pound make the sum of 9*l.* repayable, and I have assisted a number of farmers to obtain such repayments who had for many years been paying the excess. Where tax has been paid, and it is afterwards found that the income has been totally exempt, being under 150*l.*, the same rules for repayment exist. The whole of the tax paid is then to be claimed and forms No. 40 should be applied for. In the case of the other forms of relief referred to, application should be made to the Surveyor of Taxes for the district in which the claimant resides, who will instruct applicants as to what is required.

I had almost forgotten to refer to partnerships in farming concerns. Any farmer can claim back the tax on his share of profits to which he has been assessed in any joint concern if his income from every source is under 150*l.*, and I have explained how farming incomes are estimated. If his share is over 150*l.*, but under 400*l.*, he can claim repayment on the abatement of 120*l.*, presuming, of course, that his total income is within that limit.

As the Poor Law and Income Tax Acts are very numerous, it will be understood that the information here given on the question of assessments is necessarily brief, and is more particularly directed to lands in the occupation of tenants, as the latter require more assistance than their landlords, who are better able, through their agents or otherwise, to take care of their own interests.

A. Dudley Clarke.

FIELD GATES.

I.

It requires only a limited knowledge of the economics of property in agricultural land to be aware of the importance of field gates. There is not only a considerable capital sunk, which requires a yearly outlay to make it serve well its short life, but it is not long before it has to be replaced. There is the convenience or inconvenience, the pleasure or something akin to disgrace, of having good or bad gates in good or bad repair.

The capital involved varies much on different estates and in different counties. It approaches 10*s.* per acre for small enclosures, as in Devonshire and other districts with rich pastures; while, on the downs of the Southern Counties, and the moors and fells of the North, it is very small.

The readiness with which good field gates, like good fences, proclaim the social condition of an estate or farm is such that there are few of the owners who are indifferent to the character thus stamped on them who have not had to harden themselves into this indifference. Good estate management and good farming are rarely associated with bad gates or bad fences. Huntingmen are proud of good gates, and he who would be an enemy of strong language, or who would insure himself against the questionable epithets of the horseman trying in vain to open the gate, would do well to see to his gates when harvest is finished.

It is proposed to treat of the construction of timber field gates and the materials to be used in making them, of gateposts and methods of fixing them, and of the action of soils on timber posts. Reference is also made to the hanging and fastening of gates, and to iron gates.

Local conditions greatly determine the materials to be used, and there may be good reason for using indifferent materials; but it is not worth discussing whether there is less excuse for using indifferent materials than for bad construction and workmanship. Thoughtful construction will greatly assist inferior materials, and the best materials will not redeem ignorance or carelessness. Not seldom a rude gate, perhaps of split ash poles, is seen to keep its form, move freely, and last long, while an apparently well-made gate, with good parts, falls rapidly into dilapidation. To reason from such a case that no great art or care is needed is the same as to argue that care is not required to guard the well-being of the body because the strength of the strong sometimes fails, while the weak hold on in their weakness.

Every estate should have its pattern of field gate—something distinctive which tells the ownership. This is not said in order to excuse a bad pattern, but to urge that care be taken to adopt what is good and then to adhere to it.

Assistance will always be got from examining the field gates belonging to railway companies. The compensation which may have to be paid for an insecure gate demands that along railway lines the best only shall be in use. Railway gates are designed by engineers, and made by artisans from selected materials.

A gate is a rectangular frame consisting of "heel" and "head," and top and bottom rails. These must be made immovable by introducing struts, or braces and ties. The other parts are only "filling in" to make the gate a part of the fence, or for appearance. If the heel and top rail are mortised together, and the heel is hinged to a post, we have the essentials of a gate. The top rail is a lever, and, if loaded, it causes a cross strain on the

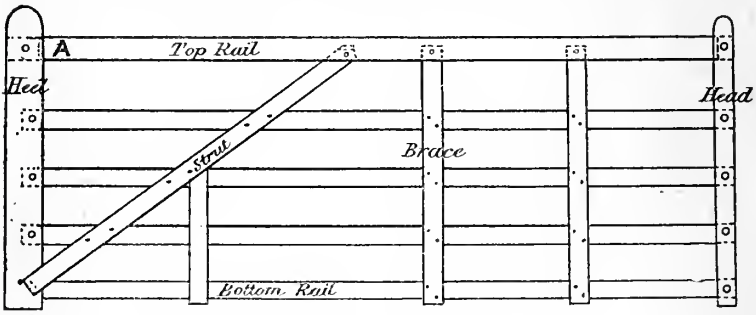

FIG. 1.—Warwickshire Gate.

rail, as at A, in fig. 1. The formula is that the top rail, being a lever of the first order, if 10 ft. long, and the heel 5 in. broad, the strain from the load will be a force twenty-four times that load together with the force exerted by the lever itself. By introducing the strut a triangle is made, and the effect is changed, for the load produces compression in the strut and tension in the top rail. The effect of the tension is, practically, to tear the tenon and mortise apart, and in a gate this must be met by the tail of the top hinge crossing the joint and passing along the rail, all being held together by the bolts, or by some other expedient. The compression in the line of the strut makes the bottom hinge a mere abutment on the post. So long as the triangle is held immovable at the angles the length of the strut is immaterial, but in practice it is not wise to make the strut extend from heel to head.

The illustration in fig. 1 is that of a Warwickshire gate,

which, with modifications, may be seen anywhere. The heel is 4 in. by 6 in., the head $2\frac{1}{2}$ in. by 3 in., the top rail 3 in. by 4 in. at the heel, tapering to $2\frac{1}{2}$ in. by 3 in. at the head. The rails are $1\frac{1}{4}$ in. by 4 in. at the heel, tapering to 1 in. by 3 in.; the braces 1 in. by 3 in. The point most open to objection is where the bottom of the strut is checked into the side of the mortise of the bottom rail, the heel being 4 in. thick and the rail $1\frac{1}{4}$ in. Even if the strut be notched in its full thickness, there may still be $\frac{5}{8}$ in. between the notch and mortise. In practice, it is better to notch the heel, say $\frac{5}{8}$ in., and the end of the strut $\frac{3}{8}$ in. This is an expensive gate, costing in planed oak 18*s*.

Fig. 2 is a common form of gate in Gloucestershire. It requires a wide plank from which to cut this heel. The enlargement on the heel is to provide a rest for the top rail where the greatest strain is, but, to be of use, the top rail must fit close to it. I have seen many carelessly fitted, and one where they were $\frac{1}{4}$ in. apart.

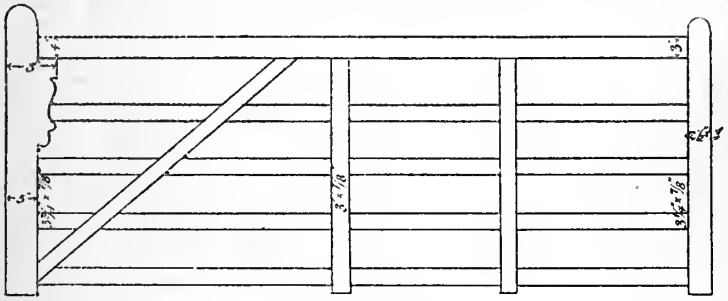

Fig. 2.—Gloucestershire Gate.

I have seen the top rail of this gate, which tapers from 4 in. to 3 in., so mortised into the heel as to throw up the point, the evident intention being to give it the character of a spring suspender of the head. No good is got from forcing the rails into a curve, and it gave this gate the appearance of drooping from the centre of the top rail to the head. The additional timber required for the projection on the heel would be of more use to increase the cross section of the top rail. This gate is about the same cost as that illustrated in fig. 1.

Fig. 3 shows a strong design. It requires more length of struts or diagonals, but this gives it great lateral rigidity, which is of much importance, as so many gates are allowed to drag on the ground from the gate dropping, or from the rise of the ground about it. The weakness of this gate is the number of lapping joints, where moisture is apt to lodge, causing, especially in ash, wet rot at the laps. The final break-up of such a gate is

in the line of a diagonal. All such joints are greatly protected if the parts crossing are well coated with white lead or tar when they are being clenched together. If the timbers are creosoted the evil effects from retaining moisture are greatly modified. The rigidity given to the bottom and top rails will admit of the use of a thin top rail for gates opening into or between tillage fields, or where the grazing is not by heavy cattle. Where horses are grazed, a strong oak rail is desirable, unless that doubtful expedient, now somewhat common, is resorted to, of stretching a line of barb-wire a little above the top rail. This design will do for a gate 11 ft. wide; a gate wider than that should be in two divisions.

The size of field gates varies from $8\frac{1}{2}$ ft. to $10\frac{1}{2}$ ft. in length, and from 3 ft. 4 in. to 3 ft. 9 in. in height. Carters do as little damage in narrow gateways as in wide ones, though in saying this it is not implied that the damage is trifling in either. Modern implements require wide openings, and several inches may be

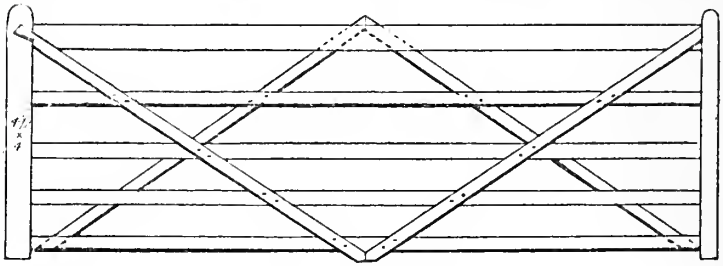

Fig. 3.—Oxfordshire Gate.

gained or lost by the gate-hinges used. Every inch over $9\frac{1}{2}$ ft. wide should be grudged. Gates between arable fields will suffice if 3 ft. 4 in. high. A few more top rails may be broken during the hunting season than on gates 3 ft. 9 in. high. The latter height is required when horses and bullocks are grazed.

There are positions where a light and smart appearance is desirable in a gate. The gate shown in fig. 4 should have an ordinary top rail with cap-piece, the bottom rail $2\frac{1}{2}$ in. by 3 in., and the intermediate rails 2 in. by 2 in. The lateral strength of these last is increased if they are tenoned angle-ways into the head and heel. The ties and struts are iron, $\frac{1}{4}$ in. by $1\frac{1}{4}$ in., but the struts will be better if $\frac{3}{8}$ in. thick. The iron should be neatly checked into the head and heel and top and bottom rail, bedded there in white lead, and fixed by bolts or rivets. The white lead helps to exclude moisture, and, in the case of oak, prevents corrosion in the iron. Stout screw-nails may be used to fix the iron to the intermediate rails; small

riveted bolts are better, as the vibration is, in time, apt to throw out screws.

Iron is associated with timber in different ways, and with pleasing variety of detail, in the designs for gates. But this is rather for ornamental gates, which do not come within the scope of this article.

It is a sound principle in the construction of a gate to make the rails taper from heel to head; strength is required for the leverage strain at the heel, and at the point of the lever the least weight commensurate with the necessary strength. Thick top and bottom rails must be shouldered at the tenons, but the less shouldering the better, and, if the thickness of the head and heel over that of these rails will allow it, the shoulders should be let in there $\frac{3}{8}$ in., as shown by dotted lines on fig. 1. The mortises for the intermediate rails should receive these their full

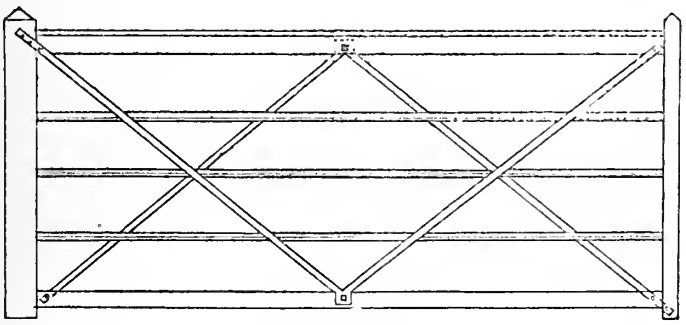

FIG. 4.—A Light Gate.

thickness. All mortises should have square ends, and not round, from the boring iron. Tenons are more easily moved in the latter. In the heel only the mortice for the top rail should go through it. All should be done that is practicable to exclude moisture at joints and laps, and notching at the laps should be avoided. Where the tail of the hinge crosses a joint, any difference in thickness there should be met, not by checking the heel to reduce its thickness, nor by fixing thin pieces on the rail, but by kneeing the ironwork, which can be slipped into place over the end.

The heel should not be less than 3 in. thick, and that thickness requires a breadth of 6 in., a cross section of 18 in. When a series of mortises, say $\frac{5}{8}$ in. wide, has to be made in timber 3 in. thick, its strength is much reduced; $3\frac{1}{2}$ in. by $5\frac{1}{8}$ in. is a better size—a cross section practically the same as 3 in. by 6 in. The heel of the gate in fig. 3 is usually 4 in. by

$4\frac{1}{2}$ in. If the rails are larch or deal this thickness will allow a mortise $1\frac{1}{4}$ in. wide. The head should be $2\frac{1}{2}$ in. by 3 in., or 3 in. by 3 in.; if the former, its broader side is given to strengthen the sides of the mortises. It will also resist the jar of the gate, which tends to split the head. Iron rivets through the ends of the head are useful to guard against this splitting. The size of the top rail need not be the same on a gate for a tillage field as for a meadow; $4\frac{1}{2}$ in. by 3 in., tapering to $2\frac{1}{4}$ in. by $3\frac{1}{2}$ in., is a good rail in oak or larch. The other rails, if oak, should be $\frac{7}{8}$ in. by $3\frac{1}{2}$ in., or $\frac{3}{4}$ in. by $3\frac{1}{4}$ in.; if larch or deal, at least $\frac{1}{4}$ in. more each way; diagonals and braces should be the same size as the intermediate rails.

Some gate-makers use riveted bolts to clench the parts together. It needs some care to form the rivet well, and repair is difficult. Not many years ago gate nails were a speciality. The "Steel rose nail" (fig. 5) is as good as can be desired, and ought to be in general use. This nail costs, say, 10*s.* 6*d.* per cwt., and can be bent, as in fig. 6, without breaking, and be riveted to perfection, whilst the head never flies off when driven home in the hardest timber.

Fig. 5.—Steel Rose Nail.

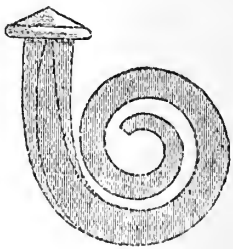

Fig. 6.—Bent Steel Nail.

Whether gate timbers should be planed and painted, or rough from the saw, is a matter of taste and of first cost. Planed timber holds moisture less. Where the dual interest exists (the landlord supplying timber, either "in the rough" or sawn, and the tenant doing the labour), or where the painting cannot be periodically renewed, these had better not be attempted. About the park and home-farm, and the home-covers, where the gates are wholly maintained by the proprietor, and frequently meet his eye, the gates should be substantial and painted. More care is taken of such gates. Such accessories of an estate have a moral influence. It may be affirmed that the gate which is carefully made of the best timber, and is kept painted, is the economical gate. But first cost, and having a staff of workmen, and a stock of seasoned timber, to do this branch of estate work

as it should be done, are considerations which render such work more and more difficult in view of the diminishing income derivable from agricultural land.

It is of vital importance to use seasoned timber. To paint unseasoned timber, especially oak, is to induce decay; good oak and larch—not any larch, but good larch—stand well without paint. If Baltic red deal has to be purchased, it is a good investment to creosote it. Mere steeping the timber in the liquid at the estate yard is of small use. The operation should be done at the timber-yard where the timber is purchased, and where it is cut to its proper sizes (no estate saw-mill ought to be used to cut imported timber). Creosote has now been in use for forty years with growing acceptance and fast-extending application. Too little of it is yet seen on estates. It has a field before it in meeting the possible requirements of the "Small Holdings Act."

In the process of creosoting, the timber is placed in an air-tight cylinder and is first acted upon by an exhaust pump, causing a vacuum which, to a very considerable extent, withdraws the sap, and otherwise prepares the fibres of the wood to receive the creosote, which is then run into the cylinder, and a pressure of about 140 lb. to the square inch is exerted. This forces the creosote into the pores, and through the timber, at the rate of from 35 to 50 gallons for 50 cubic ft. of timber, some specifications being as high as 1 gallon to a cubic foot. Creosote is distilled coal-tar.

Little is gained by creosoting oak. Its fibre is unsuitable, as is that of pitch pine, and even Baltic white wood is not very suitable.

Oak is the best timber for gate-making; ash is good, especially for rails, but when clean enough for gates it usually commands too high a price for such use. Matured larch from a heavy soil ranks next to oak in tenacity of fibre and wear. Young larch and Scotch fir, as usually found in England, and spruce, poplar, and lime, are not worth the cost of labour. Pitch pine is extensively used. It is short in the grain, and liable to snap from a kick or strain. It is a timber best used in an exposed dry situation and under cover. If Baltic red wood is used, it should be of the best quality and clean.

There are gates of cleft oak which challenge the life of any made from sawn timber. Only good oak of straight fibre is selected to be cleft. Cleaving leaves the fibre less open to atmospheric attack than sawing does. The writer has records of gates of sawn oak being in use sixty years, and he has an authenticated record of gates of cleft oak lasting fifty years.

They were the property of a master of hounds in Shropshire, who managed to get his tenants to overhaul their gates twice in the year and clear away all rubbish and vegetation about the ground-line. The writer has further the record from Kincardineshire of a larch gate being in use at the same place for forty-five years, and then given over to a new tenant. He has a piece of larch rail perfectly sound after forty years' use, and a piece of a birch rail from the Gallery estate, Forfarshire, which is authenticated by the present Laird to have been cut in 1816, and in constant use since. It is covered with lichen, but is hard and sound; at the same place there are flakes or hurdles in use made of birch forty-one years ago. The preparation was this. The trees were peeled when felled and put aside for a season, cut the next year, and the rails were carefully stacked to complete the seasoning and to prevent warping. What a plea is here for the knowledge and exercise of care in the management of home timber! Rails of split ash and black willow are useful to refill half-worn heads and heels.

Gate Posts.

If oak is the best timber for gates, and larch the next best, the same order holds good for gate posts. Fortunate are those districts where ribs can be torn from the everlasting hills and set up for gate posts. These may be seen in Derbyshire of millstone grit, shaped and set to perfection, and at no great cost—not much more than that of an average oak post. Other counties have suitable freestone, and North Wales has its slate rocks, less shapely but costing little beyond the labour of a short transport and setting. A stone post, if set in cement, will do with 6 inches of ground hold.

If seasoned heart-oak is used, it matters little whether it is hedgerow or plantation timber. The abundance of one and the ready sale of the other determine which it should be. Sapwood of oak decays quickly, and besides the disfigurement above ground, the post becomes loose, and dilapidation to the gate is facilitated. If an oak gate post is painted with the natural sap in it, the sap induces a fungoid growth which will wreck a full-sized post in ten years. If the same post had been four years cut before use, it might have lasted for fifty years.

Matured larch, peeled only, will last longer than if squared by the saw. The best preparation for larch posts is to retain the bark, keeping the trees their full length. Raise them well off the ground, protect the ends from the sun, and leave them for two years. Then remove the bark and cross cut

into lengths; the fewer ends while seasoning the less is the end-splitting, and the retention of the bark preserves the timber from side cracking, whilst the smooth hard surface carries off moisture. Before it is fixed it is well to clear off the ring of sapwood from the part to be underground; if the tree is what it should be, this will be very thin. Such a post has a life little short of one of good oak. A sawn post will not last so long. There is always a good deal of cross-grain and end-wood which is more open to hurtful atmospheric influences; this is modified by planing. A post cut from a quartered tree or log will last much longer than one with the heart in it. Quartered larch is too rare to be spoken of as being in use.

Oak, when seasoned, is greatly benefited by being painted, and so is larch; and painting is all but a necessity for Baltic redwood unless it is creosoted, in which case its life is doubled or trebled and made all but equal to that of oak. Oak sawn into posts will cost 2*s*. 9*d*. per cubic foot; creosoted Baltic redwood will cost, say, 1*s*. 9*d*. per cubic foot; Swedish timber can be had 8 to 12 inches on the side, and can be purchased at 1*s*. 2*d*. per cubic foot, whilst 5*d*. per cubic foot will creosote it. It takes creosote well, and will last a long time. The hooks have not the hold in it as in oak, but this can be met by their going through the post, and having a screwed nut at the end.

The general purpose of field gates is so utilitarian that it cannot be amiss to point out that creosoted Norway spars, such as are used for the larger telegraph poles, will prove cheap and useful gate posts. This may be safely argued from the condition of telegraph poles. The experience of a Government engineer in this department is that he has "never seen a pole rotten in the ground. He has *heard* of one or two being found rotten, but in these cases the timber bore evident signs of having been rotten before it was creosoted." "The average life of posts in the ground is practically everlasting. Out of the ground it takes something like twenty-five years for the creosote to dry out of the timber, then the ordinary disintegrating action of dry rot begins. This would be entiredy obviated by a coating of gas tar or creosote before the poles had begun to rot."

John Ridd stripped the lead from the church porch to make pellets for his Armada gun, and Mr. Irwine's first question to his excited parish clerk when he came to Broxton Rectory was: "Have the theaves been at the church lead again?" Our altered social conditions secure the church lead from such attacks, and a recent enactment does much to prevent illicit traffic in such materials. But if an old practice was revived, of protecting the tops of gate posts by a covering of sheet lead,

the spirit of mischief is still strong enough to make the attempt a foregone failure. Nor is sheet iron or tin plate much more safe, and these are less suitable. Every post should be so shaped on the top as to prevent water lodging. Tar or paint will greatly protect this vulnerable part. The condition of the tops of posts where no precaution is taken best proves the need of protection.

Charring and tarring the part of the post to be set in the ground, especially at the ground-line and a foot above it, has a most beneficial effect.

There is not a great variety of methods for fixing gate posts. Some soils possess that medium consistency as to moisture and grit that a labourer, who is careful to return the soil in thin layers and is not afraid of a bit of hard work in ramming it round the post, can give it the firmness which is necessary. This is the most desirable method. Damp clay and loam, the more they are rammed the softer they become, and they are incapable of setting firmly, so that dry materials must be brought to mix with them—the drier the better, as the after damping will cause expansion and increase the firmness. On the Cotswold Hills and in Oxfordshire, where firm flat stones are procurable, a common practice is to use such stones as wedges. The hole is dug with two flat upright sides, and the post is set against these, any irregularity of "fit" being assisted by a suitable stone, to give solid backing. For the opposite sides the hole is made slightly wider at the top, and to give 6 or 8 inches of clear space. Suitable stones are set edgeways, and rammed firmly down between the post and the soil. The soil is then returned as best the workman may and can do. This is often a successful method, but a stone may snap just as the ramming ceases, or afterwards, from a sudden change in the weather, or on the first "bang" of the gate, and the fixing is lost; for, if a movement commences, all must go. Telegraph engineers use creosoted timber blocks as wedges to meet side strains on their poles. Certainly, timber blocks will not snap, nor be easily affected by accident.

Another method is to dig out the ground the full distance between the posts and as deep as the pits. A strong piece of oak is driven down wedging the posts apart at the bottom. Let it be supposed they are firmly backed. The soil is returned, and a second piece of oak is wedged between the posts, a little below the surface level. This is an effective fixing, but expensive.

Much of this work has to be done by unskilled labour and under slight supervision, hence a strong reason for adopting any

method, not too expensive, that is least dependent on energy and care. If the hanging post (that to which the gate is hinged) is not practically immovable, the gate cannot be well hinged. Such a method is concreting, either with ground lias lime or Portland cement, mixed with sharp sand and clean broken bricks or stones. The preference should be given to a mixture consisting of one part of Portland cement, one of sand, and six or seven of stones. This concrete, rammed round the post to a thickness of from 5 to 7 inches or more—the shorter the ground-hold the thicker the mass of concrete must be—and grouted with a finer concrete on the top, will hold a post as in a vice. The expense will be partly met in the saving of labour of digging deep holes and in the length of the post, which need not be more than 27 inches into the ground. There is one risk. If an unseasoned post is used, shrinkage will leave an inlet for water between the concrete and post, which, being held, will cause wet rot. This can be obviated by placing a layer of broken stones at the bottom of the hole to act as drainage for such moisture. A similar fixing may be got by filling up round the post with rough masonry and running in liquid cement. A proper section for sawn gate posts is: for the "hanging" post, 8 in. by 9 in.; and for the "folding' post, 7 in. by 8 in. The length in the ground must be such as the nature of the ground and method for fixing require.

The writer has made many inquiries in widely separated districts as to the action of soils on timber. The diversity of information supplied points to chemical analysis as being the only path to definite conclusions. On the whole, the evidence is in favour of a retentive clay as the soil which best preserves timber.

Blue clay is reported by one observer to preserve all timber touching it; but yellow clay, on the same estate, to cause decay. One estate agent finds his gate posts last longer in chalk than in clay. Another finds them last longer, and come up at the end more sound, in lias clay than in "Brash" (oolite). Another tells of a deep gravel bed in which oak posts soon decay, but in deep loam, where the water will stand 12 inches deep in the hole made for the post, the timber below this water-line never decays, and decays much more slowly at the ground-line than on the gravel. A squad of railway men, putting up a wire fence with creosoted posts, were recently asked their observations. All were at one that timber lasted much longer in their Oxford clay than in their gravel; that though the difference of decay in the ground was not very noticeable, it was much more rapid at the ground-line on gravel. A report from Perthshire is that

posts "on a gravelly cutting had never been touched since they were put up, thirty years ago, at which time they were charred and well tarred while hot." A telegraph engineer already quoted writes: "I am bound to confess that we have found little or no difference in the action of the soils on the poles. As a matter of fact, the soil gets no chance of acting on the poles. The action of the sun on the poles causes the creosote to gradually trickle down and form a protecting layer just at the wind and water line. Of course, it also penetrates the ground and impregnates it for several inches round the pole." "I have sometimes had a suspicion that in loose sandy soil the poles were not quite so sound as in stiffer soils, in consequence of the rains washing the creosote away from the poles, traces of it having been found in wells some distance away."

What has been said on fixing gate posts states nearly all that can be done to give the soil "no chance to act (injuriously) on the timber," and to protect it at that vulnerable part—the ground-line, viz., to creosote suitable timber, or fix posts in concrete, or to char and tar above and below the ground-line. Charring is the earliest known application, known in remote ages and to many races. Last, and most important, is to use, as far as is possible, sound heartwood well seasoned, and this whether otherwise treated or not. All sapwood should be removed. A small piece of heartwood is better than a larger section made up of sapwood; the latter soon rots, and the post stands in a loose socket. Much may be learned from the management of telegraph posts, where the practice is, at stated intervals, to remove the soil for examination. If there is decay from sapwood, the decayed parts are removed, and when creosoting has not been done, re-charring and re-tarring are resorted to. The soil is replaced, and the pole has a new lease of life. This is laborious and expensive work, very trying on an estate with perhaps dual interest and the lack of division of labour. Where, however, it can be done it will repay the outlay.

The Hanging and Fastening of Gates.

As a rule, gates should open into the fields, especially in pastures. Some animals are clever at opening gates, and their operations are greatly assisted if, when they have sprung the fastener, they can push the gate from them. It is, however, sometimes fortunate when the rule is not enforced; for, when the ground rises sharply into the field, it requires the point of the gate to be unduly raised to clear this rise, and too much "bang" is given in closing, or the bottom rail has to be kept

too high from the ground, allowing stock to work under it. This is perhaps a lesser evil for the gate than when it drags on the ground, for if stock is found working under a gate the defect will be attended to; but it may drag a long time, and rank vegetation may grow high up on the timbers before anyone sees that something is wrong.

Unless the gate is intended to swing both ways, it should not be hung between the posts, but against them. This makes a difference of 4 or 6 inches in width of way, and when open there is less liability to injury from anything passing through. Besides, the gate falls against the "folding" post, and not upon any extemporised check, which is clumsy, and can only be temporary. The hanging post should be set perpendicularly. Workmen are prone to give it an inclination to assist the work of the hinges in throwing up the point of the gate and making it self-closing. The "hooks" and "bands" ought to be the same for

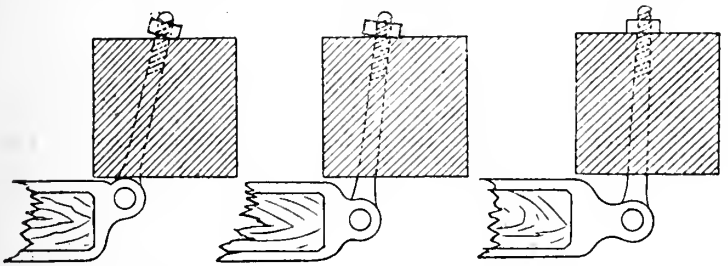

FIG. 7.
Top Hook and Band.

FIG. 8.
Bottom Hooks and Bands.

FIG. 9.

all gates opening one way, to secure a uniform motion, and there ought to be the least projection of hook from the post and of band from the heel, which gives the gate free action to open at right angles to the gateway if that is all that is necessary, or to turn over and fall against the fence, and in line with the gateway. Any superfluous length of the iron is weakness. Additional length must be given to the lower hook if the gate has to rise at the point, and if it is to be self-closing.

The first sketch (fig. 7) shows the least possible projection of the top hook, the centre of the hook being, say, an inch out from the face of the post. The second sketch (fig. 8) shows the lower hook, say, $2\frac{1}{4}$ inches out from the face of the post. When a gate so hung is opened till it is at right angles with the line of the posts, the heel of the gate is thrown off the perpendicular and forward a full $1\frac{1}{4}$ inch at the bottom, and this will raise a gate 10 feet wide nearly 6 inches at the point. But if opened till it is at right angles to the line of the posts, it

will remain stationary, and will only move gently towards the folding post when brought to, say, the angle of 45°. If the bottom hook be fixed further in on the post (fig. 9), and the additional projection from the post is continued, a double action is given. The point of the gate is raised, and the side of the gate, when brought at right angles to the line of the posts, being off the perpendicular also, it will be self-closing. The first impetus is given by the second alteration in the position of the bottom hook, and it is maintained by the first. It is only the minimum closing force, however, which should be given.

The kinds of hinges used for hanging gates are so various, it is unnecessary to treat of them at any length. The best is the double-tailed band (fig. 10) clasping the heel and top rail, and

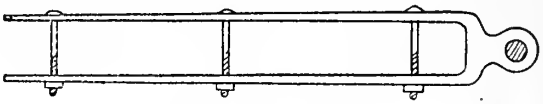

FIG. 10.—Double-tailed Band.

binding them together. The top hook should go through the post and have a screw and nut at the end. It has the weight to bear, and this gives facility for slight adjustment in the hinging.

The bottom hinge is only an abutment on the post, and may be much simpler. If made as in fig. 11, and the hanging post has moved, and the gate dropped at the point, so that the fastening is troublesome or ceases to act, the back and front nuts on the tail of this bottom hinge can be used to adjust it.

When the heel of the gate is 4 in. by $4\frac{1}{2}$ in., and the diagonal tie binds heel and top rail together (as in fig. 3), something much simpler than the double-tailed band may be used for the top hinge (as in fig. 12). As the only use of the screw is that it may

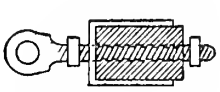

FIG. 11.—Bottom Hinge.

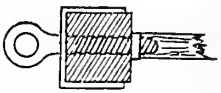

FIG. 12.—Top Hinge.

be tightened to elevate the point of the gate, when this is done it keeps the neck of the hinge—which should taper slightly—tight in the iron plate. The bottom hinge is similar, but, as a thoughtless workman might slacken the nut of the screw there, to do the same work as is done by tightening the top one, and as the back nut is not in use, it is better to make it a fixture. If the post has yielded beyond the power of the screw on the

top hinge to elevate the point of the gate, it is time to arrange for refixing the post.

The fastening of gates is of great importance for the security of grazing stock, and to meet the requirements of a hunting country, as well as the hopeless indifference of the many who have not that distinctive mark of good manners—to close a gate which they have opened. Gates must not only be self-closing, they must be self-fastening also. Perhaps the most common fastening is the long vertical spring lever, striking on the bevelled plane of the catch and springing into its notch. The wonder is that it is so common, for it is as often out of working order as it is in order. A fastener, much less liable to go wrong, is, instead of a spring on the lever, made by forming the lower end to work within a mortise on a pin (well fitted) passing through it and the gate head (fig. 13). The weight of the head keeps it against the keeper or in the catch. It is useful to have the top of the lever slightly above the gate post. It is then readily seen and reached by a person on horseback. An old cow which opens this fastener will open a spring one.

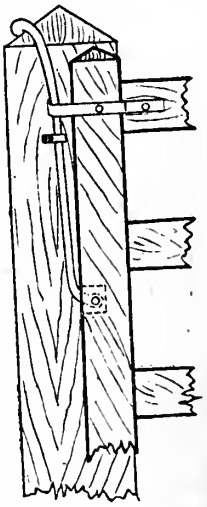

FIG. 13.—Gate Fastener.

The next very simple fastener (fig. 14) comes from Buckinghamshire, and may be new to some readers. It will please all equestrians, for whose benefit it is designed. The crook over the top rail is raised by the hand or hunting-crop. The crank action pulls the oak bar horizontally along the slots in

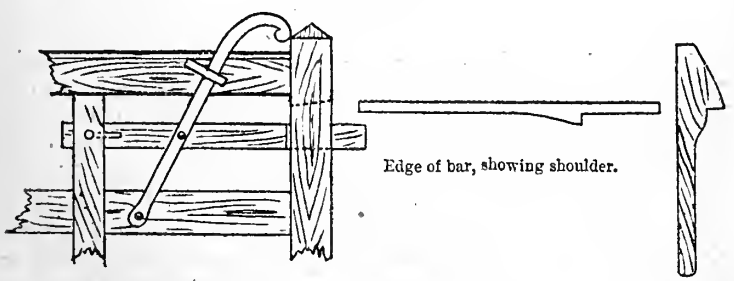

FIG. 14.—Oak Bar Fastener.

which it is held, slightly raising it at the same time, till it escapes the catch. When the gate is thrown open, the weight of the crook, which is made of iron, brings the bar forward till the

shoulder upon it comes against the head, and as the gate closes it rises on the slope of the catch and falls into the notch like an ordinary latch of the kind. In some cases, the shaft of the crook passes through a mortise through the top rail. The iron staple on the side of the rail is to be preferred. These good old oak bars and catches hold the field against hosts of new appliances. If, where they are used, a double fastener is required for cattle, an iron hasp fastened to the post and falling over one of the rails (fig. 15) is a perfect fastener. If the gate is hanging badly, and down at the point, this hasp is not easily lifted by the hunting-crop, but there is no good fastener for a gate hanging badly.

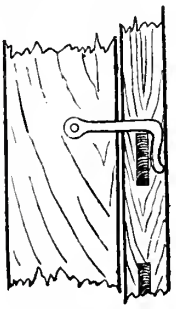

Fig. 15.—Iron Hasp Fastener.

It will prove an interesting and useful reference to stamp on each gate the year when made. This is done on a few carefully managed estates, and is preferable to another practice, that of having a number on the gate corresponding with that in a written record of age and other particulars.

A great deal of injury is done to the gates of pasture fields by the animals rubbing themselves against them. Much of this could be prevented, and fences and park trees be protected at the same time, if posts were set up for the animals to rub against. This is not uncommon in Scotland—cynics say for another use. It is a merciful provision as well as a useful one, and any interruption to haymaking is only what is met with from park trees.

Iron Gates.

Iron field gates have been long in use, but, except in parks, they are not common, and may therefore be supposed not to be favourites. It is difficult to discover why this is so, especially as the price of steel and iron is now not a barrier to their use. Nor is it the lack of enterprise on the part of firms working in iron. Home-grown timber which can be made into gates by labour, which has had to be employed in rural parts, has something to do with this, so has the difficulty of finding country smiths who can repair a damaged gate; for an injured iron gate is not easily put right. And it has often happened that a cheap gate, made of inferior iron, and hung on light posts with poor ground-fixings, has been tried and failed. Yet a much higher percentage of iron gates will be found that have far outlived

timber gates than the contrary, and this is especially true of park gates.

Stone or timber posts are better adapted for iron gates than iron posts, as far as they have yet been produced. Iron posts, even more than timber posts, require to be fixed in concrete.

It is probable that the use of iron field gates will yet become more general.

WM. C. CARNEGIE.

II.

Having for many years taken an interest in field gates, more particularly as used in a grazing country, I am glad to comply with the request of the Journal Committee to make the following general remarks upon them. It is curious how little has hitherto been written upon the subject. I am unaware of any previous paper in the Journal on Field Gates, and even that most voluminous of all agricultural writers, Arthur Young, was singularly silent on the subject; though in *The Communications to the Board of Agriculture*, of which he was secretary, there is an "Essay on Field Gates, by W. Salmon of Woburn, 1811." Probably the most scientific work on the subject was written by Thomas N. Parker, M.A., in 1804, but he deals mainly with road gates.

With a view of showing that, in spite of the literary neglect, the subject is important, I have ascertained the number of gates in several districts. In Cheshire, in an area of 7,175 acres, there are 1,839 gates, or say a gate to four acres. In Essex, on some 1,000 acres, I find a gate to six acres, and in Sussex on a similar area the result shows a gate to eight acres. Taking the highest figure, eight acres, it will be seen that in the cultivated area of Great Britain there must be many millions of money sunk in gates, requiring a large annual outlay for repairs and renewals.

If little has been written, it would appear also that little has been thought about gates, in the sense that no uniform type of construction has been fixed upon as the best. This must be apparent to anyone who will take the trouble to count the varieties of designs to be seen in driving along the road—often two or three different patterns in the course of a mile, and, sad to say, nine out of ten dragging on the ground.

It would appear that scientific principles of construction have not been considered of the first importance, but on the contrary have been readily abandoned if it were discovered possible to introduce the initial letter of the owner's name as a brace to the

gate, and I have seen the letters W, M, and O so used, the last in a hoop of iron. This ought not to be so in these days of scientific agriculture. The proper way to identify gates is to brand them on the back of the heel post, because the lettering is there more protected both from mischievous people and from weather. Each ought to have the year, a reference number, and, if desired, the name of the owner or estate.

In constructing a field gate, due regard must be had to its weight, and to the desirability of keeping this weight as much as possible at the heel or hinge end by tapering the longitudinal bars, at all events the top bar, towards the head. A heavy gate not only puts more strain on the hinge and strut (or diagonal spur), but finds a constant enemy in its own weight, banging

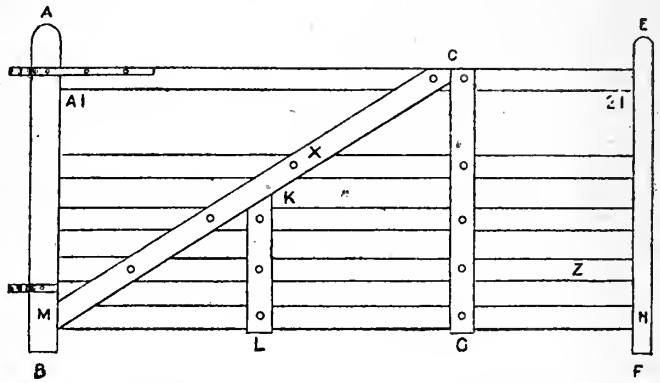

FIG. 16.

A B, Heel-post. C G, Brace.
M C, Diagonal Strut. E F, Head-post.
The weight of this gate with mountings is 140 lb.

itself to pieces. There is danger also in a too massive top bar inclining to snap rather than bend, when say a heavy old Shire mare is scratching her tail against it. It would probably be a safe rule to lay down that the top bar should always be of oak where stock are kept in the field. A light, tough, elastic gate will often hang longer than a heavy one, and such a gate was shown to me in Essex some years ago, in excellent condition, after thirty years' service. It was ten feet wide, of red deal tarred, and of the same principle of construction as that shown in fig. 16. Tarred gates are, however, very unsightly, and the best timber to use throughout is oak, provided it is well seasoned. Badly-seasoned oak will not only warp and crack, but is much heavier. Mr. Parker (of whom I have already spoken) says:—

"I find by experiment that an oak gate made of imperfectly-seasoned timber will lose a tenth part or more of its weight in two or three years."

The hanging of a gate is of vital importance, for the best gate ever made will soon be ruined if badly hung. To start with, it ought to be hung well off the ground. Gates wear out by the nose dragging on the ground. This often comes from the natural tendency of the posts to tilt inwards as the result of a heavily laden cart having gone through the gateway. In my own experience, after having had some steam ploughing done, the gate-posts where the engine had passed through had to be readjusted. The remedy is to have wide gateways, ten-feet opening, and good strong oak stumps, well sunk in the ground. No doubt modern implements have necessitated wider gateways, but for ordinary machinery a 9 ft. 6 in. gate is wide enough. In Lancashire and Cheshire they are rarely over 9 feet wide. Gates into farm-yards may be wider to admit of the threshing machine, &c.

Another way by which a gate is worn out is by banging against the falling post, caused by hanging the gate so as to be self-closing. A heavy gate, especially with a wind behind it, will strike with great violence, and in a short time will shake all the joints loose.

This is not the only objection to a field gate closing itself—the danger to stock is considerable. I have more than once known the temporary prop to a self-closing gate knocked down by the stock in passing, and the gate catch a cow and injure her seriously. Then, again, who has not seen the manner in which a carter deals with a self-closing gate? As Mr. Salmon says, he throws it open, whips on his horse, and allows it to bang against the nave of his wheel as he hurries through.

Probably the majority of gates are self-closing, more or less, but to me this seems objectionable. A gate should always open into a field, that is, against the stock. It is especially dangerous to allow a gate to open into the road, and serious accidents to people driving on a dark night have resulted from gates so hung being left open.

Now, as to the construction of the gate itself. All gates are alike in having (fig. 16) a heel post A B, a head post E F, a top bar and bottom rail, and longitudinal rails. It is when we come to tie these together that opinions differ, for though most people agree that a diagonal strut, M C, is the best way to strengthen and retain the rectangular form of the gate, they disagree as to the manner of its application. Mr. Salmon urges that it should start from the top of the heel post at A I, and run to the bottom

of the head post at H. In favour of this plan he argues, "a piece of wood or metal will support an immense weight applied to it by tension; but when placed perpendicularly it will not support its own weight."

Others exactly reverse this order, and commence the strut from the bottom of the heel post, and run to the top of the head post, M to E I. The objection to this long strut appears to me to rest in the fact that the farther you carry it towards the head the less resistance is it able to give to a weight placed on the top bar, owing to the greater leverage and increased tendency to tear itself loose from the points at which it is fastened.

But to enter into the controversy as to the merits of this plan or that would be as long a business as to attempt to discuss the question of bimetallism, and I therefore merely propose to give details of a gate which, in my opinion, is of the best construction, and which from long experience I know to wear well. It is entirely made of oak: heel post 3 in. by 5 in.; head post 2 in. by 3 in.; top bar 2½ in. by 4 in., tapering to 1 in. by 4 in. at head; rails and braces 4 in. by 1 in. The top and bottom rails, and also the bars, are mortised into the heel and head, and fastened with oak pegs. The strut, M C, is fitted flush to the heel but not mortised into it, and is bolted to the bars and top rail with four round-headed bolts neatly finished off so as not to hurt stock. The braces are fastened in a similar manner. For a

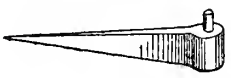

FIG. 17.—Hook.

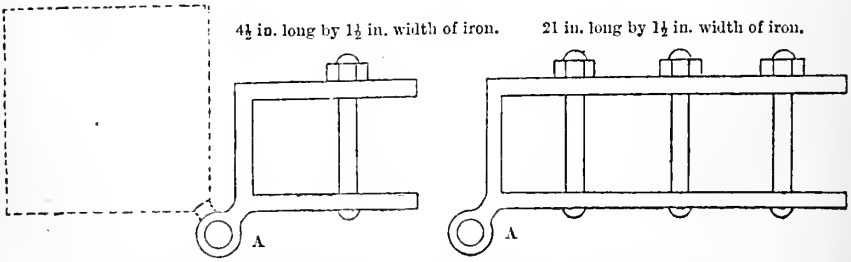

FIG. 18.—Bottom band. FIG. 19.—Top band.

The neck A is to accommodate the hook which is driven into the corner of the post. The dotted lines show the hanging post, which is 9 in. square.

10 ft. gate another brace should be added midway between C G and E F.

The mountings are very simple, and will be understood from the drawings (figs. 17, 18, 19). The hooks are driven into the corner of the hanging post, a small hole being first made with

an auger to avoid splitting. By this system of hanging from the corner of the post the fullest depth is obtained for driving the pin in, the gate will open farther back, and of course there is available the full width of the gateway, say an extra 4 to 6 inches.

Most people advise that the top hook should go through the hanging post and be fastened by a nut, the idea being that, should the gate require it, the nose could be raised by screwing the bolt. This, in my opinion, is expecting too much of such a simple fixing, and the objection to the hook coming right through is that it is more apt to admit water, and rot the post. I have known many a top hook loose in consequence. Perhaps, however, for a wide heavy gate it might be necessary to come through.

ALFRED ASHWORTH.

III.

Mr. Carnegie having favourably noticed the railway gates, it may not be out of place to give a short account of the design and materials which experience has shown to be good and lasting in the case of field gates as fixed at railway crossings.

The accompanying sketch (fig. 20) shows the gate now in use

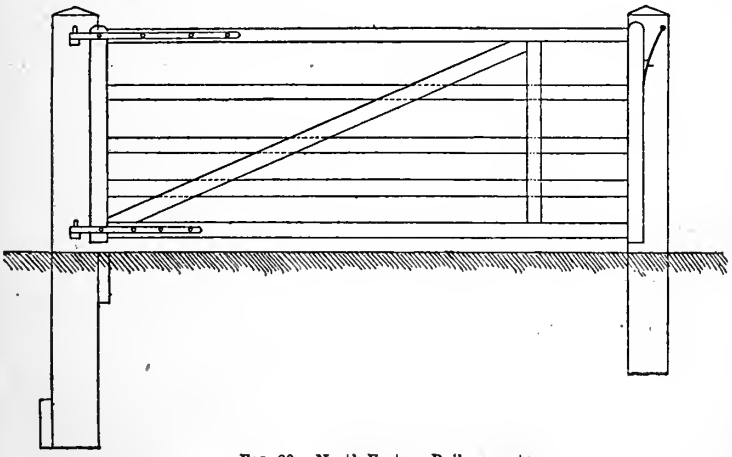

FIG. 20.—North Eastern Railway gate.

on the North Eastern Railway in Yorkshire. It has slightly more wood in it than the Warwickshire and Gloucestershire gates illustrated by Mr. Carnegie, but rather less than the Oxfordshire type; and it is in my opinion a better mechanical structure, all

the parts being carefully adapted to the work they have to perform.

The width of opening between the gate posts is 9 ft., the extreme length of the gate 9 ft. 6 in., and the height from the ground to the top rail 4 ft. 6 in.

Formerly the posts, both hanging and slamming posts, were made of oak, and in some districts of stone. The oak posts, when charred up to the ground line, lasted extremely well, but their cost is too great for them to be used, now that creosoting has shown us how to preserve the cheaper home-grown and foreign timbers. When of oak, the hanging post was made 12 in. by 12 in., neatly dressed to the ground line, the slamming post being dressed to 10 in. square.

The gates are so hung that, if carelessly left open, they will always slam to and fasten.

In situations where the soil is very light or spongy, additional stability may be given to the heel post (fig. 21) by nailing on to it slabs of timber 3 ft. long and 12 in. by 2 in., or any convenient dimensions, one slab being placed on the inside of the post, just under the ground, and the other at the outside and fixed at the bottom; these give six or more feet of additional area as support for the post.

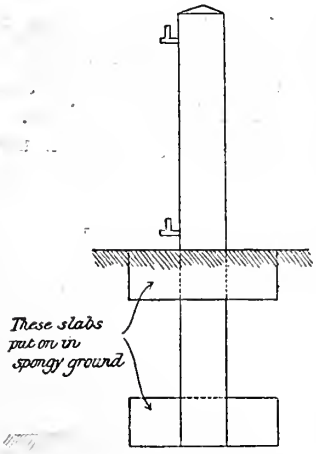

FIG. 21.—Heel post of railway gate.

Yorkshire stone is objectionable, though in many districts it is cheap in first cost; but the posts made of that material are very liable to be broken by carts running against them, and by other causes, especially as, after a few years, they get very tender at the ground line.

Of late years, in this district, creosoted Baltic posts, 10 in. by 10 in. in section, 9 ft. long, have been exclusively used for field gates: they are very economical, durable, and do not require painting, though I recommend that they should be occasionally tarred with Stockholm or gas tar. In situations where appearance is an object, they may be painted, but it will be found that three or more coats will be required to make a good job, as the creosote comes through the first coats. A better plan would be to cover the posts with two coats of cement wash, which can be readily made by mixing Portland cement with water until the

mixture is as thick as ordinary paint; the wash can then be laid on with a brush, and the second coat given as soon as the first is dry.

Under the specification in use on the North Eastern Railway, five gallons of creosote oil is forced into each 9 ft. by 10 in. by 10 in. post, under a pressure of 150 lb. per inch. The process can only be well carried on at works specially laid out and provided with machinery for the purpose.

In making the gates, oak or ash is used for the heel and head, the heel being 6 in. by 4 in., and the head 3 in. by 3 in., both being 4 ft. 3 in. long; the top rail is 4 in. by 3 in. at the heel end, and 3 in. by 3 in. at the head; the next two rails are $3\frac{1}{2}$ in. by 1 in., and the two lower rails 3 in. by 1 in.; the strut is $3\frac{1}{2}$ in. by $1\frac{1}{4}$ in., and the brace 3 in. by $1\frac{1}{4}$ in.; the brace is placed 2 ft. from the head.

The ironwork is of the ordinary class, and does not call for special description.

The average cost of a gate and posts, fixed complete and painted, is about 2*l*.

H. Copperthwaite.

THE MIDDLEMAN IN AGRICULTURE.

In a complex state of society and a thickly populated country the sub-division of labour naturally attains its greatest detail. This is especially so as regards Agriculture. In a primitive state of society the tiller of the ground may find a direct and immediate market for his produce; but where the consumers are congregated in vast groups it is obvious that there must be some machinery for bringing the products of the soil to them from greater or less distances.

Strictly speaking, so soon as agricultural produce leaves the farm on its way to the ultimate consumer it begins to incur costs of distribution.

"Before agricultural produce is brought to the market, the industry of many other labourers has been called in besides those who are actually working on the farm, all of whom will receive a certain share of the produce in the form of wages. A farmer may employ bargemen to take his wheat by canal to a particular market, but these bargemen must be paid wages, just in the same way as labourers who are employed on the farm. Again, a farmer may join with others to pay labourers

for keeping the roads in a proper state of repair; from him also are levied rates which maintain a police establishment, considered necessary to make property secure."[1]

The term "cost of distribution," therefore, it will be seen, bears a wide meaning, and consequently it is not so easy as it may at first sight appear to strictly define who may be included under the designation of "middlemen" in Agriculture. But for the purposes of this article it will at any rate be safe to exclude scavengers and police from the category.

It will be admitted that the chain of "middlemen" between the farmer and the householder has quite enough well-recognised links. The expense of conveyance from the farm to the market no doubt comes primarily under the head of cost of distribution, and it is perfectly fair to class railway companies and others who control the carrying agencies of the country among middlemen. At the present time a very considerable amount of dissatisfaction has arisen, and has been more or less emphatically expressed, with the position and power assumed by the railway companies in their dealings with agricultural produce. No doubt the British farmer is of necessity very much in the hands and at the mercy of the distributing agencies, and it is perfectly true that Parliament in its wisdom has made the carrying trade of the country a monopoly. It is evident, further, that the railway companies have chosen a most inopportune time for attempting to impose upon their customers increased charges under the revised powers which Parliament has lately sanctioned. At any time it would have come with all the force of a grievous disappointment upon the agriculturists of the kingdom to find that the result of the long struggle on the question of Railway Rates was to be chiefly an addition to the ordinary charges for the conveyance of their produce; but what in a time of comparative prosperity might have been only disappointment, at such a time as the present leads to positive desperation. But burning as this subject is, and tempting as an excursion into it might therefore be, we must venture in the present article to put it aside as one which, if dealt with at all, would demand for itself the whole of the space which is here available. A further reason for deferring it may be found in the fact that the question is just now, so to speak, *sub judice*, the Board of Trade having given the railway companies until Easter to come to terms with their customers, and having promised then to move for a Select Committee to decide upon the best independent tribunal to set up for the settlement of "reasonable" rates. It may perhaps

[1] Fawcett's *Manual of Political Economy*, 6th ed., p. 109.

just be pointed out, before dismissing the subject, that, whatever may happen as regards the fixing of actual rates, it must always be borne in mind that the Railway Rates Acts of 1890 and 1891 have at least been of enormous benefit, if only as providing for the first time a simple and complete code of the charging powers and conditions applicable to the whole of the merchandise traffic of the United Kingdom. This, to those who remember the chaos which previously existed and the absolute impossibility without a long legal process of even discovering what powers the railway companies possessed, cannot but be considered as a great advantage, and as, in one direction at least, affording a certain amount of security to farmers.

Setting aside, therefore, the carrying agencies, and treating the term "middleman" as applying mainly to a person who actually handles and obtains a profit from the handling of the produce, it is not reassuring to reflect to how small an extent the average farmer comes into direct contact with the consumer for any class of produce which he has to dispose of. No doubt the smaller occupiers, especially where they live in contiguity to centres of population, do to a considerable extent even now dispose of such products as poultry, butter, and eggs, without the intervention of any distributor. It is a noteworthy sight, in such a town, for instance, as Preston, to go on the market day into the market and see the rows of small farmers or their wives, each with a basket full of produce brought direct from the farm and purchased directly from them by the consumers. In other cases farmers occupying a considerable acreage, and conducting therefore a large business, have "gone into" the milk trade, and have sent out in their own carts their milk from house to house. But while other analogous instances might no doubt be found in different localities, speaking generally it is true to say that the average farmer does not dispose of any appreciable part of the produce grown on the land without the intervention of one or more persons as distributors.

Perhaps the only branch of agricultural industry which is almost invariably conducted on the principle of direct supply is the trade in pedigree stock. Whether the breeder holds a sale on his own farm, or sends his animals to a market or fair, he does no doubt dispose of them practically direct to the persons who use them. It is true that the middleman has, especially of late years, crept into these transactions in the shape of the auctioneer, and it is a rather curious fact that in spite of agricultural depression farmers should have found it necessary to rely to so very great an extent on the auction system instead of upon the old plan of sale by private contract.

Still, the auction system is unquestionably a convenient means of arriving at the result of the higgling of the market; and, at any rate, though one might be inclined on some grounds to regret the supremacy which it has attained, it would not be fair to hint that farmers suffer any special detriment or pay any extravagant amount for the advantages which they obtain from its adoption.

One word may be ventured, in passing, on this subject, and that is that farmers have an undoubted right to resent any attempt such as is alleged to have been made in some localities by the auctioneers to dictate to them the way in which they shall sell their stock. It has been said that considerable opposition has been more or less overtly displayed against the introduction of the system of selling stock by live weight. This practice, of course, is one which may be fairly argued upon its merits; but, whatever view may be taken of the desirability of its general adoption, no one will deny that every owner of stock ought to have the power, if he so desires, of selling his animals in such a way as he deems best. If, therefore, any class of middlemen attempt to dictate to him for purposes of their own the method which he must adopt in the disposal of the produce of his skill and enterprise, such action can only be stigmatised as intolerable and impertinent.

Just as wheat is the typical farm crop of the kingdom, so bread is the typical food of the people. It is, perhaps, for this reason, that although nowadays the item of bread is by no means the most important in the cost of living of the average inhabitant,[1] yet the market price of that commodity excites a degree of interest which is far greater than any which is displayed with regard to other articles of food.

The millers and bakers are perhaps to some extent to be commiserated in their occupancy of so prominent a position. It seems sometimes as if the butcher might charge 50 and the greengrocer 100 per cent. profit without exciting any particular amount of public indignation, while the baker brings down upon his devoted head a torrent of indignation if he gets as much as a "modest" 25 or 30 per cent.

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[1] The following extract from a letter recently received from a working man is worth quoting:—"When I went to school in 1842 we had a 4 lb. loaf for 6*d.*, and at the present time I am paying 5*d.* We use eight loaves, which is 3*s.* 4*d.*, but we got good beef at 4*d.* Now I have to give 8*d.*, which would be—

	s.	*d.*		*s.*	*d.*
In 1842, 8 loaves at 6*d.* .	4	0	In 1892, 8 loaves at 5*d.* .	3	4
„ beef 6 lb. at 4*d.* .	2	0	„ beef 6 lb. at 8*d.*	4	0
	6	0		7	4

So I am 1*s.* 4*d.* out."—The comparative price of beef is curious.—R. H. R.

Another fact which no doubt the bakers feel to press very hardly upon them is that wheat happens to be the only food stuff for which there are actual official records of prices. He who runs may read for himself every week the average price of wheat throughout the country, and with a very small amount of research he becomes qualified to write indignant and arithmetical communications to the daily papers with the assurance that one at least of his premisses is unchallengeable. The common and favourite resource of the middlemen as a class, when more or less direct reference chances to be made to their margin of profit, is to impugn altogether the accuracy of the market reports, and, as very few people indeed possess the necessary hardihood to defend the figures published by the newspapers as showing the state of the markets, it is extremely difficult to deal with this kind of argument. But, in the case of the bakers, they are debarred from taking up this line of defence, inasmuch as the price of wheat is ascertained from official sources and published on Government authority.

It must be admitted that on the face of it the bakers seem to stand in need of vindication. At the very least the prices at which bread is sold involve what appear to be anomalies. It seems curious that the 4 lb. loaf should be selling in different parts of London at the same time at prices ranging from $3\frac{3}{4}d.$ to $7d.$; nor is this anomaly confined to the Metropolis, for it appears that at the same time the 4 lb. loaf was being sold at Hampstead for $7d.$, at Kingston-on-Thames for $6\frac{1}{2}d.$, at Birmingham for $6d.$, at Shrewsbury for $4\frac{1}{2}d.$, and at Wolverhampton at a rate varying from $3\frac{1}{2}d.$ to $5\frac{1}{2}d.$ Again, the quotation given for certain Lancashire towns was $3\frac{1}{2}d.$, and that for some other English towns at from $4d.$ to $6\frac{1}{2}d.$ In Suffolk a correspondent of the *East Anglian Daily Times* recorded the price as $5d.$, while in the far West at Plymouth it was quoted at $4\frac{1}{2}d.$ In the old ante-steam days these divergences might have been easily explicable, but in these times, when wheat is practically of the same value in any part of the country, it would certainly seem that a range of 100 per cent. in the price for the same article, made of the same wheat, at the same time, is a circumstance which the public may reasonably regard with a pardonable amount of natural curiosity.

An interesting statement was given in September last in the *Morning Post*, showing the relation of the price of bread to the price of wheat during a period of about eighteen months, the retail price of household bread being that which obtained in a large Wiltshire village. The dates at which the retail

price of bread changed were as follows, the official average price of English wheat, as recorded at the same dates, being added :—

Date	Bread per 4 lb. loaf		Wheat per quarter	
	s.	*d.*	*s.*	*d.*
April 18, 1891	0	5½	39	0
April 25, 1891	0	6	40	1
May 23, 1891	0	5½	39	6
August 21, 1891	0	6	40	3
February 10, 1892	0	5½	32	3
April 30, 1892	0	5	31	3
September 3, 1892	0	5	29	1

It may fairly be assumed that bakers do not sell bread at a loss, and that when they charge 6*d.* per 4 lb. loaf for bread, with wheat at 40*s.* per quarter, they are making a profit. It is seen that from August 1891 to February 1892 the price of bread was maintained at 6*d.* per 4 lb. loaf. In the first week of September 1891 wheat rose to an average price of 41*s.* 8*d.*, which was the highest average of 1891. But it immediately declined, and, before the close of September it had fallen 7*s.* During the last three months of the year (October to December) the average price of English wheat was returned at 36*s.* 8*d.* In 1892 the average receded from 36*s.* 4*d.* at the beginning of January to 32*s.* 3*d.* at the middle of February. Whilst, therefore, the average price of wheat was gradually declining from 41*s.* 8*d.* to 32*s.* 3*d.*, a fall of nearly 10*s.* per quarter, the price of bread was maintained throughout the period of six months at 6*d.* per 4 lb. loaf. A halfpenny was then taken off the price, which stood at 5½*d.* per 4 lb. loaf for the next twelve weeks, during which the average *Gazette* price of English wheat was exactly 32*s.* per quarter, the extremes being 33*s.* 3*d.* and 30*s.* 7*d.* Bread was reduced to 5*d.* at the end of April, and has remained at that price since. During the same period the average price of wheat has been 29*s.* 11*d.*, and the extremes have been 31*s.* 7*d.* and 29*s.* 1*d.* If it paid the baker to sell a quartern loaf of bread for 6*d.* when wheat averaged 40*s.* per quarter, it must have paid him much better during the last five months (April to September) to be selling bread at 5*d.* while wheat has averaged less than 30*s.* In other words, whilst the price of wheat fell one-fourth the price of bread fell only one-sixth.

Mr. David Chadwick, who has given special attention to the subject, states that the following has been and is the current average price of bread of good quality, delivered over the counter for cash, in the years specified, and I have added thereto for reference the average price of wheat in the same years :—

Year.	Bread per 4 lb.	Price of wheat per quarter.
	d.	*s.* *d.*
1839	$8\frac{1}{2}$	70 8
1849	6	44 3
1859	$5\frac{1}{2}$	43 9
1887	$4\frac{3}{4}$	36 4
1893	$5\frac{1}{2}$	25 5 [1]

This statement is of interest in more than one way. Firstly, it gives a standard price ($5\frac{1}{2}d.$) of the 4 lb. loaf at the present time. The figures which have already been cited of the quotations of bread in various parts of the country show that this is not a very simple matter. Mr. Chadwick states that "the price to-day (February 21, 1893) of the best household bread at the counter in 100 of the best bread-shops in London is $5\frac{1}{2}d.$ per 4 lb." More striking than this, however, is the evidence given by Mr. Chadwick's figures of the lack of relationship between the price of bread and the price of wheat. The current average price of wheat at the time of writing is 25*s.*, while the price of bread is $5\frac{1}{2}d.$ But in 1859 the price of bread was the same, while the price of wheat was 70 per cent. higher. In 1887, when the price of wheat was 11*s.* per quarter more than now, the price of bread was $\frac{3}{4}d.$ less; and, again, in 1849, when wheat was practically at the same price as in 1859, bread sold for $\frac{1}{2}d.$ more. But the most startling comparison is that between 1839 and 1893; for we find that, whereas wheat has fallen during the interval 65 per cent. in value, bread has fallen only 35 per cent. In fact, relatively to wheat, bread was cheaper in 1839 than in any other of the years mentioned.

It ought perhaps to be mentioned that the fact that the price of bread has not fallen with the fall in wheat is denied. A correspondent of *The Times*, writing as "the chairman of one of the leading bread companies," stated, "from the experience of a close connection with the trade, that the price of best bread at this time last year was $6\frac{1}{2}d.$ per 4 lb. loaf, against $5\frac{1}{2}d.$ at the present time" (February, 1893.) He added that "this reduction of 1*d.* is equal to 7*s.* 9*d.* per sack of flour, whereas the average price of the latter is only 7*s.* 3*d.* less than it was at the same time last year." "This," he continues, "will clearly prove that the reduction in the price of bread is even greater than the reduction in the price of flour; and this is the case with all the principal producers of bread in the Metropolis."

The remarkable range in the price of bread at any given time is explained with some plausibility by the allegation that it is due to the different qualities of flour used. Thus the

[1] For week ending Feb. 25, 1893; the average was 24*s.* 9*d.* for week ending March 18, 1893.

commonest flour may be sold at 15*s.* per sack, while the finest may make 30*s.* or more. Of course, the lowest-priced flours are not supposed to be used for bread-making, but in some of the poorer districts no doubt they are so used. One of the arts and mysteries of the baking trade is to combine the various qualities of flour in such proportions as to satisfy alike the taste of the consumer and the pocket of the vendor.

We trench here upon ground which some may think to be delicate. Accusations are not infrequently made in the columns of the press that bakers use rice and potatoes and other adulterants in making bread. It is quite possible that such nefarious practices prevail in certain localities, and that

"Chalk and alum and plaster are sold to the poor as bread."

But there is no adequate evidence to show that this is common. On the contrary, so far as the reports of public analysts go, bread and flour would seem to be almost the least adulterated articles of food. Thus in 1891 there were 799 samples of bread taken and only eight were found to be adulterated; while out of 437 samples of flour taken only one was condemned. It is true that the taking of samples is done in a very partial manner. In several counties not a single sample was taken throughout the year, and in others the number taken was so few as to be practically useless. This, however, is the fault of the local authorities for not more stringently carrying out the law against adulteration, and on the evidence given it is only fair to say that no sweeping indictment would lie against the trade in this respect.

A striking fact which has done duty in many quarters during the past two or three months will bear repetition because of its obvious force. The Aërated Bread Company does an enormous business in London and its suburbs, as all who are familiar with the Metropolis are aware. At its last annual meeting of shareholders held on October 31, 1892, the Chairman of the Company announced a dividend of 30 per cent., in addition to an interim dividend of $7\frac{1}{2}$ per cent., while an additional profit of 5,000*l.* was put by. These remarkable results were attained, according to the explanation officially given by the Chairman, "not by speculation, but by continuous and constant labour," a creditable fact which everyone will readily believe. But there was a further cause which was thus explained by the Chairman. He said "they had had a great fall in prices this year. A collapse in prices took place last year at the beginning of the Company's financial year, and therefore they, as merchants, manufacturers, and retailers, had reaped the full benefit of that great reduction, while on the other hand it had been ruin to the importers and consumers"—the last word obviously being a misprint for "pro-

ducers." It is, however, evident that in such a case as this these exorbitant profits have been amassed simply because the cheapening of produce has benefited, not the consumer, but the middleman.

It is stated that it takes about 400 lb. of wheat to produce by the roller process 280 lb., or one sack, of flour. Thus a quarter of wheat, of 496 lb., will produce 347 lb. of flour. In the case of wheat ground into flour by the old system of stones, it takes only about 388 lb. to produce 280 lb., or one sack, of flour, and a quarter of wheat will produce 362 lb. of flour. A sack of flour of 280 lb. will produce at least 390 lb. of bread, or 97½ loaves of 4 lb. each, while the produce of a quarter of wheat ground by the rollers will be 347 lb. of flour, or 483 lb. of bread, or say 120 loaves of 4 lb. each.

I have received from Mr. G. E. Francis, of Oxford, particulars of a bread-making test made by himself in his own kitchen in April last year which are of interest in this connection. The ingredients of a 4 lb. loaf, and their cost, were as follow:

	d.
3 lb. of best seconds flour	4
1 oz. of German yeast	1
2 teaspoonfuls of salt mixed with the yeast 1½ pint of tepid water . . . . } .	say ¼
Total	5¼

The resultant quantity of dough weighed 4 lb. 12 oz. This, when made into two loaves of bread baked and brought out of the oven and set two or three hours to cool, weighed 4 lb. 3 oz., but when made into one loaf only it weighed 4 lb. 6 oz. The flour from which this bread was made cost 6*s.* 6*d.* per bushel, delivered at the house by the corn dealer. This would be 32*s.* 6*d.* per sack of five bushels of 280 lb. weight at a time when the average price of foreign and home wheat ranged from about 34*s.* to 36*s.* per quarter. The flour presumably was composed of about two parts of foreign and one part of home-grown wheat. The baker would probably get it at about 28*s.* 6*d.* per sack, or, if he paid within seven days, at a net price of, say, 27*s.* 9*d.*

The cost of this home-made 4 lb. loaf of bread, supposing it to have weighed only 4 lb. and not 4 lb. 6 oz., was 4¾*d.*, or say 5*d.* The baker who, according to custom, allows 5*s.* per sack, or 1*s.* per bushel, to cover all expenses, including the cost of yeast, making, baking, delivering, &c., would produce the 4 lb. loaf quite ¾*d.*, if not 1*d.* cheaper, or say at 4*d.*, whereas he was at that time charging 5½*d.* for it. He would, therefore, have been making a profit of nearly 1½*d.* upon every 4 lb. loaf, or something like 37 per cent.

The same thing applies with even greater force to the retail sale of flour, this product being generally sold in 3 lb. or 4 lb. packets, at a price far greater in excess of its prime cost than bread. According to Mr. Francis, the 3 lb. packet of best seconds flour was being sold a year ago at 7*d.*, when the price of bread was 6*d.*, and a 3 lb. packet of the best fine flour was being sold at 8*d.* The cost to the baker of the 3 lb. of flour would be only a little over 4*d.*, so that upon every 3 lb. of flour which the baker sold he would get a profit of something like 3*d.* It is worth remark in this connection that flour is, as a rule, only obtainable by ordinary customers through the baker, and Mr. Francis states that the millers are boycotted by the Bakers' Association if they supply small quantities direct to consumers.

Attention was recently directed in the pages of the *National Review*, by Lord Stanley of Alderley, to the fact that down to within quite recent times the Statute Book contained powers for fixing the price of bread. An Act of George II., which was only repealed in 1867, was entitled "An Act for the due making of bread and to regulate the price and assize thereof, and to punish persons who shall adulterate meal, flour, or bread." It set forth that to the intent that a "plain and constant rule and method may be duly observed and kept in the making and assizeing of several sorts of bread, which shall be made for sale," properly constituted courts were empowered "to set, ascertain, and appoint in any place or places within their respective jurisdictions the assize and weight of all sorts of bread, which should in any such place or places be made for sale or exposed to sale, and the price to be paid for the same respectively."

In every assize of bread respect was to be had to the price which the grain, meal, or flour whereof such bread was made should bear in the public market or markets in or near the place where such assize was set, and reasonable allowance was to be made to the makers of bread for their "charges, labour, pains, livelihood, and profit." The Act also contained provisions as to the quality of bread where an assize was set. An assize might be set by two or more justices within their jurisdiction, and they were to consult the returns made by clerks of neighbouring markets of the grain, meal, or flour. The bakers might see the returns the day after they were made, so as to have time to object to the advance or reduction of prices before the assize was set. The baker was not liable for any fees, and no alteration was to be made in the assize of bread, unless the price of wheat, as set forth in the returns, varied 3*d.* in the bushel.

Twenty years ago the idea of reverting except in jest to this Act, as a possible precedent for guidance nowadays, would

have seemed grotesque. But while it might require some boldness to positively advocate the re-enactment of this statute, the principle can scarcely be said now to be entirely antagonistic to the spirit of modern legislation, as it would assuredly have been two or three decades ago. The fixing by some official authority of the price of bread is not outside the range of practical politics, though perhaps it is not altogether to be regarded as probable. But, at any rate, every one will admit that such a course would be preferable to the present custom of fixing the price by a "ring." It was reported recently that the chairman of a bakers' association in Devonshire stated that but for the association the price of bread would have been 1*d.* per 4 lb. loaf lower in Plymouth. Many quotations might be given of somewhat similar statements in London, but it is not needful to labour the point. It may be taken generally that the bakers' associations exist mainly to keep up the price of bread, while the millers' associations exist mainly to keep up the price of flour. It is perhaps not possible to check such combinations as these, which deprive the consumers of the benefits of competition, without improving by one iota the position of the producer; but, at any rate, it is safe to say that if the price of bread is to be arbitrarily fixed at all, it would be better that it were done by a public authority than by a trade oligarchy.

The case as regards wheat and bread is obviously capable of being presented in more detail than that with regard to any other commodities, one reason being, as aforesaid, that in this instance we have an official record of prices to work from. It is not so easy in respect to other produce to obtain an idea, except very generally, of the margin between the price paid to the producer and that paid by the consumer. That the margin, however, is very wide in many cases there is no doubt. Take the case of milk, which is a simple one. It will be admitted by all who know anything of the trade, and might be proved, if need were, from many contracts, that an average of from 7*d.* to 8*d.* per imperial gallon is as much as the ordinary dairy farmer obtains for his milk, taking the year through. The retail price in the towns is, as a rule, 1*s.* 4*d.* per imperial gallon. In some cases it may be 1*s.* and in a few others 1*s.* 8*d.*, but 1*s.* 4*d.* is probably the most usual price.[1] Assuming that the price paid

[1] In West Kensington the price of milk at the time of writing is 4*d.* per quart, but I have recently seen a milk-cart in the streets bearing the announcement that from March 1 the price is reduced to 3*d.* This, however, is probably only an isolated case, and it would be rash to assume that the milk is up to the same standard of quality as that sold at 4*d.*—R. H. R.

to the farmer is 8*d.*, and the price paid by the consumer is 1*s.* 4*d.*, it will be seen that the "margin" for cost of distribution is 100 per cent. No doubt milk is an exceptionally expensive commodity to "handle" and deliver in small quantities, but it must be confessed that an addition of 100 per cent. to its price seems *primâ facie* rather a large allowance for the "middle profit."

Vegetables and fruit frequently supply remarkable instances of an almost ridiculous discrepancy between the prices paid to the grower and those current to retail purchasers. Cases have often occurred where the produce has been left on the land to rot, simply because it would not bear the charges of distribution, while at the same time probably in some not far distant town similar produce was making a fair price.

With regard to meat, the difficulty of arriving at accurate figures is considerable, and it is practically impossible to say what share the dealer and butcher obtain. It is of interest—as bearing to a certain extent on this point—to note the subjoined statement of prices current at the Metropolitan

——	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average top price
1888	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
Scotch . . per lb.	7	7¼	7½	7½	8	8¼	8¾	8	8¼	8¼	8¼	8¼	7⅞
English . . „	6¾	6¾	7¼	7	7⅞	8	8¼	7¾	7½	7⅝	7⅝	7⅛	7½
Australian . „	3½	3½	4	4	3⅞	4	4½	5	4⅞	4⅝	3⅞	3½	4⅜
New Zealand „	3⅝	4	4¾	4¼	3⅜	3¾	5¼	5⅝	5⅜	5⅜	4¾	4	4½
1889													
Scotch . . per lb.	8¼	8	8	8¼	9	9½	8¾	9	8¾	8¼	8¾	8¼	8½
English . . „	8	8	8	8	8½	9½	8½	8¼	8¼	7¾	8¼	8	8¼
Australian . „	3⅝	3⅝	—	—	—	5	5¼	4½	4½	4½	4⅞	3⅝	4⅜
New Zealand „	4	4⅝	4¼	4¾	5	6¾	5½	6½	5½	5	5¼	4½	5⅛
1890													
Scotch . . per lb.	8½	8¾	8¾	8¾	8¾	8½	8¼	8	8	8	7¾	8	8⅛
English . . „	8¼	8½	8¼	8⅜	8¼	8	7¾	7¼	7½	7½	7½	7½	8
Australian . „	3⅝	4¼	4⅜	4¼	4½	4	4	3⅝	3⅝	3½	3⅝	3⅜	3½
New Zealand „	5	5	5¼	5	5	5	5	4½	4¼	4¼	4¼	4¼	4⅜
1891													
Scotch . . per lb.	7¼	7	7	6¾	7¾	8¼	8¼	7½	7¾	7½	7½	7	7¼
English . . „	7	6¾	6½	6¼	7½	7½	8	7¼	7	7¼	6¾	6⅛	7
Australian . „	3½	4	4½	3½	3⅜	3½	2¾	2⅝	2⅝	3	3¼	3¼	3½
New Zealand „	4¼	4⅞	4¾	4⅜	4½	4⅜	4½	4⅜	4⅛	4½	4⅛	4⅛	4¼
1892													
Scotch . . per lb.	7	8	7¼	7½	7½	7¾	8	7½	7¼	7	7	7	7⅜
English . . „	6½	7½	7	7¼	7¼	7¼	7½	6⅜	7	6¼	6¼	6½	7
Australian . „	3½	4	3⅞	3⅝	3¾	3⅜	3¼	2¼	2⅜	3½	2⅜	2⅜	3⅛
New Zealand „	4¼	5	4⅞	4⅜	4⅜	4¼	4⅛	4	4¼	4⅓	4¼	4¼	4⅓

Note.—The general average of prices was, of course, materially less than the figures quoted above, the difference in the case of Colonial descriptions being, say, from ¼*d.* to ⅜*d.* per lb.

Market, during the past five years, for Scotch, English, Australian, and New Zealand mutton of prime quality, in the carcass.[1]

This table brings up a question which has a very direct bearing on the subject of the middleman's share in the meat trade. There were last year (1892) 51,630 tons—or 2,140,000 carcasses—of frozen and fresh mutton imported into this country, almost all of it coming from New Zealand and Australia. Now this was sold at the London wholesale market at from 40 to 50 per cent. below the price of British meat. What it would be especially interesting to know is whether these 51,000 tons were sold over the counter to consumers at this reduction. There is very good reason to believe that the greater part of it is sold, not at a price 40 or 50 per cent. below British meat, but at the same price and under the same name. This is a strong charge, but the evidence in support of it—though entirely circumstantial—is practically overwhelming.

Another instance of a frequent fraud upon producers, consumers, and honest traders alike, is the sale of margarine, or "blends," as butter. The continued existence of this practice forms one of the disappointments of legislation. It is not, perhaps, singular in this respect, for the farmer has had more than one warning against putting his trust in Acts of Parliament. But it is certainly discouraging to find that, notwithstanding the existence of at least two distinct statutes prohibiting it under penalties, the ingenious industry of butter adulteration goes on almost as merrily as ever. There are three main reasons for the practical failure of the law. One is the laxity and indifference of those who have been charged with its administration, another is the clever adaptability of those whose interest it is to evade it, and the third is the lack of any deterrent effect in the penalties imposed on those who break it.

There are three categories, under one of which the middleman's profits may fall. They may be—(1) fair, (2) exorbitant, or (3) fraudulent. As regards the first we have nothing to say. Granting, as broadly speaking we do, the necessary continuance of the middleman, it follows that he is entitled to a fair and reasonable remuneration for his work and skill. As regards exorbitant profits, it must at once be admitted that they have in the nature of things a tendency to be decreased by competition. If in any business excessive profits are being made, there will be a natural tendency among persons outside it to take it up. But the potency of competition only holds good so long as it

[1] From the New Zealand Loan and Mercantile Agency Co.'s Circular, January 1893.

is unchecked. There are artificial barriers in most cases against too great an inundation of new blood in the ranks of any business, while the existence of "rings" to maintain prices above their normal level is a distinctly disturbing factor in the situation. There is, however, one highly effective weapon, and that is co-operation.

The principle underlying co-operation is the union of producers or consumers for the purpose of saving the middle profits. Combinations of consumers have been immensely successful, as the case of the great "stores" in London testifies. The system has, however, found its greatest success among the working classes. Started in a very modest way by the "Rochdale Pioneers," the co-operative movement has now reached enormous proportions. There are at present 1,744 industrial co-operative societies throughout the United Kingdom, including over 1,100,000 members. Taking each member to represent a family, we have five and a half millions of the population whose daily food is mainly purchased on the co-operative principle. In England and Wales alone the number of societies which made returns in 1889 was 1,268, with a membership of 897,841, and a share and loan capital of 12,522,269*l.* The sales for the year amounted to 33,016,341*l.*, and the profits to 2,981,543*l.* To a certain extent, this vast organisation, by means of what is termed the wholesale society, aims at being a combination of producers as well as a combination of consumers, but the principle is only partially carried out, and, broadly speaking, it must be classed in the latter category.

It is perhaps worth noting, in passing, that a suggestion has lately been made—which has not, perhaps, obtained so much consideration as it deserves—that English farmers should make an attempt to secure for themselves the supply of this vast organised demand, so to speak. Such an idea, however, requires as a condition precedent an organisation of producers large enough and solid enough to be in a position to make terms. At present, the co-operative societies buy, of course, in the cheapest and most convenient markets, which in many instances are foreign, even in the case of articles which are largely produced in this country. Whether they would be disposed to give any preference to the home supply—presuming that there were farmers' organisations in a position to deal with them on a large scale—is an obvious element of doubt in the matter. The idea is evidently very much in the air, and possibly Utopian altogether, but it certainly possesses fascination. One would say that combinations, of producers on the one hand and of consumers on the other, contracting on either side for the sale and purchase

of produce, formed an almost ideal method of dealing with the "middleman" question. Whether such an ideal is realisable is another matter.

That the present methods of distributing English farm produce are to a large extent careless, clumsy, and costly is self-evident. The case of the meat trade in London may be cited in proof. The four million inhabitants of the Metropolis are supplied with meat through three main channels—viz. the Islington Cattle Market, the Deptford foreign animals wharf, and the Central Meat Market. The supply in 1891 was as follows:—

Islington Cattle Market.

		No.	
Home supply:	Cattle	107,188	
	Sheep	727,370	
	Pigs	6,176	
			840,734
Foreign:	Cattle	14,222	
	Sheep	48,960	
			63,182
			903,916

Central Meat Market.

	Cwt.
Country-killed meat [1] [2]	2,345,960
Town-killed meat [2]	1,333,320
General foreign-killed meat [2]	501,140
American-killed fresh meat	1,162,560
Australian- and New Zealand-killed fresh meat	813,720
	6,156,700

We may put aside the Deptford supply, as this would lead to considerations outside the scope of this article. All the beef and mutton grown on English farms and sent to London pass through Islington or the Central Meat Market. The figures quoted above show the enormous extent of the carcass trade, and the comparatively small proportion of the town-killed meat. The question arises why animals are sent to London for slaughter at all. Four-fifths of the butchers in the Metropolis are said to buy dead meat only; why should not the other fifth do the same? There is no doubt an enormous waste annually entailed by the conveyance of live cattle to market. A finished beast is the worst possible traveller, and is bound to deteriorate every

[1] This includes meat, poultry, and provisions.

[2] The weight of American cattle slaughtered at Deptford is included in *town-killed*, and the weight of those slaughtered at Liverpool in *country-killed*.

hour he is on the railway. The improved methods of carrying meat have really made the old system obsolete, a fact which our foreign competitors in many cases recognise. It would be absurd to suggest that the practice—which has been tried in a few instances in the North—of slaughtering on the farm can be generally adopted, but it would certainly seem that farmers might by some means of combination slaughter their beasts nearer home, and sell them in carcass instead of "on the hoof." They would thus avoid the deterioration and waste necessarily incidental to a railway journey, they would know exactly how much dressed meat they had to sell, and the "fifth quarter" would more than pay the cost of slaughtering.

Farmers are buyers as well as sellers, and they are interested therefore in reducing, if possible, the margin of profit on farm requisites, such as manures and feeding stuffs. A committee of the Central Chamber of Agriculture has just presented a report on the subject of Co-operation for Purchase, which is based on a considerable amount of evidence collected by them. They state that there are in the kingdom about thirty co-operative societies for supplying farm requisites. Some of them, however, like the well-known Lincolnshire Association, deal only in one commodity, while at least half do not deal in more than two or three articles. The report gives brief particulars of a few typical associations. The following may be taken as representing a strictly local one of good standing:—

South Durham and North Yorkshire Association (established 1878), headquarters Darlington, has from forty to fifty members, who pay an entrance fee of 2*d.* per acre, and 2*s.* per ton registration fee on all manures ordered. Only manures are dealt in at present. The secretary sends in January to each member a list of manures, which is returned marked with the number of tons of each kind required, and the month in which it is wanted. All the requisitions having been scheduled, the secretary advertises for tenders from manufacturers, stating the quantity of each manure required, and the station at which it is to be delivered.

The committee reported that they were strongly impressed, from the information laid before them, with the advantages which may accrue to farmers by the adoption of the principle of co-operation. With careful management the risk of failure is small, as is proved by the fact that, so far as they had been informed, no agricultural co-operative association formed for the purpose of purchasing farm requisites has failed.

This fact, viz., that there is no instance on record of a co-operative purchasing society having failed, is very noteworthy. Candour compels the admission that this is by no means the case with regard to co-operative societies for the sale

of farm produce. More than one is known to have come to financial grief. It would be of little avail to speculate on the causes of their failure, but it may be observed that not all who take the name of "co-operation" really adopt its principles. A real co-operative association of producers, dealing only—or, at any rate, mainly—in the products grown by its members, and dividing all profits fairly among the producers, has seldom, if ever, been tried on such a large and well-organised scale as to afford a complete test of the principle. Theoretically, the idea seems unassailable, but there are considerable practical difficulties on the dealing with which success or failure depends.

The most successful application of the co-operative principle, hitherto, in agricultural production has been in cheese factories and creameries. The former have in a few cases been established for some time, but they have not been multiplied; the latter have never become very popular in Great Britain, but in Ireland a large number have been started and appear to be flourishing.

Reference has already been made to the fraudulent profits which are still obtanied by some unscrupulous middlemen in the case of margarine and meat. As regards the former commodity, two suggestions have been made for the amendment of the law. One is that all margarine, or butter containing an admixture of it, shall be sold uncoloured, or coloured in a distinctive manner; and the other is that travelling inspectors shall be appointed by a central authority to carry out the law against adulteration.

As regards meat, the figures given of the supply at the Central Market showed that nearly half of it was foreign. When we see in the butchers' shops anything like that proportion of foreign meat we shall believe that it is all sold openly and honestly, but until then it is justifiable to assert that a fraudulent profit is systematically made by selling foreign meat as English. There are several bills before Parliament this session which propose to deal with the matter, and a Select Committee of the House of Lords is promised on the subject.

In summing up these rather disjointed observations on a subject of which it may fairly be said that age does not wither, nor custom stale—but indeed increase—its infinite variety, let it be admitted that to talk of eliminating the middleman, in a country such as this, is absurd. He is at once the product and the organiser of civilisation.

"Even in modern England we find now and then a village artisan who adheres to primitive methods, and makes things on his own account for sale to his neighbours, managing his own

business and undertaking all risks. But such cases are rare; and in the greater part of the business of the modern world the task of so directing production that a given effort may be most effective in supplying human wants has to be broken up and given into the hands of a specialised body of employers, or, to use a more general term, of business men. They 'adventure' or 'undertake' its risks, they bring the capital and the labour required for the work; they arrange or 'engineer' its general plan, and superintend its minor details. Looking at business men from one point of view we may regard them as a highly skilled industrial grade, from another as middlemen intervening between the manual worker and the consumer.[1]"

The difficulty of definition which even the scientific economist finds may easily perplex common folk. The farmer has of late been clamouring—not without cause—against the "middleman," yet he is, in fact, a middleman himself. If the principles advocated by Mr. Albert Grey[2] obtained general adoption he would be abolished, except, perhaps, as the paid superintendent of his men—a consideration which may give pause to some of those who write and speak vehemently. It is well, therefore, to recognise frankly that the middleman in agriculture is, to some extent at least, a necessity. But enough has been said to show that he is apt when unchecked to presume upon his intermediate position, and to use it without regard to the interests of either the consumer or the producer. This fact naturally disposes both consumers and producers to regard with favour any scheme for rendering them less dependent upon the generosity and goodwill of the intermediaries. It is also a matter for grave consideration whether in the distribution of some articles of produce, especially those of a perishable nature which must go into consumption immediately, there are not too many "dealers" and "handlers," and it is, further, not a matter for consideration but one of entire certainty that where the middleman prostitutes his calling, by adulterating or wrongly describing the articles passing through his hands, the most stringent measures should be adopted to compel his honesty.

R. Henry Rew.

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[1] Marshall's *Elements of Economics*, Vol. I., 1892, p. 182.

[2] "Profit Sharing in Agriculture." By Albert Grey. *Journal of the Royal Agricultural Society*, Vol. II., 3rd Series, Part 4, 1891, pp. 771-793.

HOME PRODUCE, IMPORTS, CONSUMPTION, AND PRICE OF WHEAT, OVER FORTY HARVEST-YEARS, 1852–53 TO 1891–92.

Contents.

Introduction.

In 1863, and each year since, an estimate of the Home Produce of Wheat in the United Kingdom has been published by us in the daily and agricultural papers soon after harvest. An estimate of the total requirement for consumption within the then current harvest-year has at the same time been given; also an estimate, as forecast, of the requirement from stocks and imports within the harvest-year. In 1868, we gave in this Journal (Vol. VI., 2nd Series, Part 2) records and estimates on the subject for a period of sixteen harvest-years, from 1852–53 to 1867–68 inclusive. In 1880, in the *Journal of the Statistical Society* for June, and some months later in this Journal (Vol. XVI., 2nd Series, Part 2, 1880), with further particulars for the then current harvest-year added, the estimates and records were brought up to 1879–80 inclusive, completing a period in the

one case of twenty-seven, and in the other of twenty-eight years; and the basis, and the results, of the estimates so far, were passed in review. Lastly, in *The Field* of February 12, 1887, the records were brought up to 1885–6, and some points were considered in reference to current discussions at the time. It is proposed in the present paper to bring up the records to date, thus completing a period of forty harvest-years, from 1852–53 to 1891–92 inclusive.

The completion of a period of forty years would of itself be a sufficient reason for recurring to the subject, for bringing up the records to date, and for discussing the results with the view of determining how far the annually published estimates of the yield of the home-crop, of the requirements for consumption, and of the amounts to be provided by stocks and imports, have been borne out by the subsequent actual records of the net imports. Another and important reason for recurring to the subject at the present time is, however, the fact that, in 1891, the *Board of Customs*, the *Board of Trade*, and the *Board of Agriculture*, adopted a different weight per bushel in converting the recorded hundredweights of imported wheat into quarters, and, what is of more importance, they at the same time adopted a new factor for the calculation of imported "wheat-meal and flour" into its equivalent of wheat.

Further, we understand that the Registrar-General's annually published estimates of the population at the middle of each year, between one census period and another, are founded on the rate of increase actually ascertained to have taken place between the two preceding censuses, but that after the next census results are obtained, showing the actual increase, correction is made if necessary for each of the years of the previous intercensal period. It happens that the corrections so made from time to time are brought together in the Registrar-General's 53rd Annual Report, issued in 1891, and they are found to affect the numbers we have previously given for the population —that is, for the number of consumers—from 1860–61 up to the present time, sometimes in the direction of decrease, and in others of increase, more or less considerable; and it is proposed to adopt these corrections accordingly, as will be fully explained farther on.

Obviously it is desirable to adopt in the future, in our annual estimates, the new factors above referred to, for the conversion of imported flour into its equivalent of wheat, and of hundredweights of imported wheat into quarters; and also, as far as possible, to take into account any correction of the population that is available. Thus, if the population be taken at too low a

figure, the estimate of requirement for consumption will be too low, or if the estimate of population be too high, so also will that of consumption be too high. Again, if the amount of flour imported represents a larger amount of wheat grain than has hitherto been supposed, the amount available each year, and consequently the amount available per head of the population, has been greater than has been estimated. On the other hand, the reduction in the adopted weight per bushel of the home and imported wheat, although it implies an increase in the figure representing the measure of the wheat grown, imported, and consumed, does not represent any increase in the actual quantities by weight.

It is proposed to consider—the methods and the results of the estimates and records for the past forty years, as previously given; how far they require modification, in view of the altered factors in regard to imported wheat and flour, and the corrected estimates of the population, as above referred to; and whether any, or what changes, should be adopted in the future. Lastly, attention will be directed to the important bearings of the results finally arrived at.

The Data Required.

In our first paper on this subject, published in the Journal (Vol. IV., 2nd Series, Part II.) in 1868, the estimates and records were given for each division of the United Kingdom separately, and for the whole collectively, but in 1880 the illustrations were confined to the United Kingdom as a whole, and it is proposed so to limit them on the present occasion.

For each harvest-year the data required are—the area under wheat; the average yield of wheat per acre over the whole country; the aggregate home produce, and the amount of it available for consumption; the net imports; the population; and the average consumption of wheat per head of the population per annum.

The data at command in 1868, and the results arrived at, were fully discussed in the paper of that date, and for detailed information reference must be made to it, but the main facts may be briefly summarised as follows:—

The Area under Wheat.—For the fourteen years 1852 to 1865 inclusive, estimates only were available for fixing the area under the crop in England and Wales. For Scotland, returns were collected by the Highland Society for the years 1854, 1855, 1856, and 1857; but for the two years prior to 1854, and for the eight years 1858–65 inclusive, estimates only had to be relied upon. For Ireland, returns have been available from the

commencement of our inquiry up to the present time. For 1866, and for each year since, thanks to the exertions of the late Sir James (then Mr.) Caird, we have an official record of the area under the crop, in each division of the United Kingdom, and in the whole collectively, in the "Agricultural Returns" annually published about the time of harvest. For the last twenty-six years, therefore, one element of uncertainty in any estimates of the home produce of wheat has been removed.

The Average Yield of Wheat per Acre.—For 1884, and each year since, estimates of the average yield of wheat per acre in England, Wales, Scotland, Great Britain, Ireland, and the United Kingdom as a whole, have been published by the Board of Agriculture, in the "Agricultural Produce Statistics." But, prior to that date, the only returns or official estimates at command relating to the subject were, for Scotland for four years, 1854–57, and for Ireland for each year within the period of our inquiry; whilst, for England and Wales, comprising in the earlier years from 85 to 90, and in the later nearer 95, per cent. of the total area under the crop, there was no official information whatever for any year prior to 1884, as above referred to. For this large proportion of the United Kingdom it was, therefore, after very full consideration of the data, and of the results to which they led, decided to adopt the average produce per acre each year on certain selected and very differently manured plots, in the permanent experimental wheat field at Rothamsted, as the basis of the estimates of the average produce per acre each year; and the same data have been relied upon in forming an estimate of the average produce over the United Kingdom as a whole. But, having regard to the character of the soil of the experimental field at Rothamsted, to the characters of the individual seasons, and to the consideration whether the season was more favourable for heavy or for light land, and so on, the estimate actually adopted for the country at large has, in some seasons, and especially in bad seasons, differed somewhat from the actual average indicated on the selected plots in the experimental field. Lastly, in all cases, the actual number of bushels per acre has been reduced by calculation into bushels of the adopted weight of 61 lb. per bushel.

For detailed discussion, and for illustrations of the applicability of the data for the purposes of an estimate of the yield of the country at large, so far as evidence was available at that time after adopting them for a period of sixteen years, we must refer to our first paper on the subject published in the Journal in 1868; and for further discussion, after the application of the data for a period of twenty-eight years, to our papers given in the *Journal*

of the Statistical Society, and in this Journal, in 1880, as already referred to. We have now, however, experience in the use of such data for a period of forty years; and, with this aid, it is proposed further to examine into their validity, and to the trustworthiness of the results arrived at, as tested by subsequent knowledge, and by the accordance or otherwise of the results so obtained, with conclusions arrived at with regard to other elements of the question.

The Aggregate Home Produce, and the Amount of it available for Consumption.—It is obvious that if the area under the crop, and the average yield per acre, are known, the aggregate home produce is very easily calculated. In estimating the amount of the total produce which is available for consumption, deduction has to be made for the amount annually returned to the land as seed. As explained in our first paper (in 1868), we then assumed $2\frac{1}{4}$ bushels per acre (calculated on the acreage of the past year for the next) to be on the average so returned to the land; and this amount was deducted from the aggregate produce for each year from 1852 to 1886 inclusive; but, for 1887 and each year since, only 2 bushels per acre have been deducted from the total home produce in estimating the amount available for consumption.

The imports.—For the whole of the period to which our inquiry relates, returns have been available for the United Kingdom collectively, either of the net imports of wheat and of wheat-flour, or of the imports and exports from which the net imports could be calculated. For the separate divisions of the country the returns have not been so complete; and, mainly for this reason, we have, since our first paper, in 1868, confined attention to the United Kingdom as a whole. For the United Kingdom, returns are available for the individual weeks or months; and, as our estimates are made, not for calendar, but for "harvest-years," that is, from September 1 of one year to August 31 of the next, the records enable us to calculate the net imports for the exact period required.

The Population.—The Registrar-General publishes an estimate of the population at the middle of the calendar year for every year between one census and another; and from these data we have calculated the average number of consumers for the harvest-year. The middle of the calendar year being the end of June, and the middle of the harvest-year the end of February, the plan adopted has been to add to the number recorded for the preceding midsummer two-thirds of the difference between that figure and the number given for the next midsummer, thus bringing the estimate up to the end of

February. Of course, this can only be done after the record for the second midsummer is published, and hence the same plan is not available in estimating the population of the then current harvest-year soon after harvest each year. For this purpose, the plan has been to estimate the increase of population since the preceding midsummer up to the end of the following February (the middle of the harvest-year) at the same rate as that indicated by the recorded increase during the three months prior to the preceding midsummer. Such estimates can obviously be only approximate, and it has been suggested to us that it would be more correct to adopt the rate of increase on the whole preceding twelve months instead of on the three months only. This we did in our estimate for the then current harvest-year soon after harvest last year, and we propose to do the same in future. But, under any circumstances, the annually published estimates are only provisional; and, as above intimated, in any publication of the estimates of the average population, for the individual harvest-years, subsequent to the publication of the record for the second midsummer, the figure obtained during the current harvest-year has always been corrected accordingly. The results show some irregularities of increase, especially immediately after the census years, presumably from a new factor being then adopted for the calculation of the annual increase of population during the intercensal period. It will be seen further on, however, that some, and sometimes even material, corrections, beyond those above referred to, should be made, for some of which the data have not been available until quite recently.

The Average Consumption of Wheat per Head of the Population per Annum.—Previously to the publication of our first paper on this subject in 1868, a higher figure had generally been assumed than we were then led to adopt. For England and Wales we founded an estimate of the average consumption per head of the population, on the calculation of eighty-six different dietaries, arranged in fifteen divisions, according to sex, age, activity of mode of life, and other circumstances; and the result so obtained was compared with that arrived at on the basis of population, and of the amounts of the estimated available home produce, and of the net imports, of wheat each year. For Scotland and for Ireland it was only possible to found an estimate on the basis of population and the estimated amounts of the home and foreign supplies. On these bases, the average consumption of wheat in the United Kingdom collectively was reckoned at 5·1 bushels (of 61 lb. per bushel) per head of the population per annum during the first eight years, 1852–53 to 1859–60, and at

5·5 bushels during the second eight years, 1860–61 to 1867–68; and in the subsequent annually published estimates that figure was adopted up to 1879–80 inclusive. But, on the review of the estimates and their results in our second paper, in 1880, the consumption was estimated at 5·6 bushels during the third eight years, and 5·65 subsequently; and this last figure has been adopted since that date, that is, from 1876–77 up to the present time. The correctness of this estimate in the past, and its continued applicability in the future, will be considered farther on.

Reconsideration of the Data.

From the foregoing review it results that, so far as the area under the crop, and the amount of the imports, are concerned, the same data must be relied upon as heretofore. But, in regard to the average produce of wheat per acre over the United Kingdom each year, the estimates of the population each year, and those of the consumption per head of the population, the basis of the estimates, and the results arrived at, will now, after the experience of forty years, and with the further information available, be submitted to careful re-examination, and be confirmed or corrected accordingly, as the case may be.

The Estimates of the Average Produce of Wheat per Acre in the United Kingdom each Year.

We will first consider the validity of the estimates of the average yield of wheat per acre over the United Kingdom each year. As already stated, they have been founded on the average produce obtained on certain selected plots in the field at Rothamsted, which is now growing the crop for the fiftieth year in succession—without manure, with farmyard manure, and with various artificial manures. There has been no change in the treatment of either the unmanured or the farmyard manure plot since the commencement of the experiments in 1843–44. There were, however, some changes in the manures applied to the various artificially manured plots during the first eight years, that is, to 1850–51 inclusive. But, for all the subsequent crops, from 1852 up to the present time, two of the three selected artificially-manured plots have, respectively, received exactly the same manure each year, and the third has done so for a period of thirty years from 1854–55 to 1883–84; after which, from 1884–85 and since, another plot has received the same manures, and from that time the results obtained on it have been brought into the calculation, as further explained below.

The selected plots are :—

Plot 3. Unmanured every year, commencing 1843–44.

Plot 2. Fourteen tons farmyard manure every year, commencing 1843–44.

Plot 7. Mixed mineral manure, and 400 lb. ammonium-salts, each year, commencing 1851–52.

Plot 8. Mixed mineral manure, and 600 lb. ammonium-salts, each year, commencing 1851–52.

Plot 9 (or 16). Mixed mineral manure, and 550 lb. sodium nitrate, each year, thirty years, 1854–55 to 1883–84, on Plot 9; and the same manures on Plot 16, 1884–85, and each year since.

In forming the estimate of the average produce per acre in the United Kingdom each year, the plan has been to take the mean produce of the unmanured plot, the farmyard-manure plot, and of the three artificially manured plots reckoned as one, and to reduce the result so obtained to bushels of the adopted weight of 61 lb. per bushel. As will be shown farther on, experience has proved that this mode of computation leaves little to be desired as a means of estimating the average yield of the country at large over a number of years, and indeed for most individual years. It has not, however, been found equally applicable for every individual year. Careful comparison leads to the conclusion, that the so calculated average produce per acre, on the selected plots, probably gives somewhat too high a result for the country at large in seasons of great abundance, and too low a result in very unfavourable seasons. Accordingly, as already referred to, in some seasons, instead of the actual average indicated by the experimental plots, a higher or a lower figure has been adopted; and, especially in the case of some bad seasons, a higher one has been taken.

Independently of any such admitted occasional differences between the so directly calculated, and the actually adopted, estimates for individual years, the questions arise—whether the average result indicated by the several selected plots remains as applicable as heretofore? Or whether the produce of some of them is annually declining, or that of others annually increasing, irrespectively of the influence of season; so as to vitiate the continued applicability of the results for the purposes of the estimate for which they have hitherto been employed? This point was carefully considered in our paper in 1880, on a review of the results obtained up to that time, that is, over a period of twenty-eight years; and, with the additional experience now extending to forty years, we on the present occasion submit it to further detailed re-consideration.

The Unmanured Plot.—There can be no doubt that the produce of this plot has gradually declined; and, independently of the evidence of diminishing produce, analyses of the soil, at different periods, show that there has been a gradual diminution in the amount of nitrogen in it. But, owing to the great fluctuations in the amount of produce from year to year dependent on season, it is by no means easy to estimate the decline due to exhaustion of the soil, as distinguished from variations due to the seasons.

In the first place it is difficult to say what figure should be adopted as the standard produce of the plot by which to compare the yield from year to year. The whole field was manured with farmyard dung in 1839, and then grew turnips (fed on the land), barley, peas, wheat, and oats, before the commencement of the experiments in 1843–4. The plot then grew eight crops of wheat without manure, to 1850–1, before the commencement of the period to which our present estimates refer. Although, at the conclusion of the five-course rotation since manuring above described, the land would doubtless be, in an agricultural sense, so far exhausted as to require re-manuring, there can be no doubt that there would nevertheless be some accumulation due to comparatively recent manuring and cropping. It would be supposed, however, that the growth of wheat for eight years in succession without manure would remove most, if not all, accumulation which could be attributed to comparatively recent treatment. Indeed, there can be little doubt that the land would suffer more or less exhaustion during those eight years; but, as serving to counteract the tendency to decline in yield from exhaustion during that period, it happened that, taken together, those eight seasons were of more than average productiveness.

Upon the whole, therefore, it was, in 1880, considered that the average produce of those eight years, which was 17 bushels per acre, at 61 lb. per bushel, might be taken fairly to represent the standard produce of the unmanured land, independently of material exhaustion. Adopting this as the standard, we endeavoured to estimate whether, or to what extent, there had been decline in yield during the twenty-eight years, due to exhaustion, independently of variations due to season. To this end we first endeavoured to calculate what should be the produce in each year subsequent to the first eight, provided there were no decline from exhaustion, but only variation from season. Assuming that, if there were no exhaustion, it would each year fluctuate from the standard under the influence of season in the same proportion as the fluctuation of the adopted average yield

of the country at large, the produce that the unmanured plot should yield each year has been calculated; and the difference between the result so obtained and the actual yield of the plot each year shows the excess or deficiency of the actual produce, and, if deficiency, indicates the decline due to exhaustion.

In 1880, with the results for twenty-eight years then at command, such a calculation showed an average deficiency over the period of rather more than $4\frac{3}{8}$ bushels. This, therefore, according to the mode of calculation adopted, represented the decline of the produce on the unmanured plot during that period irrespectively of season. The results further showed that, supposing the decline had been uniform over the whole period, it would correspond to a rate of diminution of between one-quarter and one-third of a bushel from year to year. It was suggested, however, whether with a return of better seasons the decline would be as marked. In reference to this point it may be stated, that the last nine of the twenty-eight years gave a lower average produce over the country at large than any equal period of the previous nineteen or of the succeeding twelve years; and that they gave an average of only 9 bushels per acre on the unmanured plot against $12\frac{3}{8}$ bushels over the succeeding twelve years. Following the same line of calculation for forty years, with, as above referred to, a return of better seasons, especially during the last eight or nine years, to 1891 inclusive, the figures showed almost exactly the same average deficiency of actual produce, compared with the standard of 17 bushels, over the forty years as was formerly found for the twenty-eight years, namely, $4\frac{1}{2}$ bushels, against rather more than $4\frac{3}{8}$ bushels over the twenty-eight years. This, if the decline had been uniform, would correspond to less than a quarter (about two-ninths) of a bushel per acre from year to year over the forty years, instead of nearly one-third of a bushel over the twenty-eight years. But even this reduced rate of decline, due to a return of better seasons, indicated a calculated produce on the unmanured plot of only about 8 bushels in the fortieth year, against an actual produce over the last three years of about 13 bushels; and it showed an average of only about 9 bushels over the last ten years, against an actual average of nearly $12\frac{1}{2}$ bushels.

It was concluded, therefore, that the adopted standard of 17 bushels showed a greater decline than was indicated by the actual produce obtained, and that that standard was too high. Accordingly, the calculations have now been made on the assumption that the standard unmanured produce with which to compare the actual produce, as influenced by exhaustion, was only 16 bushels.

Adopting 16 bushels as the standard, the result is, that with an average actual produce over the twenty-eight years of rather over $12\frac{1}{2}$ bushels, the average decline is less than $3\frac{1}{2}$ instead of nearly $4\frac{1}{2}$ bushels when 17 was taken as the standard; and the rate of decline from year to year is rather less than one-quarter of a bushel, instead of, as before, nearly one-third of a bushel. And, whilst with a standard of 17 bushels the calculated produce in the twenty-eighth year was little more than 8 bushels, with a standard of 16 bushels it is more than 9 bushels.

Then, the results for forty years show, with a standard of 16 bushels, and an actual average produce of about $12\frac{1}{2}$ bushels, an average decline of about $3\frac{1}{2}$, instead of about $4\frac{1}{2}$ bushels with a standard of 17 bushels; and the average rate of reduction from year to year is little more than one-sixth of a bushel instead of nearly one-quarter of a bushel, with 17 bushels as the standard. Further, whilst with 17 bushels as the standard, the calculated produce would amount to little more than 8 bushels in the fortieth year, showing a deficiency of nearly 9 bushels, with a standard of 16 bushels the calculated produce would be more than 9 bushels in the last year, and the reduction less than 7 bushels since the beginning.

Upon the whole, therefore, assuming the standard produce of the unmanured plot to have been 16 bushels per acre independently of material exhaustion, there was an average decline from year to year of rather less than a quarter of a bushel over the twenty-eight years, and of little more than one-sixth of a bushel over the forty years. It will be seen that a return of better seasons since the first twenty-eight has led to a considerable reduction in the estimate of the rate of decline from year to year due to exhaustion. It remains to be seen what will be the result in the future; and whether a point has already been, or will in time be reached, at which the produce will remain constant, excepting so far as it is influenced by the fluctuations of the seasons.

The Farmyard Manure Plot.—It has been seen that the unmanured plot has declined in yield and fertility; but there can be no doubt that the farmyard manure plot has, on the other hand, increased in fertility. Analyses of the surface soil at different periods has shown that it has become about twice as rich in nitrogen as that of the unmanured plot. It has, indeed, been shown on several occasions, that a large amount of the constituents of farmyard manure accumulates within the soil, and that they are very slowly taken up by crops; in fact, notwithstanding this great accumulation within the soil, the wheat crops on the dunged plot seldom, if ever, show over

luxuriance; and in unfavourable seasons the produce has been comparatively small, largely owing to the encouragement of weeds, and especially of grass, which, in wet seasons, it has been impossible effectually to eradicate, and what has been done has not been accomplished without injury to the crop.

In writing upon the results of the twenty-eight years, 1852–1879, we adopted, as in the case of the unmanured plot, the average of the preceding eight years, 1844–51, to represent the standard yield of the farmyard manure plot, irrespectively of material accumulation. The figure so arrived at was 28⅛ bushels at 61 lb. per bushel. Adopting this as the standard produce of the plot, then calculating what would be the produce in each of the subsequent twenty-eight years, provided it fluctuated from the standard from year to year in the same degree as the fluctuation of the average produce of the country at large, and then taking the difference between this calculated produce fluctuating by season alone, and that actually obtained each year, the result indicated the increase, if any, due to accumulation. On this mode of calculation, the average increase due to accumulation would amount, over the twenty-eight years, to about 5 bushels; and the average rate of increase from year to year, provided it were uniform throughout the period, would be rather less than ⅜ of a bushel.

Adopting the same amount, 28⅛ bushels, as the standard yield, and following the same line of calculation for the forty years, the average increase would amount to rather over 6¼ bushels, and the rate of increase from year to year, if uniform throughout the period, would be rather less than one-third of a bushel; that is, less per annum over the forty than over the twenty-eight years, which, towards the end, included a series of very unfavourable seasons.

Such are the results for the twenty-eight and for the forty years, on the assumption that the standard produce of the farmyard manure plot, irrespectively of material accumulation, was only 28⅛ bushels. This is, however, certainly a very low produce to be obtained by the annual application of 14 tons of farmyard manure per acre for eight years in succession, and in seasons which, taken together, were of more than average productiveness. If, however, we exclude the produce of the first of the eight years, 1844, which gave a high yielding crop over the country at large, but less than 20 bushels on the farmyard manure plot, the average of the remaining seven years amounts to 29·3 bushels, whilst three of the seven yielded more than 30 bushels, and two others 29 bushels or more. Adopting 29·3 bushels as the standard instead of 28⅛, the result would be an

average increase of only about $3\frac{3}{4}$ instead of about 5 bushels over the twenty-eight years, and of only $5\frac{1}{8}$ bushels instead of $6\frac{1}{4}$ over the forty years; whilst the average increase from year to year, if uniform throughout the period, would be little more than one-quarter of a bushel instead of nearly $\frac{3}{8}$ of a bushel over the twenty-eight years, and little over one-quarter of a bushel instead of nearly one-third of a bushel over the forty years.

The general result is, then, that if we exclude the produce of the first of the eight preceding years (1844), which the fact of the high produce over the country at large, and the low produce of the experimental plot, seems fully to justify, we get a standard produce of the farmyard manure plot of 29·3 instead of $28\frac{1}{8}$ bushels by which to calculate the subsequent increase from accumulation; and the estimated rate of increase is accordingly lower.

The Artificially-manured Plots.—Neither the previous history of the plots, nor common experience, enables us to adopt a standard average produce for the respective manures, with which to compare the actual produce each year, so as to form a judgment whether there has been progressive decline or progressive increase in the productive effect of the manures irrespectively of fluctuations dependent on season. If we take the average produce of either of the plots over the twenty-eight or the forty years as its standard produce, and then take the difference between this standard and the actual yield each year, we get more or less difference, sometimes plus and sometimes minus in the individual years, according to the characters of the season; but over the total period of twenty-eight or forty years, the average of which is taken for the standard, the pluses and the minuses necessarily balance one another; showing, therefore, neither progressive decline nor progressive increase due to the manure.

A careful study of the results in detail also indicates that there is practically no appreciable variation from year to year in the produce of the respective manures, other than that obviously attributable to the seasons. Or, if we divide the total period into a number of shorter ones, the difference of result for each of the shorter periods is again seen to depend on the favourable or unfavourable conditions of the seasons included. On the other hand, the examination clearly shows, that the selected artificially manured plots give a proportionally higher produce in seasons of high productiveness than the excess over the average in the country at large would indicate. In other words, so far as the yields of the selected artificially manured plots are brought into the estimates, they tend to indicate somewhat too high a

produce in the better seasons, and somewhat too low a produce in unfavourable seasons.

If, then, as a careful examination of the facts seems to indicate, the yield of the unmanured plot has somewhat declined from exhaustion, and that of the farmyard manure plot has in a rather greater degree increased from accumulation, whilst the produce of the selected artificially manured plots has not changed otherwise than from year to year, according to the fluctuations of the seasons, the question arises whether, or to what extent, the average results of the whole of the selected plots should be considered inapplicable as a basis for estimating the yield for the United Kingdom each year, either during the past forty years, or in the future.

In order to form a judgment on this point, the produce of the unmanured plot in each of the past forty years has been increased in the proportion in which the previous calculations showed that there had probably been decline from exhaustion, and that of the farmyard manure plot has been reduced in the proportion in which the calculations showed that there had probably been increase from accumulation. That is to say, the actual results have been corrected on the assumption that there had been neither decline from exhaustion in the one case, nor increase from accumulation in the other. Then, the average of the thus corrected produce of the unmanured and of the farmyard manure plot, and of the three artificially manured plots (which are supposed not to have changed) taken as one, has been calculated, and this corrected or calculated average produce of the selected plots each year has then been deducted from the average of the actual average results, the difference showing the excess of the actual over the calculated result each year, due to the greater increase by accumulation on the farmyard manure plot, than decline by exhaustion on the unmanured. The result indicates an average over the forty years of rather more than half a bushel excess of produce per acre per annum; and an excess of rather over a bushel in the fortieth year, supposing the rate of increase had been uniform throughout the period. Whether or not this change vitiates the applicability of the data as hitherto used, or their utility for the same purpose in the future, will be better seen farther on.

It has already been explained, that the average produce of the selected plots probably indicates somewhat too high a result for the United Kingdom in seasons of great abundance, and too low a result in very unfavourable seasons, and that, accordingly, in some seasons a higher or a lower figure has been adopted; but that the estimates so founded on the produce of

the selected plots have, as a matter of fact, been proved to be very near the truth for series of years, and in most cases for individual years also. Illustrations of this will be adduced farther on.

The Results for the Forty Years, according to the previously adopted Standards.

Appendix-Table I. (p. 132) gives the particulars of the home produce, the imports, and the consumption, of wheat in the United Kingdom, for the forty harvest-years, 1852–3 to 1891–2, in the same form as published in former papers for shorter periods. The area under the crop, the estimated average produce per acre, the total home produce each year calculated therefrom, and the amount available for consumption after deducting the quantity required for seed, are, for the first twenty-eight years, the same as given in our last paper on the subject in the Journal (Vol. XVI., 2nd Series, Part 2, 1880); and for the subsequent years they are, with some immaterial subsequent corrections, the same as given in the annual letter on the wheat crop of the country.

The net imports (imports less exports) have, however, been recalculated throughout on one uniform basis. Thus, the same source is now adopted throughout, namely, the "Trade and Navigation Returns," which formerly had not been used for the earlier years; and we have now to thank Mr. Giffen, of the Board of Trade, for kindly giving us access to the records. Again, for the earlier years, the quantities of wheat returned in cwts. were calculated into equivalent quarters, and the quantities of "wheat-meal and flour" returned in cwts. into their equivalent quarters of wheat, by factors not always precisely corresponding with what seem to have been the officially adopted relations. Now, the wheat imported as wheat, and returned in cwts., has been converted into quarters, as we understand had been done by the Departments, by multiplying the cwts. by $\frac{3}{1\,5}$, which gives quarters of $485\frac{1}{3}$ lb.$=8$ bushels of $60\frac{2}{3}$ lb. per bushel; and the imported "wheat-meal and flour," returned in cwts., has been calculated into quarters of wheat (also as we understand had as a rule been done by the Departments) by reckoning $3\frac{1}{2}$ cwts. of "wheat-meal and flour" to be equivalent to a quarter of wheat. This calculation corresponds to 80·77 by weight of "wheat-meal and flour" to 100 of wheat; and it gives the result in quarters of wheat of $60\frac{2}{3}$ lb. per bushel. In some of the earlier years, however, it is stated in the Returns that 1 cwt. of "wheat-meal and flour" was taken as equivalent to $1\frac{1}{4}$ cwt. of

wheat, which corresponds to 80 parts by weight of "wheat-meal and flour" to 100 of wheat.

The general result of the adoption of the above data, and of the slightly altered modes of calculation, has been to make changes which are practically immaterial; but it was thought better, on republication, to have the results calculated uniformly throughout.

The population is taken as before; but, as will be seen farther on, the figures will be subject to some alteration for the intercensal years, according to corrections subsequently published by the Registrar-General.

It is obvious that the alterations in the calculation of the imports, as above described, will slightly, though quite immaterially, affect the calculations of the amount of wheat available for consumption per head from home and from foreign sources respectively, within each year, and also the sum of the two.

Appendix-Table I. (p. 132) therefore gives, with what have turned out to be immaterial corrections, a complete record of the home produce, imports, and consumption, of wheat over the forty years of our estimates, so far as already published, either in our former papers or in the annual estimates; and before applying to the estimates of the past, the alterations or corrections which we have stated will be necessary in the future—in accordance with the altered standards recently adopted by the Departments in the calculation of cwts. of wheat into quarters, and of cwts. of "wheat-meal and flour" into quarters of wheat, and with the corrections of the population since recorded by the Registrar-General—it will be instructive to consider the bearing of the results obtained without these alterations, for the period of forty years, as formerly for shorter ones.

We will first compare in this way the directly calculated average produce of the selected experimental plots at Rothamsted, with the annually adopted estimate of the average produce of the United Kingdom founded upon them; and next show how far the adopted estimates have been borne out by other evidence bearing upon the subject.

The following Table (I.) shows, for each of the first four eight-yearly periods, for the next five years, and for the total thirty-seven years, 1852–88 inclusive,—also separately for the last three years, 1889–91, and for the total period of forty harvest-years, 1852–91,—the produce of wheat per acre, in bushels of 61 lb., as hitherto always reckoned, as under :—

1. The directly calculated mean produce per acre on the selected plots in the experimental wheat field at Rothamsted.

2. The annually adopted estimates of the produce per acre in the United Kingdom, as founded on the results obtained on the selected plots.

3. The produce per acre, as calculated by deducting the net imports, subsequently recorded, from the total estimated requirement for consumption given as forecast each year, adding to the result the amount assumed to be returned to the land as seed, and dividing the product by the area under the crop.

TABLE I.

	Produce per acre, at 61 lb. per bushel		
	Directly calculated mean produce of the selected plots	According to annually adopted estimates	According to consumption and imports
	Bushels	Bushels	Bushels
Averages for:—			
8 years 1852–3 to 1859–60 . .	27½	28	28⅛
8 „ 1860–1 „ 1867–8 . .	29	28⅜	28½
8 „ 1868–9 „ 1875–6 . .	27	26⅜	26⅞
8 „ 1876–7 „ 1883–4 . .	23	24⅞	24¾
5 „ 1884–5 „ 1888–9 . .	29	28⅞	30¾
37 „ 1852–3 „ 1888–9 . .	27	27¼	27½
3 „ 1889–90 „ 1891–2 . .	30¼	30¼	26⅛
40 „ 1852–3 „ 1891–2 . .	27¼	27½	27½
5 years 1884–5 to 1888–9 . .	29	28⅞	30¾
3 „ 1889–90 „ 1891–2 . .	30¼	30¼	26⅛
8 „ 1884–5 „ 1891–2 . .	29½	29⅜	29⅛

It will be seen that although the Table relates to a period of forty years, the results are given for four periods of eight years and for one of five, making together only thirty-seven years; and that those for the last three years, and the average for the total forty years, are given separately. The reason is, that, notwithstanding very much labour annually bestowed on hand-hoeing, the land had, in the later years, partly owing to the characters of the seasons, become very foul; *Alopecurus agrestis* (slender fox-tail) being the most prominent and troublesome weed. Hence, for the crops of 1889, down one-half the length of the plots (the top), only alternate rows were sown, in order, as far as possible, to eradicate this and some other plants; the other half (the bottom) being sown in the usual way. For the crop of 1890, on the other hand, the full number of rows were sown on the top half, and only alternate rows on the bottom, in order

the better to clean that portion. For the crop of 1891, however, the full number of rows were again sown over the whole length of each plot.

In 1889, the produce of the ordinarily or thick-sown portion of the land was taken as the produce of the plot; and this being the bottom portion, which is the worst half of the plots, was undoubtedly abnormally low; the selected plots yielding a mean produce of only $27\frac{1}{2}$ bushels at 61 lb. per bushel, whilst our actually adopted estimate was $29\frac{1}{2}$ bushels.

In 1890, the top half of the plots was ordinarily sown, and this portion being not only the better half, but having been only thin-sown—that is, partially fallowed—in 1889, the produce was without doubt abnormally high; the average produce of the selected plots being $37\frac{1}{4}$ bushels, whilst we estimated the yield of the country at large to be only $31\frac{1}{2}$ bushels. Accordingly, we have adopted the mean produce of the thick- and the thin-sown portions, as more nearly representing the normal produce of the plots; and this gives an average for the selected plots of $30\frac{7}{8}$ bushels, which is not much less than our adopted average yield for the United Kingdom.

Lastly, in 1891, the entire plots were ordinarily sown, but after partial fallow of the top half in 1889, and of the bottom half in 1890. The produce was, therefore, assumed to be abnormally high. The average of the selected plots gave $32\frac{3}{8}$ bushels at 61 lb. per bushel; but we estimated the crop of the country at only $29\frac{1}{2}$ bushels at 61 lb., or 30 bushels at 60 lb. per bushel.

It was, therefore, under abnormal conditions of the land, that abnormal results were obtained in the last three years of the forty, and hence the same accordance as usual between the actual produce of the selected plots and the estimated yield of the country in the individual years was not to be expected. It is seen, however, that the average yield of the selected plots over these three years taken together was, nevertheless, identical with the estimated yield of the United Kingdom over the same three years—namely, $30\frac{1}{4}$ bushels.

Let us now consider the estimates of yield per acre calculated in the three different ways, over the individual periods, and over the total period of the first thirty-seven of the forty years. Although in the majority of seasons the mean produce of the selected plots closely represents the average produce per acre of the United Kingdom, as has already been stated it generally indicates a somewhat higher yield than the average of the country at large in seasons of high productiveness, and a somewhat lower one in unfavourable seasons; and hence, in some

seasons, we have adopted an estimate rather higher or rather lower, as the case may be, than the exact experimental results would indicate. Accordingly, the figures show that, over the eight years 1860–1 to 1867–8, which included several of very high productiveness, the average yield on the selected plots was 29 bushels, whilst the average of the annually adopted estimates for the United Kingdom over the same period was $28\frac{3}{8}$ bushels, or rather less. Again, over the eight years 1876–7 to 1883–4, which included some exceptionally bad seasons, the selected plots gave an average of only 23 bushels, whilst the average of the annually adopted estimates of the yield of the United Kingdom was $24\frac{7}{8}$ bushels. Taken over the whole period of the thirty-seven years of normal treatment of the land, however, the selected plots indicate an average of 27 bushels, against $27\frac{1}{4}$, according to the annually adopted estimates. In other words, there is, over the thirty-seven years, only a difference of a quarter of a bushel per acre per annum between the direct indication of the produce of the selected experimental plots and the results of the annually adopted estimates. Lastly, even including the abnormal results of the last three years, the average for the forty years is seen to be $27\frac{1}{4}$ bushels according to the actual results of the selected plots, and $27\frac{1}{2}$ bushels according to the annually adopted estimates, showing, therefore, a difference of only $\frac{1}{4}$ bushel over the forty years.

We will now compare the annually adopted estimates of the produce of the country at large with the results given in the last column of the Table, which are obtained by deducting the subsequently recorded net imports from the estimated total requirement for consumption, each year adding the amounts required for seed, and dividing the product by the number of acres under the crop. It is seen that, over each of the first four eight-yearly periods, there is a difference of only $\frac{1}{8}$ bushel per acre between the average of the annually adopted estimates and the average of the results founded as above on consumption and imports over the same periods.

Over the subsequent five years, however, whilst the average of the annually adopted estimates indicates $28\frac{7}{8}$ bushels per acre for the home crop, the calculated result founded on consumption and imports shows $30\frac{3}{4}$ bushels, or a difference of $1\frac{7}{8}$ bushels in excess of the average of the estimates. On the other hand, over the last three years, whilst the average of the annually adopted estimates is $30\frac{1}{4}$ bushels, the result founded on consumption and imports indicates only $26\frac{1}{8}$ bushels, or a deficiency of $4\frac{1}{8}$ bushels. The facts are, as will be seen farther on, that the amounts available for consumption per head of the population from home

and foreign supplies taken together, were comparatively low within the five years, the imports not increasing at so rapid a rate as previously; whilst during the last three years, and especially in the last harvest-year (1891–2), the imports were very much in excess of the requirements. Hence, during the five years, the amount of imports to deduct from the requirements for consumption were comparatively low, leaving, according to the mode of calculation, a larger proportion to be apparently derived from the home produce; whilst, over the last three years, the imports being undoubtedly in excess of the requirements, deducting them from the requirements leaves a too low amount to be credited to the home crop. If, however, we take the average for the two periods of five and three years together, that is, for the last eight years, as shown in the bottom line of the Table, the average of the annually adopted estimates, and the result founded on consumption and imports, differ by only $\frac{1}{4}$ of a bushel.

Finally, taking the result for the total period of forty years in each case, the average of the annually adopted estimates, and that calculated from consumption and imports, are identical, namely $27\frac{1}{2}$ bushels; whilst the actual average produce of the selected plots is $27\frac{1}{4}$ bushels.

So much for the validity, in the past, of the results of the selected plots in the experimental field at Rothamsted, as a basis for the annual estimation of the yield per acre of the United Kingdom.

We will now consider how far the estimates of the total home crop available for consumption arrived at as above, together with the actually returned net imports each year, indicate amounts consumed per head of the population from home and foreign sources respectively, and from the two together, which confirm the estimates that have been annually made of the total requirement per head of the population.

Table II. (p. 97) shows, for each of the first four eight-yearly periods, for the next five years, and for the total thirty-seven years, also for the last three years, and for the total period of forty years, the amounts of wheat available for consumption per head per annum, from home and from foreign sources respectively, and from both together, according to the estimates of the home, the actual records of the foreign supplies, and the returns of the population, as given in the Appendix-Table I. (p. 132); and, in the last column of the Table there are given for comparison, the averages for each period of the annually adopted estimates of the total requirement per head of the population. It should be added that, in these calculations relating to our past estimates, the

population for each year has been taken as adopted in our previous papers and annual estimates, which are, as has been explained, subject to alteration in accordance with corrections made from time to time by the Registrar-General, and which will be carried out in subsequent Tables.

The first point to notice in the Table is the marked reduction from period to period in the amount and proportion of the total requirement for consumption which is supplied by the home-crop. Thus, according to the figures, 3·74 bushels were obtained per head per annum from the home produce over the first eight years, and only 1·83 bushel, or less than half as much,

TABLE II.

	Available for consumption per head			Adopted total requirements per head per annum
	From home produce	From imports	Total	
	Bushels	Bushels	Bushels	Bushels
Averages for :—				
8 years 1852–3 to 1859–60 .	3·74	1·33	5·07	5·10
8 „ 1860–1 to 1867–8 .	3·31	2·18	5·49	5·50
8 „ 1868–9 to 1875–6 .	2·93	2·66	5·59	5·60
8 „ 1876–7 to 1883–4 .	2·03	3·63	5·66	5·65
5 „ 1884–5 to 1888–9 .	1·83	3·69	5·52	5·65
37 „ 1852–3 to 1888–9 .	2·85	2·61	5·46	5·49
3 „ 1889–90 to 1891–2 .	1·83	4·07	5·90	5·65
40 „ 1852–3 to 1891–2 .	2·77	2·73	5·50	5·50
5 years 1884–5 to 1888–9 .	1·83	3·69	5·52	5·65
3 „ 1889–90 to 1891–2 .	1·83	4·07	5·90	5 65
8 „ 1884–5 to 1891–2 .	1·83	3·83	5·66	5·65

over the last eight years of the forty. On the other hand, imports supplied an average of only 1·33 bushel per head per annum over the first eight years of the forty, and 3·83 bushels, or not much less than three times as much, over the last eight.

Let us now turn to the third column, showing the total amounts available per head per annum from home and foreign sources taken together, and compare the results there given with those for the same periods in the last column, according to which the estimates of the requirement for consumption have been calculated each year as forecast. It is seen that, over each of the five eight-yearly periods, the amounts calculated from the estimated home-crop and the subsequently recorded imports,

agree almost absolutely with the annually adopted estimates for the same periods. For reasons already explained, however, when considering the results in Table I., the amounts calculated as available per head, from home and foreign sources together, are pretty certainly too low for the first five years of the last eight, and too high for the last three years. But, as will be seen in the bottom lines of the Table, the amount calculated as available per head per annum over the last eight years, that is, taking the five years and the three years together, is almost identical with, but very slightly in excess of, the annually adopted estimate for the period; the average amount calculated as available being 5·66 bushels, and the estimate for the period annually adopted as forecast being 5·65 bushels. Lastly, the average consumption per head per annum over the forty years is 5·50 bushels, reckoned from the amounts available from home produce and imports together, and it is absolutely the same taking the average of the annually adopted estimates of requirement per head over the same period.

Such, then, is the accordance of the estimate of the consumption per head per annum of the population, founded on the amounts of wheat available from home and foreign sources, with the annually adopted estimates of the requirement per head. It is to be remembered that these estimates of the past are on the assumption of $60\frac{2}{3}$ lb. per bushel for the doubtless somewhat drier foreign wheat, and of 61 lb. per bushel for the produce of the home crop.

Effects of the Application to our previous Records and Estimates of the recently adopted Standards or Corrections.

We have now to consider the differences which the changes in the weight per bushel of wheat, and in the relation of flour to wheat, which have been recently adopted, and also the corrections in the number of the population which have been referred to, would make in our results over the last forty years, if these various alterations were adopted throughout in the records and estimates of the past, as it is proposed they shall be in those of the future.

Appendix-Table II. (facing p. 132) gives, in precisely the same form as in Appendix-Table I. (p. 132), the results for the forty years as to the estimated home produce, the amount of it available for consumption, the imports, the total available supply, the population, and the amounts available per head per annum; but with the home produce, both per acre and aggregate, and the

imports, reckoned at 60 lb. per bushel instead of, as formerly, the home at 61 lb. and the foreign at 60⅔ lb. per bushel; also reckoning 72 parts "wheat-meal and flour," instead of, as formerly, 80·77, or 80 to correspond to 100 of wheat; and lastly with the corrected population. It also shows the percentage of the total available supply from home and foreign sources respectively.

Appendix-Table II. further shows the average *Gazette* price of the home wheat per quarter; and the calculated price per quarter of the imported wheat, according to the Trade and Navigation Returns, as will be explained farther on, for each harvest-year; the aggregate value of the wheat available within each harvest-year, both home and imported; also the aggregate value of the wheat estimated to be required, and the value per head, each year.

Before referring to the general and very important indications of this very comprehensive Table, it will be well to discuss the influence, on the results, of the several individual alterations adopted in it.

First as to the population:—The basis of the corrections subsequently adopted by the Registrar-General has already been explained (p. 78). It would serve little useful purpose to take up space by showing the corrections for each individual year, but a comparison of the columns showing the population each year, in the Appendix-Table I. uncorrected, and in the Appendix-Table II. corrected, will supply detailed information on the point. It will suffice here to point out the direction and range of the alterations over the several periods.

In the intercensal years from 1861 to 1871, and from 1871 to 1881, there is a progressively increasing addition made from the first to the last year from census to census in each case. This ranges over the first of the two intercensal periods, from between 2,000 and 3,000 in the first, to more than 400,000 in the last year of the ten; and over the second of these periods of ten years each, from about 26,000 in the first to about 18,000 in the last of the ten years. On the other hand, from 1881 to 1890 inclusive, there is, instead of an addition, a reduction in a greater proportion than the former additions. The reduction ranges from about 72,000 in 1882, to nearly 740,000 in 1890.

These statements relate to the returns of the Registrar-General, given for the middle of the year, that is, for the end of June in each case. But it is to be borne in mind that, in our Tables, the figures are given, not for the middle of the civil, but of the harvest-year; that is, for the end of February. The effects of the corrections above referred to on our eight-yearly periods of harvest-years are as follows:—Over the eight-

yearly period, 1852–3 to 1859–60, no alteration is made. Over the second period, from 1860–1 to 1867–8, with an average population of between 29 and 30 millions, the corrections show a progressively higher population than the original returns, ranging from under 2,000 in the first, to nearly 300,000 in the last of the eight harvest-years, and an average annual addition of about 132,000. Over the third period, 1868–9 to 1875–6, there is still a progressively increasing addition, amounting to about 400,000 in the second harvest-year; and then, after the census of 1871, there is at first a comparatively small increase, which only reached about 105,000 in the eighth year. Over the whole period of eight years, with an average population of nearly 32,000,000, the average annual increase, according to the amended as compared with the original returns, amounts to about 156,000. Over the fourth period, from 1876–7 to 1883–4, there is some increase over the five years up to the census of 1881, and afterwards, that is, over the last three years of the period, a greater annual reduction; the result being that, with an average population of rather more than 34,500,000, the corrections add an average annual number of less than 12,000. Lastly, over the last eight years, 1884–5 to 1891–2, there is, up to the census of 1891, a considerable deduction to be made from the earlier returns, amounting to more than 700,000 in 1889–90; but afterwards the reduction is quite insignificant. The general result, so far as this last eight-yearly period is concerned, is that, with an average population of about 37,000,000, the corrected figures, compared with the earlier, show an average annual reduction of about 370,000.

Taking the results for the forty years, the corrections in the direction of increase are so far compensated by those in the direction of reduction, that over the whole period they indicate an average annual reduction which amounts to only about 14,000. It will not be surprising, therefore, that although the uncorrected and the corrected figures for the population show some slight difference in the calculated amount of wheat available for consumption per head over individual periods, they make none whatever when the average is taken over the forty years. This is illustrated in Table III. on the opposite page.

It should be understood that the figures in the Table (III.) relate to the amounts of wheat available as recorded in Appendix-Table I. (p. 132), that is, without any alteration from the hitherto adopted relation of imported flour to wheat, and weights per bushel of 61 lb. for home, and of 60⅔ lb. for foreign wheat. Indeed, the figures in the first column are precisely the same

as those given in Table II. (p. 97); and those in the second are only altered in accordance with the corrected number of the population. It will be seen that whilst over the first and fourth periods the two columns show identical amounts, over

TABLE III.

	Total wheat available for consumption per head	
	Calculated on population as formerly given	Calculated on corrected population
	Bushels	Bushels
Averages for :—		
8 years 1852–3 to 1859–60 .	5·07	5·07
8 „ 1860–1 „ 1867–8 .	5·49	5·47
8 „ 1868–9 „ 1875–6 .	5·59	5·56
8 „ 1876–7 „ 1883–4 .	5·66	5·66
8 „ 1884–5 „ 1891–2 .	5·66	5·72
40 „ 1852–3 „ 1891–2 .	5·50	5·50

the second and third periods, the second (corrected) shows slightly lower figures, and over the fifth period the second column shows a slightly higher amount. The two calculations show, however, absolutely identical amounts reckoned over the total period of forty years.

The next point to consider is the effect, upon our past estimates, of the amount of wheat available for consumption, of the altered relation recently adopted by the Boards of Trade, Customs, and Agriculture, in calculating the imported "wheat-meal and flour" into their equivalent of wheat.

We have been informed that wheat imported as wheat and returned in cwts. was, until recently, converted into quarters by multiplying the cwts. by 3 and dividing by 13. This gives the weight of the quarter $=485\frac{1}{3}$ lb., corresponding to $60\frac{2}{3}$ lb. per bushel. Throughout the period of our inquiry, we have frequently checked the relation between the official returns of imported wheat in cwts. and its recorded equivalent in quarters, and we have always found it to be that above stated. Wheat imported as wheat has, therefore, been recorded in quarters of $60\frac{2}{3}$ lb. per bushel.

Then as to the calculation of imported "wheat-meal and flour" into its equivalent of wheat. In Vol. VI. of Tooke and Newmarch's *History of Prices*, published in 1857, they say (pp. 466–7), that "flour" returned in cwts. is calculated into imperial quarters of wheat at the rate of $3\frac{1}{2}$ cwts. of flour from

a quarter of wheat. Now, taking $3\frac{1}{2}$ cwts. of flour = 392 lb., and a quarter of wheat at the so long adopted weight of $60\frac{2}{3}$ lb. per bushel = $485\frac{1}{3}$ lb. per quarter, the relation is 100 of wheat for 80·77 flour. This is exactly the relation which we find to hold good in the official returns of flour in cwts., and its equivalent in quarters of wheat, for about the latter half of the period of our inquiry; but, at any rate in some of the previous years, the relation has been 80 parts of flour to 100 of wheat, instead of 80·77 to 100. Indeed, it is stated at the head of the Tables in some of the numbers of the "Statistical Abstract," that 1 cwt. of imported flour is reckoned as equivalent to $1\frac{1}{4}$ cwt. of wheat; and when the returns are so given, we have, for the purposes of our estimates, calculated the cwts. of wheat so obtained into quarters of 488 lb., corresponding to 61 lb. per bushel. It makes, in fact, comparatively little difference in the number of quarters of wheat, whether flour is reckoned into wheat at the rate of 80·77 flour to 100 wheat, and the wheat in quarters of $485\frac{1}{3}$ lb. = $60\frac{2}{3}$ lb. per bushel, or whether 80 flour to 100 wheat, and quarters of 488 lb. = 61 lb. per bushel, be adopted.

Such were the relations adopted in the official returns of imported wheat, and of imported "wheat-meal and flour," in the conversion and representation of them in quarters of wheat up to 1890 inclusive. Commencing with 1891, however, wheat has been reckoned in quarters of 60 lb. per bushel = 480 lb. per quarter, and 72 instead of 80·77 parts by weight of imported flour have been reckoned as equivalent to 100 of wheat. Further, it is, we are informed, proposed to correct the figures which relate to 1890 and 1889 in future issues of the accounts upon the same basis; and also, in summarising the imports of wheat and flour as wheat for a series of fifteen years, as is annually done in the "Statistical Abstract for the United Kingdom," to raise the equivalent 1 per cent. each year, for the nine years 1888 to 1880 inclusive; thus, in 1888, 73 flour for 100 wheat will be taken, in 1887, 74 flour, and so on, until in 1880 the old figure of 80·77 is reached; but earlier than this no change will be made.

The question obviously arises—how far the necessity for the change is due to corresponding real differences in the yield of flour obtained in the earlier and in the later years? It is quite certain that 80·77 parts by weight of ordinary bread-flour have not been obtained from 100 of wheat; and as in the official returns of the Board of Trade the imports have generally been designated as "Wheat-meal and Flour," the question is suggested whether any material quantity of *wheat-meal* properly so called—that is, simply the ground grain, of which the latter

would of course yield cent. per cent., less the small loss in grinding—be included. On this point we are informed that the imports of wheat-meal are quite insignificant. The question still remains—whether the imports included any large proportion of flour of lower grades, or of pollards? Here, again, we are informed that pollards are returned as such, and not included under the designation of flour. Then it is to be observed that, so long ago as 1857, Tooke and Newmarch designated the imports as "flour," and gave the relation of $3\frac{1}{2}$ cwt. of flour to a quarter of wheat as the basis of the conversion; and, as has been seen, this relation has substantially been adopted up till quite recent years.

Upon the whole, therefore, we conclude that the change recently adopted is a real correction of an estimate, dating from the time of the first adoption of the rough and ready reckoning of $3\frac{1}{2}$ cwt. of flour to a quarter of wheat. We think, however, that 72 for 100 of wheat is probably somewhat too low for the average of imported flours; and that at any rate 73, if not even a rather higher figure, would probably better represent the relation in the case of imported flours. That English millers consider the figure 72 too high, judged by the yield in this country, seems irrelevant to the present question, which has reference to imported flour alone. About three-fourths of the flour imported into the United Kingdom come from the United States, and from our own inquiries we are led to believe that, both at Minneapolis and at San Francisco, the yield of barrelled flour for export is certainly not less than 72 from 100 of wheat. Then about 10 per cent. of our imports come from Austrian territories, and the average yield there is probably at least 74 parts of flour from 100 of wheat.

Under all the circumstances, therefore, we have decided that if in our revised Table we assume the now adopted figure of 72 flour for 100 wheat as applying to the returns of imported wheat flour from the period of the commencement of our inquiry, namely, the harvest-year 1852–3, for the whole forty years ending 1891–2, we shall probably bring the figures more nearly into harmony with the actual facts, than by adopting any compromise or partial scheme founded on probably more uncertain data. A further reason in favour of the plan proposed is that, as will be seen presently, the amount of wheat represented by imported flour bears but an insignificant proportion to the whole quantity available from all sources in the earlier years, and a gradually increasing one up to the present time. The consequent alteration in the records for each individual year of the forty will be seen on comparing the uncorrected results given in

Appendix-Table I. (p. 132), with the corrected ones in Appendix-Table II. facing (p. 132).

The following Table (IV.) summarises, for each eight-yearly period, and for the forty years, the effect on the results of adopting throughout, 72 flour for 100 wheat, instead of, as formerly, taking $3\frac{1}{2}$ cwt. flour to a quarter of wheat, corresponding to 80·77 flour to 100 wheat. The first column shows the average amount of wheat per annum for each period, due to imported flour on the old calculation, and the second column corresponding results on the new basis. The right-hand division of the Table shows—in the first column the total available supplies of wheat, home and foreign together, with the imported flour reckoned according to the old factor; in the second column the same, but with imported flour reckoned into wheat by the new factor; and in the last column the difference. In all cases the imported wheat is reckoned in quarters of $485\frac{1}{3}$ lb., which correspond to $60\frac{2}{3}$ lb. per bushel.

TABLE IV.

	Imported wheat-meal and flour, as wheat		Total available wheat, home and imported		
	$3\frac{1}{2}$ cwt. wheat flour = 1 qr. wheat; or 80·77 to 100	72 flour to 100 wheat	$3\frac{1}{2}$ cwt. wheat flour = 1 qr. wheat; or 80·77 to 100	72 flour to 100 wheat	New calculations + or − old
Averages for :—	Quarters	Quarters	Quarters	Quarters	Quarters
8 years 1852–3 to 1859–60 . . .	928,900	1,042,035	17,814,000	17,927,135	+113,135
8 „ 1860–1 „ 1867–8 . . .	1,404,657	1,575,738	20,301,099	20,472,180	+171,081
8 „ 1868–9 „ 1875–6 . . .	1,434,758	1,609,504	22,219,508	22,394,254	+174,746
8 „ 1876–7 „ 1883–4 . . .	3,139,854	3,522,272	24,499,335	24,881,753	+382,418
8 „ 1884–5 „ 1891–2 . . .	4,630,006	5,193,917	26,438,261	27,002,172	+563,911
40 „ 1852–3 „ 1891–2 . . .	2,307,635	2,588,693	22,254,441	22,535,499	+281,058

The first two columns show that, over the first eight years, 1852–3 to 1859–60, the amount of wheat due to imported flour was less than 1,000,000 quarters; during the next two eight-yearly periods it rose to about $1\frac{1}{2}$ million quarters; during the fourth period to considerably over 3,000,000, or more than twice as much as formerly, and over the last eight years to about 5,000,000 quarters, or about $1\frac{1}{2}$ time as much as over the immediately preceding eight years. Lastly, the average per annum over the total period of forty years has corresponded to rather under $2\frac{1}{3}$ million quarters according to the old, and to over $2\frac{1}{2}$ million quarters according to the new calculation.

Turning to the results given in the last three columns of the Table, we there see the influence of the alteration on the estimate of the total available annual supply of wheat from all sources; the last column showing the increase over the former estimates of the supply, on the assumption that the new calculations more nearly represent the truth. It will be seen that the change represents an annual increase of supply over former reckonings of about 113,000 quarters over the first eight years, of about 171,000 over the second, of nearly 175,000 over the third, of more than 382,000 over the fourth, and of nearly 564,000 over the fifth eight-yearly period. Large as these amounts seem, especially in the later periods, it is satisfactory to know that they represent an increase in the total supply of only about 0·64 per cent. over the first eight years, 0·84 per cent. over the second, 0·79 per cent. over the third, 1·56 over the fourth, and 2·13 per cent. over the fifth eight-yearly period; whilst over the forty years they represent a difference of only 1·26 per cent.

Nevertheless, these quantities do represent a veritable and not immaterial amendment of the former estimates. The effect of the adoption of the change on our previous estimates of the average annual consumption of wheat per head of the population is brought to view in Table V. The first column shows our annually adopted estimates of the consumption per head; and the remaining columns the amounts available per head. The second column shows the amounts of the total available, derived from the home produce; the third and fourth the amounts derived from imports, according to the old and the new calculation

TABLE V.

—	Adopted average consumption per head	Available for consumption per head					
		From home produce	From imports		Total from home produce and imports		
			80·77 flour to 100 wheat	72 flour to 100 wheat	80·77 flour to 100 wheat	72 flour to 100 wheat	New results + or − old
	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels
Averages for:—							
8 yrs. 1852–3 to 1859–60	5·10	3·74	1·33	1·36	5·07	5·10	+0·03
8 „ 1860–1 „ 1867–8	5·50	3·31	2·18	2·23	5·49	5·54	+0·05
8 „ 1868–9 „ 1875–6	5·60	2·93	2·66	2·70	5·59	5·63	+0·04
8 „ 1876–7 „ 1883–4	5·65	2·03	3·63	3·71	5·66	5·74	+0·08
8 „ 1884–5 „ 1891–2	5·65	1·83	3·83	3·95	5·66	5·78	+0·12
40 „ 1852–3 „ 1891–2	5·50	2·77	2·73	2·79	5·50	5·56	+0·06

respectively; and the fifth and six columns the total amounts available per head from home and foreign sources together, also respectively, according to the old and the new calculations; and the last column shows the increase in the available total supply per head per annum, according to the new as compared with the old calculations.

In the first place it is to be observed, that the estimates of the average amounts available per head over the different periods from home produce, are, of course, in no way affected by the alteration in the calculation of the imports. It is seen, however, comparing the third and fourth columns, that there is, over each period, a slight increase in the estimated amount of the supplies from foreign sources, due to the alteration in the calculation of the amount of wheat corresponding to the imports of flour. There is necessarily the same amount of increase shown on comparing the fifth and six columns, which represent the total quantities annually available per head over each period, according to the old and the new calculation respectively. The actual amount of increase indicated as due to the new mode of estimate is shown in the last column. It is seen to be small over the first, second, and third periods, but greater over the fourth, and greater still over the fifth, amounting then to 0·12 bushel per head per annum.

On this point it may be observed, that the annually adopted estimates for the last eight-yearly period show an average annual requirement of 5·65 bushels, whilst the amount calculated from the available supplies of home and foreign wheat, and the population, show, for the same period, according to the old calculation, 5·66, and according to the new 5·78 bushels per head. It may be of interest to state, however, that an increase in the consumption of 0·12 bushel per head on a population of about 37 millions, which was approximately the average for the period, represents an increase in the annual requirement of about 564,000 quarters on the previously estimated amount of nearly 26,500,000 quarters.

It will be obvious that the change in the estimates of the total amount of wheat annually available for consumption, and of the annual consumption per head accordingly, in no way vitiates the significance of the accordance of the estimates of consumption and of requirement hitherto annually made, with the amounts subsequently recorded as available. But it will be equally obvious that it implies a real change, not only in the figures previously adopted, but in the actual quantities they represent on the two points. It is to be borne in mind that in all the foregoing summary Tables, the old reckoning of 61 lb.

per bushel for home produce, and of 60⅔ lb. per bushel for imported wheat, are adopted; and the last two summary Tables (IV. and V.) indicate the extent of the change expressed in quarters, or bushels, of the above-mentioned weights per bushel. The amounts so expressed, of course, represent a real increase, both in the aggregate quantities available, and in the consumption per head, compared with those previously assumed. On the other hand, although the adoption for the past, as in the Appendix-Table II. (facing p. 132), and in all future estimates as we propose, of a uniform weight of 60 lb. per bushel, both for home and for foreign wheat, will materially alter the figures, the alteration so made will not represent any change in actual quantity.

The Results for the Forty Years, according to the recently adopted Standards or Corrections.

We have now discussed the influence, on our former estimates, of corrections made by the Registrar-General of the originally recorded numbers of the population, and it has been shown to be comparatively immaterial. We have also considered the influence on the past estimates, of the change adopted by the Departments, in the calculation of imported flour into its equivalent of wheat, and this has been found to involve, though a comparatively small, yet by no means an immaterial, correction. We propose now to apply the weight of 60 lb. per bushel to the whole of the estimates for the past forty years, an alteration which, as we have pointed out, involves no change in actual quantity, but only in the mode of representation; and it is from the results as so calculated, that we shall draw illustrations as to the bearing and the importance of the facts which the inquiry, extended over so long a period, brings to light. We shall also point out what changes will be adopted in future estimates.

As already intimated, the Appendix-Table II. (facing p. 132) gives the whole of the results for the forty years, embodying the corrections in the number of the population which have been referred to, those due to the altered estimate of the relation of flour to wheat, and, lastly, adopting a weight of 60 lb. per bushel for both the home produce and the imported wheat. For the details the reader is referred to the Table itself; but, as in the discussion of the various points hitherto, the bearing of the various results will be founded on summaries from the detailed Table, which will be embodied in the text.

Area under Wheat in the United Kingdom.

The following Table (VI.) shows the average area under the crop in the United Kingdom for each of the five eight-yearly periods, and for the total period of forty years.

TABLE VI.

	Average area under wheat in the United Kingdom	Increase or decrease over each period of 8 years
	Acres	Acres
Averages for:—		
8 years 1852–3 to 1859–60.	4,092,160	
8 „ 1860–1 „ 1867–8 .	3,753,011	−339,149
8 „ 1868–9 „ 1875–6 .	3,788,132	+ 35,121
8 „ 1876–7 „ 1883–4 .	3,091,310	−696,822
8 „ 1884–5 „ 1891–2 .	2,512,924	−578,386
40 „ 1852–3 „ 1891–2 .	3,447,507	—

This summary Table is sufficient to bring clearly to view the very great decline that has taken place in the area under the crop during the forty years. But the better to understand the causes of it, it is necessary not only to study the figures for the individual years, but to consider them in connection with the acreage yield of the crop, the imports, and the average price of wheat. Speaking generally, it will be found that a good yield, or relatively high price, has tended to check reduction, whilst contrary conditions in these respects have had the effect of accelerating it. It has been explained at p. 79, that over the first fourteen years of the forty, the area was to a great extent estimated only, but that from 1866 up to the present time official returns have annually been available. These circumstances must, of course, be borne in mind, and must prevent too rigid an interpretation of the exact figures. Still, having regard to the unusually high yields per acre in 1863, 1864, and 1865, and the consequent reduction in price, there is no reason to doubt that the reduction of area over the second eight-yearly period, including these years, which the figures indicate, substantially represented the truth. The recovery in the area over the third period of eight years, especially in the first and second years, 1868–9 and 1869–70, is obviously a natural consequence of the higher price over the two preceding harvest-years; whilst the general, though slight, increase throughout the period is accompanied with fair maintenance of price up to nearly the end of it.

As the summary shows, it is over the fourth and fifth periods that the very great decline has taken place, and it is over these that the very marked decline in price prevailed. Further, it was within the fourth period that the disastrous harvest of 1879 occurred, not only in the United Kingdom, but in Western Europe generally. This led to some increase in price, and to greatly increased imports, which, with the exception of one or two years, have steadily increased ever since. In fact, it was the very bad season of 1879, succeeded by several of less than average yield, that led to the great extension of exporting areas in different parts of the world, and coincidently to a great reduction in price; and, with this, to a great reduction of area under the crop in the United Kingdom. Assuming the estimates of area in the earlier years to be approximately correct, it would appear that it has been reduced from rather more than 4,000,000 acres over the first eight years, to little more than 2,500,000 over the last eight, to 1891 inclusive; whilst, in 1892, it was not quite 2,300,000 acres.

Average Yield of Wheat per Acre in the United Kingdom.

Table VII. shows the average yield of wheat per acre over each eight-yearly period, and over the forty years, according to our annually adopted estimates of the crop. The first column shows the results reckoned in bushels of 61 lb., as we have always hitherto given them, and the second in bushels of 60 lb., as given in Appendix-Table II., and as it is proposed in future to represent them.

TABLE VII.

	Average yield of wheat per acre	
	Bushels of 61 lb.	Bushels of 60 lb.
Averages for:—	Bushels	Bushels
8 years 1852 to 1859 . .	28	$28\frac{3}{8}$
8 „ 1860 „ 1867 . .	$28\frac{3}{8}$	$28\frac{7}{8}$
8 „ 1868 „ 1875 . .	$26\frac{3}{4}$	$27\frac{1}{8}$
8 „ 1876 „ 1883 . .	$24\frac{7}{8}$	$25\frac{1}{4}$
8 „ 1884 „ 1891 . .	$29\frac{1}{8}$	$29\frac{7}{8}$
40 „ 1852 „ 1891 . .	$27\frac{1}{2}$	$27\frac{7}{8}$

Here, again, we must refer to the Appendix-Tables I. and II. for the yield of individual years. Referring to the summaries as in Table VII., it is seen that the first two eight-yearly periods show

fairly uniform average amounts; the second, however, rather more than the first. The third period gives considerably less, the fourth less still, and the fifth period, 1884–91, inclusive, considerably the highest of the five. Directing attention first to the estimates as formerly given, that is, at 61 lb. per bushel, it is seen that the average of the first two eight-yearly periods indicates somewhat more than 28 bushels per annum; and up to comparatively recent years we reckoned the general average yield of the United Kingdom at 28¼ bushels. The third and fourth periods taken together show, however, an average of scarcely 25⅞ bushels. The fifth period, on the other hand, shows an average of 29⅜ bushels, or one bushel higher than even the highest of either of the preceding eight-yearly periods.

The fact is, that within the fifth eight-yearly period there was only one year with an estimated yield of less than 28 bushels; whilst the second eight-yearly period, which gives the next highest average, although it included two years, 1863 and 1864, of the highest yield of the forty, and two others of more than average yield, at the same time included four years of considerably less than average. There can, indeed, be no doubt, that the eight years commencing with 1884 and ending with 1891 gave a higher average yield of wheat per acre than any equal period of the forty years. Notwithstanding this, however, with the very low average yields over the third and fourth periods, the average of the forty years shows only 27½ bushels at 61 lb. per bushel, against rather more than 28 assumed to be the general average of the country over the early years. Of course, reckoned at 60 lb. per bushel, the figures are so much higher; but, even so reckoned, the average yield of the forty years is only 27⅛ bushels, that is, less than 28 as formerly assumed, whilst the average yield of the last eight years, 1884–91 inclusive, is 29⅞ bushels, or 2 bushels more than the average of the forty years, and 2½ bushels more than over the preceding thirty-two years.

The Aggregate Home Crop, and the Amount of it available for Consumption.

The next Table (VIII.) shows, for each of the eight-yearly periods, and for the forty years, the average annual total home produce, calculated from the recorded area under the crop, and the estimated average yield per acre; also the amount of it estimated to be available for consumption, after deducting from the total the amount assumed to be required for seed. The first two columns show the so-reckoned total and available

amounts reckoned at 61 lb. per bushel, as formerly, and the last two in each case at 60 lb. per bushel. For the first thirty-five of the forty years, $2\frac{1}{4}$ bushels per acre on the acreage of the year have been deducted from the total home crop for the seed of the next year, but for the last five years only 2 bushels per acre. It is, of course, not assumed that there was a sudden change at that period; but, believing that a gradual reduction has taken place, it was at that date, that is, first for the crop of 1887, decided to reduce the amount then and for the future.

TABLE VIII.

	Home produce of wheat			
	At 61 lb. per bushel		At 60 lb. per bushel	
	Total	Available for consumption	Total	Available for consumption
Averages for:—	Quarters	Quarters	Quarters	Quarters
8 years 1852 to 1859 . .	14,310,779	13,159,859	14,554,230	13,403,310
8 „ 1860 „ 1867 . .	13,309,247	12,253,712	13,523,034	12,467,499
8 „ 1868 „ 1875 . .	12,684,765	11,619,353	12,900,291	11,834,879
8 „ 1876 „ 1883 . .	9,636,682	8,754,751	9,793,979	8,922,986
8 „ 1884 „ 1891 . .	9,208,029	8,549,916	9,365,087	8,706,974
40 „ 1852 „ 1891 . .	11,829,900	10,867,518	12,027,324	11,067,130

The figures show an average annual reduction in the total home-crop of about 1,000,000 quarters over the second period compared with the first, about two-thirds of a million over the third compared with the second, more than 3,000,000 quarters over the fourth compared with the third, but less than half a million over the last compared with the fourth. Of course these reductions in the aggregate produce of the country are largely due to the reduction in area under the crop, but they are also largely dependent on the difference in the average yield per acre over the different periods. Thus, with a fully equal—indeed, the figures show a slightly higher—estimated area over the third period compared with the second, there is nevertheless a considerable relative deficiency in the aggregate produce of the third period, due to an average reduction of $1\frac{5}{8}$ bushel in the yield per acre. Then, comparing the fourth with the third period, there is a greater average reduction in area than in any other case, but there is at the same time a reduced yield per acre of $1\frac{7}{8}$ bushel; and it is these two conditions combined that result in the reduction of more than 3,000,000 quarters per annum in the aggregate produce over the fourth

period. Lastly, though over the fifth eight-yearly period there is, compared with the fourth, a very large average annual reduction of area under the crop, amounting to more than half a million acres, there is, at the same time, an increase of 4½ bushels in the average yield per acre per annum; and, with this, there is a reduction of less than half a million quarters over the fifth period compared with the fourth, instead of more than 3,000,000 quarters under contrary conditions as to yield per acre over the fourth compared with the third period.

Not only is there the great reduction in the aggregate yield of the home-crop which the figures in Table VIII. show, but examination of the results for the individual years, as given in Appendix-Tables I. and II., show that sometimes during the earlier years the home produce was twice as much as in some of the individual later years.

Comparing column with column in Table VIII, it is seen that reckoning the produce at 60 lb. instead of at 61 lb. per bushel, raises the number of quarters by which an equal weight of grain is represented by about 200,000 per annum on a total quantity of about 12,000,000 quarters, or by about 1⅔ per cent. Next, comparing the amounts estimated to be available for consumption, deducting from the total the requirement for seed, it is seen that over the first three periods the reduction represents an average of more than one million quarters per annum, over the fourth period with its much reduced area, yield, and aggregate produce, less than one million quarters, over the fifth period with the still further reduction of area and total produce, and of course still less deduction per acre for seed, only about two-thirds of a million; but, over the forty years, an average of nearly one million quarters per acre per annum.

The figures further show that the average annual amounts available for consumption from the home-crop were only about two-thirds as much over the last sixteen as over the first sixteen of the forty years. What this reduced actual supply of wheat available for consumption from the home-crop represents, when considered in connection with the coincident increase of population, and therefore of requirement, will be seen farther on.

The Imports of Wheat, and of Flour reckoned as Wheat.

In the discussion of Table IV. (p. 104 and context), we have shown the actual increase in the amount of wheat available from imported flour, due to adopting, as we now do, the relation of 72 flour to 100 wheat, instead of 80·77 to 100 as formerly; and we have pointed out to what extent this change increases

the estimate of the total supply annually available for consumption from all sources, home and foreign; and we must refer the reader to that Table and discussion for further particulars on these points. Adopting now the new mode of computation, Table IX., below, shows the average annual net imports (imports less exports) of wheat and of flour reckoned as wheat, over each of the eight-yearly periods, and over the forty years. The quantities are, however, given both in quarters reckoned at $60\frac{2}{3}$ lb. per bushel as formerly for imported wheat, and at 60 lb. per bushel as now adopted.

TABLE IX.

—	Net imports of wheat, and of flour reckoned as wheat (72 flour=100 wheat)		
	At $60\frac{2}{3}$ lb. per bushel	At 60 lb. per bushel	Increased number at 60 lb.
	Quarters	Quarters	Quarters
Averages for :—			
8 years 1852–3 to 1859–60 .	4,767,276	4,820,246	+ 52,970
8 „ 1860–1 „ 1867–8 . .	8,218,468	8,309,783	+ 91,315
8 „ 1868–9 „ 1875–6 . .	10,774,901	10,894,622	+119,721
8 „ 1876–7 „ 1883–4 . .	16,127,002	16,306,191	+179,189
8 „ 1884–5 „ 1891–2 . .	18,452,256	18,657,281	+205,025
40 „ 1852–3 „ 1891–2 . .	11,667,980	11,797,625	+129,645

Unlike the change in the adopted relation of flour to wheat, which, as has been pointed out, causes a real and not immaterial increase in the estimate of the amount of wheat available for consumption, the change in the figures due to reckoning the quantities at only 60 lb., instead of $60\frac{2}{3}$ lb. per bushel, does not represent any increase in actual quantity by weight; but only a larger number of quarters of less weight per quarter, as shown in the last column of the Table. The actual increase in the number of quarters at the lower weight per bushel is seen to be comparatively small over the earlier periods, when both the total quantity of the imports, and the proportion of them due to flour, were small. It may be observed that the increase in measure, by adopting the lower weight per bushel, represents about $1\frac{1}{9}$ per cent. on the quantities at the higher weight.

Let us now turn to the more important indications of the Table. When considering the home-crop, it was pointed out that its aggregate produce was only about two-thirds as much over the later as over the earlier periods. The Table now under consideration shows that the imports were, on the other hand,

not far short of four times as great over the last as over the first of the five eight-yearly periods. It is seen that the annual imports averaged about $4\frac{3}{4}$ million quarters over the first eight years; that they increased by nearly $3\frac{1}{2}$ million quarters over the second eight, by more than $2\frac{1}{2}$ million over the third eight, by about $5\frac{1}{3}$ million over the fourth eight, and by nearly $2\frac{1}{3}$ million quarters over the last eight years. It will be thus seen that by far the greatest rate of increase in the imports was over the fourth period from 1876–7 to 1883–4 inclusive. The fact is, that in four out of the last five years of the third period, the yield per acre of the home crop was very low; and that in six out of the eight years of the fourth period the yield was below the average, and in 1879 it was extremely low; the result being a lower average yield per acre over this than over either of the other eight-yearly periods; and, as we pointed out in our paper on *Allotments and Small Holdings*, in a recent number of the Journal (Vol. III., 3rd Series, Part III., 1892), the series of unproductive seasons, not only in our own country but in Western Europe generally, led concurrently to the opening up of large wheat-growing areas in various parts of the world, to greatly increased imports, and at the same time to much lower prices.

The significance of the very great and rapid increase in the imports of this staple article of the food of the population of the United Kingdom, which the figures in the Table (IX.) bring to light, will be better appreciated when we come to consider, in the next section, the proportion which the imported wheat bears to the total amount available for consumption; and farther on, the proportion which the value of the imports bears to the total value of the wheat consumed.

Total Wheat (Home and Imported) available for Consumption.

The following Table (X.) shows, for each of the five eight-yearly periods, and for the forty years, the average annual amount of wheat available for consumption from home and foreign sources taken together, reckoning 72 of imported flour to represent 100 of wheat, and the whole taken at the newly adopted weight of 60 lb. per bushel. The first column shows the average annual amounts in quarters so reckoned, and the second and third columns show the percentage of the total derived from home and from foreign sources respectively.

The figures in the first column show that the average annual aggregate amount of wheat available for consumption in the United Kingdom was almost exactly one-and-a-half time as much over the last eight as over the first eight of the forty years.

It will be seen further on, that the amount available per head of the population has somewhat increased over the later as compared with the earlier periods, but in only a small degree

TABLE X.

—	Average annual total wheat available for consumption, home and imported		
	72 flour=100 wheat, 60 lb. per bushel	Per cent. of total	
		From home produce	From imports
	Quarters	Per cent.	Per cent.
Averages for :—			
8 years 1852–3 to 1859–60 .	18,223,556	73·1	26·9
8 „ 1860–1 „ 1867–8 . .	20,777,282	59·5	40·5
8 „ 1868–9 „ 1875–6 . .	22,729,501	52·0	48·0
8 „ 1876–7 „ 1883–4 . .	25,229,177	35·3	64·7
8 „ 1884–5 „ 1891–2 . .	27,364,255	31 9	68·1
40 „ 1852–3 „ 1891–2 . .	22,864,754	50·4	49·6

compared with the great increase in the aggregate consumption; which, as will be seen presently, is mainly due to the rapid increase in the population.

The last two columns of the Table show in what proportion the increased demand has been met from home and from foreign sources respectively. Thus, whilst over the first eight-yearly period the home producer provided about 73 per cent. of the total requirement, over the last eight years he provided only about 32 per cent. In other words, over the earlier period he provided nearly three-fourths, but over the later less than one-third of the total requirement. On the other hand, whilst over the first eight years imports supplied only about 27 per cent., over the last eight they supplied about 68 per cent. of the requirement, or more than two-and-a-half times the proportion of the total over the last than over the first eight years; in fact, little more than one-quarter of the total over the first period, but more than two-thirds of the total over the last period. This was the case, notwithstanding that the last eight-yearly period gave a higher average yield per acre of the home-crop than either of the four preceding periods. The truth is, that the less dependence on home, and the greater on foreign supplies, has been largely due to the increase of the population overcoming our capability of production; but, of course, largely also to the reduction of area under the crop at home as a consequence of greatly increased production for export in other countries, and coincidently great increase in our imports, and great reduction in price.

The Population, and the Requirement of Wheat per Head per Annum.

Table XI. shows the average population for each of the eight-yearly periods, and for the total period of forty years, according to the corrected returns. The next three columns show, for comparison with the newly adopted results given in the last column—in the first the previously adopted estimates of annual requirement per head, assuming 80·77 imported flour to 100 wheat, and wheat at 61 lb. per bushel; and in the second and third columns the amounts available per head on the assumption of the same relation of flour to wheat, but in the second reckoning home wheat at 61 lb. and foreign at 60⅔ lb. per bushel as hitherto, and in the third, for better comparison with the new results, taking both home and foreign at 60 lb. per bushel. The last column shows the total amounts available per head per annum from home and foreign sources together, on the assumption of 72 flour = 100 wheat, and taking wheat at 60 lb. per bushel.

TABLE XI.

—	Population	Previously estimated requirement per head, 80·77 flour = 100 wheat; wheat 61 lb. per bushel	Total available per head		
			80·77 flour = 100 wheat		72 flour = 100 wheat; wheat 60 lb. per bushel
			Home 61 lb. imported 60⅔ lb. per bushel	Home and imported 60 lb. per bushel	
		Bushels	Bushels	Bushels	Bushels
Averages for:—					
8 years 1852–3 to 1859–60	28,067,170	5·10	5·07	5·16	5·19
8 „ 1860–1 „ 1867–8	29,738,375	5·50	5·47	5·55	5·60
8 „ 1868–9 „ 1875–6	31,943,230	5·60	5·56	5·65	5·69
8 „ 1876–7 „ 1883–4	34,615,019	5·65	5·66	5·74	5·83
8 „ 1884–5 „ 1891–2	36,950,178	5·65	5·72	5·83	5·92
40 „ 1852–3 „ 1891–2	32,262,794	5·50	5·50	5·59	5·65

The first column of the Table (XI.) brings strikingly to view the rapid increase of the population in the United Kingdom during the last forty years. Comparing each eight-yearly period with the one preceding it, there was an increase over the second eight years of about 1⅔ million; over the third period of nearly 2¼ millions; over the fourth of 2⅔ millions; and over the fifth of 2⅓ millions; that is to say, the progression was the most rapid during the fourth period, and somewhat less over the

fifth. Comparing the first eight years with the fifth eight, the latter shows an increase from 28 to nearly 37 millions, or by nearly 9 millions, corresponding to nearly one-third more over the last period compared with the first. No wonder, then, at the great increase in the aggregate supplies of wheat over the later as compared with the earlier periods, as shown in the last section. The increase in the supply from period to period as there shown has, however, to meet the demand, not only of an increased number of consumers, but also a slightly larger requirement per head over the later periods.

Comparing the last column with the one before it, both being reckoned at 60 lb. per bushel, it will be seen to what extent the actual available supply per head per annum is increased over the respective periods, by raising the estimate of the amount of wheat corresponding to a given amount of flour. It has already been shown that the previously annually adopted estimate of the requirement per head, which was modified from time to time according to the subsequently ascertained available supplies, agreed extremely closely with the amounts of those supplies when averaged over a series of years so as to eliminate the disturbing influence of stocks on hand; and it is obvious that it could not be otherwise, if the annual estimates were judiciously modified according to the previously actually ascertained supplies. But now that the past supplies are assumed to have been in reality greater than the previously adopted figures represented, it is obvious that the estimate of the available supply per head must also be correspondingly increased. To add to this, the quantities are now represented in bushels of only 60 lb., so further raising the figure, but not the amount represented by it.

A comparison of the first and second columns, relating to the quantities per head, will show how very closely the annual estimates of requirement and the amounts afterwards proved to be available agreed, the two being taken at approximately the same weight per bushel. The third column gives the same results as the second, but reckoned at only 60 lb. per bushel, and shows, therefore, higher quantities by measure available; and, compared with these, the higher amounts in the last column show the increase in the amount available per head, due to assuming a given amount of imported flour to represent a greater quantity of wheat. It is these last quantities that we now adopt, as representing the annual requirement per head, in accordance with the actual amounts annually available from all sources—home and foreign.

It will be seen that the previously adopted estimate of require-

ment per head for the last two eight-yearly periods was 5·65 bushels at 61 lb. per bushel; that the amount actually available over the first of these two periods was 5·66, and over the second 5·72 bushels at approximately the same weight, and 5·74 and 5·83 bushels at 60 lb. per bushel. But the new reckoning shows an available supply of 5·83 bushels over the fourth, and 5·92 bushels over the fifth period, at 60 lb. per bushel. The question arises, therefore, whether the actual figure indicated for the last period, namely 5·92 bushels, at 60 lb. per bushel, should be adopted in annually estimating the requirement in the near future, or whether, provisionally, the round number of 6 bushels per head at 60 lb. per bushel should be taken for some years, until experience shows how far that estimate is borne out by the subsequent records of the total amounts available and used.

It is in favour of adopting the higher figure that, after very full consideration of the great difficulty of forming anything like a trustworthy estimate of the amount consumed other than as human food, and also the fact that it bears, at any rate ordinarily, a very small proportion to that so consumed, we decided that there would be less error in fixing the estimate of requirement per head, so as to include the very small average consumption in other ways, than in attempting to estimate the consumption by stock, &c., separately. On this point it may be observed that the consumption in manufactures of any kind is very small: and that, generally, it is only the offal wheat that is given to stock, and this is excluded in our estimate of yield per acre, and therefore in the reckoning of the total wheat available. It is true that when the price is very low, not only will more offal be dressed out, and the sample so improved for sale, but more or less saleable wheat will also be consumed by stock; but there is no reason to suppose that this has taken place to such an extent as to materially affect our estimates. Thus, if for the sake of illustration we were to assume that, with the present very low prices, one million quarters of saleable home or imported wheat were consumed by stock, this would represent, on our average area under the crop over the last eight years, more than 3 bushels per acre, and on our average population over the same period 0·21, or about one-fifth of a bushel per head. It will be admitted that in the past, at any rate, the quantity of saleable wheat so appropriated has been much less than this; but what it may be under conditions of excessive supply and very low price, such as prevail at the present time, it is difficult to predict.

Upon the whole it is concluded that it is safer to form an estimate of requirement per head in the near future, including

consumption or use in other ways, rather higher than the amount indicated to have been actually available and used in recent years, and we adopt, therefore, provisionally, an estimated requirement per head per annum of 6 bushels at 60 lb. per bushel.

Price per Quarter, and Aggregate Value, of the Total Wheat annually available; also the Aggregate Cost, and the Cost per Head, of the Annual Requirement.

Referring as usual to Appendix-Table II. (facing p. 132), for the details, the summary Table (XII.) on p. 120 shows the averages for each of the eight-yearly periods, and for the forty years. The results are, in all cases, calculated for harvest not civil years.

As to the average *Gazette* price of the home wheat per quarter, as given in the first column, we understand that it frequently refers to quarters by measure irrespectively of weight; but that when weight is known to enter into the transaction, it is calculated to apply to quarters of 480 lb. = 60 lb. per bushel. The values for the home-crop, given in the second column of the Table, are reckoned at the *Gazette* price, on quarters of 480 lb. throughout. It is probable that, taking the average of seasons, the weight of the portion returned in measure only, would average more than 60 lb. per bushel; and, so far as it is so, the aggregate values given will be somewhat too high. It must be admitted, however, that there is by no means the certainty that would be desirable as to the weight represented by the quarters to which the *Gazette* price applies.

As the imports include both wheat imported as wheat, and flour as such, the Trade and Navigation Returns give the declared value of the imported wheat, and of the imported flour, separately. It seems inappropriate, however, for our present purpose—that of comparing the aggregate value of the home and the imported wheat—to include the value of the manufactured article—flour, as such. For the purposes of the Table, therefore, we have first converted the flour into its equivalent of wheat, and then reckoned the value as such, at the same rate as given for the wheat imported as wheat. On former occasions, we have calculated the value of imported wheat at the *Gazette* price per quarter of the home wheat; but it is pretty certain that this gives the value of the imported sometimes too high and sometimes too low. Thus, Mr. Rew in the Journal (Vol. I., 3rd Series, Part III., 1890) showed that, according to the Official Returns, in 1889 imported wheat averaged 2*s.* 10*d.* per quarter more than the *Gazette* price of home wheat; and in the calculations for the present paper we have found that, although the difference varies greatly from year

to year, the declared values of imported wheat in some years show a rate per quarter of several shillings more, and in others of several shillings less, than the *Gazette* price. Accordingly, we now adopt the rate per quarter of the declared value instead of the *Gazette* price as formerly, for imported wheat—excepting for the first four years, for which the data are not available, and hence for them the *Gazette* price is still taken. There can be little doubt that the figures now given are nearer the truth than if the *Gazette* price were adopted throughout. At the same time, it is not clear how far the values given for the imported wheat, either accord with the values as sold in our markets, or compare strictly with the local market values of the home-crop.

TABLE XII.

—	Average *Gazette* price of home wheat per quarter	Price per quarter of imported wheat according to Trade and Navigation Returns	Value of wheat available for consumption. Home at average *Gazette* price; imports, wheat, and flour as wheat, at rates for wheat, according to the declared value in the Trade and Navigation Returns			Value of wheat estimated to be required	
			From home produce	From imports	Total	Total	Per head
	s. *d.*	*s.* *d.*	£	£	£	£	*s.* *d.*
Averages for :—							
8 years 1852–3 to 1859–60	57 8	(57 8)	38,420,217	13,518,974	51,939,191	52,494,776	37 6
8 „ 1860–1 „ 1867–8	52 2	49 6	31,355,606	20,956,252	52,311,858	53,152,383	35 8
8 „ 1868–9 „ 1875–6	52 0	49 0	30,535,899	26,742,885	57,278,784	57,609,561	36 1
8 „ 1876–7 „ 1883–4	45 7	46 2	20,280,559	37,413,986	57,694,545	57,943,572	33 6
8 „ 1884–5 „ 1891–2	32 5	33 9	14,108,380	31,601,890	45,710,270	45,660,252	24 8
40 „ 1852–3 „ 1891–2	47 11	(47 3)	26,940,132	26,046,797	52,986,929	53,372,109	33 6

Referring first to the particulars relating to the home-crop, it is seen that the *Gazette* price of wheat per quarter averaged 57*s.* 8*d.* over the first eight years, declined 5*s.* 6*d.* per quarter over the second period, and only 2*d.* more over the third, by 6*s.* 5*d.* over the fourth, and by 13*s.* 2*d.* over the fifth; the average price for those last eight years being only 32*s.* 5*d.* per quarter, or 25*s.* 3*d.* less than over the first eight years, and less than three-fifths, indeed not much more than half as much as over those first eight years. In reference to the higher range of prices during the first three periods, it is to be borne in mind that, during the first period there was the Crimean war, during the second the American Civil War, and during the third the Franco-German war.

The most marked decline in price was during the last

eight years, but the fourth period of eight, 1876–7 to 1883–4, shows the commencement of the rapid fall; and it was during that period, including the disastrous harvest of 1879, and, in all, six years of less, and sometimes much less, than average yield, that the aggregate home-crop declined so rapidly; whilst it was coincidently with this that the imports began so enormously to increase, and prices so seriously to go down. Then as to the last eight years, 1884–5 to 1891–2, notwithstanding a higher average yield per acre than over either of the other eight-yearly periods, the aggregate home-crop came down to even less than over the previous eight years; the imports were larger than ever, and the price, accordingly, was much lower than ever. In neither of those last eight years, however, was the average *Gazette* price for the year so low as 30*s.* per quarter; but it was frequently below it in individual months of the period. Thus, in the first of the eight years, 1884–5, it ranged from 31*s.* 2*d.* in December to 36*s.* 8*d.* in May; in the second year from 29*s.* 6*d.* in February to 32*s.* 6*d.* in August; in the third, from 30*s.* in October to 35*s.* 8*d.* in January; in the fourth, from 29*s.* 1*d.* in September to 35*s.* in August; in the fifth, from 35*s.* 10*d.* in September to 28*s.* 6*d.* in June; in the sixth, from 29*s.* 8*d.* in October to 36*s.* 2*d.* in August; in the seventh, from 31*s.* in October to 40*s.* 4½*d.* in May; and in the last year, 1891–2, from 38*s.* 5*d.* in September to 29*s.* 3*d.* in July; whilst in no week since the end of the last harvest-year—August 31, 1892—has the price been so high as 30*s.*, and in the week ending March 18, 1893, it reached its lowest point, namely—24*s.* 9*d.*!

The third column shows the average aggregate value per annum, at the *Gazette* price per quarter, of the saleable wheat crop of the United Kingdom, over each eight-yearly period, and over the forty years; and it is this that illustrates the most strikingly the reduction in value to the farmer of the crop which formerly constituted a very important, if not the most important, item of his marketable produce. The average annual value of the crop was nearly 38,500,000*l.* over the first eight years, more than 31,000,000*l.* over the second, and more than 30,500,000*l.* over the third eight years; it then comes down to little more than 20,000,000*l.* over the fourth eight, and to little more than 14,000,000*l.* over the last eight years; whilst in 1887–8 it was less than 12,500,000*l.* In other words, the aggregate value of the saleable wheat crop of the country came down from about 38,500,000*l.*, over the first eight years, to little more than 14,000,000*l.* over the last eight, or to not much more than one-third. In fact, the value of the home wheat crop averaged more than 24,000,000*l.* less per annum over the last eight

than over the first eight of the forty years! The result was to a great extent due to reduction in area, itself the result of reduction in price, which also greatly reduced the value of the much smaller crops grown. It has, indeed, been reduction in price, to which both reduction in area, and reduction in aggregate value, are to be attributed.

The causes of the disastrous results to our own wheat growers are plainly seen in the records given in the fourth column of Table XII., which shows the value of the imports, calculated according to the declared values given in the Trade and Navigation Returns, as above referred to.

But, before comparing the aggregate values of the home-crops and the imports, it will be well to direct attention to the difference between the *Gazette* price per quarter of the home, and the price of the imported wheat obtained as above explained. Reference to the details given in Appendix-Table II. (facing p. 132), will show that the so reckoned prices of the home and the imported wheat varied considerably in the individual years; that during the earlier half of the period the price of the imported was generally lower, but during the later years higher than that of the home wheat. In some cases the difference amounts to as much as 4*s.*, 5*s.*, and in one to 6*s.* 9*d.* per quarter; but it is less in the later than in the earlier years. Much will probably depend on the comparative condition of the home and foreign wheats in the individual years; and it is also probable that the condition of the imported wheat has been relatively better in the later years. But it is remarkable, as will be seen by reference to the figures in the bottom line of Table XII., that over the thirty-six years for which the comparison can be made, there is an average difference of only 8*d.* per quarter; and that is in favour of the home wheat. Lastly, in reference to these records of price per quarter, as already stated, there is uncertainty as to the weight per quarter to which the *Gazette* price of the home wheat applies. In the case of the imported wheat, however, the declared values are given for quantities stated in cwt., and we have calculated them for quarters, of 480 lb. =60 lb. per bushel, as adopted throughout in Appendix-Table II., and in the summary Tables founded upon it. The two sets of prices are, therefore, so far, not strictly comparable; nor, as already said, is it clear that the declared values of the imported wheat accord with the prices as sold in our markets.

Referring to the results given in the fourth column of Table XII., it is seen that the average annual value of imported wheat, and flour reckoned as wheat, was, over the first eight years, little over 13,500,000*l.*, over the second eight about 21,000,000*l.*,

or more than one-and-a-half time as much, over the third eight years nearly 26,750,000*l.*, over the fourth about 37,400,000*l.*, and over the fifth, with larger quantities than ever, but with very low price, 31,600,000*l.* To put it in another way, the value of the imports was not much more than one-third that of the home-crop over the first eight years, about two-thirds as much over the second eight, about nine-tenths as much over the third eight, nearly twice as much over the fourth eight, and considerably more than twice as much over the last eight years.

Turning now to the fifth or "total" column, it is seen that, notwithstanding the great decline in the aggregate value of the home-crop from period to period, there is, with a greater proportional increase in that of the imports, a notable increase in the annual aggregate value of the total wheat available over the third and fourth compared with the first and second periods; but, over the last eight years, in spite of the increased quantities, the annual aggregate value was, with the extremely low price per quarter, scarcely four-fifths as much as over the two preceding periods. It may here be observed that, whilst over the last eight years the home-crop has, both in quantity and in value, supplied less than one-third the requirement of the country, it is to be feared that the crop of the last harvest, 1892, will yield less than one-fourth of the total requirement. Such are the facts and their bearing from the point of view of their influence on our home agriculture. No wonder that under such conditions a conference to consider the depression in agriculture should have been convened.

The concluding columns of the Table show the estimated average annual value of the wheat required for consumption, both aggregate and reckoned per head of the population, over each of the five periods and over the forty years. Of course, with an equal value per quarter, the aggregate value must increase from year to year with the increase of the population. But it is seen that there is considerable increase from the first to the fourth period, notwithstanding the reduction in price per quarter. Over the fifth period, however, with a still greater reduction in price per quarter, the aggregate value of the wheat required is only about four-fifths as much as over the third and fourth periods; and, notwithstanding a larger population by about one-third, nearly 7,000,000*l.* less than over the first eight years. In other words, the aggregate cost of the wheat required by an average population of about 37,000,000 over the last eight years was about 7,000,000*l.* less than that of the amount required at even a slightly lower rate per head, by an average population of about 28,000,000 over the first eight years.

It will be seen that the aggregate value of the wheat annually required does not quite agree with that of the wheat annually available, and it is generally somewhat higher. The two values are, however, reckoned at the same rates per quarter each year; but as the quantity "available" within the harvest-year sometimes includes a considerable excess over the amount required for consumption within the year, there being frequently a quantity brought forward, or carried over to the next or even subsequent years, it may be with a price differing from that of the year in which it comes in under the head of "available;" and hence the discrepancy between the two reckonings. The results are, however, as nearly true as the facts admit of; and they are sufficiently correct for the purposes of our illustration.

Referring now to the last column in the Table (XII.), it is seen that the cost of wheat per head to the consumer averaged, with considerable variation between individual years, the highest over the first eight years, and was not much lower over the next two eight-yearly periods; there being at the same time a less reduction in price per quarter than afterwards. Thus, the average cost per head was 37*s.* 6*d.* over the first eight years, 35*s.* 8*d.* over the second eight, and 36*s.* 1*d.* over the third eight. But, with the greater reduction in price per quarter over the fourth eight years, the cost per head was reduced to 33*s.* 6*d.*; and with the still greater reduction over the last eight years, to 24*s.* 8*d.* per head. That is to say, with enormous imports, and extremely low price per quarter, the cost of wheat per head of the population over the last eight years was less than two-thirds as much as over the first eight, and little more than two-thirds as much as over the first twenty-four years of the forty. Lastly, it may be stated that, of the total cost per head, imported wheat supplied about 26 per cent. over the first eight years, about 40 per cent. over the second eight, nearly 47 per cent. over the third eight, about 65 per cent. over the fourth eight, and nearly 70 per cent. over the last eight years. However disastrous, therefore, the large imports of wheat, and the greatly reduced price per quarter, may have been to the home producer, the consumer has, so far as the cost of this staple article of his food is concerned, reaped immense advantages.

General Considerations and Conclusions.

Among our arable land crops, it is not only the production of wheat that has declined. The decline in the home crop of wheat may be said to have commenced about twenty years ago, but to have been the most marked during the last thirteen or fourteen

years. The area under barley has declined very considerably since the repeal of the malt-tax in 1880, and the imports have increased in a greater proportion. Our area under oats has fluctuated, but not materially diminished, during the last twenty years, though it has shown a tendency to do so during the last four or five years. The imports have, however, very considerably increased. The agricultural area under potatoes in the United Kingdom has not varied very much during the last twenty years. It was, however, higher over the first five years than it has been during any equal period since; and there has been a decided tendency to reduction during the last few years. Notwithstanding this, the imports have averaged considerably less than half as much over the last ten as over the first ten of the last twenty years. It is probable that the reduction of the available supply of potatoes per head of the population which these facts taken alone would indicate has been to some extent compensated by an increased growth of the crop in market gardens, the area of which has, it is satisfactory to note, increased considerably in recent years. It is also probable, however, that there has in reality been some reduction in the actual consumption per head under the influence of the cheapening of bread-stuffs. Of other crops, chiefly used as stock foods, and which are also products of home growth, our own area under beans and peas has in recent years declined, but the imports have been about one-eighth more over the last ten than over the preceding ten years. Then, of stock foods (of course also yielding manure) not grown at home, the annual imports of Indian corn have been about one-third more over the last fifteen than over the preceding five years; those of oil-cakes have increased by considerably more than one-half; those of cotton-seed by nearly one-third; and those of linseed by one-fourth more, over the last ten than over the preceding ten years.

The general result is, that our own arable area has gone down from an average of 23,808,294 acres over the first five of the last twenty-five years to 1892 inclusive, to 20,856,075 over the last five; in other words it has declined by 2,952,219 acres. Against these results, it is satisfactory that the area returned as under permanent grass has, over the same periods, increased from 22,485,020 acres to 27,146,147, or by 4,661,127 acres. With this increase in feeding area, and increase also of imported food-stuffs, there has, comparing the last ten years to 1892 inclusive with the preceding ten, been an increase in our average annual number of cattle from 9,965,546 to 10,709,656, or by 744,110; a decrease in that of sheep from 31,718,768 to 30,343,502, or by 1,375,266, and an increase in that of pigs

from 3,532,015 to 3,841,959, or by 309,944. Yet, over the same periods, there has been an average annual increase in the imports of cattle from 268,514 to 447,347, or by 178,833, but a decrease in that of sheep from 934,874, to 723,859 or by 211,015, and a decrease in that of pigs from 53,155 to 18,338, or by 34,817. There has, on the other hand, been an average annual import of 7,281,330 cwt. of dead meat, fresh and salted, over the last fifteen years, against only 3,915,516 cwt. over the preceding five years, or nearly twice as much over the later years.

Thus, although our own feeding area, and the imports of stock-foods, have greatly increased during recent years, with this our live stock has also increased, so also have the imports of live animals and of dead meat. It is obvious that the staple products of the feeder, like the crops of our arable land, have been insufficient to meet the requirements of a rapidly increasing population.

In connection with this question of our home production on the one hand, and imports on the other, it will be of interest to consider our position in regard to some of the smaller articles of agricultural production. Those of most importance to the farmer are—poultry and eggs, and the dairy products, milk, butter, and cheese. In our paper on *Allotments and Small Holdings*, in a recent number of the Journal (Vol. III., 3rd Series, Part III., p. 439), we called attention to the fact that, in 1890, the values of our imports were—of butter 10,598,848*l.*, of cheese 4,975,134*l.*, of eggs, 3,428,806*l.*, and of poultry and game, 497,857*l.*; or in all for these articles 19,500,645*l.* In 1892, however, the values of the imports were—of butter, 11,965,284*l.*, of cheese 5,417,777*l.*, of eggs 3,793,018*l.*, and of poultry and game 583,430*l.*; or in all 21,759,509*l.* Thus the increase in the value of the imports of these articles in 1892 compared with 1890 was—for butter 1,366,436*l.*, for cheese 442,543*l.*, for eggs 364,216*l.*, and for poultry and game 85,572*l.*; or in all 2,258,767*l.*

In reference to these amounts it may be stated that the value of the poultry and game imported was nearly three times as much over the last five years as over the first five of the last twenty years to 1892 inclusive, and that the number of eggs imported was nearly double over the last compared with the first five years of the twenty. More attention might perhaps with advantage be paid to the home production of poultry and eggs; but, with our climate, any really material increase in such production could only be attained by outlay for protection from the weather, and perhaps for artificial heat, during the colder months of the year; whilst the expenditure for food would be the greater the less the

birds had to rely on the waste corn and other matters they could pick up about the farm, as they largely do at present.

As to butter, unfortunately until the last few years "butterine" or "margarine" was included with butter in the returns, which show, of the two together, a very great increase. Probably in the earlier years of the Returns, the imports were chiefly butter; but during the last seven years to 1892 inclusive, when margarine has been given separately, it contributed from one-third to one-half of the total quantity of the imports, which were more than twice as great over the last five as over the first five of the last twenty years. Certainly there has been great room for improvement, and, indeed, there still is, in the quality of much of our home-made butter. But, thanks to the good work done in technical teaching on butter-making during the last few years, some improvement has already been attained; and there is every reason to hope that it will be more general in the near future. As to quantity, the home product has probably increased to some extent in recent years; but when it is considered that to produce, in addition to the present home yield, the amount annually imported, would require a very large area of grass land, besides a good deal of arable land produce, and of imported food-stuffs as well, the hopelessness of meeting the whole requirement of our present, to say nothing of an increased, population is obvious.

Then as to cheese, our imports have gradually increased during the last twenty years; and they have been about one-third more over the last five than they were over the first five of the twenty years. As in the case of butter, so in that of cheese, improvement in the making is taking place, under the influence of more widely disseminated technical teaching. But to increase the quantity so as to meet the requirement for consumption without imports would again involve the devotion of a very large acreage of grass—the more the less suitable the land for the purpose; besides, as in the case of butter, the use of a considerable quantity of arable land produce and of imported food. In fact, to produce the increased amounts of butter and cheese supposed, would require several million acres of grass-land, necessarily displacing some other produce, involving increased importation of something else to compensate the loss; and it would also require increased importation of food-stuffs for the cows.

As to fruit and vegetables, the annual value of the imports of which is considerable, their increased production at home is more dependent on local circumstances of soil and climate than is that of some of the more purely agricultural and more important products. It is satisfactory to note, however, that, according to

the Returns, the area under market gardening in Great Britain has been about twice as great during the last five as during the first five of the last twenty years; and the rate of increase has been the greater during the last few years. Still, our imports of fruit and vegetables have also increased; and there is little hope that we can effectively compete with the countries from which we derive large supplies of certain fruits, and of early vegetables, which command the highest prices.

Although, therefore, there is evidence of some increase in the home production of the various smaller articles, and further extension seems both probable and promising, yet there can be no hope that the home production of these articles can be so raised as to meet the requirement of our present, to say nothing of an increasing, population.

But, in an article in the *Nineteenth Century* of December 1892, Mr. Jesse Collings, M.P., calls attention to the fact that, leaving corn and cattle out of the question, we in 1891 imported other articles of agricultural produce to the value of more than 38,000,000*l.* The articles he enumerates are—cheese, butter, margarine, lard, poultry, game and rabbits, bacon and hams, pork—fresh and salted, potatoes, eggs, and apples; and he asks—"Why cannot the farming industry supply our home market—the best of all markets—with sufficient quantities of the articles named?" He says the question arises: "Why should an industry be subject to continual depression which has such a vast amount of trade offered at its very doors? What would be said of a body of manufacturers who had available men and material, but who, through failing to adapt their productions to the demand, allowed half the orders offered them to go to foreign countries, and who nevertheless complained of depression in trade?" He adds—"The matter is one of national importance, as affecting the trade of the country, and it is time for the shopkeeper, the manufacturer, and the commercial classes generally to take it up." And again he says—"If a few thousand pounds' worth of steam-engines or iron girders are imported from Belgium, the Chambers of Commerce and the commercial press are alive to the dangers therefrom to British manufacturers, but no anxiety at all is shown at the steady increase in our imports, say, of cheese, which in 1891 amounted in value to nearly 5,000,000*l.* sterling. Surely this country is as fitted to produce cheese as it is to manufacture steam-engines and girders!".

Now it so happens that in the very same number of the Trade and Navigation Returns, which gives the list of articles of agricultural produce imported in 1891, to the value of more than 38,000,000*l.*, we find that—under the head of "Manufactured

Articles"—clocks, cotton manufactures, glass, hats and bonnets of straw, iron girders, beams, pillars, and other articles, leather, boots, shoes, and gloves, paper, silk, straw-plait, watches, woollen manufactures, silk manufactures, and others not enumerated, were in the same year (1891) imported to the value of more than 65,000,000*l.*! No doubt the home producers of these various articles would be able satisfactorily to explain why the large amounts of them imported are not produced at home instead, when such numbers of our population are unemployed; and doubtless the various reasons could be summed up in the few words—it would not pay! Agriculturists, we suppose, would not presume to pass a judgment on the validity of the reasons given by the experts in the different branches of manufacture. But agriculturists are treated in a very different manner by those who apparently know as little about the necessary conditions of profitable agriculture, as agriculturists may be supposed to do of the various manufactures of which we import 65,000,000*l.* worth a year!

The truth is that, for the essential purpose of providing cheap food for the people, and for the urban manufacturing populations especially, free trade in agricultural produce has been established, and imports have, accordingly, immensely increased. An inevitable result of this has been a great reduction in price, the cost for bread-stuffs alone having been, as we have shown in this paper, less than two-thirds as much per head of the population during the later as during the earlier years of the period of our inquiry. A necessary consequence has been to reduce the area under grain crops, and with this the area under the plough, in our own country, and hence to reduce the amount of labour required to a given area, and so naturally to reduce the rural population. A further consequence has been great reduction in rents, and serious loss of tenants' capital. But the urban and manufacturing populations resent the idea that they should bear any share of the burden resulting from the competition with foreign producers, and the great reduction in price chiefly in their interest, necessitating as it does a less requirement for rural labour, which, together with a rapidly increasing population, leads many to go into the towns. It so happens, too, that the most practicable suggestions for change in our agricultural system would only tend to increase the particular evil complained of, by still further reducing our arable and increasing our grass land area; whilst some of the schemes proposed are of very limited applicability, and others would pretty certainly be unprofitable, if not indeed attended with considerable loss.

We have indicated above in which direction there seems the

best prospect of improvement or extension in the production of some of the smaller articles of which we import so much; and we should desire to give every encouragement to well-directed effort. At the same time, we are firmly of opinion that it is out of the question to look for anything like such a result as a greatly increased production of some of the articles enumerated. Nor do we believe that an extensive application of the *Small Holdings Act* would bring about the changes anticipated to anything like the extent that seems to be assumed. County Councils, to whose judgment and action in the matter Mr. Collings looks forward so sanguinely, will, after all, have to face the question—will it pay?

But to return to the question of wheat production, which is our special subject on the present occasion: In our paper on *Allotments and Small Holdings*, above referred to, we showed that, with the rapid increase of population which had taken place, it would have been impossible for our own country to have produced all the wheat required for consumption; and that, should the increase continue, it will be in a greater degree impossible in the future. It was pointed out, that the area under wheat in the United Kingdom had during the last eight years averaged rather less than one-eighth of the total arable area; and that to produce all the wheat required for consumption, more than one-third of our existing arable area would be required; or that, if the area devoted to other rotation crops were to continue to bear about the same relation to that under wheat as in recent years, the total arable area would have to be increased nearly three-fold, making in all much more than our present total arable and grass areas put together; or that, if wheat were to be grown on a larger proportion of the existing arable area, it could only be by the exclusion of the growth of other grain crops and stock-foods, which would then, in their turn, have to be imported in larger quantities; or, our stock must be reduced, and our imports of live animals, dead meat, and dairy produce, be very much increased.

Doubtless, if the price of wheat were materially to recover, the area under the crop would again increase; but it is obvious that with an annually increasing population, and demand for sustenance, it is hopeless to suppose that we can supply from home produce even so large a proportion of the total amount required as during the earlier periods to which our inquiry relates. Indeed, it is evident that, even if our wheat area were to regain its former proportions, it could, with the rapidly increasing demands for other products, only be by the

displacement of some of them, which would then have to be imported instead of grown at home.

In conclusion, it must be admitted that, unless low prices should check the production of grain for export in other countries, or from any other cause prices should rise, there is little likelihood that our own farmers will have much inducement to increase their area under grain crops. Under such circumstances, a larger proportion of the remaining arable area will be devoted to the growth of stock-foods, and, with the increased and increasing area under grass, the production of meat and dairy produce may acquire increased importance in our own agriculture; that is, provided the farmer be protected from imported cattle disease, and from the importation of adulterated dairy products. But it is to be borne in mind, that material increase in the production of meat, milk, butter, and cheese, cannot be attained without the aid of imports of stock-foods, providing both food and manure, and of some direct manures also; whilst, with our increased and increasing population, and limited agricultural area, it cannot be expected that the demands for home consumption can be met without large imports of both grain and the products of feeding. Lastly, with the decrease of arable area, and the increase of permanent grass and of feeding, the number of the population engaged in rural pursuits must necessarily diminish.

JOHN BENNET LAWES.
JOSEPH HENRY GILBERT.

APPENDIX-TABLES.

I. (p. 132).—Home Produce, Imports, and Consumption of Wheat, in the United Kingdom, 40 Harvest-Years, 1852–3 to 1891–2, inclusive.

II. (facing p. 132).—Home Produce, Imports, Consumption, and Price of Wheat, in the United Kingdom, 40 Harvest-Years, 1852–3 to 1891–2, inclusive.

APPENDIX-TABLE I.—*Home Produce, Imports, and Consumption of Wheat, in the United Kingdom, 40 Harvest-Years, 1852–3 to 1891–2, inclusive.*

[N.B.—Home produce at 61 lb., imports at 60⅔ lb. per bushel; 80·77 flour reckoned = 100 wheat. Population as formerly given.

Harvest-years September 1 to August 31	Estimated home produce (bushels of 61 lb.)			Available for consumption			Population (middle of [a]harvest-years)	Available for consumption per head within each year		
	Area under the crop [1]	Average yield per acre	Total home produce	Home produce less 2¼ (or 2) [2] bushels per acre for seed	Imports less exports	Total		From home produce	From imports	Total
	Acres	Bush.	Quarters	Quarters	Quarters	Quarters		Bush.	Bush.	Bush.
1852–3	4,058,731	22⅝	11,574,982	10,433,464	5,807,292	16,240,756	27,511,144	3·03	1·69	4·72
1853–4	4,013,963	20⅝	10,466,473	9,337,546	5,851,960	15,189,506	27,619,999	2·70	1·70	4·40
1854–5	4,036,969	34¾	17,563,140	16,427,742	2,647,314	19,075,056	27,767,388	4·73	0·76	5·49
1855–6	4,076,447	27⅜	13,922,801	12,776,300	3,689,009	16,465,309	27,947,933	3·65	1·06	4·71
1856–7	4,213,651	27	14,192,543	13,007,453	4,014,940	17,022,393	28,129,198	3·70	1·14	4·84
1857–8	4,185,974	33½	17,321,221	16,143,915	5,766,643	21,910,558	28,322,607	4·56	1·63	6·19
1858–9	4,131,822	31½	16,309,949	15,147,874	4,971,278	20,119,152	28,523,406	4·25	1·39	5·64
1859–60	4,019,725	26⅝	13,135,124	12,004,575	4,484,695	16,489,270	28,715,682	3·34	1·25	4·59
1860–1	3,992,657	22½	11,078,948	9,956,012	10,112,748	20,068,760	28,909,045	2·75	2·80	5·55
1861–2	3,898,177	25¼	12,271,546	11,175,183	8,882,890	20,058,073	29,128,110	3·06	2·44	5·50
1862–3	3,823,947	29½	13,957,554	12,882,069	9,102,914	21,984,983	29,331,695	3·51	2·48	5·99
1863–4	3,698,629	38⅔	17,922,048	16,881,807	6,906,087	23,787,894	29,509,298	4·57	1·87	6·44
1864–5	3,685,493	35½	16,216,328	15,179,783	5,454,547	20,634,330	29,700,831	4·09	1·47	5·56
1865–6	3,646,691	30⅔	13,975,936	12,950,305	7,273,595	20,223,900	29,886,735	3·47	1·94	5·41
1866–7	3,649,584	25⅝	11,485,091	10,458,645	7,541,655	18,000,300	30,087,001	2·78	2·00	4·78
1867–8	3,628,910	21	9,566,522	8,545,890	9,104,664	17,650,554	30,299,054	2·26	2·40	4·66
1868–9	3,937,275	34	16,733,419	15,626,060	8,115,943	23,742,003	30,525,967	4·09	2·13	6·22
1869–70	3,976,147	27	13,419,496	12,301,205	9,906,858	22,208,063	30,760,150	3·20	2·58	5·78
1870–1	3,761,457	30	14,105,464	13,047,554	8,080,016	21,127,570	31,299,067	3·33	2·07	5·40
1871–2	3,818,818	24	11,456,544	10,382,493	9,424,253	19,806,746	31,749,121	2·62	2·37	4·99
1872–3	3,827,146	24	11,481,438	10,405,053	12,424,700	22,829,753	32,040,636	2·60	3·10	5·70
1873–4	3,658,815	22½	10,290,417	9,261,375	11,284,136	20,545,511	32,318,503	2·29	2·80	5·09
1874–5	3,821,655	29½	13,972,926	12,898,085	11,705,254	24,603,339	32,628,940	3·16	2·87	6·03
1875–6	3,503,709	22⅞	10,018,418	9,033,000	13,860,079	22,893,079	32,974,761	2·19	3·36	5·55
1876–7	3,114,555	25	9,732,984	8,857,015	12,107,293	20,964,308	33,327,426	2·13	2·90	5·03
1877–8	3,311,859	26½	10,970,533	10,039,073	14,408,628	24,447,701	33,736,117	2·38	3·42	5·80
1878–9	3,372,590	30	12,647,213	11,698,672	14,145,647	25,844,319	34,064,731	2·75	3·32	6·07
1879–80	3,047,752	15½	5,905,020	5,047,840	16,409,933	21,457,773	34,388,733	1·17	3·82	4·99
1880–1	3,057,784	24½	9,364,464	8,504,462	16,079,311	24,583,773	34,788,371	1·95	3·70	5·65
1881–2	2,960,066	24	8,880,198	8,047,679	17,077,974	25,125,653	35,163,544	1·83	3·89	5·72
1882–3	3,157,924	25⅝	10,115,225	9,227,059	19,947,156	29,174,215	35,514,293	2·08	4·49	6·57
1883–4	2,707,949	28	9,477,822	8,616,211	15,780,731	24,396,942	35,845,007	1·92	3·52	5·44
1884–5	2,744,928	29⅜	10,079,032	9,307,021	17,971,566	27,278,587	36,200,698	2·06	3·97	6·03
1885–6	2,549,335	30¼	9,639,673	8,922,673	15,153,636	24,076,309	36,579,984	1·95	3·32	5·27
1886–7	2,355,451	29½	8,612,118	7,949,647	17,346,795	25,296,442	36,963,515	1·72	3·75	5·47
1887–8	2,384,505	28⅜	8,457,541	7,861,415	16,689,389	24,550,804	37,332,904	1·68	3·58	5·26
1888–9	2,663,250	26⅝	8,946,855	8,281,042	18,007,974	26,289,016	37,690,453	1·76	3·82	5·58
1889–90	2,539,099	29½	9,362,928	8,728,153	18,074,666	26,802,819	38,087,845	1·83	3·80	5·63
1890–1	2,478,677	31½	9,759,791	9,140,122	17,973,042	27,113,164	(37,693,356)	1·94	3·81	5·75
1891–2	2,388,147	29½	8,806,292	8,209,255	21,889,695	30,098,950	38,007,239	1·73	4·61	6·34
AVERAGES.[3]										
Periods of 8 years										
1852–3 to '59–60	4,092,160	28	14,310,779	13,159,859	4,654,141	17,814,000	28,067,170	3·74	1·33	5·07
1860–1 to '67–8	3,753,011	28⅜	13,309,247	12,253,712	8,047,387	20,301,099	29,606,462	3 31	2·18	5·49
1868–9 to '75–6	3,788,132	26½	12,684,765	11,619,353	10,600,155	22,219,508	31,787,143	2·93	2·66	5·59
1876–7 to '83–4	3,091,310	24½	9,636,682	8,754,751	15,744,584	24,499,335	34,603,528	2·03	3·63	5·66
1884–5 to '91–2	2,512,924	29⅜	9,208,029	8,549,916	17,888,345	26,438,261	37,319,499	1·83	3·83	5·66
40 yrs.										
1852–3 to '91–2	3,447,507	27½	11,829,900	10,867,518	11,386,923	22,254,441	32 276,760	2·77	2 73	5·50

[1] Exclusive of the islands in the British seas.
[2] From 1852–3 to 1886–7, 2½ bushels; 1887–8 and since, 2 bushels.
[3] The "Averages" are, in each case, the mere means of the figures in the columns for the respective periods.

APPENDIX–TABLE II.—*Home Produce, Imports, Consumption, and Price of Wheat, in the United Kingdom,*[1] *40 Harvest-Years, 1852–3 to 1891–2, inclusive.*

[*N.B.—Home Produce and Imports at 60 lb. per bushel throughout: 72 Flour reckoned = 100 Wheat. Population according to corrected Returns.*]

Harvest-years, Sept. 1 to Aug. 31	QUANTITY: Estimated home produce (bushels of 60 lb.)			QUANTITY: Available for consumption			QUANTITY: Per cent. of total available		QUANTITY: Population (middle of harvest years)	QUANTITY: Available for consumption per head within each year			VALUE: Average *Gazette* price of home wheat per quarter	VALUE: Price per quarter of imported wheat according to declared values in Trade and Navigation Returns[5]	VALUE: Value of wheat available for consumption. Home at average *Gazette* price; imports, wheat and flour as wheat, at rates for wheat, according to the declared values in the Trade and Navigation Returns			VALUE: Value of wheat [5] estimated to be required		Harvest-years, Sept. 1 to Aug. 31
	Area under the crop [4]	Average yield per acre	Total home produce	Home produce less 2½ (or 2·2) bushels per acre for seed	Imports less exports	Total	From home produce	From imports		From home produce	From imports	Total			From home produce	From imports	Total	Total	Per head	
	Acres	Bushels	Quarters	Quarters	Quarters	Quarters	Per Cent.	Per Cent.		Bushels	Bushels	Bushels	*s.* *d.*	*s.* *d.*	£	£	£	£	*s.* *d.*	
1852–3	4,058,731	22¼	11,795,687	10,654,169	6,017,383	16,671,552	63·9	36·1	27,511,144	3·10	1·75	4·85	44 7	(44 7)	23,749,918	13,413,750	37,163,668	39,862,502	29 0	1852–3
1853–4	4,013,963	21¼	10,662,089	9,533,162	6,079,223	15,612,385	61·0	39·0	27,619,999	2·76	1·76	4·52	72 11	(72 11)	34,756,320	22,163,834	56,920,154	65,453,643	47 5	1853–4
1854–5	4,036,969	35⅜	17,850,972	16,715,574	2,724,844	19,440,418	86·0	14·0	27,767,388	4·82	0·78	5·60	70 1	(70 1)	58,574,157	9,548,308	68,122,465	63,216,011	45 7	1854–5
1855–6	4,076,147	27½	14,203,870	13,057,369	3,845,039	16,902,408	77·2	22·8	27,947,933	3·74	1·10	4·84	73 11	(73 11)	48,257,860	14,210,623	62,468,483	67,139,085	48 1	1855–6
1856–7	4,213,651	27½	14,484,125	13,299,336	1,135,216	17,434,552	76·3	23·7	28,129,198	3·79	1·17	4·96	60 1	61 5	39,953,421	12,690,247	52,643,668	55,208,515	39 3	1856–7
1857–8	4,185,971	33⅝	17,594,172	16,416,867	5,968,969	22,385,836	73·3	26·7	28,322,607	4·61	1·68	6·32	47 8	45 9	39,126,866	13,645,203	52,772,069	43,398,768	30 8	1857–8
1858–9	4,131,822	32	16,527,288	15,365,213	5,150,367	20,515,580	74·9	25·1	28,523,406	4·31	1·41	5·75	43 8	41 10	33,547,382	10,770,391	44,317,773	40,050,586	28 1	1858–9
1859–60	4,019,725	26½	13,315,339	12,184,791	4,640,924	16,825,715	72·4	27·6	28,715,682	3·39	1·29	4·68	48 3	50 6	29,395,808	11,709,442	41,105,250	45,599,098	31 9	1859–60
1860–1	3,992,657	22½	11,229,348	10,106,413	10,490,711	20,597,124	49·1	50·9	28,910,892	2·80	2·90	5·70	55 3	55 6	27,918,966	29,126,520	57,045,486	56,019,828	38 9	1860–1
1861–2	3,898,177	25⅝	12,486,348	11,389,986	9,185,826	20,575,812	55·3	44·7	29,154,784	3·12	2·52	5·64	58 2	51 5	33,125,876	23,612,265	56,738,141	56,276,359	38 7	1861–2
1862–3	3,823,947	29⅜	14,220,303	13,144,818	9,402,694	22,547,512	58·3	41·7	29,395,183	3·58	2·56	6·14	47 8	45 0	31,328,483	21,141,303	52,469,786	47,883,393	32 7	1862–3
1863–4	3,698,629	39⅜	18,204,190	17,163,951	7,159,557	24,323,508	70·6	29·4	29,610,614	4·61	1·94	6·58	41 0	40 6	35,186,100	14,503,877	49,689,977	42,343,626	28 7	1863–4
1864–5	3,685,493	35⅞	16,527,133	15,490,588	5,628,982	21,119,570	73·3	26·7	29,843,597	4·15	1·51	5·66	40 1	37 8	31,045,720	10,595,667	41,641,387	41,189,770	27 7	1864–5
1865–6	3,646,691	31⅛	14,187,907	13,162,275	7,543,877	20,706,152	63·6	36·4	30,073,562	3·50	2·01	5·51	46 6	41 2	30,602,289	16,654,189	47,256,478	48,041,630	31 11	1865–6
1866–7	3,649,581	25½	11,633,049	10,606,603	7,751,213	18,357,816	57·8	42·2	30,322,006	2·80	2·04	4·84	60 1	58 3	31,996,586	22,569,468	54,566,054	63,089,561	41 7	1866–7
1867–8	3,628,010	21⅜	9,695,994	8,675,363	9,315,408	17,990,771	48·2	51·8	30,596,362	2·27	2·43	4·70	68 4	65 5	29,640,824	29,446,730	59,087,554	70,341,894	46 0	1867–8
1868–9	3,937,275	34½	17,041,018	15,933,659	8,354,687	24,288,346	65·6	34·4	30,882,177	4·13	2·16	6·29	50 0	46 5	39,834,148	19,376,408	59,210,556	53,640,643	34 9	1868–9
1869–70	3,976,147	27½	13,668,005	12,549,714	10,205,817	22,755,531	55·2	44·8	31,163,783	3·22	2·62	5·84	46 2	43 8	28,968,923	22,274,666	51,243,589	50,001,050	32 1	1869–70
1870–1	3,761,457	30½	14,340,555	13,282,645	8,278,143	21,560,788	61·6	38·4	31,455,974	3·38	2·10	5·48	54 2	49 1	35,973,830	20,309,422	56,283,252	58,506,289	37 2	1870–1
1871–2	3,818,848	21⅝	11,635,553	10,561,502	9,641,084	20,202,586	52·3	47·7	31,768,020	2·66	2·43	5·09	56 7	51 8	29,880,249	24,907,372	54,787,621	61,383,336	38 8	1871–2
1872–3	3,827,146	24⅜	11,660,835	10,584,450	12,793,514	23,377,964	45·3	54·7	32,076,428	2·61	3·19	5·80	57 4	55 0	30,342,090	35,175,366	65,517,456	64,050,306	39 11	1872–3
1873–4	3,658,815	22½	10,461,921	9,432,882	11,626,585	21,059,467	44·8	55·2	32,393,528	2·33	2·87	5·20	61 3	56 2	28,888,201	32,636,721	61,524,922	67,429,016	41 8	1873–4
1874–5	3,821,655	29⅞	14,211,780	13,136,910	12,032,813	25,169,753	52·2	47·8	32,726,341	3·21	2·91	6·15	44 7	41 8	29,284,429	26,894,030	56,178,519	52,011,364	31 10	1874–5
1875–6	3,503,709	23¼	10,182,651	9,197,236	14,224,334	23,421,570	39·3	60·7	33,079,582	2·22	3·11	5·66	45 11	45 6	21,115,321	32,369,039	53,484,360	53,821,481	32 6	1875–6
1876–7	3,114,555	25⅜	9,878,979	8,990,510	12,474,139	21,464,649	41·9	58·1	33,450,625	2·15	2·98	5·13	54 7	51 2	24,536,600	31,892,466	56,429,066	64,085,809	38 4	1876–7
1877–8	3,311,859	27	11,177,521	10,246,064	14,849,018	25,095,082	40·8	59·2	33,821,162	2·42	3·51	5·93	50 10	51 0	26,042,079	37,854,192	63,896,271	62,755,817	37 1	1877–8
1878–9	3,372,590	30½	12,857,999	11,909,458	14,619,708	26,529,166	44·9	55·1	34,182,962	2·79	3·42	6·21	41 7	42 2	24,761,748	30,830,813	55,592,561	52,201,301	30 7	1878–9
1879–80	3,047,752	15⅝	6,000,262	5,113,082	16,952,587	22,065,669	23·3	76·7	34,516,139	1·19	3·93	5·12	46 1	49 3	11,850,518	41,757,939	53,608,457	61,027,689	35 1	1879–80
1880–1	3,057,781	24⅞	9,507,797	8,617,795	16,683,015	25,330,810	34·1	65·9	34,830,721	1·99	3·83	5·82	43 11	45 6	18,989,117	37,925,247	56,914,364	57,031,375	32 9	1880–1
1881–2	2,960,066	24⅜	9,018,951	8,186,432	17,651,374	25,840,806	31·7	68·3	35,116,899	1·87	4·02	5·89	47 1	48 2	19,272,225	42,517,763	61,819,988	61,223,420	34 10	1881–2
1882–3	3,157,921	26	10,263,253	9,375,087	20,739,677	30,114,764	31·1	68·9	35,368,975	2·12	4·69	6·81	42 0	42 11	19,687,683	44,464,231	64,151,914	54,907,441	31 1	1882–3
1883–4	2,707,949	28½	9,647,068	8,885,456	16,477,011	25,362,467	35·0	65·0	35,632,671	2·00	3·70	5·70	38 6	38 11	17,104,503	32,039,238	49,143,741	50,315,717	28 3	1883–4
1884–5	2,744,928	29⅞	10,250,591	9,478,580	18,748,588	28,227,168	33·6	66·4	35,919,338	2·11	1·18	6·29	33 2	33 8	15,718,645	31,534,679	47,253,324	44,571,585	24 10	1884–5
1885–6	2,549,336	30¾	9,799,006	9,082,006	15,798,881	24,880,887	36·5	63·5	36,216,609	2·01	3·49	5·50	30 11	32 7	14,039,268	25,771,369	39,810,637	42,954,212	23 9	1885–6
1886–7	2,355,451	29¾	8,759,333	8,096,862	18,124,585	26,221,447	30·9	69·1	36,507,049	1·77	3·98	5·75	33 1	33 3	13,393,559	30,115,640	43,509,199	44,902,019	24 7	1886–7
1887–8	2,384,505	28⅞	8,606,573	8,010,447	17,490,376	25,500,823	31·4	68·6	36,790,244	1·74	3·80	5·54	31 0	31 1	12,416,193	27,184,503	39,600,696	42,349,276	23 0	1887–8
1888–9	2,663,250	27⅜	9,118,309	8,447,496	18,699,852	27,147,348	31·1	68·9	37,083,110	1·82	4·03	5·85	30 9	34 0	12,988,025	31,777,559	44,765,584	45,327,001	24 5	1888–9
1889–90	2,539,099	30	9,521,621	8,886,846	18,845,483	27,732,329	32·0	68·0	37,387,034	1·90	4·03	5·93	31 3	32 11	13,885,697	30,987,202	44,872,899	44,841,848	24 0	1889–90
1890–1	2,478,677	32	9,914,708	9,295,039	18,720,065	28,015,104	33·2	66·8	37,693,356	1·97	3·98	5·95	35 5	35 11	16,459,965	33,606,011	50,065,006	49,931,147	26 6	1890–1
1891–2	2,388,147	30	8,955,551	8,358,511	22,830,421	31,188,935	26·8	73·2	38,004,686	1·76	4·81	6·57	33 5	36 8	13,965,684	41,839,131	55,804,815	50,404,929	26 6	1891–2

Official Reports.

ANNUAL REPORT OF THE ROYAL VETERINARY COLLEGE

On Investigations conducted for the Royal Agricultural Society during the year 1892.

A LARGE body of work has been done in the Pathological Laboratory of the College during the past year, and results have been obtained that are likely to be of much practical value in dealing with some of the most important diseases of farm stock. A considerable part of the work undertaken has had for its object to bring into use more precise methods of diagnosis in dealing with tuberculosis and glanders, and another part has been directed towards elucidating the cause of certain obscure outbreaks of disease. From examinations conducted in the laboratory, a positive diagnosis was made in the following instances :—

Anthrax	10	Discomycosis	1
Septicæmia	1	Parasitic Lung disease	3
Actinomycosis	1	Parasitic Bowel disease	2
Swine-fever	2	Swine Erysipelas	1

Investigations have also been made regarding outbreaks of three hitherto undescribed diseases, viz. suppurative udder disease in cows, dysenteric diarrhœa in cattle, and pneumo-pericarditis in turkeys. Although in each of these cases it is believed that the cause of the disease has been discovered, further experiments and observations are deemed necessary before publishing the results.

ACTINOMYCOSIS.

Actinomycosis is a disease caused by a vegetable parasite termed the Actinomyces, or ray fungus. In certain districts of England and Scotland it is a comparatively common disease of cattle. It generally attacks the tongue or the bones of the upper or lower jaw. In either of these situations its effects are serious, for the structural alterations which it causes in the tongue or jaw render the act of mastication very painful, and ultimately impossible. Hitherto only a small measure of success has attended the treatment of actinomycosis, but in a certain proportion of tongue cases a cure

has been effected by severe scarification followed by the application of a strong counter-irritant, such as iodine or carbolic acid. A few years ago Professor Thomassen, of the Utrecht Veterinary College, reported that he had obtained great success in the treatment of actinomycosis by the internal administration of iodide of potassium, combined with the application of tincture of iodine to the affected tongue. This statement did not attract much attention, probably because the success obtained was placed entirely to the credit of the local iodine treatment. Subsequently, however, Thomassen reported that he had entirely abandoned the latter, and limited the treatment to the internal administration of the iodide, and that a cure had been effected in every case. More recently, experiments made at the Paris Veterinary College by Professor Nocard corroborated Thomassen's statement regarding the curative effects of iodide of potassium in actinomycosis, and it was therefore deemed desirable to test the matter at the Royal Veterinary College. Unfortunately only one animal has yet been obtained for experiment, but in that case the result was so striking as to warrant its early publication.

This animal—a heifer aged two years and eight months—was admitted to the College Infirmary on October 17, 1892. At that time her tongue presented the unmistakable appearance of actinomycosis. The disease had its seat in the lower part of the tongue, which was double the normal thickness, distorted in shape, covered with shallow abrasions, and extremely hard to the touch. Saliva was constantly dribbling from the animal's mouth, mastication appeared to be very painful, and the general condition was poor. Treatment with iodide of potassium was begun on October 15, one drachm being given twice daily in water. The animal was fed on mashes, but was also allowed hay, of which it took only a little. During the first ten days of this treatment there was no noticeable improvement in the condition of the tongue, but the heifer began to feed better. On October 31 it was noted for the first time that the indurated part of the tongue felt softer to the touch, and a few days later it was observed that the abrasions were healing. On November 16 the dose of iodide was raised to two drachms (twice daily), and on November 22 to three drachms. The latter doses were continued till November 30, when the medicine was stopped. During the whole period of treatment the condition of the tongue steadily improved, as did also the appetite and the general condition, save that the skin became covered with a most copious scurf. By the end of December the animal could be pronounced cured, and there has not since been any evidence of the disease recurring.

The result in this case accordingly fully bears out Thomassen's statements regarding the absolute curability of actinomycosis. This effect of iodide of potassium must be pronounced remarkable, and the discovery is important, not only because it places a hitherto intractable disease among the list of curable affections, but also because it revives a hope that medicinal remedies may yet be discovered in the case of other bacterial diseases for which at the present time no cure is known.

The Diagnosis of Tuberculosis.

During the past year a most extensive series of experiments and observations have been made regarding the diagnosis of tuberculosis. It is now generally recognised that tuberculosis is a contagious disease, and that its present alarming prevalence among cattle is due to the transmission of the germ from diseased to healthy animals. There are some who believe that this transmission in many cases takes place from the bull or the cow to the calf, before the birth of the latter, while others consider that in all but an insignificant proportion of cases the disease is contracted after birth, through cohabitation with cattle already affected with tuberculosis. No matter which of these views regarding the mode of infection is accepted, the immense importance of being able to detect the disease in its early stages is apparent. If the disease (and not the mere predisposition thereto) is actually transmissible from parent to offspring, every breeder will naturally wish to know which animals of his herd are already infected, so that he may avoid breeding from them ; on the other hand, if every tuberculous animal is a source of danger to its companions in the same stock, the hope of eradicating the disease will lie in being able to detect it at an early stage, so as to get rid promptly of the source of infection.

It must be frankly confessed that hitherto anything approaching a certain diagnosis of tuberculosis in cattle in its early stage has been impossible. This has been due to the circumstances of the case, and not to any inferiority of skill on the part of veterinary surgeons. In the vast majority of cases the disease has its starting point in parts of the body so deeply situated as to be entirely removed from examination during life. Added to that there is the fact that these primary seats of the microbe may be pretty extensively diseased without entailing any very great deterioration of the animal's general condition. Whenever the disease has seriously invaded a vital organ, such as the lung or the bowel, the disorder can generally be diagnosed with more or less probability, and sometimes with absolute certainty, but before that becomes possible the affected animal may have done much mischief by sowing the seeds of the disease in some of its companions.

During the past year various suggested methods of arriving at an early diagnosis were put to the test of experiment. Microscopic examination of blood, milk, mucus from the throat, &c., and inoculation of these same materials from animals proved subsequently by post-mortem examination to be tuberculous, showed that none of these procedures could be relied upon to point out the existence of the disease in more than a very small proportion of cases. Fortunately, much more encouraging results have been obtained in an extensive trial of Koch's tuberculin.

Tuberculin is a liquid which contains in solution certain substances manufactured or excreted by the tubercle bacillus when artificially cultivated. Koch discovered that this material exercises a much more powerful effect in tuberculous than in non-tuberculous

individuals, and as soon as the fact was published veterinary surgeons both at home and abroad may be said to have jumped at the idea that tuberculin might render immense service in the diagnosis of tuberculosis. Experiments in this direction were immediately set on foot in almost every European country, and numerous reports on the subject have appeared within the last two years. The tenor of these reports is by no means uniform, but the great majority of them were favourable to the employment of tuberculin as an aid to the diagnosis of tuberculosis. During the past year over a hundred cattle, some obtained specially for experiment, and others belonging to members of the Royal Agricultural Society, have been treated with tuberculin, but, before stating the general result, the mode of administration and the *rationale* of its employment may be explained.

Tuberculin is an amber-coloured liquid prepared and dispensed under the authority of the German Government. It is administered by subcutaneous injection, and the most marked effect to be looked for in tuberculous animals is an elevation of the body temperature. When it is intended to use it for diagnostic purposes on an animal, the temperature must be taken once or twice during the twenty-four hours before the injection is made. The normal temperature of the ox is about 101° F., and it is only exceptionally that this temperature is much exceeded in tuberculous subjects. During the next twenty-four hours after injection the temperature is taken at intervals of three or four hours, so as to detect any elevation that may be brought about by the tuberculin. Not rarely the temperature rises to 105° or more, and sometimes this is accompanied by other signs of fever, such as hurried breathing, restlessness, and loss of appetite. The dose required to bring about this febrile reaction is comparatively small—about half a cubic centimetre for a cow or ox of ordinary size. The diagnostic value of the agent lies in the fact that such a dose is without appreciable effect on an animal that is not the subject of tuberculosis, while it determines an appreciable rise of temperature in animals that are tuberculous. In the experiments here referred to various doses were employed, and the result appeared to show that no advantage was gained by using larger doses than the one above mentioned.

It would be out of place here to give in detail the observations made regarding the temperature of all the animals that were treated with tuberculin, but the general result may be briefly stated.

Seventy-two of the animals have been killed and submitted to post-mortem examination since they were treated with tuberculin. In thirty-two of these animals the temperature after injection rose to 103° F. or more ; and, in twenty-seven of these, lesions of tuberculosis were discovered, while in the remaining five no such lesions could be found. Of the forty animals in which the temperature after injection remained normal, or at least did not rise to 103° F., twenty-one appeared on post-mortem to be free from tuberculosis, and in the remaining nineteen lesions of that disease were discovered. The results in the case of these seventy-two animals may be otherwise stated thus : The tuberculin pointed out correctly the existence of tuber-

culosis in twenty-seven animals, and wrongly in five, and it failed to indicate the existence of the disease in nineteen. At first sight, this result does not seem to bear out the expectations that have been formed regarding the value of tuberculin as an aid to diagnosis, but it is only fair to state that, although the post-mortem was as careful as it was possible to make it in animals dressed for the butcher in a slaughter-house, it is quite possible that tuberculous lesions may have been missed in some of the five animals that had a reaction but appeared sound. Moreover, it is important to bear in mind that in only three of the twenty-seven animals in which the tuberculin correctly pointed out the existence of tuberculosis could a positive diagnosis have been made by any other means. The remaining twenty-four were apparently healthy cows, many of them in fair condition and giving a good yield of milk.

Besides the seventy-two animals above referred to, over thirty others were tested with tuberculin, and in a large proportion of them a reaction indicating the existence of tuberculosis followed. Unfortunately, a post-mortem examination in these cases could not be obtained, and the correctness of the indications could, therefore, not be verified.

The Diagnosis of Glanders.

Among those who have not had much experience of glanders the belief is general that the disease is one that is easily detected during life. This belief, however, is to a large extent erroneous. At the present time glanders is lamentably prevalent in London and in one or two other centres in Great Britain; and this prevalence is mainly due to the latent course which the disease runs in many cases, and to the consequent difficulty of diagnosis. Shortly after the introduction of Koch's tuberculin, an analogous preparation, termed mallein, was prepared by the Russian veterinary surgeon Kalning, and recommended for use as an aid to the diagnosis of glanders. This material contains in solution certain poisonous substances elaborated by the bacillus of glanders, and experiments made with it showed that it had a specific action on glandered horses; that is to say, when injected subcutaneously it excited a very marked attack of fever (lasting for twenty-four hours or more) in horses that were the subjects of glanders, but was without effect (in moderate doses) in healthy, or non-glandered horses.

It appeared to be of the highest importance to ascertain to what extent the statements made regarding the diagnostic value of mallein were true. A supply of the material was therefore obtained from the Pasteur Institute in Paris, and experiments have been made with this on upwards of seventy horses. The results warrant the statement that mallein is an agent of greater precision than tuberculin, and that it is likely to render most important service in any attempt to stamp out glanders. Hitherto such attempts in the large studs in London have been futile, because even the most experienced veterinary surgeons have found themselves

unable in many cases to detect the disease at an early stage. There is good reason to hope that by the aid of mallein it will now be possible to pick out every horse in a stud that is the subject of glanders, and with this knowledge the eradication of the disease will present little difficulty where the expense of slaughtering the affected animals can be faced. Mallein is now manufactured at the Royal Veterinary College, and supplied to veterinary surgeons free of charge.

Swine Erysipelas.

Although the term Swine Fever in a sense implies that the pig is the subject of only one kind of fever, it has for some years been known that there are three perfectly distinct epizootic or infectious diseases of swine. The first of these is the disease with which we are only too familiar in this country under the name of swine fever; the second is swine erysipelas; and the third is swine plague. It has generally been assumed that the latter two diseases, which are the cause of great annual loss among pigs in most European countries, do not occur in Great Britain; but several observations prove that supposition to be erroneous, at least as regards one of them.

Swine erysipelas has for long been recognised as an important disease abroad. It is caused by a minute germ—a bacillus, which was first accurately described by the German professor Loeffler. This germ is found in large numbers in the blood of pigs dead from the disease, and its presence or absence is a sure guide in diagnosis. The disease, like swine fever, is readily spread by contagion and infection, but it differs clinically from swine fever in being as a rule more rapidly fatal. Death or recovery usually occurs within two or three days, and pigs that have passed through one attack are, for a time at least, protected against a second. But, strange to say, the disease in some individuals runs a chronic course. This important fact was first recognised by Professor Bang, of Copenhagen, who showed that in this chronic form the affected pig may linger in an unthriving state for months, and that when it dies, or is killed, the post-mortem examination usually reveals extensive disease of the valves of the heart. These valves, which are normally thin, smooth, and membranous, become greatly thickened, and acquire a cauliflower appearance from the formation of soft, irregular excrescences on their surface. In the substance of these excrescences Bang found the bacillus of swine erysipelas in great numbers, and thus proved conclusively the true nature of the condition.

During the past year the heart of a pig was sent to the Pathological Laboratory of the Royal Veterinary College by Captain Russell, of Grantham, and a naked-eye inspection of it showed that its valves were the seat of cauliflower growths resembling those described by Bang. Microscopic examination of sections made from these growths revealed enormous numbers of small bacilli, agreeing in form and size with the germs of swine erysipelas. The history

of this pig as ascertained by Captain Russell was as follows :—It belonged to a labouring man, who had purchased it in February 1892, when it was about three months old. At that time it appeared quite healthy, and it continued to thrive until the month of October, when it fell ill. It ceased to feed, and a large purple patch made its appearance on the animal's right side. This patch subsequently turned almost black, and later it became dry and scaly, like a part that had been blistered. Eventually the diseased patch of skin reacquired its normal appearance, save that it remained of a deeper red than the other parts. The pig, however, did not recover : it lay constantly, refused to eat, and died five weeks after the beginning of the illness. No history of contagion or infection was obtainable.

There can be little doubt that this was a case of swine erysipelas, but the proof that the disease is not unknown in Great Britain does not rest solely on this single observation. More than two years ago Dr. Murray and Mr. Clement Stephenson, of Newcastle, demonstrated the presence of these small bacilli in the diseased cardiac valves of pigs supposed to have suffered from swine fever, and in the latter part of 1891 the writer of this report published an account of three similar cases. Moreover, in two of these three cases pure cultures of the bacilli were obtained from the diseased hearts, and complete proof of the identity of these organisms with the germ of swine erysipelas was thus furnished.

These observations make it certain that swine fever is not the only disease of its class affecting pigs in this country, and the question arises, Is swine erysipelas a disease recently introduced with foreign pigs, or has its existence been overlooked for years past owing to its being confounded with swine fever? With a view to throwing some light on this point, and at Professor Brown's suggestion, the College Museum was searched for specimens of pigs' diseased hearts. Unfortunately, the collection was found to contain only one specimen of the kind, and that had no history attached to it, but bore the date 1888. This heart, of which an illustration is given on p. 140, had been preserved to show the before-described valvular excrescences, but without any suspicion that they were lesions caused by the bacillus of swine erysipelas. A microscopic examination, however, shows that these organisms are present in enormous numbers in the cauliflower growths. It is therefore certain that swine erysipelas has existed for years unnoticed among British pigs, and, considering its contagious and fatal character, the circumstance can hardly be accounted for on any other supposition than that it has been confounded with swine fever. Now that the existence of the disease has been proved, it is very likely that numerous outbreaks of it will be reported; for to anyone who keeps his mind open to the fact that every outbreak of infectious pig-disease is not necessarily swine fever the diagnosis of swine erysipelas presents little difficulty. The principal clinical and pathological distinctions between the two diseases may be summarised as follows :—

1. *Swine Fever.*—Attacks pigs of any breed or age, but is most fatal in young animals. Has an incubative period of eight to ten days. Discoloration of the skin is a common but not a constant symptom. Generally attended with constipation or diarrhœa, quick breathing, and cough. Seldom fatal within less than a week, and often lasts for two or three weeks or more. Save in very acute cases, bowel lesions are constant, and pneumonia is almost equally constant. The bowel affection may take the form of a diffuse diphtheritic inflammation of the mucous membrane, sometimes of the small, generally of the large, intestine. In more chronic cases the lining of the large intestine is beset with well-defined "ringed" patches of dead tissue, the so-called "ulcers," or with nodular elevations ("buttons") covered with dead mucous membrane. The lung disease is a catarrhal form of

Diseased Heart of Pig, showing valvular excrescences.

pneumonia, frequently attended with larger or smaller patches of blood effused into the lung tissue. Spleen, as a rule, not notably enlarged.

2. *Swine Erysipelas.*—Coarser breeds (Yorkshire included) are least susceptible. Generally attacks animals from three to twelve months old; older pigs are sometimes attacked, but sucking pigs seldom or never. Incubative period, three to four days. Discoloration of the skin a very common symptom; sometimes confined to the under surface of the body and inner surface of the limbs; sometimes general, occasionally absent, at first bright red, later bluish or brownish red. Illness sets in suddenly, with high fever, great depression, weakness, paralysis of the hind quarters, and sometimes severe nervous disturbance. Death generally occurs on the second or third day of illness, sometimes within twenty-four hours, occasionally after a week, or even months (from chronic disease of the lining membrane of the

cavities of the heart). Is readily spread by mediate and immediate contagion. Fatality 50 to 75 per cent., or even more. Lesions revealed at post-mortem are—enlargement of the spleen; acute inflammation of the mucous membrane of the stomach and intestines, with minute spots of blood; inflammation of the liver, heart, and muscles; inflammation of the kidneys with effusion of blood. Lungs in general free from pneumonic lesions, but congested; and no diphtheritic inflammation or formation of "ringed" ulcers in the large intestine.

In concluding this note it may be as well to give one or two illustrations to show what a formidable plague swine erysipelas is in some foreign countries. In a monograph published by Lydtin and Schottelius on this disease it is stated that in the year 1884 the total number of pigs in the Grand Duchy of Baden was 393,244, and of that number no fewer than 12,564 were attacked with swine erysipelas; 2,923 of these succumbed to the disease, 8,218 were slaughtered, and 1,423 recovered. These authors quote many examples illustrating its highly contagious and infectious character, and show that it spreads not only by direct contact between diseased and healthy pigs, but also with great readiness by intermediate infection, butchers, pig-dealers, and castrators very frequently acting as agents for the dissemination of the disease.

In France also the disease is very common. Thus, in the two months of November and December 1892, over 100 outbreaks of the disease were reported. But perhaps the figures which are of greatest interest are those furnished regarding the occurrence of swine erysipelas in Denmark. A few years ago the disease was almost unknown in that country, but at the present time it prevails to an alarming extent. Thus, in 1887 there were reported 387 cases; in 1888, 786 cases; in 1889, 1,019 cases; in 1890, 1,372 cases; and in 1892, 2,146 cases.

There is no reason to suppose that the disease is at the present time anything like so prevalent in Great Britain as swine-fever, but the foregoing figures regarding its rapid development in Denmark are sufficient warning of what may happen here if measures against it are not immediately taken under the Contagious Diseases (Animals) Act. For a long time past swine from Denmark could only be landed in Great Britain for slaughter at the place of landing.

Yew Poisoning.

In view of the conflict of evidence regarding the poisonous effects of yew leaves, Professor Brown deemed it advisable to have some experiments with animals of different species carried out at the Royal Veterinary College. It cannot be said that the results yet throw much light on the matter; but so far as they go they appear to indicate that the poisonous alkaloid is very unequally distributed in the leaves.

Experiment I.—A full-grown sheep ate in twenty-four hours 14 oz. of the half-dried leaves, and two days later it ate other 6 oz. No effect whatever was observable.

Experiment II.—A year-old heifer ate in twenty-four hours 2 lb. 6 oz. of the half-dried leaves and twigs. No effect.

In these two experiments the leaves were from the male plant.

Experiment III.—Three calves, aged about seven months, consumed in two hours 3 lb. 6 oz. of half-dried leaves and small twigs from a female plant. No effect. Three days later (October 24) the same three calves ate 10 oz. in two hours. No effect was observable on the following day (the 25th), but on the morning of the 26th one of the calves was noticed to be ill, and within half an hour thereafter it died. The symptoms noted were great depression and hurried respiration. The post-mortem examination revealed most intense gastro-enteritis. The entire mucous membrane of the fourth stomach was of a deep crimson-lake colour, and the intestinal mucous membrane was acutely inflamed, the hyperæmia being most marked in the small intestine. The contents of both stomach and intestines were deeply tinged with blood. The spleen was swollen and soft—almost diffluent; it bore a striking resemblance to an anthrax spleen, save that the colour of the pulp was brighter. The other organs showed no marked deviation from the normal.

Experiment IV.—The two surviving calves from the preceding experiment consumed, on November 7, 3 lb. of half-dried leaves and small twigs from a female plant. On the 8th one of the calves appeared a little dull, but both continued to eat and ruminate. On November 12 the same two calves ate 4 lb. 7 oz. of half-dried leaves and twigs from a female plant. No signs of disturbance followed.

Experiment V.—A donkey ate in twenty-four hours $5\frac{1}{2}$ oz. of half-dried leaves from a female plant. No effect.

Experiment VI.—Two guinea-pigs consumed $1\frac{1}{2}$ oz. of half-dried leaves from a female plant in seventy-two hours. No effect.

This inquiry will be continued.

J. McFadyean,
Professor of Pathology and Bacteriology.

January, 1893.

QUARTERLY REPORT OF THE CHEMICAL COMMITTEE,

March, 1893.

1. Mr. B. S. James, of the Shushions Manor, Church Eaton, Stafford, sent, on December 2, a sample of Linseed-cake for analysis, and this cake, he stated, had been "guaranteed 95 per cent. pure, and to contain over 12 per cent. of Linseed-oil." The price was 9*l.* 2*s.* 6*d.* per ton delivered at nearest wharf.

After analysis the following report was sent:—

December 10, 1892.

Moisture	13·44	
Oil	12·74	
[1] Albuminous compounds (flesh-forming matters)	27·81	100·00
Mucilage, sugar, and digestible fibre	31·21	
Woody fibre (cellulose)	8·62	
Mineral matter (ash)	6·18	
[1] containing nitrogen	4·45	
[2] including sand	1·29	

An impure cake containing a quantity of rape, with other weed-seeds.

Two tons had been purchased, the invoice reading as follows :— "2 Tons 95 per cent. Linseed-cakes . . . at 9*l.* 2*s.* 6*d.*—18*l.* 5*s.* 0*d.*"

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2. Mr. J. W. Millyard sent for analysis on Nov. 21, on behalf of Mr. W. Barneby, of Saltmarshe Castle, Bromyard, Worcester, a sample of Linseed-cake, which had been offered to him by Messrs. Needham & Co., of Worcester.

The following report was given by Dr. Voelcker :—

November 30, 1892.

Moisture	13·01	
Oil	12·22	
[1] Albuminous compounds (flesh-forming matters)	22·25	100·00
Mucilage, sugar, and digestible fibre	35·32	
Woody fibre (cellulose)	9·75	
[2] Mineral matter (ash)	7·45	
[1] containing nitrogen	3·56	
[2] including sand	2·80	

This cake is branded "Special," I note. It is, anyhow, a specially bad cake, and very impure indeed. It contains a quantity of cockle-seed, rape, earthnut, and other adulterants.

After the receipt of the analysis Mr. Millyard wrote as follows :—

Estate Office, Saltmarshe Castle, Bromyard.

December 1, 1892.

"Dear Sir,—I am much obliged for your analysis of cake. I usually buy what cake is used on the Home Farms from . . .; but Messrs. Needham & Co., of Worcester, informed me they could serve us better. Consequently, I asked for sample cake, quotation of price with analysis, and told them if your report was good I would give them a trial. The cake I sent you was part of the sample cake. The price quoted is 8*l.* 15*s.* per ton delivered to Bromyard on the following analysis :—

Analysis of * * * *Special Linseed-cake by* * * * *

Moisture	12·76	
Oil	12·31	
[1] Albuminous compounds	23·99	100·00
Mucilage, sugar, &c.	36·56	
Woody fibre	7·02	
Ash	7·36	
[1] nitrogen	3·79	
= ammonia	4·60	

This is a superior quality of oil-cake, rich in oil and other feeding compounds. (Signed) * * *

I have written to ask Messrs. Needham & Co. for the name of the manufacturer, but I need hardly say I shall not think of having such rubbish as this cake appears to be. I find it true economy to buy a good cake.—Yours truly, W. MILLYARD.

Dr. J. Augustus Voelcker.

In reply Dr. Voelcker wrote :—

J. W. Millyard, Esq. December 2, 1892.

DEAR SIR,—I thank you for your reply, and the present case affords you a good instance of what I have so often mentioned, namely, that it does not do to rely simply upon the *figures* of an analysis. In the present case, for instance, the oil is not composed merely of linseed-oil, but is made up also of the oils from the foreign seeds mixed with the linseed . . . Yours faithfully,

J. AUGUSTUS VOELCKER.

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3. Mr. R. Phipps, of Buckenhill, Bromyard, Worcester, sent on November 23, a sample of Linseed-cake.

10 cwt. had been purchased at 8*l.* 10*s.* per ton, nett cash, from Messrs. Needham & Co., Worcester. The vendors stated it to be Linseed-cake, although the invoice subsequently received described it merely as *oil*-cake.

Dr. Voelcker's report was as follows :—

	November 30, 1892.	
Moisture	13·85	100·00
Oil	11·79	
[1] Albuminous compounds (flesh-forming matters)	21·56	
Mucilage, sugar, and digestible fibre	35·76	
Woody fibre (cellulose)	8·89	
[2] Mineral matter (ash)	8·15	
[1] containing nitrogen	3·45	
[2] including sand	3·40	

A grossly adulterated cake. It contains a lot of rape, cockle-seed, and earthnut, along with some half-dozen other kinds of weed-seeds which I have identified, and over 3 per cent. of sand.

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4. Mr. Watson Peck, Jr., of Beckjay Farm, Aston-on-Clun, Salop, sent on Dec. 6, a sample of Linseed-cake which he stated had been guaranteed to be pure and to contain 12 per cent of oil.

The following report was given :—

	December 19, 1892.	
Moisture	10·55	100·00
Oil	17·27	
[1] Albuminous compounds (flesh-forming matters)	22·94	
Mucilage, sugar, and digestible fibre	29·59	
Woody fibre (cellulose)	7·60	
[2] Mineral matter (ash)	12·05	
[1] containing nitrogen	3·67	
[2] including sand	6·10	

This is a cake not only impure by reason of admixture of rape, cockle, and other weed-seeds with the linseed, but highly objectionable and risky to use on account of the large amount of sand which it contains.

The cake was obtained of a local dealer.

Mr. Peck subsequently wrote that the vendors had made him a large allowance on the cake, and he declined to give any further information.

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5. Mr. C. Lethbridge, of Sherfield Manor, Basingstoke, sent on January 6, 1893, a sample of Linseed-cake.

One ton of this had been purchased at 8*l.* 10*s.* per ton, the manufacturers being Messrs. A. Whittet & Co., The Oil Mills, Weybridge.

The invoice described the cake as, "Whittet's & Co., Linseed Cake."

The following report was given :—

January 18, 1893.

Moisture	10·65	100·00
Oil	8·50	
[1] Albuminous compounds (flesh-forming matters)	31·19	
Mucilage, sugar, and digestible fibre	29·48	
Woody fibre (cellulose)	12·47	
[2] Mineral matter (ash)	7·71	
[1] containing nitrogen	4·99	
[2] including sand	2·91	

This is an inferior and adulterated cake. It contains rape-seed, rice-husk and starchy ingredients, with an excess of sand.

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6. Mr. J. H. Bletcher, of Grove House, Thorne, Doncaster, sent on November 30, 1892, a sample of Linseed-cake taken from a 4-ton lot which he had purchased on a guarantee of its being "95 per cent. pure."

The following report was duly forwarded to him :—

December 7, 1892.

Moisture	12·60	100·00
Oil	11·98	
[1] Albuminous compounds (flesh-forming matters)	29·69	
Mucilage, sugar, and digestible fibre	32·14	
Woody fibre (cellulose)	7·52	
Mineral matter (ash)	6·07	
[1] containing nitrogen	4·75	

This cake has decidedly much foreign seeds and starchy matters, and is not pure.

Mr. Bletcher subsequently wrote :—

December 30, 1892.

Dear Sir,—I received your letter of the 24th instant with regard to the sample of Linseed-cake No. 1 C. I only bought four tons of that lot, and the

merchant I bought it off is not the manufacturer; and, as I do a deal of business with him in other things, I do not wish to give his name. He allowed me 3*l.* on the 4-ton lot.—I remain, yours truly,

JOHN HY. BLETCHER.

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7. Mr. Bletcher also sent later, on December 20, a further sample of Linseed-cake, which he stated he had bought as "95 per cent. pure."

The following report was given :—

	December 24, 1892.	
Moisture	14·20	
Oil	10·51	
[1] Albuminous compounds (flesh-forming matters)	31·06	100·00
Mucilage, sugar, and digestible fibre	31·01	
Woody fibre (cellulose)	7·45	
[2] Mineral matter (ash)	5·77	
[1] containing nitrogen	4·97	
[2] including sand	1·24	

Not at all a pure cake—but adulterated with rape-seed, mustard-seed, and cockle-seed, as well as some cotton-husk.

Mr. Bletcher declined to give any information with regard to this case also.

The following cases are given as examples of the desirability of obtaining a definite guarantee as to the purity of feeding materials, and as instances of what a purchaser may be supplied with if he neglect to provide himself with such guarantee.

8. Mr. G. I. Stokes, of Bushbury Hall, Wolverhampton, sent on November 11 a sample of Oil-cake which he said he was about to purchase as "pure."

The following report was given him :—

	November 19, 1892.	
Moisture	12·58	
Oil	12·72	
[1] Albuminous compounds (flesh-forming matters)	25·69	100·00
Mucilage, sugar, and digestible fibre	32·38	
Woody fibre (cellulose)	9·39	
[2] Mineral matter (ash)	7·24	
[1] containing nitrogen	4·11	
[2] including sand	2·29	

This is not pure. Besides a small excess of sand, it contains considerable admixture of rape.

On receiving this report Mr. Stokes decided not to purchase.

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9. Mr. J. K. Turnbull, of Billy Hall, Crook, R.S.O., sent for analysis, on December 6, a cake on which the following report was returned :—

	December 19, 1892	
Moisture	10·55	100·00
Oil	10·63	
[1] Albuminous compounds (flesh-forming matters)	24·94	
Mucilage, sugar, and digestible fibre	37·47	
Woody fibre (cellulose)	7·01	
[2] Mineral matter (ash)	9·40	
[1] containing nitrogen	3·99	
[2] including sand	4·65	

This is a very bad cake, which is a mixture of Linseed and different weed-seeds. It has over 4½ per cent. of sand and dirt, and is a cake which I would advise you not to use.

In answer to inquiries Mr. Turnbull wrote :—

Billy Hall, Crook. January 11, 1893.

To Dr. J. A. Voelcker.

Sir,—Yours to hand about Linseed-cake sent by me for analysis. I only bought a small quantity of it from a local dealer without getting a proper guarantee with it, therefore I cannot make anything out of this case, but I shall use more care in purchasing cake and manures for the future. —I remain, yours obediently,

J. K. Turnbull.

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10. Mr. A. M. Wilson, of East Witton, Middleham, R.S.O., sent, on December 14, a sample of Linseed-cake for analysis. The report given on it was as follows :—

	December 24, 1892.	
Moisture	11·65	100·00
Oil	11·13	
[1] Albuminous compounds (flesh-forming matters)	24·31	
Mucilage, sugar, and digestible fibre	37·04	
Woody fibre (cellulose)	7·07	
[2] Mineral matter (ash)	8·80	
[1] containing nitrogen	3·89	
[2] including sand	3·75	

A most impure cake, containing large amounts of rape-seed and cockle-seed with other weed-seeds, besides 3¾ per cent. of sand. It is not a proper feeding-cake for stock.

On making inquiries it was elicited that the cake was only sold as *Oil*-cake, but at 9*l.* per ton.

Only a small quantity (2 cwt.) having been purchased, the vendor agreed not to charge anything for it.

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11. Mr. A. Edwards, of Chapmansford, Whitchurch, Hants, sent on December 21 a sample of Corn-meal which he said was sold as being screenings from the crushing of mixed horse corn, the price of it being 4*l.* 8*s.* 4*d.* per ton.

Dr. Voelcker's report on this was :—

	January 18, 1893.	
Moisture	12·41	
Oil	5·53	
[1] Albuminous compounds (flesh-forming matters)	11·87	100·00
Mucilage, sugar, and digestible fibre	46·31	
Woody fibre (cellulose)	4·23	
[2] Mineral matter (ash)	19·65	
[1] containing nitrogen	1·90	
[2] including sand	12·81	

A material which I do not consider, from the dirt and impurities with it, to be a fit feeding meal—still less to be worth anything like the price you gave for it.

Four tons had been purchased, but without any guarantee ; Mr. Edwards, however, was allowed 10*s.* per ton for the meal, as not being "equal to sample," but he would not give particulars as to the vendor.

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12. Mr. James Milnthorp, of 28 South Parade, Doncaster, sent on January 28 a sample of Rice-meal, upon which the following report was given :—

	February 10, 1893.	
Moisture	10·14	
Oil	1·89	
[1] Albuminous compounds (flesh-forming matters)	9·19	100·00
Starch, digestible fibre, &c.	41·81	
Woody fibre (cellulose)	8·23	
[2] Mineral matter (ash)	28·74	
[1] containing nitrogen	1·47	
[2] including sand	10·01	
The sample also contains sulphate of lime	17·15	

This is a meal grossly adulterated with sand and sulphate of lime (gypsum), and is not a fit feeding material.

Seven tons of this had been purchased by Mr. Milnthorp subject to his being satisfied with the result of the analysis. Upon receiving the report Mr. Milnthorp refused to take delivery of the meal, which was accordingly returned to Hull, from whence it had come.

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13. Mr. F. S. Stanley, of Montague Street, Borough, London, S.E., sent on January 31, 1893, a sample of Oil-cake, which he had purchased without any guarantee.

In forwarding the sample Mr. Stanley wrote :—

January 31, 1893.

DEAR SIR,—Please analyse the cake, and let me know as soon as possible. From what I can see, there is a lot of sand in it. I have had a sheep die suddenly, and found a lot of sand in the fourth stomach.—Yours truly,

F. S. STANLEY.

The following report was given :—

February 9, 1893.

Moisture	14·25	100·00
Oil	8·16	
[1] Albuminous compounds (flesh-forming matters)	25·51	
Mucilage, sugar, and digestible fibre	35·18	
Woody fibre (cellulose)	8·10	
[2] Mineral matter (ash)	8·80	
[1] containing nitrogen	4·08	
[2] including sand	3·85	

A bad cake, having a bitter taste owing to the presence of much rape-seed, besides which occur cockle-seed, spurrey, mustard and numerous other weed-seeds. Lastly, it has close on 4 per cent. of sand, which is highly objectionable.

This case was settled by the vendors replacing the purchase by "95 per cent. guaranteed" cake, this being charged at the reduced price of 7*l.* 5*s.* per ton only, delivered.

February 28, 1893.

R. A. WARREN,
Chairman.

Notes, Communications, and Reviews.

OIL-ENGINES IN RELATION TO AGRICULTURE.

Although liquid fuel has been employed during the last twenty years for the production of mechanical energy, it is only lately that its use for this purpose has been sufficiently successful to justify the question, May a farmer use an oil-engine?

Meanwhile, certain preliminary considerations of great importance in the choice of such an engine beset this inquiry, and must be disposed of before it can be usefully answered.

Liquid fuel has been employed in the past in four different ways.

1. It has been burned as, and instead of, coal, by means of suitable spray-making devices, in the furnace of an ordinary steam-boiler.

2. In one or other of its more volatile forms, such as naphtha or benzoline, it has formed the fuel of a boiler, itself containing naphtha or benzoline, whose vapour takes the place of steam in the motor.

3. It has been evaporated at low temperatures, and the resulting vapour, mixed with a suitable proportion of air, exploded in the cylinder, as in the gas engine.

4. It has been gasified at high temperatures, and the resulting gas, mixed with a suitable proportion of air, exploded in the cylinder as in the former case.

These plans are all defective, for various reasons. Method No. 1 is costly; for, although experiment has proved that a pound of oil burned, in the best way, in the furnace of a steam-boiler will evaporate some twenty-five per cent. more water than the same quantity of Welsh coal, the oil costs four times as much as the coal, weight for weight.

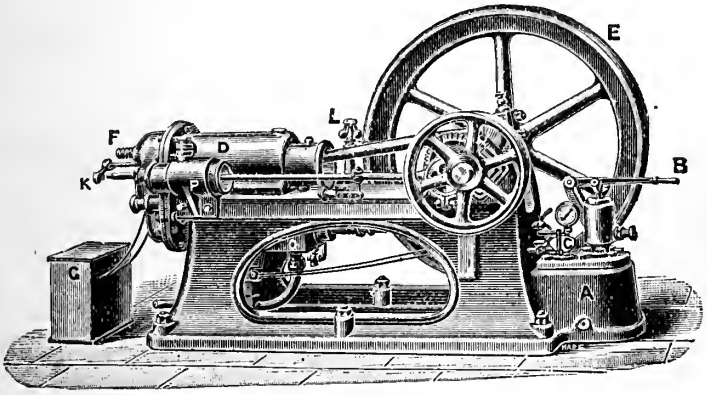
Method No. 2 is dangerous; for only the volatile mineral oils, such as naphtha or benzoline, whose vapour ignites at comparatively low temperatures, can be employed for the purpose. In addition, these "spirits" (rather than oils) are not easily procurable in the country, are dangerous to handle or store, and are regarded with profound dislike by both railway and insurance companies.

Methods Nos. 3 and 4 are surrounded with difficulties arising from the fact that the petroleum of commerce is not a simple body,

but a compound of various bodies which boil at temperatures differing from each other by many degrees. When, therefore, petroleum is evaporated (as in the case of method No. 3) by moderate heat, first, its more, and, afterwards, its less volatile constituents are successivcly vaporised, until there remains a very considerable residue which is so difficult to evaporate as to be practically useless.

When, on the other hand, mineral oil is gasified by great heat (as in method No. 4), a quantity of tarry matters are produced which, passing into the motor with the gas, become deposited in the cylinder and its passages to such an extent as seriously to interfere with the working of the engine.

Some one or other of the difficulties here enumerated prevented the success of the oil-engine until Etève conceived the idea of first spraying, and then evaporating, the complex compound called



An Oil-engine.

A, oil tank.
B, lever of hand pump for starting.
C, cock lever.
D, cylinder.
E, fly-wheel.
F, top valve of cylinder.
G, battery.
K, tappet lever attached to lower valve of cylinder.
L, governor.
O, vaporizer.
P, air-pump.

petroleum, a plan which has been successfully reduced to practice in this country by Messrs. Priestman Brothers, of Hull. Only the "safe" oil, which, being everywhere used for lighting, is everywhere procurable, is employed. This, flowing from a suitable tank, is first converted into the finest possible spray by its passage, under pressure, through a suitable nozzle, or spray-maker. In this finely divided condition, it enters a heated chamber, where the oil-spray is vaporised, and whence it passes to the motor, becoming mixed, on its way, with a proper quantity of air, the compound being finally exploded in the cylinder, as in a gas-engine. The products of combustion leave the cylinder at a very high temperature, and the exhaust is utilised to maintain the required heat in the vaporising chamber.

Under this system, it is of no consequence whether the whole of the oil-spray becomes vaporised before explosion, or not; for its

particles are so minute that they are burnt in the cylinder as easily as the true oil-vapour, and the difficulties inherent, whether in vaporisation or gasification of the oil in bulk, are avoided. Thus the Etève-Priestman engine makes use of all the hydro-carbon supplied to it without residual waste, and without the production of tar; independent testimony of the most reliable kind being at hand to prove that the cylinder, valve chamber, and passages of this engine remain perfectly clean after a period of use which may be measured by several millions of revolutions. Such, then, being its present state of development, it becomes interesting to inquire a little more closely into the general suitability of the oil-engine for use on the farm.

A farmer's engine should be an appliance

1. Economical of fuel.
2. Light in weight, relatively to power developed.
3. Using fuel procurable everywhere, easy of transport, and safe to store.
4. Requiring little skilled attention.
5. Safe to use in the rick-yard.

1. *Economy of Fuel.*—The Etève-Priestman engine was first shown at the Nottingham Meeting in 1888, where Dr. Anderson found that it gave one brake horse-power for a consumption of $1\frac{3}{4}$ lb. of petroleum per hour. A "portable" form of the same engine was shown at Windsor in 1889, which on trial gave one brake horse-power for $1\frac{4}{10}$ lb. of oil burnt in an hour. At the Plymouth trials of 1890 a Priestman engine gave a duty of one brake horse-power for a consumption of $1\frac{1}{4}$ lb. of oil per hour, while, still more recently, a similar oil-engine has given a brake horse-power for rather less than 1 lb. of oil consumed per hour.

The trials of 1890, which lasted a week, were very carefully made by Professor Unwin (Journal, Vol. I., 3rd Series, 1890, p. 596), to whose interest in the oil-engine, first aroused at Plymouth—where, together with the writer, he acted as judge of "Small Motors"—we owe most of what we now know of oil-engines.

Speaking generally, the price of oil may be taken as $\frac{1}{2}d.$ per lb., at which rate the cost of a brake horse-power would be also one halfpenny per hour. The cost of a brake horse-power delivered by small non-condensing engines, such as are supplied to farmers, is never less, and often very much more, than $\frac{3}{4}d.$ per hour, while the best large condensing steam-engines in existence do not give a brake horse-power for less than one-third of a penny per hour. In other words, a saving of at least one-third in the cost of fuel may be expected to follow from the use of the oil-engine as against the farmer's steam-engine.

2. *Lightness relatively to Power.*—The oil-engine above alluded to as under trial by Professor Unwin for a week, at Plymouth, was one of 5 horse nominal power, developing $7\frac{3}{4}$ horse-power on the brake, and weighed 36 cwt., including a fly-wheel of 10 cwt.

3. *Procurability, &c., of Fuel.*—Thanks to the universal use of

the petroleum lamp, such oils as are required by the Etève-Priestman engine are now readily procurable, even in the most remote villages, and are, as is well known, perfectly safe for transport, while they load better than coal for the road, and are more snugly stored.

4. *Skilled Attention.*—The oil-engine requires no driver or stoker. It may be set to work, and then locked up, or otherwise left to its own devices, and it will continue, up to the limit of its power, to develop such varying energy as may be required of it without any attention beyond oiling. Only skill enough to follow a few plain printed directions, for the occasional renewal of the simple voltaic battery which effects the explosion of the mixed gases in the cylinder, is required.

5. *Safety in Use in the Rick-yard.*—The exhaust of the oil-engine, not being in connection with any furnace, requires no cage on the chimney-top, and cannot throw sparks into the air. There is no firebox, and no fire to be drawn at the end of the day's work. There is no boiler-pressure, and no safety-valve, and there is no possibility, in cold weather, of a feed-pipe being burst by residual water. A match is all that is required for a start, and no time is lost over "getting up steam."

It seems now, indeed, worth the farmer's while to consider the question of oil against coal, always taking care, when choosing an oil-motor, to avoid such engines as may be chargeable with either of the defects described, against which it is the chief object of this note to warn those who may already be looking into this matter.

DAN PIDGEON.

SHEEP WASHING.

WHY do British farmers wash their sheep? Is it to benefit the animal, or is it for the sake of the wool? If it is for the benefit of the sheep, and they are improved by the operation, why not give all animals on the farm an annual tubbing? If it is on account of the wool, I hope to be able to show that farmers are incurring an annual expenditure and giving themselves needless trouble, which in these bad times might be avoided.

Up to within a very recent period I grant that most manufacturers could only use wool that had been washed by the farmer, and that from the time of the establishment of the English woollen industry, in the year 1333, in the country town of Kendal, from which I write, up to the last ten or twenty years, it was essential for the sale of the wool that it should be well washed on the sheep's back, as the bulk of it was spun and manufactured in this state, the manufacturer in those days not being equipped with machinery to wash and dry the fleece.

Since the introduction of the steam engine, and the combing machine, and also of improved spinning and washing machinery, a

gradual change has taken place, and now, however well the farmer washes the wool on the sheep's back, the comber and spinner have to scour it again before they can spin and manufacture it. It is immaterial to the top-maker and spinner whether they buy the wool washed or in the grease, but most of them buy it to-day in the unwashed state.

Last year there was imported into this country from our colonies and from foreign countries 763,000,000 lb. of wool, representing the produce of nearly 200,000,000 sheep. Of this quantity not more than 5 per cent. would be clipped in the washed state; from which it is evident that the farmers abroad do not think it advantageous to wash their sheep. Even in our great wool-growing colonies of Australasia and South Africa a very decided change has taken place in recent years. Thus, of the sheep of these colonies :—

In the year 1869 about 30 per cent. were shorn unwashed.
" 1879 " 45 " " "
" 1887 " 80 " " "
" 1892 " 98 " " "

In the wool-growing countries of Russia, South America, North America, Persia, and India all the sheep are shorn in the unwashed state.

The important point for the British farmer to consider is the question of pay, or result. Does it pay him better to have his wool sold washed or greasy? Can he find as ready a market for his greasy wool? The obvious answer would seem to be afforded by the experience of other countries, where flockmasters do not wash their sheep, but still find a ready market for their clips. My experience, as a wool salesman and broker for upwards of thirty years, is that the unwashed British wool finds a readier market to-day than the washed wool. I have before me the views of several North-country farmers who have carefully tested the matter, and in every case except one the result to the grower has been advantageous.

The one exceptional case was that of the Rev. H. Fox, of St. Bees, who wrote in 1889 :—

There was much controversy last year about wool, whether it should be washed or not.

It happened that I was unable to wash my sheep owing to the pollution of the stream in which I have been accustomed to wash them by the influx of water from some newly opened iron mines, so with the exception of a few fleeces—about twenty—which were washed in a tub, my wool was sent to your place to be sold unwashed.

I was so dissatisfied with the result that I wrote a letter to the local papers, giving the result of my experience, and strongly advising farmers to wash their sheep before shearing them. I send you the account, from which you will see that a small quantity of wool fetched 10½*d.* per lb. This I take to be the washed wool.

It is described as prime hog, but much of it was from the backs of the same description of sheep as the bulk of my flock. The unwashed wool was very clean, there was no dirt in it except the sap, and I cannot think that weight of the sap compensated me for the lower price it fetched, some of it only 7½*d.* per lb.

Though I did not see the correspondence alluded to by Mr. Fox, I referred, on receipt of his letter, to my remarks and valuations made at the time in my catalogue. I find that I valued the washed wool at 10*d.* per lb., describing it as clean, and shrinkage about 15 per cent. His unwashed I described as good but sappy, valued it at 7¾*d.* per lb., and estimated the shrinkage at about 40 per cent. So that if the twenty fleeces washed had been weighed against twenty fleeces unwashed I think the financial results would have been approximately equal.

Against the preceding I will quote the case of Mr. Mitchell, of Howgill Castle, who says :—

In 1887 I tested the difference in weight and price between washing and not washing both blackfaced and greyfaced sheep.

I have unfortunately lost the paper I had them marked upon, but the blackfaced sheep made 2¾*d.* and the greyfaced 2½*d.* per head more unwashed, so we have never washed any sheep since.

I consider it a great advantage not requiring to wash, especially to owners of fell stock, as after washing they require to be shepherded on the fell, or let go, and again gathered when dry to clip.

The blackfaced sheep that I made the trial of, both washed and unwashed, got half a gill of oil apiece when dipping in the previous back-end, but no salving.

The next question to consider is one of great importance, and I have already briefly referred to it.

Do the top-makers, spinners, &c., the consumers of our English wool, prefer to buy and use it in the unwashed state? I have made careful inquiries of some of the largest consumers of English wool, and the majority of them are strongly in favour of buying the wool in the unwashed condition, provided the dirty breech-locks are taken off the fleece before it is rolled up after clipping, and that no other dirty locks are rolled up inside the fleece, as these discolour the good wool. Farmers must remember that all wool, whether clipped in the *washed* or in the *greasy* state, before it can be combed, spun and manufactured, must be well scoured by soap and hot water; and the scouring machines in all factories are a very important and expensive plant. The wool buyer for a manufacturer, in valuing and purchasing wool, has to estimate what the wool will cost clean-scoured. Flockmasters must not, however, be misled by the idea that if they do not wash their wool they will get as much for it per pound as they will if it is washed. Take, for example, an ordinary washed half-bred hog fleece, such as will lose in scouring 15 to 20 per cent. In this state it is worth about 10*d.* per lb. We will say it loses 20 per cent.: this will cost clean-scoured about 12½*d.* per lb. If the same wool is unwashed it will lose about 40 per cent. The buyer would then require to purchase it at about 20 per cent. less than the washed wool, viz., at 8*d.* per lb., and at this it would come out clean-scoured about the same price. Briefly stated, a farmer will be as much in pocket by selling, say, a mixed clip unwashed at 7*d.* per lb. as he would be by selling the same clip washed at 9*d.* per lb.

There is no doubt wool loses colour if kept too long, either in

the greasy or in the washed state. I do not think that, on this point, there is much to choose between them. But why should farmers and dealers keep and hoard up wool? It is made to use, and not to keep for moth and rust to corrupt.

I may repeat here what I said in a paper read before the Kendal Farmers' Club a dozen years ago :—

"In my remarks I wish it to be understood that I speak from a wool point of view, and also with the object of helping forward Lady Bective's movement.

"The best advice I can give you if you want to aid this movement, and to see the woollen industry flourish in our land, is to sell your wool every year. Make it a rule never to commence to clip your sheep until the previous year's clip is sold, and turned into money. This, to my mind, is the kernel of the whole question. You know wool is always good to sell at a market price, especially in the season. You know there are in this neighbourhood plenty of facilities for selling wool. In Kendal alone there are about a dozen firms, all wool buyers at clip time, and in the case of my own firm we have monthly sales whereby we put farmers in direct communication with spinners and manufacturers throughout the whole kingdom. Let us think of the advantages that would arise from your adopting the policy of selling your wool every year.

"1st.—If you sell it, it will find its way to the manufacturer and spinner, who will use it in manufacturing something useful. If not intended for ladies' dress goods, it will be utilised in other materials, such as carpets, tweeds, knitting yarns, curtains, furniture cloths, braids, and other articles which take up an enormous quantity of wool.

"2nd.—Your selling wool to be manufactured will be giving employment to all the hands required to make these goods.

"3rd.—If you sell your wool at low prices you will find the benefit in buying low-priced clothing.

"4th.—By adopting a policy of selling your wool every year, you will keep prices more uniform, and we should not have so many fluctuations.

"My experience is, that the farmer who sells his wool every year is the man who does best in the long run. Many a farmer says he cannot afford to take the price he may have had offered, and yet he wants to sell his wool. Cannot afford! Why, that man is the very man who can afford to sell it; the very fact that he can afford to keep it shows he is not wanting money, but that he has himself turned speculator."

There can be no doubt that within the last ten years there has been a great change of opinion in reference to the question of sheep washing. Ten years ago we had 27½ million sheep in Great Britain and Ireland, of which about 3 million would be clipped in the unwashed state. Last year (1892) we had 33½ million sheep, and of these fully 10 million would be clipped in the greasy state, clearly showing that the practice of washing sheep is gradually being abandoned.

In Scotland a rapid change of opinion is taking place. In analysing the catalogues of wool sold by auction at the Scotch sales, in the year 1862, I find only about 10 per cent. of the wool offered was unwashed. In 1892, on the other hand, 50 per cent. of the wool catalogued was in the grease. In the case of the sales of my own firm a similar change has taken place within the last thirty years.

I am aware that many farmers hold strongly to the belief that sheep benefit by being washed once a year. On this point I am not qualified to give or express an opinion, but if this is the case, why not wash them after they are clipped? They will wash much more easily, and the animal will be better cleansed in a short coat of wool than in a long one.

Much of the so-called sheep washing to-day is a complete farce; I have seen many sheep washings where the sheep are just pitched into a "dub" or stream and thrown out again. A good shower of rain would be more effective for wool-washing purposes.

If by not washing sheep the flockmaster can get an average of 3*d.* per fleece more for his wool, farmers' interests in this country would be benefited to the extent of nearly half a million sterling per annum, besides the saving of time now lost in washing. Three years ago I read a paper, on the question of sheep washing, before the Penrith Farmers' Club, and I feel I cannot do better than close this brief communication with the concluding remarks which I then used:—

"I have been asked very often by farmers what I would recommend them to do, and I say candidly, with my present knowledge of the subject, that if I was a farmer with clean grass land I would—speaking from the wool point of view—never wash a sheep again. My experience as a salesman is that unwashed wool to-day meets with better competition than washed wool. But in all these matters it is well to be cautious and careful, and to those who cannot make up their minds on the question I would say: If you have a fair-sized flock of sheep, wash one-half of the sheep well, and leave the other half unwashed, and you will be then able to judge for yourselves which is the better policy to adopt for the future. In any case, whether you clip your sheep washed or unwashed, see that the fleece is well got up. In all cases improve the breed as much as possible.

"To the fell farmers I would say there is still room for great improvement in the blackfaced breeds. Abolish the use of salve, and do not mix your dip with bad oil or tar, or anything that discolours and stains the wool. Do not wrap locks inside your fleeces before rolling up. All fribs and dirty pieces must be taken from the fleece and kept separate, as they stain and injure the wool if rolled up with the fleece. Also avoid the large tar mark. Cannot you mark your sheep on the ear or on the face? Careful attention to these details will give you a better market for your wool, though I need not preach a sermon to you on these points, because many of the clips in your neighbourhood are sent to the market in first-class condition.

"But in these days of keen competition, when the good and cheap land in Australia, New Zealand, the Cape, South America, the United States, and Canada, is brought into direct rivalry with your farms by means of large, quick, and powerful steamships, which convey the produce of these countries to our great seaports almost as cheaply as your products can be conveyed from here to Yorkshire and London, it behoves farmers and wool-growers to be on their mettle, and to see that their products are turned out in first-class condition, so that they will find as ready a market as those of their colonial brethren."

J. E. Hargreaves.

THE PHOSPHATES OF MILK.

One of the greatest authorities on the chemistry of dairy products, M. Duclaux, discusses the above subject in the volume for 1892 of the *Annales de l'Institut Pasteur*. The importance in nutrition of the mineral matter of milk lies in the fact that it is from this portion that the osseous or bony system of the young animal is produced. Duclaux, in alluding to this importance, mentions the fact, ascertained by Bunge by chemical analysis, that the mineral matter of a puppy, incinerated entire, has almost the same composition as that of the milk of the bitch.

The minerals of milk are also known to exercise considerable influence on the properties of the casein, its coagulation, digestibility, texture, &c. Hammersten's theory in connection with this matter, alluded to in the article on the Fermentations of Milk, which appeared in the last number of the Journal (Vol. III., 3rd Series, Part IV., 1892, pp. 796–808), is that casein, under the influence of rennet, is resolved into two albuminoids, one of which, present in the greater quantity, is insoluble in such a solution of phospate of lime as milk is assumed to be, and is therefore precipitated as "curd;" the other, present only in small quantity, remains in solution as the albuminoid of whey. The view of MM. Arthur and Pagès is similar, except that they suppose the lime compounds to take an active part in precipitating the casein (called by them "caseinogen"), by combining therewith to form insoluble or precipitated casein or curd.

The facts published by M. Duclaux in 1883 are in opposition to the above views. He finds that when milk coagulated by rennet is filtered through biscuit-porcelain, the clear liquid which passes through contains no greater amount of soluble albuminoid than the clear liquid of fresh milk after similar filtration, which seems to prove that no soluble albuminoid is formed during the curdling process. Further, he denies that phosphate of lime takes any active part in the curdling. The particles of this salt are, according to him, not in solution at all, but in simple suspension in the milk, from which they may be separated by settlement. They are thus carried down by the precipitated curd by mechanical entanglement,

and, although always found in the ash of curd in pretty constant proportion, do not enter into its proper composition at all. M. Duclaux has made new determinations of the matters which milk holds in suspension as distinct from solution, by exact analyses of the entire milk, and of the clear portion which passes through a Chamberland biscuit-filter. This filtration must be conducted with precautions, since even when pressure is employed it takes twenty-four hours to pass 100 cubic centimetres [1] of milk through such a filter, and during this time acidity develops and increases under ordinary circumstances, and so more and more phosphate of lime passes into solution. To prevent this the milk is either *sterilised* before filtration, or is cooled by ice; the filter itself and the receiving vessel are carefully sterilised previous to use by being passed through a flame.

The ingredients of milk in suspension consist of the fat, seven-eighths of the casein, and nearly half of the minerals. The present paper is restricted to an investigation of the minerals only, with especial regard to the state of combination of the phosphates.

The analytical methods adopted by Duclaux for the determination of the proximate ingredients of the ash are detailed in the paper, but need not be repeated here. The results only, which are of considerable interest, need be quoted.

Composition of the Ash of 100 Cubic Centimetres [1] of Milk.

	Entire milk. Grammes	Filtered milk. Grammes	Minerals in suspension (difference). Grammes
Alumina and oxide of iron .	0·005	0·002	0·003
Magnesia	0·017	0·011	0·006
Lime	0·178	0·051	0·127
Phosphoric acid . .	0·213	0·088	0·125
Not estimated . . .	0·339	0·302	0·037
	0·752	0·454	0·298

The nature of the phosphates in suspension is hardly open to doubt; they may be arranged thus:—

	Grammes
Phosphates of iron and alumina	0·006
Phosphate of magnesia (tribasic)	0·013
„ lime „ . . .	0·235
	0·254

When the ingredients are combined thus, there is still an excess of 0·007 grammes only of phosphoric acid not combined with lime, magnesia, or oxide of iron. This slight excess doubtless represents

[1] A hundred cubic centimetres (about $\frac{1}{6}$ pint) is the quantity actually used by Duclaux for the filtration. The results may be read in English standards as grains of the various ingredients found in 100 grain-measures of milk, or, as milk is slightly heavier than water, grains per 103 grains of milk. They are thus practically, but not exactly, equivalent to *percentages*.

a small quantity of soluble phosphate of soda or potash mechanically retained by the layer of suspended casein which coats the surface of the filter. Even if it were all supposed to represent phosphorus chemically combined with the casein, it would amount to only one-tenth of the phosphorus present in casein, as given by Hammersten in his *Traité de Chimie Physiologique*. There is, therefore, every reason to believe that the phosphorus found by all analysts in the purest preparations of precipitated casein really belongs to phosphate of lime entangled in the precipitate, and forms no part of the chemical molecule of casein.

Passing to the minerals in solution, it will be seen that these include sensible quantities of both phosphoric acid and lime; hence *some* phosphate of lime must exist in true solution in milk. The quantity of phosphoric acid is nearly double that required to form the tribasic phosphate of lime; but as the ash of the filtered milk is *alkaline*, instead of *acid*, it cannot be admitted that a mixture of monocalcic and bicalcic phosphates is present in the solution. In all probability, the alkalinity of the ash is due to trisodium phosphate, and, adopting this view, three-fourths of the saline ingredients of the filtered milk are thus accounted for :—

	Grammes
Phosphate of lime (tribasic)	0·107
,, soda ,, ...	0·104
Common salt	0·140
	0·351

According to this view, milk would contain in solution over one part in a thousand of the alkaline phosphate of soda, a quantity sufficient to render its reaction perceptibly alkaline to litmus, whereas, in fact, it is slightly acid; moreover, the tribasic phosphate of lime is an *insoluble* salt in the proportion represented. These objections are met by the discovery of Soxhlet, that milk contains *citric acid* in quantity reaching nearly one part per thousand. It is evidently this citric acid which is combined with the excess of soda in the fresh milk to form sodium citrate, and this, in common with the other alkaline citrates, has the property of dissolving tribasic phosphate of lime. The phosphate of soda in the fresh milk will then be the ordinary neutral bibasic phosphate, and on calcination this will combine with the soda set free by the burning off of the citric acid to form the alkaline trisodium phosphate found in the ash.

The analyses of other milks cited by M. Duclaux give similar results. It appears that phosphatised milk, or milk supposed to be enriched beyond the normal proportion in phosphates, is advertised on the Continent at a high price; this is claimed to be natural milk, the enrichment being supposed to be brought about by an addition of phosphates to the food given to the cows. The author's analyses show that in three cases examined these milks were no richer in phosphates than ordinary milk, so that it is, to say the least, extremely doubtful whether any augmentation in the proportion of phosphates can be produced by this means. On the other hand

should a soluble phosphate, like phosphate of soda, or an insoluble one, like powdered phosphate of lime, be introduced into milk after milking, such an admixture can be readily detected, since the normal proportion of soluble or insoluble phosphates must be thereby disturbed. The normal proportion of ash in milk (0·75 per cent.) is in fact more constant than that of any other constituent, and furnishes one of the most valuable criteria of genuineness.

J. M. H. Munro.

LAND IMPROVEMENT IN AUSTRALIA.

A very interesting paper by Mr. Pell, on the "Making of the Land in England," in this Journal (Vol. XXIII., 2nd Series, Part II., 1887), was recalled forcibly to my mind, during a recent visit to Australia, by some of the processes of making the land, the results of which I witnessed there. The building up of the productive and useful state of the land is the same in the new countries as it is in the old, but it is done much more rapidly, owing to the general use of improved implements and means of locomotion, such as were not available in the early days of making the land in England. I do not allude here to the vast extent of pastoral land, though it also has been improved and cleared and fenced to make it fit for cattle and sheep. It was the rich land of part of the Western District of Victoria that particularly came under my notice, and it is a stretch of fine land, originally subject to flood but now reclaimed, that I wish to describe.

When the land was purchased about the year 1850 it was covered with timber and dense scrub—scrub and undergrowth generally thriving with the luxuriance due to a warm climate and plenty of moisture, for there is an abundant rainfall near the sea in this part of Victoria. Roughly speaking, there were about 7,000 acres, extending in an irregular way for four or five miles on either side of a small river. This river meandered about with a very slight fall, and frequently covered all the neighbouring low land with its waters, the result being that the best of the land was a deep swamp.

The first thing to be done was to get the water away, and this was effected by straightening the course of the river, and making a deep cut through an ancient flow of lava that had extended itself between the river and its outlet to the sea. The very considerable expenditure this entailed was recouped by rendering available for rough pasture about 3,000 acres that had previously been swamp covered with grass, reeds, and water-plants. The dense vegetation was removed by burning and the finer grasses were encouraged, but much still remained to be done. An old settler, writing to me, thus described the appearance of the land at that period: "Covered with heavy timber in places, and in others with tremendous scrub, its condition was such that the hardiest sons of toil hesitated to

give 6*d.* an acre rent for it." He then went on to point out the splendid state the land is in now.

The Western District generally is of comparatively recent volcanic origin. The whole country is studded with extinct craters, some rising into considerable mountains, and others showing themselves as circular lakes in the plain. Where not covered with lava flows, the soil is usually very rich, and of a deep chocolate colour, or nearly black where mixed with alluvial and vegetable matter. It is excellent land for potatoes, which are largely cultivated and exported to Melbourne and other parts of the Colonies, where there are not the same facilities for growing them.

Between Warnambool and Port Fairy, near where the land I am describing is situated, the distance is twenty miles, and there is hardly an acre of bad land the whole way. It is chiefly chocolate-coloured, or black volcanic soil; but there is also a limestone formation between the volcanic soil and the sea, and on it there grows a good quality of grass, very valuable for dairying purposes.

On an area of 3,357 acres, with which I am more particularly interested, I can give the outlay on improvements from 1872 to 1890; but this does not include the preliminary operations of cutting new channels for the river, and deepening and widening the latter where necessary.

	£
Drainage and roads	5,427
Walls and fences	3,919
Grubbing and clearing	5,447
Buildings	2,895
Total . .	17,688

This represents an expenditure of 5*l.* 5*s.* 4*d.* per acre, which would probably mount up to 6*l.* per acre were I able to include what was spent previous to 1872, but these figures are not available. Roughly speaking, this 6*l.* per acre is rather more than half the present value of the land, and with the 1*l.* an acre, the original purchase money, it comes out at 7*l.* per acre laid out on purchase and improvements to make it worth from 10*l.* to 11*l.* an acre. This is taking it at the low value of a period of depression, but prices fluctuate very greatly in Australia, so much so that, at the time of the recent "land boom," the adjoining estate, of very similar quality, sold for considerably more than 20*l.* per acre.

At first sight the large sum of 5,427*l.* spent on drainage and roads did not seem to show much for the money. There is a main road leading to the homestead and beyond it through the estate. This road is macadamised up to the homestead, but no farther. There are two other roads intersecting the property, but they are merely fenced off from the surrounding fields, and in wet weather they are rather soft. The beneficial results of the drainage are in this case very visible, for whereas, before the drainage operations were carried out, the whole of the rich bottom lands were in a perpetual state of flood, they are now dry and well adapted for cultivation or pasturing. The straightening and deepening of the river

was a heavy initial cost, but now that this has been done, and a free outlet has been given to the sea, the floods, when they come, scour out the channel and prevent it from silting up. All the low-lying land is drained by open ditches with lateral feeders ; these require constant attention and entail a considerable annual expense. The walls and fences are a heavy item, but they are of much importance through the saving of labour in herding the sheep and cattle. There are about forty enclosures, all numbered on the plan, and averaging a little over eighty acres to each field. The walls are built of loose stones, very much in the style of Scotch dykes, where the stone is plentiful on the lava ridges ; and they form very good and permanent fences, the only drawback to them being that they are rather a harbour for rabbits. Where stone is not available there are post and rail fences and wire fences, and some two miles of rabbit-netting.

It is in the grubbing and clearing that the return for the money spent is most evident. All the rich land, about half the total extent, was originally covered with heavy timber and dense scrub. It is entirely cleared now, and is either under cultivation or laid down to grass. It is, in fact, ready to be divided into moderate-sized farms which would be well adapted for dairying. The buildings are merely those suited for the management, consisting of a manager's house, built of stone, a house for the men, a wool-shed, a large hay barn, a corn barn, and stables, all built of timber.

Of course this place cannot be compared with an improved estate in England, similar to those that Mr. Pell gives examples of, but probably as much has been done to it as can be done at present, with any likelihood of a return for the money ; for though the land is very fertile, and the climate is good, there are certain drawbacks in the way of insect pests that make cultivation on an extended scale rather precarious. There is a field cricket that comes out of the cracks in the ground in vast numbers in the autumn, the depredations of which are very serious in some seasons. I could not get the correct name of this cricket, though there are specimens in the Museum at Melbourne. There is also a very destructive caterpillar which bites through the straw of the corn below the ear, and which, when it gets thoroughly into a field, makes the crop almost worthless. These insect attacks are more easily controlled on small holdings than where the farming is extensive.

The estate seems now to be at the stage of its improvement at which it is ready to be sub-divided into farms when a demand for them arises. As an outlet for the produce of such farms, there is a fine butter and cheese factory in the neighbourhood ; I saw there a mighty churn with a capacity for 700 lb. of butter, and a circular butter worker able to work 100 lb. of butter in five minutes. The cream separators, with the churns, and butter workers, and the other appliances, were driven by steam power, and the whole concern appeared to be managed in the best manner. The farmers who send in milk are chiefly the shareholders in the butter factory, they being paid according to the price the butter and cheese are sold for. If

the price of butter can be maintained, dairying is likely to be very successful.

It was my good fortune last summer to visit the fertile stretch of country that I have attempted to describe, and, judging from the necessarily superficial view I could get in a short time, I should say that it will become even a more important factor in the agricultural future of the Colony of Victoria than it is at present. When fully developed, and covered with prosperous farms, it will compare favourably with the best parts of the old country.

JAMES A. CAIRD.

THE QUESTION OF CALF-REARING.

THE rearing of live stock, especially stock of the food-yielding classes, has been, and no doubt will continue to be, more or less subject to fluctuations. These irregularities have not, however, been unvarying as to interval or uniform in degree. Some of them have been comparatively slow in operation and moderate in extent, whilst others have been somewhat rapid in the one and extreme in the other. They were the results of disturbing tendencies, which are, no doubt, in some degree, susceptible of being regulated and controlled; and which may possibly be less various in character in the future than they have been in the past, though, at the same time, as nothing is so certain to occur as that which is not expected, it is almost idle to try what peering into the future will disclose in reference to this. A partial failure of crops, a dread of infectious diseases, a new development in foreign supplies of meat, a shrinkage in the value of cattle, a semi-tropical summer, or a partially-arctic winter, have all of them been, turn and turn about, causes of fluctuations in calf-rearing in the British Isles. Taking into our ken the latest of these disturbing tendencies, we find that the searching winter of 1891–2, which was rough on forage, greatly diminishing our normal surplus store of it, and followed as it was by a summer whose hay-crop was small in quantity and inferior in quality, must be held responsible—primarily if not chiefly responsible—for the heavy drop in the price of cattle which occurred in the fall of 1892. The unusually small supply of food for cattle with which farmers almost everywhere commenced the recent winter may be taken to explain the greater part of the drop in price, as well as the falling-off in rearing which will almost certainly be the sequel.

In order to obtain a good hold of the salient bearings of the subject, it will be expedient to consult the Agricultural Returns of Great Britain—which so well merit, and even demand, perennial study on the part of every stock-breeding farmer in the kingdom, for if chronic fluctuations in the rearing of calves are ever to be kept within bounds, I know of nothing so well calculated to accomplish that desirable state of things as the lessons which these Returns annually disclose. To serve our present purpose, it will, perhaps, be

sufficient to make up a few sets of columns relating to live stock and to the crops on which they feed ; the first and third consisting of five-year-interval totals, and preferably covering a period of twenty-five years ; and the second consisting of three-year-interval figures, relating to cattle under two years of age, and covering a period of ten years. Of horses, those used solely in agriculture, mares kept for breeding purposes, and unbroken horses, only, are enumerated in these returns :—

TABLE I.—NUMBER OF CATTLE, SHEEP, AND HORSES IN GREAT BRITAIN.

Year	Cattle	Sheep	Horses
1868	5,423,981	30,711,396	1,461,061
1872	5,624,944	27,921,507	1,258,020
1877	5,697,933	28,161,164	1,388,582
1882	5,807,491	24,319,768	1,413,578
1887	6,441,268	25,958,768	1,428,383
1892	6,944,783	28,734,704	1,518,082

It will be observed in Table I. that a continuous though irregular increase has taken place in the number of cattle ; a five-year-interval plan does not, however, exhibit the full extent of the fluctuations which have occurred in the rearing of calves. To illustrate this definite feature a little more clearly, Table II., covering the last ten years, may perhaps be deemed sufficient :—

TABLE II.—CATTLE UNDER TWO YEARS OF AGE IN GREAT BRITAIN.

Year	Number	Year	Number
1882	2,143,990	1891	2,691,118
1885	2,602,262	1892	2,627,186
1888	2,244,626		

Here it will be noticed that the fluctuations in calf-rearing in the last ten years have been very considerable, and that although there is now a marked turn of the tide, in the direction of ebb, in the figures of 1892 as compared with those of 1891, we are still above the figures of 1885 by some 25,000, and above those of 1882 by no less than 483,000, in cattle under two years of age. It may be inferred from these data that the total number of cattle in Great Britain is greater than it ought to be—greater than the land can be expected to maintain. Whether or not such an inference may be sustained will best be seen by a study of the acreages recorded in Table III., on the next page.

In this table will be noticed, as between 1892 and 1868, an increase of more than 240,000 acres of oats. But in all other corn crops, except rye, the official figures show a decreased acreage, that in wheat being startling and serious, viz., 1,432,286 acres. Peas and beans together exhibit a decrease of 320,000 acres, and barley one

TABLE III.—ACRES OF OATS, GREEN CROPS, AND PERMANENT GRASS IN GREAT BRITAIN.

Year	Oats	Green crops	Permanent grass
1868	2,757,053	3,385,866	12,136,036
1872	2,705,837	3,616,383	12,575,606
1877	2,754,179	3,584,846	13,728,355
1882	2,833,865	3,475,660	14,821,675
1887	3,087,989	3,463,706	15,671,395
1892	2,937,545	3,269,577	16,358,150

of 120,000 acres; there is also, as will be seen in the table, a decrease of 116,000 acres in green crops. The increase in permanent grass land, however, amounts to no less than 4,222,000 acres. If we strike a balance of increase and decrease of land in essentially stock-feeding crops and in grass—taking due account of the proportion of other crops which may be partly consumed by stock—we find, on a moderate estimate, a net increase of some three and a half million acres of grass land; and this may be taken to roughly denote the amount of reclamation of land which has been accomplished in a quarter of a century.

How, then, do we stand? It has been shown that we have in twenty-five years an increase of, in round numbers, 1,500,000 cattle, a decrease of 2,000,000 sheep, and an increase of 57,000 horses. If we reckon on the basis of five cattle to twenty sheep, the decrease in sheep stock makes room for one-third of the increase in cattle stock, leaving us with a net increase of one million cattle, and the horses in addition; and an increase of, say, three and a half million acres of permanent grass land to keep them upon. And if we extend our estimate a little farther, and go on the familiar "three-acres-and-a-cow" basis, we have three million acres for the one million cattle, and at least half a million acres in addition for the maintenance of the extra 57,000 horses. The increase in cattle does not all consist of adult animals, so that the allowance of three acres to each of them is altogether too liberal. It will be observed, therefore, that our live stock have not hitherto kept pace with the increase in the area of permanent grass; and that, relatively speaking, the land of this country is not so heavily stocked now as it was in 1868.

Whether the land will carry as much stock per hundred acres now as it would a quarter of a century ago, is a question upon which opinion is fairly unanimous. There are many experienced farmers who think that the cold and drenching seasons which have occurred so frequently in the last fourteen years have reduced the store of fertility which naturally belongs to soils that are worth farming; and others there are who think that two or three fine seasons would restore to the land a good deal of the condition it has lost. Admitting the probability that more than a modicum of truth is contained in each of these opinions, particularly in the first one, it may be remarked that we need go no farther back than 1892 for

an instance of the reduction in the stock-carrying capacity of land which takes place in a wet, cold, and almost sunless season.

It has been said that the wasteful winter of 1891–2, coupled with the deficient hay-crops of the succeeding summer, is primarily responsible for the drop in the price of cattle which occurred in the autumn following it, and for the falling-off in calf-rearing which will probably be the sequel. In the corresponding sequence of events which occurred in 1886–7, the fall in prices was even greater than in the autumn of last year. And yet in 1887, the year of lowest prices, there had been, as compared with 1886, a decrease of more than two hundred thousand cattle in Great Britain—almost entirely consisting of those under two years of age, and showing a still greater falling-off in calf-rearing than the foregoing year had done. But, notwithstanding these downward steps—these supposed preventives of a shrinkage in value—the drop in prices came, and this in its turn was followed by a further decrease of more than three hundred thousand cattle, one-third of which were in the class under two years of age.

Is this process of depletion to be repeated in 1893? If so, it is to be hoped that it will be only on a moderate scale, for these heavy fluctuations do a great deal of harm all round. If a comparison be made with the earliest year of the Returns, viz., 1868, it will be seen that the country is now under- rather than over-stocked with both cattle and sheep, and especially the latter, when we take into the calculation the land and crops available for their support in the two periods respectively; but if the comparison be made with 1887 instead, a reverse picture is produced. If, therefore, we had in 1887, and have now, all—and even more than all—the live stock the land will support, there is ample ground for the contention that the store of fertility in the soil has been reduced by a long and almost constant series of impoverishing seasons. But all this is not to be easily admitted.

A good many farmers rear all the calves they possibly can, *when they are dear*, but sell all they conveniently can spare when they are cheap; many others there are who keep steadily at it, rearing about the same number every season; and yet others—far-seeing ones, these—rear many when they are cheap, and few when they are dear. If only the obvious lesson could be put universally into practice, the fluctuations which occur in the numbers of our cattle would become far less extreme than they have hitherto been. It is disappointing to find how slowly the information conveyed by the annual Agricultural Returns filters down among the mass of our stock-raising farmers—indeed, of all sorts and conditions of farmers—and, consequently, how unnecessarily extreme the fluctuations in numbers of live-stock remain. By the aid of the past, whose facts are before us, it is most desirable that we should endeavour to regulate the future, in reference to this important question. There is no sufficient reason why, like moles, we should be unable to perceive what is in front of us until we have scratched our way into it.

There are ample grounds for expecting that the current season will

exhibit a large falling-off in calf-rearing, and that the markets will be glutted with half-fed veal. The Returns collected last June exhibit a decrease of rearing, for there were sixty-four thousand fewer cattle under two years of age than there were in June 1891, although the total number of cattle of all ages shows an increase of more than ninety thousand : this increase arose from the exceptionally large number of cattle which passed out of the under-two into the over-two years' class in the interval. This, however, must be borne in mind by those who are in the habit of rearing calves : the season of 1892 was one of the worst in memory for grazing, and it is tolerably certain that a vast number of half-fattened cattle were slaughtered after the last Returns were collected. The exceptionally low price of store stock in the period referred to has also caused the slaughtering of many thousands of young cattle—such as were at all fit for the butcher—that would otherwise have been wintered as store stock ; and hence it is, indeed, that the price of beef has been exceptionally low throughout the winter.

We have much reason to fear that the Returns to be collected next June will exhibit a considerable decrease in cattle *over two years of age*, and indeed of those under two years as well ; and therefore we may venture to come to the conclusion that we have not now, and in three months' time shall not have, a larger stock of cattle than, under average conditions as to crops and pasture, the land of the country is calculated to maintain. It may be hoped, and indeed expected, that the approaching summer will be a more fruitful one than that of last year, so far as yield of crops is concerned, and that the coming winter will find the country better prepared with food for live-stock than was the case six months ago. The probability is, however, that the wholesome dread engendered by the recent winter will cause an extra area of land to be mown for hay, and that this in its turn will help on the expected massacre of the innocents.

J. P. Sheldon.

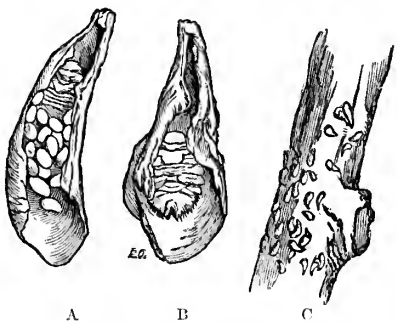
THE APPLE MUSSEL SCALE.

The scale insect which is the subject of this note [1] is recognised as belonging to the tribe of the Diaspides, which includes all species covered with a shield, the latter being independent of the body of the animal, and formed by a waxy secretion glueing together the skins cast off by the insects in their successive moults.

The investigators have found *Mytilaspis pomorum* chiefly upon the stems of young apple trees, not exceeding four or five inches in diameter, and upon young branches. In the case of aged trees it appears to be generally absent. Its presence is indicated by

[1] *Note sur le* Mytilaspis pomorum (*parasite du pommier*), par MM. L. Huet et E. Louïse. Ministère de l'Agriculture. Bulletin. Onzième année. No. 7. Paris: Imprimerie Nationale. Décembre, 1892.

numerous slight elevations upon the surface of the bark, each one seldom straight, but usually somewhat curved upon itself, either to right or to left, sufficiently suggestive of the shape of the mussel shell. Its colour scarcely differs from that of the bark to which it is attached, though it is a trifle paler. Its length is usually between $\frac{7}{100}$ inch and $\frac{8}{100}$ inch, and its breadth from $\frac{3}{100}$ inch to $\frac{4}{100}$ inch. Its anterior extremity becomes almost pointed; its posterior extremity is more rounded, is less adherent, and is easily raised. The scale always presents transverse curved lines, concentric with the pointed end: these denote the successive zones of growth.



Apple Mussel Scale, *Mytilaspis pomorum*, Bouché; *Aspidiotus conchiformis*, Curtis.
A, magnified scale, under side, showing female and eggs; B, ditto, showing female shrivelled within the scale; C, apple branch infested with scales—natural size.

The fact that the scales are rather more adherent at the anterior extremity is due to the circumstance that the insect here thrusts its proboscis, or sucker, into the bark for the purpose of extracting nourishment. In the early months of the year a brownish body may be found at the anterior end of the space beneath the scale. This body, extracted with a needle, is seen to be very flattened, and is about $\frac{4}{100}$ inch long; it becomes narrowed in front, is plainly segmented transversely, and is destitute of limbs. This is the body of a female Mytilaspis, dead and dry. Behind it there is seen to be a heap of twenty or thirty whitish elliptical structures about $\frac{1}{100}$ inch long: these are eggs, and between them delicate filaments may be seen to pass.

This, then, is the state of the Mytilaspis before the larvæ are hatched out. If, at the beginning of May, the eggs are examined under a sufficient magnifying power, the shells are thin enough to permit the development of the embryo to be observed. The exact date of hatching is determined, of course, by the temperature of the surrounding air, and by the total amount of heat the egg has received. After the rigorous winter of 1891 in Normandy hatching was effected as late as June 6, whilst in 1892 it took place on May 20. M. Noël regards the middle of May, however, as the mean period of hatching. But, whatever may be the date, the larvæ never all emerge simultaneously, for the process of hatching extends over some days. It is accompanied by the crawling out, from beneath the broad end of each scale, of twenty or thirty pale whitish larvæ, which leave under the scale the crumpled shells of the minute eggs from which they have escaped.

The young creatures are seen to be transversely segmented; they are furnished with a pair of antennæ or horns, two reddish eyes,

three pairs of legs, and two blunt outgrowths at the end of the body. On each side of the larva are marginal spines. The head segment carries a beak lengthened into a proboscis or sucker, twice the length of the body, and coiled up in a sort of pouch which occupies almost the entire length of the middle line along the under surface of the body. This sucker is unrolled when the larva desires to fix itself. At this stage the creature bears a close resemblance to the young wingless Phylloxera [1] which infests the grape vine.

As the hatching progresses the larvæ crawl over the surface of the tree, showing preference for the sunny side. According to the observations made they fix themselves not later than the end of three weeks, and henceforth cease their wanderings. They now begin to envelop themselves, behind and at the sides, with a lace-work of delicate white filaments, secreted from the blunt outgrowths at the rear end of the body: these threads are much more delicate than the fine ones which have been mentioned as passing amongst the eggs. Soon after the formation of this incomplete silky shroud the creature undergoes the first moult, due to its increasing size. The skin splits along the middle line below, thus setting free the sucker which, being uncoiled, is forced into the tissues of the bark of the tree, its extreme slenderness facilitating its penetration. As to the cast skin, it becomes adherent to the waxy secretion and forms, in conjunction with the latter, the first covering (the incipient scale) —at the outset very thin—of the animal. A further quantity of waxy material is secreted, to which a subsequent moult adds a fresh cast skin. By a continuation of this process the protective scale, which gradually thickens, is thus built up of a series of skins successively rejected by the animal, and kept together by the glutinous secretion which is incessantly poured out.

As the moults follow, one after another, the creature undergoes a retrogression; first its eyes disappear, then its legs become atrophied and are no more seen, and finally the antennæ vanish also.

The preceding description applies only to the female insect. The males of *Mytilaspis pomorum*, like those of some other scale insects, have not yet been observed, and nothing is known as to the fecundation of the female.

The number of scales to be met with, even upon one tree, is enormous. Generally, they arrange themselves in groups or clusters, but in some cases all the branches and also the trunk, especially of young trees, are entirely covered. As, beneath each scale, the insect buries its sucker in the tissues of the bark in order to extract therefrom the juices of the tree, it is easy to understand how myriads of them, all working simultaneously, at length exhaust the tree and finally cause its death.

Whilst these pests are mostly constrained, on account of the delicate structure of their suckers, to attack only the younger shoots, yet, as the apple trees grow, the bark exfoliates, and on the newly-

[1] An illustration of *Phylloxera vastatrix* is given in the Journal, Vol. III. 3rd Series, Part II., 1892, p. 418.

exposed surface the creatures find a medium soft enough to be penetrated by the suckers. Nevertheless, it is obvious that it is in plantations of young apple trees, and in nurseries, that the attacks of *Mytilaspis pomorum* are chiefly to be feared. Accordingly it is recommended :—

1. To reject all grafts affording evidence of the presence of scale.

2. To examine all grafted stocks with care, and in the case of such as are invaded by the parasites to vigorously scour with a hard brush, preferably a metallic brush, and afterwards to apply a liquid insecticide. This mode of treatment should be restricted to the winter, as, if resorted to later, the buds might be injured.

3. To inspect minutely any young trees it is proposed to purchase, and to refuse them if found to be infected.

4. The liquid insecticides (*lotions parasiticides*) can be used at any period, but are specially to be recommended at the time of hatching of the eggs, say from the middle of May to the middle of June, when the larvæ are still moving about, or when, only recently fixed, their protective scale is incomplete. At the time they first attach themselves the creatures are so exceedingly small that the eye usually fails to detect them, so that measures should be in operation before the pests are actually visible to the unaided eye.

5. By shaking the young trees at the time the larvæ are moving about many of the latter will be thrown to the ground, where they are powerless for injury, and will probably perish.

The liquid insecticide recommended is tobacco juice mixed with 5 per cent. of glycerine or of treacle, the object of the latter being to give to the material some degree of viscosity, and to retard its drying up.

From the foregoing translation of the French memoir it will be apparent that each scale, as it is seen upon the apple and other trees, shelters from 20 to 50 eggs, each of which is capable in due course of producing a new scale insect. The generic name *Mytilaspis* (μυτίλος, a mussel, and ἀσπὶς, a shield) is in allusion to the shape of the scale, like that of a mussel-shell. The specific name *pomorum* (from *pomum*, a fruit) is suggestive of the predilection which the pest has for the apple tree, although it also infests pears, plums, hawthorns, rose trees, cotoneasters, and other rosaceous shrubs. In the synonym *Aspidiotus conchiformis*, by which the creature is likewise known, the generic name literally means *ear-shield*, and the specific name *shell-shaped*. The illustration on page 169, kindly lent by Miss E. A. Ormerod from her *Manual of Injurious Insects*, affords faithful representations of the solitary scale, and of the scale-infested twig.

The colour of the scales approximates so closely to that of the bark that the scales are liable to be overlooked unless close inspection be made. Complaints of barren apple trees are, however, often found to be associated with the presence of this scale in enormous numbers ; and cultivators of the apple and allied trees would be well

advised to examine the bark carefully, especially that of the younger twigs. The appearance of the scales, when once recognised, is so characteristic that they can scarcely pass unnoticed when vigorously searched for.

The month of April is a very suitable period at which to resort to the remedial measures which the French investigators have found efficacious in Normandy, where apples are extensively cultivated. This brief note on *Mytilaspis pomorum* will, therefore, be in the hands of English apple-growers in time to suggest to them a means of coping with the pest during the current season. The interest concerned is a large one, for in 1892 the area of orchards in England was 203,520 acres, and in Wales 3,509 acres; the largest county areas were 26,717 acres in Devon, 26,189 in Hereford, 24,094 in Somerset, 20,528 in Kent, 19,347 in Worcester, and 17,525 in Gloucester. After this there comes a fall to 5,134 acres in Cornwall, but it should be remembered that apples and other rosaceous trees are also largely cultivated in kitchen gardens, in which situations they are at once readily inspected and easily subjected to remedial treatment.

The Apple Mussel Scale is closely allied to the White Woolly Currant Scale (*Pulvinaria ribesiæ*, Signoret), which attacks all kinds of currant trees. Both insects are members of the family Coccidæ, of the natural order Homoptera.

W. Fream.

THE MILK-YIELDS OF TWO CHESHIRE HERDS.

The actual records, extending over a period of seven years, of the quantity of milk yielded by each cow in a dairy herd ought to afford some facts of practical interest to dairy farmers. Besides supplying useful data as to what may be regarded as maximum and minimum yields per cow, they should also furnish reliable information for arriving at what may be regarded as an average yield of milk per cow per annum. In this communication it is proposed to record the yields of milk obtained from each cow on the two home farms on the Duke of Westminster's estate, Eaton, Eccleston, Cheshire, during the seven years, 1886–92. The system followed is to weigh the total milk of each of the two herds daily, whilst the milk of each cow is only weighed once a fortnight, an interval that has been found by experience to be quite compatible with accurate results. The records are tabulated on pp. 173 to 176, and are set forth in such a form that the reader will understand them at a glance. Where dashes are put opposite the number of a cow, it means that the animal was removed from the herd; in the following year a fresh cow takes her place. On p. 176 is given a summary of the seven years' results.

Total Yield of Milk of Each Cow.

1886						1887					
Grange Farm			Woodhouse Farm			Grange Farm			Woodhouse Farm		
No. of cow	Gallons	Weeks in milk	No. of cow	Gallons	Weeks in milk	No. of cow	Gallons	Weeks in milk	No. of cow	Gallons	Weeks in milk
1	757	38	1	843	42	1	902	43	1	846	44
2	—	—	2	795	48	2	—	—	2	582	42
3	974	44	3[2]	380	36	3	843	44	3[1]	472	38
4	834	42	4	—	—	4	—	—	4	492	38
5	961	42	5	510	48	5	793	38	5	465	32
6[1]	461	36	6	693	42	6	593	34	6	492	38
7	705	48	7	774	48	7	871	42	7	665	36
8	738	42	8	—	—	8	769	43	8	519	38
9	512	34	9	497	30	9	535	34	9	473	32
10	673	44	10	498	44	10	922	44	10	629	38
11	803	46	11[2]	435	36	11	851	45	11[1]	529	39
12	933	48	12[2]	599	36	12	1,335	46	12[1]	594	43
13	827	40	13	491	32	13	963	48	13	570	38
14	759	46	14	557	48	14	697	44	14[1]	526	33
15[2]	430	38	15	603	38	15[1]	477	40	15	—	—
16	827	42	16	703	46	16	738	40	16	636	41
17[2]	323	36	17	841	46	17	499	42	17	691	39
18	519	42	18	950	44	18	539	35	18	1,066	44
19	—	—	19	856	42	19	—	—	19	818	39
20	—	—	20	—	—	20[2]	464	34	20	—	—
21	507	28	21	764	42	21	653	41	21	—	—
22	—	—	22[2]	349	40	22	—	—	22[1]	420	38
23	857	40	23	439	36	23	814	44	23	—	—
24	659	42	24[2]	392	40	24	664	40	24	470	41
25	—	—	25	447	40	25	—	—	25	343	35
26	648	42	26	—	—	26	707	43	26[2]	383	36
27[2]	319	34	27	—	—	27	—	—	27	—	—
28	—	—	28	721	37	28[2]	383	35	28	451	35
29	417	34	29	666	38	29[2]	547	46	29	659	38
30[2]	509	40	30	893	49	30	462	44	30	636	52
31	614	42	31	845	42	31	684	43	31	735	39
32	—	—	32	—	—	32[2]	319	33	32	—	—
33	714	42	33	886	44	33	791	42	33	755	36
34	572	42	34	563	44	34	688	44	34[1]	512	34
35	480	38	35[2]	483	40	35	598	36	35[1]	535	41
36	510	40	36	797	34	36	636	37	36	655	30
37	612	42	37[2]	827	44	37	740	39	37	—	—
38	492	40	38	376	34	38	622	43	38	—	—
39	575	42	39	933	48	39	635	46	39	787	42
40	684	42	40	—	—	40	825	40	40	—	—
41[2]	354	36	41	—	—	41[1]	393	40	41[2]	426	34
42	656	36	42	—	—	42	647	33	42	—	—
43[2]	396	30	43	421	32	43[1]	571	46	43	308	42
44	622	36	44	631	43	44	719	40	44	781	52
45	551	38	45	—	—	45	518	35	45[2]	256	36
46	487	34	46	574	44	46	537	37	46	—	—
47	674	38	47	798	52	47	871	37	47	634	36
48	545	46	48	501	34	48	656	40	48	—	—
			49	618	40				49	602	42
			50	708	42				50[2]	406	35
			51	407	33						
41 cows gave 25,490 gallons			41 cows gave 26,064 gallons			42 cows gave 28,471 gallons			38 cows gave 21,819 gallons		
Average per cow 622 gallons			*Average per cow* 636 gallons			*Average per cow* 677 gallons			*Average per cow* 574 gallons		

[1] Three-year-old Heifer.

[2] Two-year-old Heifer.

Total Yield of Milk of Each Cow.

1888						1889					
Grange Farm			Woodhouse Farm			Grange Farm			Woodhouse Farm		
No. of cow	Gallons	Weeks in milk	No. of cow	Gallons	Weeks in milk	No. of cow	Gallons	Weeks in milk	No. of cow	Gallons	Weeks in milk
1	1,035	52	1	812	38	1	876	34	1	716	46
2	—	—	2	804	40	2	598	36	2	805	40
3	690	27	3	—	—	3	349	34	3	—	—
4[1]	426	44	4	605	47	4	495	42	4	603	42
5	906	42	5	475	36	5	868	38	5[1]	316	34
6	772	43	6[1]	317	34	6	816	44	6[1]	333	42
7[1]	490	42	7	—	—	7	428	36	7	—	—
8[1]	128	20	8	590	46	8	—	—	8	415	39
9	656	40	9	—	—	9	168	19	9[1]	213	34
10	929	43	10	661	52	10	840	46	10	573	32
11	940	47	11	733	37	11	991	50	11	687	42
12	1,448	47	12	776	37	12	—	—	12	726	38
13	—	—	13	603	34	13	644	44	13[1]	296	34
14	—	—	14	752	42	14	498	38	14	801	46
15	675	46	15	—	—	15	388	36	15	576	48
16	813	42	16	773	42	16[1]	347	26	16	751	36
17	586	40	17	872	40	17	645	36	17	723	40
18	750	38	18	987	42	18	660	32	18	1,150	47
19	—	—	19	877	38	19[1]	593	48	19	1,058	42
20	681	40	20[1]	259	52	20	849	46	20	—	—
21	812	42	21	624	42	21	795	40	21	559	40
22[1]	243	26	22	569	34	22[1]	280	34	22	659	38
23[1]	641	46	23	596	31	23	622	46	23	—	—
24	774	38	24	621	39	24[1]	425	35	24	620	41
25	956	43	25	—	—	25[1]	420	36	25	—	—
26	—	—	26	437	40	26	839	37	26	—	—
27	—	—	27[1]	243	36	27[1]	302	40	27	271	36
28	602	48	28	583	26	28	627	40	28[1]	269	32
29	456	29	29	650	38	29	—	—	29	673	32
30	—	—	30	591	42	30[1]	290	28	30	—	—
31	502	30	31	752	47	31[1]	109	17	31	708	42
32	512	36	32[1]	490	36	32	628	36	32	—	—
33	975	44	33	842	38	33	941	40	33	603	42
34	719	41	34	—	—	34	551	40	34[1]	341	39
35	762	37	35	598	36	35	839	34	35	612	46
36	767	40	36	804	35	36	832	42	36	802	36
37	1,108	42	37	—	—	37	1,206	44	37	532	45
38	726	45	38[1]	494	41	38	882	41	38	—	—
39	826	46	39	—	—	39	—	—	39	—	—
40	1,144	51	40[1]	304	39	40	1,123	44	40	280	34
41	499	32	41	631	30	41[1]	278	30	41	665	37
42	846	37	42	—	—	42	771	37	42[1]	369	30
43	670	44	43	734	40	43	792	48	43	628	38
44	973	49	44	—	—	44	780	40	44	576	46
45	858	44	45	350	30	45	738	36	45	444	37
46	—	—	47	834	46	46	—	—	46	—	—
47	1,110	44	48[1]	280	30	47	1,097	42	47	698	44
48	913	46	49	710	36				48	365	38
			50	286	50				49	612	34
			51	556	43				50	502	35
			52	574	39				51	622	40
									52	653	35
40 cows gave 30,349 gallons			41 cows gave 25,079 gallons			42 cows gave 27,220 gallons			41 cows gave 23,805 gallons		
Average per cow 758 gallons			*Average per cow* 611 gallons			*Average per cow* 648 gallons			*Average per cow* 580 gallons		

[1] Two-year-old Heifer.

Total Yield of Milk of Each Cow.

1890						1891					
Grange Farm			Woodhouse Farm			Grange Farm			Woodhouse Farm		
No. of cow	Gallons	Weeks in milk	No. of cow	Gallons	Weeks in milk	No. of cow	Gallons	Weeks in milk	No. of cow	Gallons	Weeks in milk
1	861	36	1[1]	347	34	1[1]	425	22	1	472	35
2	372	34	2	817	43	2	282	21	2	1,044	52
3	385	36	3[1]	401	26	3	449	36	3	605	38
4	480	39	4[1]	269	34	4	379	30	4	286	30
5	918	38	5	528	38	5	905	39	5	547	46
6	571	31	6	—	—	6	200	22	6	624	36
7[1]	596	32	7	834	40	7	866	46	7	555	37
8	—	—	8	359	26	8[1]	144	18	8[1]	528	37
9	—	—	9	272	29	9[1]	438	36	9	397	37
10	249	28	10	821	41	10	564	46	10	980	43
11	1,139	48	11	700	38	11	598	28	11	806	37
12	604	36	12	839	35	12	438	40	12	862	37
13	815	46	13	558	38	13	859	46	13	520	40
14[1]	216	22	14	704	38	14	812	37	14	817	35
15	429	32	15	487	38	15	251	20	15	725	38
16	—	—	16	761	34	17	791	38	16	723	38
17	681	40	17	942	44	18	766	38	17	859	45
18	762	40	18	955	46	19[1]	369	34	18	698	43
19	377	30	19	975	40	20	1,227	48	20	492	48
20	1,196	45	20[1]	409	32	21	548	20	21	308	27
21	917	42	21	—	—	22	371	31	23	666	40
22	—	—	22	757	40	23	631	45	24	634	34
23	694	44	23[1]	470	30	24	202	22	29[1]	499	40
24	367	38	24	656	40	25	501	29	30	494	36
25	593	42	25	—	—	26	1,137	44	31	795	42
26	1,004	42	26	—	—	27	518	38	32	430	32
27	244	26	27	—	—	28[1]	289	30	33	895	40
28	—	—	28	—	—	29	547	46	34	508	35
29[1]	378	28	29	—	—	30	571	37	35	1,096	46
30[1]	477	41	30	—	—	31[1]	361	30	36	660	37
31	—	—	31	717	38	32	786	41	37	726	42
32	749	44	32	—	—	33	1,219	44	38	364	23
33	1,110	42	33	689	34	34[1]	198	32	39	561	30
34	790	42	34	665	42	35	785	33	40	403	30
35	771	35	35	585	32	36	925	44	41	556	39
36	868	36	36	906	38	37	1,297	44	42	716	32
37	1,362	44	37	500	38	38	1,221	46	43	787	39
38	945	41	38	517	30	39	780	38	44	560	40
39[1]	740	45	39	503	26	40	1,462	48	45	611	32
40	1,272	44	40	—	—	41	490	36	46[1]	518	41
41	534	34	41	595	28	42	515	24	47	550	44
42	725	32	42	490	28	43	763	40	48	639	32
43	807	43	43	701	38	45	858	34	49[1]	400	35
44	507	32	44	584	44	46	1,073	40	50	431	32
45	796	36	45	560	36	47[1]	367	27	51	837	43
46	1,002	40	46[1]	414	36	48	732	49	52	751	37
47	1,129	32	47	—	—						
48[1]	581	44	48	305	20						
			49[1]	300	28						
			50	469	32						
			51	699	40						
			52	662	38						
42 cows gave 30,013 gallons			41 cows gave 24,702 gallons			46 cows gave 29,900 gallons			46 cows gave 28,935 gallons		
Average per cow 714 gallons			*Average per cow* 602 gallons			*Average per cow* 650 gallons			*Average per cow* 629 gallons		

[1] Two-year-old Heifer.

Total Yield of Milk of Each Cow.

1892						1892					
Grange Farm			Woodhouse Farm			Grange Farm			Woodhouse Farm		
No. of cow	Gallons	Weeks in milk	No. of cow	Gallons	Weeks in milk	No. of cow	Gallons	Weeks in milk	No. of cow	Gallons	Weeks in milk
1 [1]	316	36	1	454	34	31	329	16	31	442	36
2 [1]	398	36	2	—	—	32	828	42	32	447	28
3	—	—	3	552	37	33	993	35	33	921	47
4	—	—	4 [1]	374	42	34	—	—	34	667	52
5	857	40	5	428	38	35	837	35	35	425	40
6 [1]	606	50	6	456	36	36	715	38	36	448	37
7	631	40	7	669	50	37	1,080	42	37	621	40
8	—	—	8	595	40	38	987	44	38	735	49
9	489	30	9	288	32	39	830	37	39	531	40
10	—	—	10	599	50	40	1,275	44	40	633	38
11 [1]	377	33	11	720	34	41	524	32	41	598	41
12	600	34	12	766	33	42 [1]	461	40	42 [1]	549	50
13	610	38	13	443	41	43	779	50	43	776	42
14	762	31	14	648	36	44 [1]	435	31	44	602	39
15 [1]	431	38	15	483	46	45	755	40	45	675	36
16	744	43	16	749	38	46	1,338	49	46	505	36
17	804	38	17	—	—	47 [1]	386	35	48	596	52
18	581	40	18	733	36	48 [1]	506	38	49	348	45
19	—	—	19 [1]	233	34				50	607	37
20	1,081	42	20	615	43				51	672	40
21	—	—	21	517	30				52	815	44
22	376	31	22 [1]	327	40						
23	559	40	23	721	38						
24	—	—	24	765	45	40 cows gave 26,929 gallons			47 cows gave 26,913 gallons		
25	721	46	25	354	28						
26	1,065	46	26	422	28						
27 [1]	567	40	27	—	—	*Average per cow* 673 gallons			*Average per cow* 573 gallons		
28	279	26	28	—	—						
29 [1]	383	39	29	454	36						
30	634	40	30	935	44						

[1] Heifer.

Summary of the Average Annual Yields of Milk per Cow for the Seven Years 1886–92.

Grange Farm			Woodhouse Farm		
Year	Number of cows	Average yield, gallons	Year	Number of cows	Average yield, gallons
1886	41	622	1886	41	636
1887	42	677	1887	38	574
1888	40	758	1888	41	611
1889	42	648	1889	41	580
1890	42	714	1890	41	602
1891	46	650	1891	46	629
1892	40	673	1892	47	573
Mean yield for 7 years, 677 gallons per cow per annum.			Mean yield for 7 years, 601 gallons per cow per annum.		

Before entering upon a brief discussion of the figures, it may be of interest to give a few details concerning the herds, their feeding and management. The cows are all Shorthorn cross-breds, very like the ordinary Cheshire dairy cows, but containing rather more Shorthorn blood than the latter. It is arranged for the cows to begin calving in November, and to finish by about May 20. Most of them drop their calves in February, March, and April, but as it is necessary to supply large quantities of milk, cream, and butter during the winter months, a higher proportion of the cows calve down in November, December, and January than is the case in the majority of herds.

During the winter and early spring months the cows which have calved are fed with hay, and 4 to 7 lb. per day of ground oats. Silage, Swedish turnips, pulped and mixed with hay chaff, and mangel are also used, but in varying quantities to different cows, and some have none. Turnips and silage, unless used very sparingly, give a flavour to the milk and cream, and it is found necessary to keep these two foods away from the cows the milk or cream of which is directly consumed. When, however, the milk is made into butter, the flavour is very little noticed, provided the turnips and silage are used in moderation, and not given till after milking. At the time the cows are not in milk, during the winter, they have a larger quantity of pulped turnips and as much silage as they care to eat ; but the meal is discontinued. Hay is given twice each day. The crushed oats are used in various quantities according to the size of the cows and the amount of milk they may be giving, and the quantity also varies according as the quality of the hay is good or indifferent. We occasionally use maize meal, bean meal, and bran, but crushed oats form the staple purchased food. This feeding is continued up to the time the cows go to grass, which is generally between the 1st and 12th of May. After this they are fed morning and evening with cotton cake or meal for ten to fourteen days, and then all artificial feeding is discontinued until the autumn, when the cows commence to calve again.

There is generally, as is especially shown by the summary table on p. 176, a considerably larger average quantity of milk given by the cows at the Grange Farm. This is in great part to be accounted for from the fact that the pastures on this farm nearly all rest on the Cheshire Clay, which is doubtless admirably adapted for milk-production. Moreover, the pastures on this farm are kept entirely for the milking stock and their calves.

Some years ago I had a turf, two feet long by one foot wide, cut from one of the Grange pastures, and sent to Dr. Fream, to be included in his series of experiments on the herbage of pastures. His report, as given in the Journal (Vol. I., 3rd Series, Part II., 1890, p. 371), is in effect as follows, and shows that the herbage is of an exceedingly grassy character :—

A turf from one of the best fields on Eaton Home Farm, on the estate of the Duke of Westminster. There is no record as to how long the pasture has been down, and it is used exclusively to graze dairy cows. It is occa-

sionally mown, the last time having been in 1888. The land had received 5 cwt. of bones to the acre twice within the last five years. The turf was dug seven inches deep, and there was no sign of rootlets on the lower face. The soil was a dirty yellowish-brown clay, becoming darker towards the top: it was free from stones.

This was a very grassy turf; cut on July 6. It yielded—

Gramineous herbage	97 per cent.
Leguminous „	1 „
Other herbage	2 „

The leguminous herbage was Trifolium pratense (purple or meadow clover). The "other herbage" was made up of Taraxacum (dandelion), Plantago (plantain or rib-grass), and Ranunculus bulbosus (buttercup).

On separation the grassy herbage yielded the following percentages:—

Lolium perenne (rye-grass)	75 per cent.
Agrostis stolonifera (fiorin)	15 „
Holcus lanatus (Yorkshire fog)	3 „
Phleum pratense (timothy)	2 „
Poa trivialis (rough-stalked meadow grass)	1 „
Cynosurus cristatus (dogstail)	1 „
Anthoxanthum odoratum (sweet vernal)	a trace
Undetermined	3 per cent.

The Woodhouse pastures lie upon mixed soils, composed of sandstone, clay, alluvial deposit, and gravel; they often get flooded, and are always very wet in rainy weather, whilst the Grange pastures never get floods on them. There are also a number of working horses kept on the Woodhouse pastures during the summer, and occasionally some sheep, these being more or less detrimental to the dairy cows.

We rear a large number of calves each year, from the females of which the herds are kept at their full complement. The principle followed is to keep the calves from the heaviest milkers, although there is no certainty that we shall get a first-class milker by so doing; nor indeed can the bull always be depended upon. Nevertheless, there is greater likelihood of getting a good milker from a good cow than from an inferior one. If farmers would exercise care in selecting and breeding from good milkers, and in eliminating the poor ones, the returns would be more satisfactory, for it costs as much to keep a bad cow as to maintain a good one.

The year 1892 was not a very favourable one for milk. There was a cold, backward spring, very little summer, and October was a most wretched month, in which 7¼ inches of rain fell, and twenty-three of its days were wet. The milk during this period decreased much more than it should have done, and a great loss was thereby sustained. The in-calf heifers, coming into the herd this year, are small, their inferior growth being due to the cold wet season of 1892. Both of the herds which form the subject of this communication are under the management of Mr. W. H. Phillips, who keeps the milk-records with every care.

Turning now to an examination of the tabulated yields of individual cows, it will commonly be noticed that a low yield coincides with the case of either a young cow or a short period of lactation;

sometimes these two circumstances are seen to go together. As regards age, cows of two or three years old (heifers) are separately distinguished. For practical purposes three heifers should be regarded as equivalent to two cows; all dairymen in Somerset and Dorset, where cows are hired out, reckon in this way. It will be seen, by way of example, that cow No. 8, in the Grange Farm herd, 1891, a two-year-old heifer, gave only 144 gallons in a lactation of 18 weeks, which is not much over a gallon per day. The next cow to her, No. 9, also a two-year-old heifer, was in milk twice as long, but gave treble the yield. Again, cow No. 21, in the Woodhouse herd, 1891, was in milk only 27 weeks, and gave but 308 gallons; this, however, was a better performance than that of cow No. 4, which yielded as little as 286 gallons for 30 weeks, whereas No. 38 afforded 364 gallons in 23 weeks: these are the three lowest cases at Woodhouse, 1891, as regards both yield and time in milk.

Interesting cases are discoverable of variations in yield associated with uniformity in the number of weeks in milk. Thus, in Grange Farm herd, 1886, it will be found that 13 cows, all of them over three years old, were each 42 weeks in milk. The total number of gallons given by each may be conveniently arranged as follows:—

961
834, 827
738, 714
684, 659, 648, 614, 612
575, 572, 519

Here it is seen that, whilst the highest yield was 961 gallons, and the lowest 519 gallons, a difference of 442 gallons, the commonest yield per cow was between 600 and 700 gallons. As a matter of fact, the total yield of these 13 cows adds up to 8,957 gallons, which is equivalent to exactly 689 gallons per cow.

With regard to maximum yields, it will suffice to take those exceeding 1,000 gallons per annum. These are of sufficient interest to merit the separate tabulation given on p. 180.

Two facts are noticeable in connection with these 34 cases—the first, that the cows were all over three years old; the second, that, with the solitary exception of No. 47, Grange Farm, 1890, the number of weeks in milk never fell below 40. The maximum individual yield recorded is seen to have been that of No. 40, Grange Farm, 1891, in which case it reached 1,462 gallons, so that this cow gave about 7 tons of milk in a period of 48 weeks. It may be stated generally of these high-yielding cows that they are mostly animals of from six to nine years of age, and that, while some have been bought, others are home-bred. Nos. 37 and 40, Grange Farm, it will be observed, each gave upwards of 1,000 gallons of milk per annum for five successive years, 1888–92.

Finally, it may be learnt from the summary table (p. 176) that, over a period of seven years, the average annual yield per cow ranged from 622 gallons to 758 gallons at Grange Farm, and from 573 to

636 gallons at Woodhouse Farm, the mean yield at the former being 677 gallons, and at the latter 601 gallons per cow. As a general summary of the whole of the results at both farms, it may be said that a continuous measurement, extending over a period of seven

YIELDS OF OVER 1,000 GALLONS PER COW PER ANNUM.

Grange Farm.

Year	No. of cow	Gallons	Weeks in milk
1887	12	1,335	46
1888	1	1,035	52
,,	12	1,448	47
,,	37	1,108	42
,,	40	1,114	51
,,	47	1,110	44
1889	37	1,206	44
,,	40	1,123	44
,,	47	1,097	42
1890	11	1,139	48
,,	20	1,196	45
,,	26	1,004	42
,,	33	1,110	42
,,	37	1,362	44
,,	40	1,272	44
,,	46	1,002	40
,,	47	1,129	32
1891	20	1,227	48
,,	26	1,137	44
,,	33	1,219	44
,,	37	1,297	44
,,	38	1,221	46
,,	40	1,462	48
,,	46	1,073	40
1892	20	1,081	42
,,	26	1,065	46
,,	37	1,080	42
,,	40	1,275	44
,,	46	1,338	49

Woodhouse Farm.

Year	No. of cow	Gallons	Weeks in milk
1887	18	1,066	44
1889	18	1,150	47
,,	19	1,058	42
1891	2	1,044	52
,,	35	1,096	46

years, of the yields of between 80 and 100 cross-bred Shorthorn cows has given an average result equivalent to about 640 gallons of milk per cow per annum.

CECIL T. PARKER.

YEW POISONING.

IN the discussion upon Yew Poisoning in the last number of the Journal (Vol. III., 3rd Series, Part IV., 1892) Mr. Whitehead had occasion to remark (page 702) that there appeared to be only one reference to the subject in our previous volumes. On the publication of the number referred to, the *Salisbury and Winchester Journal*, which circulates widely through the Chalk districts of Wilts and Hants, where the yew is particularly abundant, drew the attention of its readers to the discussion in this Journal. The result was to draw forth a series of communications, which are of sufficient interest to be reproduced in these pages, where they will be readily available for future reference when the subject again comes to the front, as it in all probability will do.

Mr. W. Wyndham, of Dinton, Wilts, says (January 14, 1893) :—

Some twenty years ago I lost two valuable young cart horses. The carter at the end of their day's work stopped them opposite a yew tree for a minute or two, whilst he "hitched off" from the harrows or plough they were harnessed to. He took them thence to their stable about one and a half miles off, and each in the course of a few minutes reared on end in the stable and fell back dead. They were poisoned by yew. Consequently on this I made inquiries, and obtained these principal results :—

(1) That yew is generally fatal to animals with an empty stomach, and seldom so otherwise.

(2) That yew in a partly withered state or when dormant (*i.e.*, when the sap is inactive) is more dangerous than when in an actively growing state.

These results seem to be fully borne out by the instances quoted by Mr. Squarey [Journal, Vol. III., 3rd Series, Part IV., 1892, p. 699]. The soil probably makes but little difference.

On January 21 the following communication appeared over the signature F. A. V. M., Salisbury :—

Some years ago, when the furniture of a former Rector of West Knoyle, near Mere, was being removed from the Rectory, the horses attached to the van were allowed to stand some minutes in the drive previous to starting. The two leaders availed themselves of this delay by eating freely of an adjacent yew. Both those horses fell back dead within a few miles of the Rectory gate. The yew in this instance was eaten on an empty stomach.

Can any of your readers inform me whether yew is poison to the human constitution also?

I remember two small children who in the course of a game put some yew in their mouths, doing nothing more than lick it. A few minutes afterwards both complained of headache, and were almost immediately seized with violent vomiting.

In the succeeding week, January 28, Mrs. Charlotte Starky, of Bromham, wrote :—

I remember, during a severe frost about 1881, that several of the finest and oldest deer in Compton Park were killed by eating yew. The pond was frozen over, and the deer walked over the ice to a small islet where a yew tree grew, of which they ate and died. Mr. Penruddocke had them examined to ascertain the cause of death, and the yew was found to have poisoned them.

The incident related in the foregoing letter was corroborated by Mr. Penruddocke, of Compton Park, Salisbury, who, writing on February 4, said :—

I can corroborate what Mrs. Charlotte Starky writes in her letter about the deer dying in Compton Park from eating yew. During the severe winter of 1881 the upper pond was frozen over and covered with snow, which afforded a foothold for the deer. Three bucks died from eating yew on the islet—a two-year buck, *i.e.*, 6, rising 7; a bare buck, *i.e.*, 4, rising 5; and a sore, *i.e.*, a young deer, 3, rising 4. The oldest deer was found dead but warm. The next reached about 100 yards from the islet and fell dead. The youngest deer was found on the islet and driven out. It ran about 300 yards, then stopped suddenly, jumped straight up on end, and, falling backwards, expired. A post-mortem examination was made of the largest buck. Its intestines were found to be swelled and filled with the *bark of the branches of dead or dried yew.* The passages were stopped, and the intestines and lungs were of a purple or plum colour.

I have a large yew tree in the park, which is not fenced in. The park-keeper is careful to pick up and carry away all withered droppings from this tree. The bucks knock off *green* sprays with their horns, and eat them without, apparently, any bad effect.

On February 11, 1893, the subjoined letter appeared from Mr. Thomas Hobbs, of Malshanger Farm, Basingstoke :—

A short time before leaving Wiltshire I lost a valuable horse, costing me 40*l.*, from eating yew. My horses were ploughing and pressing in a field, and about an hour before leaving for the day the trace-horse laid hold of some yew in the hedge as they were turning round. Nothing appeared amiss until the horses got near the stable, and I believe the horse drank some water. The lad came running for me, saying the horse was very bad, and, though I had only a very short distance to go, before I reached the stable the horse was dead. Of course I have since then been most careful to keep all my cattle from eating yew. I have heard of several losses in a similar way since I have been in Hampshire. Two things, it seems to me, should be the practical outcome of this correspondence: first, all owners of land should cease to cultivate the yew; and second, they should destroy as fast as possible a tree that has proved so disastrous to the public.

Some experimental evidence on the subject of yew poisoning will be found recorded at page 141 of this number of the Journal.

Ed.

PUBLICATIONS OF INTEREST TO AGRICULTURISTS.

Of the three works which are here noticed two are French publications, and the third is an official *brochure* issued by the United States Department of Agriculture.

They are reviewed in the following order :—

1. The Disorders of Apple and Pear Trees.
2. Analyses of American Feeding-stuffs.
3. Natural History of Animals of the Farm.

THE DISORDERS OF APPLE AND PEAR TREES.[1]

M. Dangeard's *brochure* is an addition of considerable importance to the knowledge of the affections of apple and pear trees, and particularly of those caused by fungi, whose harmful influences are frequently most serious, and often unsuspected by cultivators, or attributed by them to unkindly and unsuitable conditions of soil or subsoil, or to the effect of weather. To the attacks of insects upon fruit-trees a short chapter only is devoted, which is, and purposes to be, merely a summary of information obtained from various authorities upon those which are most destructive, and of methods of prevention, and remedies against them. M. Dangeard gives a list of insecticides that have been found useful against some of the insects injurious to apple and pear crops, such as the weevil, *Anthonomus pomorum*, and the winter moth, *Cheimatobia brumata*.

In the fore-front of this list he places arsenical compounds, as Paris Green and London Purple, at least for those insects which actually eat the leaves or the flowers, such as caterpillars and the larvæ of beetles, and would be killed by the poison upon them ; while for insects which suck up the juices—as aphides, for example, and the apple sucker, *Psylla mali*—a composition of soft soap and petroleum should be employed. This is supposed by M. Dangeard to act as a poison upon the bodies of insects, but it is questioned whether it does not rather starve them out, and prevent them from feeding, by its unpleasant odour, fixed as it is upon the bodies of the insects and the leaves upon which they are placed. At least this is the effect of syringing with soft soap and quassia concoctions upon the aphides of the hop plants. Arsenites, it appears, are not made use of as insecticides in France, and M. Dangeard advises that they should be employed as in the United States, adding that there is a new field open for careful experiments upon these powerful insecticides, and that it seems more simple and less costly to spray

[1] *Les Maladies du Pommier et du Poirier*, par P. A. Dangeard, Maître de Conférences de Botanique à la Faculté de Poitiers. Pp. 80, with 10 plates of many figures. Paper covers. Paris: J. B. Baillière, 1892. 8 francs.

fruit trees with Paris Green for the winter moth and the weevil than to visit every day bands of tar encircling the trees to catch the one, or to shake the boughs continuously to dislodge the other.

Very pertinent remarks are made as to the mode of putting on insecticides, which should be applied in the form of a mist, and not as deluging showers. The object should be to cover each leaf with a light layer (*mince couche*) of the substance, and for doing this M. Dangeard states there is no machine better than the Éclair.

Two pseudo-insects, or creatures allied to insects, are described here as belonging to the *Acaridæ*; one, a species of *Tetranychus*, and the other a *Phytoptus*. This *Tetranychus*, termed by Donnadieu *Tenuipalpus glaber*, causes the discoloration of the leaves of apple and pear trees by sucking out their juices and eventually making them shrivel and fall off.[1] They are always on the lower surfaces of the leaves, and about October the 7th, M. Dangeard remarks, they leave them, and retire for the winter to the twigs, where they shelter themselves in the fissures of skin or bark, under lichenous growths, and between the scales of the buds, still sucking up sap, and unaffected by sharp frosts. When the leaves appear the mites go to them. From the habit of this species of *Tetranychus*, M. Dangeard argues that the *Tetranychus telarius*, spinning mite, or "red spider," so injurious to hop plants, damson trees, peach trees, gooseberry bushes, strawberry plants, and many other trees and plants, likewise retires to the twigs, branches, and stalks of its host. This is an important deduction, and if confirmed will enable cultivators to deal with this universal pest during the winter. It is not known whether the *Tenuipalpus glaber* attacks apple trees in Great Britain. The *Tetranychus telarius* does, or at least a *Tetranychus* of some species, which has so far been taken to be *Tetranychus telarius*, but may be *Tenuipalpus glaber*, in default of close observation, though there are marked distinctions between the two species. Petroleum washes applied both in winter and summer are recommended as valuable remedies for this mite.

M. Dangeard notes that a fungus, *Pestalozzia concentrica*, is frequently found in the spots (*taches*) caused by these mites, which serves to finish the ruin of the leaves already almost exhausted by their attacks. Also, in the case of apple and pear leaves infested by a species of *Phytoptus* described by Sorauer as *Phytoptus piri*,[2] M. Dangeard remarks that the evil effects of this mite are often much aggravated by the presence of a fungus of a Fumago type in or upon their galls. For this double attack, which is not uncommon in England, it is recommended that all fallen leaves should be carefully collected and burnt. The leaves should be treated in the summer with *bouillie bordelaise*, which would arrest the fungus and serve as an obstacle to hinder the *Phytoptus* from penetrating their epidermis.

The most useful and interesting chapter is upon the canker

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[1] This is termed *la marbrure des feuilles* by M. Dangeard.

[2] *Handbuch von Pflanzenkrankheiten*, von Dr. Saul Sorauer.

(*chancre cancereux*) of apple-trees, that insidious and little understood malady common and fatal in many English orchards. M. Dangeard says canker causes grave injuries in the orchards of La Sarthe, where dessert apples are largely grown. Many trees are attacked, but not all varieties to the same extent. Those which produce cider fruit are not so liable to canker as those yielding dessert apples. The Reinettes are particularly affected, and much dead wood must be cut from the old trees every year; while the young trees are deformed and their growth is often checked. At Chambois the Reinette de Bretagne and the Reinette du Canada are disappearing on account of canker.

Several figures are given of stages in the growth of this disorder and the deformities peculiar to it upon boughs, large branches, and small twigs. In some of these the perithecia of the fungus, *Nectria ditissima*, which causes this injury, are distinctly shown. These, the organs of fructification of the fungus, are tiny red specks like minute beads dotted here and there upon the affected parts, and just visible without a glass, and can always be found where active mischief is going on. As M. Dangeard points out, boughs and branches may be found with the characteristic scars of canker upon them, but the fungus itself has disappeared, and vitality is preserved in proportion to the circumference invaded. When, however, the whole circumference of a bough or branch has been invaded, all that part above the canker dies. This attack, it is shown, commences at the point of a bud where the tissues are delicate and have been injured and dried up by frost or other causes and made suitable for the fungus, which is able to begin its existence as a saprophyte (*i.e.* an organism which lives upon dead or decaying substances) before it attacks the living tissues. After a while the skin of the twig, or branch, below the bud is penetrated by the fine mycelium of the fungus, though the characteristic red perithecia are not yet seen. Some observers, not finding these, conclude that the affection is not due to *Nectria ditissima*, forgetting that fungi exist at first in the fine, threadlike mycelial form, and do not fructify at once. In the early stages of the parasite a depression is noticed round the part attacked by it, and it is not till later on that there is any increase in the diameter of the twig or branch, or formation of cushion-like swellings (*bourrelets*). M. Dangeard holds that the fungus *Nectria ditissima* is undoubtedly the cause of canker, and cites Hartig [1] and Prillieux,[2] who have both written able treatises in exposition of their belief.

The following advice as to treatment for canker is given :—

1. To avoid grafting with a cankered graft, or upon a cankered limb. The traces of canker may be easily perceived. Every wound of the skin or bark is dangerous, as it serves as a centre for the fungus.

2. At the very first indication of canker all affected branches should be cut away and burnt.

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[1] *Lehrbuch der Baumkrankheiten*, von Dr. R. Hartig. Berlin, 1889.

[2] Prillieux, *Société Mycologique de France*, séance de juin 1888.

3. If the disorder has become chronic, it would be well to cut down an infected tree whose propinquity to healthy trees would be dangerous, or to cut away all diseased branches from those not infected, and to graft them.

4. Some varieties are not so liable to canker as others; it is therefore desirable to choose those for planting which appear from examination of the orchards of the district to be free.

5. All cankered wood must be cut away every year, as it serves as a harbour for the *Nectria*, which can live as a saprophyte.

It is recommended to spray cankered fruit trees with sulphate of iron and sulphuric acid, according to the subjoined formula :—

Sulphate of iron, 110 lb.
Sulphuric acid (poured on the sulphate of iron), $1\frac{3}{4}$ pints.
Boiling water, 22 gallons.

When cold this may be applied with the Éclair machine or with a garden engine. It is considered that the application of *bouillie bordelaise* would also be effectual in checking the progress of *Nectria ditissima*.

The action of the woolly aphis (*Aphis lanigera*) upon apple trees is well known. In some seasons and to some varieties of apple trees this insect does considerable harm by sucking the juices from the younger branches and twigs, and making nodules or excrescences upon them. But M. Dangeard has discovered that a fungus follows in the wake of the aphides and completes their work of destruction. When by reason of local hypertrophy of the nodules, or swellings raised by the irritation of the insects, there is a rent made in the bark, and the tissues of the branch are laid bare, the fungus appears immediately. M. Dangeard saw this in a nursery in which the trees were greatly injured by the united attack of insects and fungus. The latter especially penetrated into the tissues of the young branches, disorganising them and eventually killing them. A figure is given illustrating the action of the fungus, showing the parenchyma of the nodules penetrated by its mycelial threads. An elaborate description of the fungus elucidated by figures of many of its stages seems to indicate that it is a species of Cladosporium.

This is the first time, M. Dangeard observes, that the special action of this parasitic fungus has been noticed. When the woolly aphis is at work alone the vital parts of the infested branches may recover their normal functions : the tree is less vigorous, it is deformed, but in general its branches do not die. If the fungus is developed the vitality of the branches is destroyed and they die above the injury. M. Dangeard terms this *le chancre noduleux* (the canker of the nodules), and is of opinion that it does not act independently of the woolly aphis, therefore that steps should be taken to get rid of the insect by syringing the trees with a mixture of petroleum and soft soap. He advises that all branches and twigs infected by the fungus should be cut off and burnt.

The blackening of the leaves of apple and pear trees caused by *Fusicladium* (*Cladosporium*) *dendriticum* is treated under the head of

"La Fumagine des Feuilles," and its life history is graphically detailed and illustrated by many figures. M. Dangeard after long investigations and cultures of the fungus discovered that, at a certain stage, cells (*Kystes*) are formed, either solitary, or ranged like beads side by side, in which are oily globules or spores, one or two in each cellule. These cells are intended to preserve the fungus during the winter, and are brought to the ground with the dead leaves, or are formed upon them after their fall. In the spring the fungus is propagated by these spores released from their cells and carried by the insect to the young leaves.

This fungus is injurious to apple trees because it lives at the expense of their leaves, and chokes up the pores so that they cannot assimilate food. When the apples are formed the fungus fastens upon them, and spoils their appearance, and checks their growth.[1] Even when the fruit is in store the fungus continues its progress as long as the juices remain.

A closely allied fungus (*Fusicladium pyrinum*) injures pear-trees and pears in exactly the same way. Its life history also is identical with that of *Fusicladium dendriticum*. Sorauer says that it is more dangerous, as it lives not only on the leaves and fruit but also on the young twigs.[2] He gives the names of the Winter Nelis, Bonne Louise d'Avranches, Esperen's Bergamotte, Autumn Butter Pear, among others, as most liable to this affection.

This disorder is very common in England, though it is often attributed to climatic conditions or to unkindly growth. Pears are particularly subject to it, and in some seasons much of the fruit is covered with the peculiar specks which disfigure it and spoil it for dessert purposes. As a remedy for these fungi M. Dangeard recommends *bouillie bordelaise*, which should be applied as a preventive early in the season, and the application renewed frequently if the fungus spreads. *Eau céleste*, consisting of 2 lb. 6 oz. of sulphate of copper and 2 pts. of ammonia to from 22 to 44 gallons of water, may also be employed.

Sucrated *bouillie* has been found valuable, made by mixing 4 lb. 6 oz. of lime in 17 gallons of water. 46 oz. of treacle (*mélasses de commerce*) are dissolved in 8 gallons of water and mixed with the lime water. To this 4 lb. 6 oz. of sulphate of copper, dissolved in 2 gallons of water, is added and the whole well stirred. The stickiness of the treacle retains this composition upon the leaves and prevents the spores of the fungi from germinating.

M. Dangeard deals with other minor affections of apple and pear trees, such as rust of the leaves, occasioned by species of Gymnosporangium, and the affections of their roots (*Pourridié*), also caused by fungi, which there is not space to describe here.

CHARLES WHITEHEAD.

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[1] Frank in his *Pflanzenkrankheiten*, and Sorauer in his *Handbuch der Pflanzenkrankheiten*, alike hold that the *Fusicladium dendriticum* attacks both the leaves and fruit of apple trees.

[2] *Loc. cit.*

ANALYSES OF AMERICAN FEEDING STUFFS.[1]

THE compilers have presented in an accessible form a complete record of the work which has in recent years been done in America, in the direction of the proximate analysis of feeding-stuffs. The analyses of a vast number of samples of green fodders, silage, hay, roots, grain, mill-products, and miscellaneous waste materials have been collected, and, from these data, tables showing the "average" composition, and the maxima and minima results obtained with most of the varieties of American feeding-stuffs, are given.

The value of such tables is undoubtedly very great, provided the data from which they are computed are reliable. The compilers admit the difficulty and uncertainty of calculating the average compositions from the data they have collected, many of the analyses which are recorded being clearly incorrect. In addition, also, it may be seen that, in many cases, the differences between the maxima and minima results are too great to be fairly averaged. For instance, in the tables giving the analyses of maize fodder, the percentage of water varies from a maximum of 93·6 to a minimum of 51·5, and the maximum and minimum figures for the percentages of ash, protein, fibre, and fat, calculated on the dry matter of the fodder, are widely different.

A very large number of analyses of maize and wheat grown in different States are given, and it is interesting to note how little variation there is in the average results of the various analyses. The analyses of a large and varied selection of mill-products and by-products are quoted; of the latter the most important are the by-products from linseed and cotton seed. These appear in the form of "meals," hardly any analyses of linseed-cake or cotton-cake being given. In the case of linseed, it is noticeable that the "old" process meal contained an average of 8 per cent. of oil, but that by the "new" process, this valuable constituent is so thoroughly extracted that only 3 per cent. is left in the meal.

While much useful information is collected in these tables, there is, at the same time, much which might well have been omitted. It is difficult to understand why, in a list of feeding-stuffs, the analyses of such materials as "vegetable ivory sawdust," "ground peach-stones," and dried blood should be recorded. The celebrated American wooden nutmegs would be equally in place.

E. W. VOELCKER.

NATURAL HISTORY OF ANIMALS OF THE FARM.[2]

IN this presentable volume we have an example of the capable working out of a good idea. It embraces a full descriptive account of the animals of the farm, not only of the animals which are the

[1] *A Compilation of Analyses of American Feeding Stuffs*, by E. H. Jenkins, Ph.D., and A. L. Winton, Ph.B. Pp. 155; paper covers. Washington: Government Printing Office, 1892.

[2] *Histoire Naturelle Agricole du Gros et Petit Bétail.* Par le Dr. GEORGES PENNETIER, Directeur du Muséum d'Histoire Naturelle de Rouen. Pp. xi + 779, with 108 illustrations. Paris: Baudry et Cie., 1893. 20*s*.

special object of the stock-breeder's skill, but—as will presently be seen—of other animals, though the author does not venture outside the class Mammalia. The volume comprises four parts, the first of which (*Zootechnie générale*) deals with the broad principles of classification, anatomy, and physiology. Considerable space in this section is allotted to a discussion of the details of feeding and of breeding, whilst the concluding chapter (*Exploitation du Bétail*) is directed to an inquiry into the development of animals, according as these are destined to become producers of meat or of milk, or are intended to be used for purposes of work.

Animal products form the subject of the second part, and in it the chapters are devoted severally to milk and its derivatives; to meat; to animal fats; to hides, hair, and wool; to hoofs and horns, and bones; and to dung, or farmyard manure.

Nearly one-half of the volume is occupied by the third part, wherein chapters are respectively assigned to the horse, the ass and mule, the ox, the sheep, the goat, the pig, the rabbit, the dog and the cat. The two last-named are prettily termed "the guardians of herd, flock, and farm."

In the fourth part parasites and maladies are considered. Of the former, reference is first made to parasites common to all the animals under notice, and then to those which specially infest each of these animals. The diseases of domesticated animals are arranged in alphabetical order, and though it is only possible to discuss each briefly, yet this section of the book alone occupies upwards of one hundred pages. The volume concludes with a chapter on sanitary legislative enactments and their enforcement in France.

It will be apparent, therefore, that not only is the work of a comprehensive character, but that it deals with subjects which are of direct interest to farmers in general and to breeders in particular. We cannot call to mind any treatise in the English language, either original or translated, which covers exactly the same ground as Dr. Pennetier's useful volume. Though the title and the arrangement suggest a somewhat scientific method of treatment, the work is pre-eminently one for the practical man. It is well printed, and, unlike most Continental books, it is furnished with a full index.

It will interest English readers to see what a countryman of M. Nocard has to say on the vexed question of abortion. It is premised that domesticated animals vary much in their susceptibility to this malady; the mare and cow should be placed first, followed in order by the ewe, the doe, and the sow. At the present time, when there exists a tendency to refer all cases of abortion to one primary cause, it deserves to be noted that, according to our author, the causes are various. Amongst them he includes disturbance arising from presence of the male animal, ill-treatment, falling down, excessive work, fright, debility, unhealthy surroundings, insufficient nourishment, the consumption with the food of poisonous plants (ergot of grasses, ergot of rye, rue, savin, yew, colchicum, certain moulds), plants covered with hoar-frost, frozen roots, water containing ice, violent purgatives (with which it is necessary to

include, according to M. Gayot, the administration of salts during the second month of gestation), abrupt changes of temperature, and various diseases. To the foregoing are added the placing of fodder racks at too great a height above the animal's head, thereby causing a straining, which M. Morel de Vindé insists is very dangerous, and the too pronounced inclination of the floors of byres and stables.

The control of sex is another subject which has, at various times, aroused considerable discussion. The author revives M. Thury's theory, according to which the sex of the offspring is determined by the exact period at which the service takes place. Although, however, he quotes the testimony of a breeder of cattle, who certifies that in the course of twenty-nine experiments there was not one failure in securing the desired end, it is evident that the author still regards the problem as unsolved.

The subjoined table is quoted as showing the normal number of respirations and beats of the pulse per minute in adult healthy animals :—

	Respiration.	Pulsation per minute.
Horse	9 or 10	36 to 40
Ox	15 to 18	45 to 50
Sheep, goat	12 to 15	70 to 80
Dog	16 to 18	90 to 100

These numbers vary, of course, with the age. A young horse, for example, makes fourteen or fifteen respiratory movements per minute, whereas in an old horse the number may fall to nine or ten. In a young ox the number is from eighteen to twenty-one, in an old one it varies from twelve to fifteen.

Directions are given for feeling the pulse. In the case of the horse (fig. 1) the operator applies his right hand to the inferior border of the left lower jaw, where the beatings of the glosso-facial artery may be perceived. In the case of the ox (fig. 2) the root of the tail is grasped between the hands, when the pulsations of the coccygeal arteries are felt on the under face. In smaller animals (fig. 3) the beating of the radial artery can be felt on the internal face of the fore-leg, in the groove just above the knee.

In the classification of the varieties of the several groups of live stock the work is scarcely up to date, and the affinities and the relative importance of English breeds are hardly estimated at their true value. Of horses, the Shire is not classified, though the Lincolnshire, the Staffordshire, and the Black Horse are referred to. An estimate is made of the horse population of Europe, which is placed in the aggregate at 33,000,000 head, thus distributed :—

Russia	17,000,000	United Kingdom	2,700,000
Austria-Hungary	3,500,000	Italy	1,200,000
Germany	3,300,000	Other countries	2,300,000
France	3,000,000		

In discussing the varieties of cattle the author assigns the place of honour to the British breeds. After a review of the various

attempts that have been made to effect a classification of cattle, resort is finally made to a geographical arrangement, as at once the most simple, the most practicable, and the least open to objection. In this scheme the Shorthorns are called Durhams, as indeed is still the case in every country save in the land which gave them birth. We observe only a solitary reference to the *courtes-cornes de Durham.* There is no specific mention of the Red Polled breed, though the terms Norfolk and Suffolk both appear. The only recognition of Welsh cattle is under the head of "Glamorgan." The cattle *des îles Normandes,* are classed as Jersey and Alderney, despite the fact that the latter term is fast becoming obsolete in England; there is no reference to the Guernsey. The author follows M. Sanson in grouping together the Kerry, Ayrshire, Devon, Jersey, Alderney and Brittany cattle—all small or medium-sized breeds—as constituting the Irish (or Celtic) race, *Bos taurus Hibernicus.* The diminutive size of the Brittany cattle is well conveyed by the illustration, Fig. 4, p. 192.

The frequently recorded triumphs of Charolais blood at French Agricultural Shows will add to the

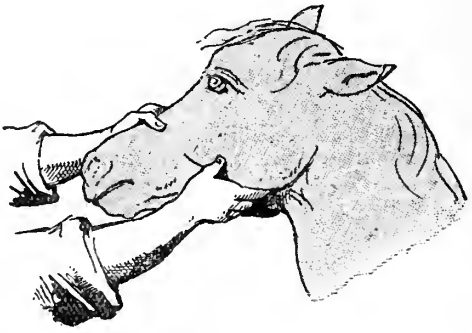


FIG. 1.—Feeling the pulse of the horse.

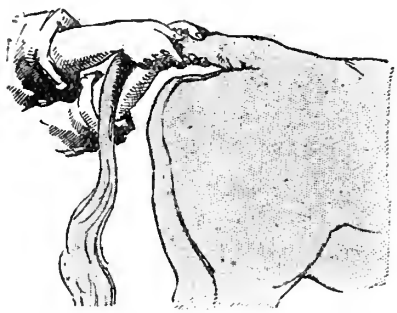


FIG. 2.—Feeling the pulse of the ox.

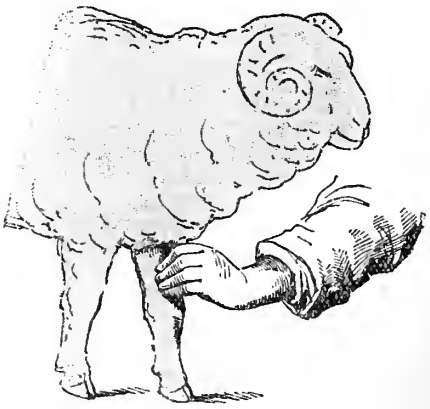


FIG. 3.—Feeling the pulse of the sheep.

interest of the following translation of the remarks upon the Charolais cattle, which have been so successfully crossed with the Shorthorns :—

This ancient breed, of which the cradle was the county of Charolais, in the Saône-et-Loire (situated in the East Midlands of France), was formerly used for purposes of draught, but its precocity and its natural aptitude to fatten rapidly upon the pastures, led breeders to develop its capacity in this direction.

The Charolais breed is large, strong, and hardy. The uniformly cream-coloured coat, but rarely marked with the yellowish spots which it is the effort of breeders by selection to suppress, covers a skin at once thick and remarkably supple. The head is rather large, the horns are fine and white, and sometimes greenish at their extremities, the muzzle and eyelids are rosy,

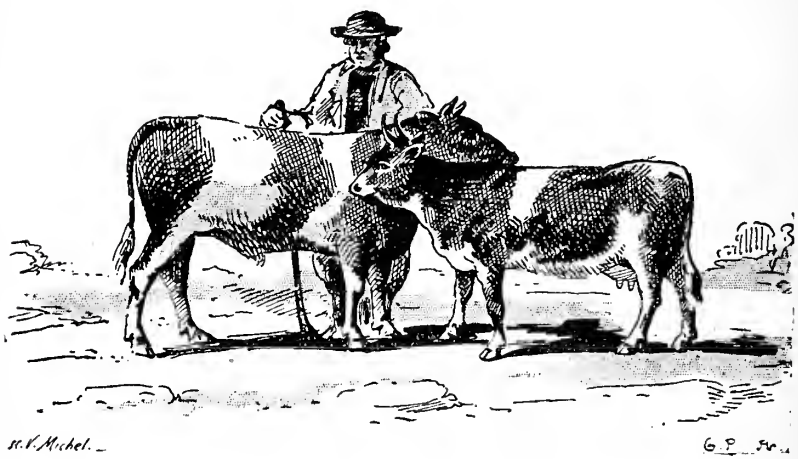


FIG. 4.—Bull and Cow of the Brittany breed.

and the nostrils well open. The body, which is lengthy, has a full, deep chest, with restricted dewlap, rump and thighs well developed, the tail short, broad at its root, and slender at its extremity.

Considerable improvement had already been effected with the breed, when, in 1770, the Charolais farmers introduced it into the adjoining Nivernais district, lying to the north-west, which at that time possessed only the Morvan breed, and cattle which were imported as draught beasts from Auvergne and Limousin. The newly-introduced cattle were made the objects of the greatest care, and were generously nourished in rich and extensive pastures, whilst their essential characteristics were rendered permanent by means of a rigid selection of breeding stock. In these circumstances they throve exceedingly well, and thus gave rise to the Nivernais variety.

Subsequently, in 1830, Count de Bouillé introduced into the Nièvre some Shorthorn bulls, which he crossed with pure-bred Charolais cows. The English blood was found to stimulate the precocity and to enhance the beef-producing capabilities. It rendered the cows better milkers, but it diminished the aptitude of the breed as animals of draught. Nevertheless, the advan-

tages of crossing were universally appreciated, and this practice is to-day followed throughout the Nivernais district, wherein the breeders continue to resort to the use of Shorthorn and Charolais sires.

Thus is obtained the Shorthorn-Charolais (*Durham-Charolais*) cross, which constitutes one of the most beautiful races of cattle in Europe. "Nowhere," says M. Sanson, "is the breeding of animals more energetically or better conducted than in the Nivernais district."

These half-breds, which are classed in the catalogues of French live-stock shows as *race Charolaise-Nivernaise*, or as *race Charolaise-améliorée*, have the white coat of the Charolais breed, for the breeders use as sires only those Shorthorn bulls which have also this shade of colour. They possess in a high degree the typical characters of butchers' beasts. The head is shorter than that of the pure-bred Charolais; the horns, smaller and entirely white, are directed forward, but turned up at the ends; the neck and shoulders

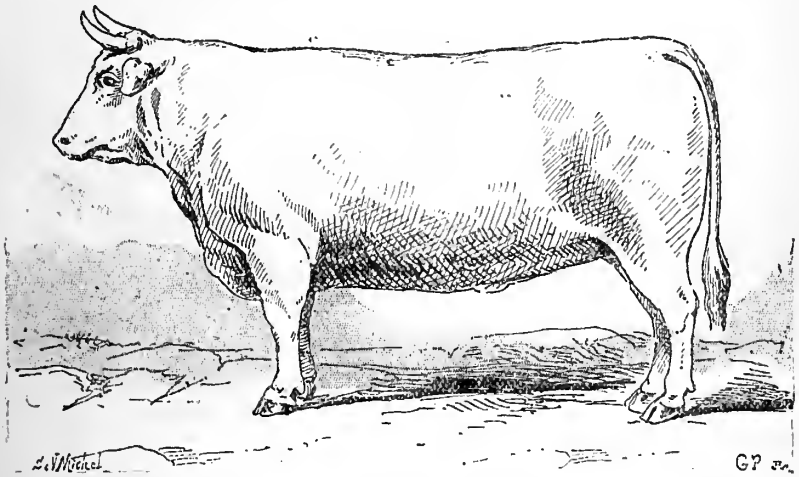


FIG. 5.—Ox of the improved Charolais breed.

are shorter, and the chest is fuller; the back, the flanks, the rump, and the thighs are more developed; the legs are more slender; the beasts handle more firmly, and they yield beef of the best quality.

Thus, then, the Charolais breed (fig. 5), localised originally in the Saône-et-Loire, is to-day cultivated in the adjoining regions. Introduced into the Cher (to the west of the Nièvre) and into the Allier (to the west of the Saône-et-Loire), it promises to completely displace the large Bourbonnais breed which formerly spread over the plains of the Allier.

In the classification of the breeds of sheep the same difficulties are encountered as in the case of cattle, at least so far as British breeds are concerned. Whilst room is found for such names as Norfolk Down, West Down, and Buckinghamshire, there is no reference to the Suffolks, the Dorset Horns, the Wensleydales, the Roscommons, and various other recognised breeds, nor do the Border Leicesters appear to be differentiated.

With regard to the Merino, a breed which has played so important a part in the development of fleece-bearers in various parts

of the world, we read that although Spain prohibited their exportation, yet under the administration of Colbert some Merino rams were, for the first time, introduced into France in the Roussillon district, whither new importations were subsequently made. The chief dates of importation since then may best be translated from the author's own words :—

1723. Introduction of Merinos into Sweden.

1763. First importation of Merinos into Germany. The Elector of Saxony obtained from the King of Spain 100 rams and 200 ewes. Establishment of Shepherds' Schools. Improvement of the breed by selection.

1776. A flock of Spanish Merinos was introduced into France under Turgot. Entrusted to the care of Daubenton, they throve and increased under his intelligent direction.

1782. Importation of Merinos into the Cape of Good Hope.

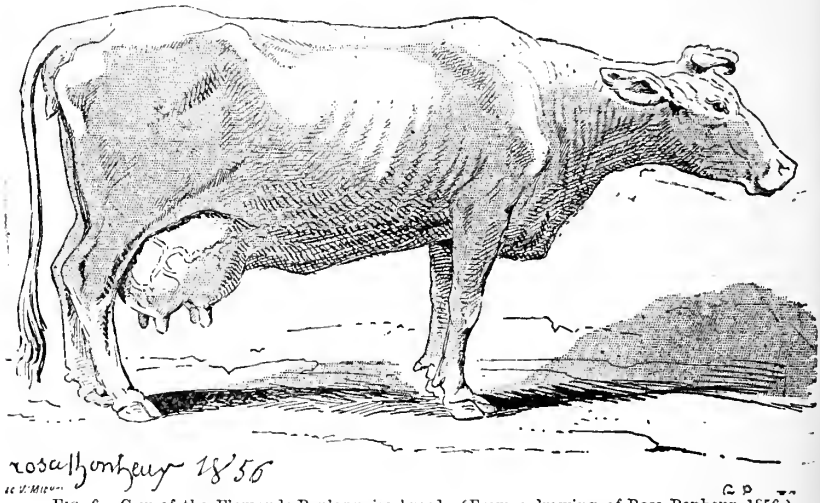


FIG. 6.—Cow of the Flamande-Boulonnaise breed. (From a drawing of Rosa Bonheur, 1856.)

1786. A new flock of 366 sheep arrived at the model farm of Rambouillet, established by Louis XVI. This *bergerie*, which became the national property in 1792, still exists.

1788. Introduction of Merinos into England. They excited but little interest till 1804, at which period commenced the Royal sales.

1793. Introduction of a Spanish flock into Piedmont, under the auspices of Count Graneri. This became the parent flock of the Merinos of Italy.

1799. Importation into Australia of Spanish Merinos, which were forthwith crossed with the better varieties of European Merinos, notably those of Saxony.

Under the French Consulate, Gilbert obtained from Spain fresh Merinos, for which there were established in various parts of France (at Perpignan, Arles, &c.) ten new national *bergeries*, which no longer exist.

Since then, Merinos have been successively imported into Hungary, Southern Russia, and North and South America, and to-day the Merino sheep of the world number hundreds of millions.

It is noteworthy that, as in connection with the turf, so in relation to the breeding of animals, English phrases have become current in France, where the terms Stud Book, Herd Book, and Flock Book are employed. It is true they have their French equivalents—stud books, *livres d'écuries* ; herd books, *livres d'étables* ; and flock books, *livres de bergeries*—but it is the English phrases which appear to be commonly used.

By the courtesy of the author and the publishers several of the illustrations in the work are here reproduced. Fig. 6 possesses an additional interest on account of the name of the artist which it bears.

W. Fream.

HAY HARVEST FORECASTS, 1892.[1]

The results of the checking of the Hay Harvest Forecasts, issued during the hay-making period of 1892, show that, notwithstanding the very unsettled conditions which again prevailed during the summer months, the general percentage of success reached 88. The largest general percentage (96) was attained in England, N.W., while the smallest (78) was in Scotland, E.

Summary of Results.

Districts	Names of Stations	Percentages				Total percentage of success
		Complete success	Partial success	Partial failure	Total failure	
Scotland, N.	Munlochy and Golspie	61	28	11	—	89
Scotland, E.	Aberfeldy, Rothiemay, and Glamis	58	20	16	6	78
England, N.E.	Ulceby and Chatton	46	35	14	5	81
England, E.	Thorpe and Rothamsted	50	32	15	3	82
Midland Counties	Cirencester and Retford	44	38	15	3	82
England, S.	Reading, Maidstone, Horsham, and Downton	61	30	8	1	91
Scotland, W.	Ardwell, Dumbarton, and Islay	63	29	5	3	92
England, N.W.	Leyburn and Prescot	61	35	4	—	96
England, S.W.	Clifton, Glastonbury, and Falfield	60	33	7	—	93
Ireland, N..	Edgeworthstown and Moynalty	58	30	9	3	88
Ireland, S..	Ardfert, Kilkenny, and Parsonstown	56	38	6	—	94
	Mean for all districts in 1892	56	32	10	2	88
	„ „ in 1891	58	31	10	1	89
	„ „ in 1890	53	36	9	2	89

[1] Particulars supplied by the Meteorological Office.

The telegrams were sent daily between 3.30 P.M. and 4 P.M. on each week-day for about five weeks. The issue commenced over the Southern districts of England on June 13, and ended on July 16 ; but commenced and ended about a fortnight later in the more western and northern parts of the country.

In addition to the recipients named in the list, telegrams were sent to six other gentlemen at their own cost.

Several of the recipients speak very favourably of the forecasts.

THE WEATHER OF 1892.[1]

First Quarter.—The weather in *January* was dry, and for the most part very cold, with frequent N.E. and N.W. winds, and snow, till the 20th ; it was mild with strong S.W. wind at the end of the month. The temperature of the air was below the average on nearly every day till the 21st, with severe frost on several nights ; from the 22nd, with the exception of two days, the mean temperature was above the average. The atmospheric pressure, saving on the 2nd, 3rd, and 4th, was low, particularly so on the 6th, 7th, 8th, and 9th, and the 14th, 15th, and 16th days ; from the 23rd the readings of the barometer were above the average. The fall of rain was less than the average ; snow fell frequently between the 6th and the 20th.

The weather in *February* was dry, dull, and moderately warm till the 11th ; then cold, being exceptionally severe from the 16th to the 20th ; afterwards warm for a few days, and cold at the end of the month. The temperature of the air till the 11th was a little above the average ; a cold period set in on the 12th, and was particularly severe on the 16th, 17th, 18th, and 19th days, when the decreases of their mean temperatures below their averages were as large as 10°·7, 14°·3, 11°·2, and 11°·3 respectively. On the morning of the 17th the temperature was 16° at Blackheath, and a very low temperature was general, and in many cases less than 16°.

There is no doubt that at numerous places in the N. the temperature was below zero ; whilst in the S. the lowest in the month at Guernsey was 28°·1, at Ventnor 22°·6 and at Truro, Torquay, Osborne, and Barnstaple it was about 21°. At the Royal Observatory, Greenwich, the lowest reading was 18°·8. The following are the instances back to the year 1841 of minima below 19° in February :—

1889 it was 18°·9	1855 it was 11°·1	1845 it was 7°·7
1888 „ 18°·4	1847 „ 10°·2	1841 „ 12°·4
1865 „ 15°·5		

The atmospheric pressure was above the average from the 9th to the 14th and on the 26th and 27th, and below on all other days, and

[1] Abstracted from the particulars supplied to the Registrar-General by James Glaisher, Esq., F.R.S., &c.

particularly so from the 15th to the 21st ; the average deficiency of pressure for these seven days was 0·6 inch. The fall of rain was generally less than the average. Snow fell on every day from the 14th to the 20th ; on the 19th it fell so heavily in Cornwall and Devonshire that the trains were stopped and the telegraph service was very much delayed. So deep were the drifts in some places that two engines coupled together had to be employed, and were frequently brought to a standstill. There were gales from the E. and N. from the 15th to the 20th, causing casualties and loss of life. At the end of the month vegetation was very backward.

The weather in *March* was dry throughout, with keen frost and bitter winds during the first half of the month, then milder weather from the 16th to the 19th, afterwards a renewal of the cold weather on the 20th, which continued to the end of the month, excepting the 26th and 27th, which were moderately mild. The temperature of the air till the 15th was constantly below its average, on some days to the amount of 11° or 12°, and low temperatures were general in London and all parts of the country. On the morning of the 9th the temperature at the Royal Observatory was 22°·3, whilst it was 9°·9 at Blackheath. The previous instances of low temperature in March at the Royal Observatory back to 1841 are :—

1890 it was 13°·1	1883 it was 20°·6	1850 it was 20°·0
1889 „ 18°·7	1853 „ 20°·8	1847 „ 16°·9
1887 „ 22°·1	1852 „ 21°·3	1845 „ 13°·1
1886 „ 20°·3		

From the 16th to the 19th the temperature was mild, and the air in contrast to the preceding cold weather was very pleasant ; on the 20th a moderately cold period set in, and the month ended with three very cold days with cold winds.

The pressure of the atmosphere was above the average from the 2nd to the 6th, and from the 17th to the 25th, and from the 29th. On the 9th and 10th snowstorms were general all over the country. The fall of rain was small everywhere. The cold days during the first half of this month and at the close, with the keen N.E. winds, completely kept back all vegetation.

Second Quarter.—The weather in *April* was dry, generally warm by day and cold by night. The temperature of the air was above its average till the 11th, particularly so on the 4th, 5th, 6th, and 7th. On the 4th and 5th the high day temperature exceeded 70° at some stations—a very high value for April. A sudden change to cold set in on the 12th, and continued to the 20th ; the mean temperature was as much as 9°·3, 10°·1, 10°·1, 11°·3 and 11°·0 below on the 13th, 14th, 15th, 16th, and 17th respectively, and snow fell on some of these days at several stations ; it was above the average from the 21st to the 24th, and then below to the end of the month. The atmospheric pressure was above its average till the 5th and from the 18th to the 24th, and below it on all other days. The fall of rain was small. The N. and E. winds were prevalent. At

extreme southern stations this month was distinguished by being fine and sunny, and at extreme northern stations by much frost and an absence of sun.

The weather in *May* was somewhat changeable, being very cold at the beginning, then moderately warm, and hot at the end; it was dry till towards the end, then some rain fell. The temperature of the air was below its average till the 7th, particularly so on the 5th and 6th, when it was 9°·7 and 9°·3 respectively, below. From the 8th to the end of the month the temperature was above the average, especially from the 25th. On the 31st the high day temperature exceeded 80° at all stations between Whitchurch and Rugby; on this day there was a severe thunderstorm, which did damage in many places. The atmospheric pressure was generally above its average from the 5th to the 23rd, and on the 29th and 30th, and below on other days. The fall of rain was below the average at southern stations, but was generally above at midland and northern stations.

The weather in *June* was variable, but on the whole was pleasant. The temperature of the air was above its average till the 11th; on the 10th it was as much as 10°·4 in excess; on the 12th a sudden cold set in; and on the 14th the mean daily temperature was as much as 10°·4 below the average. On the 10th, at Blackheath, the temperature was 85°·7, and on the morning of the 15th it was 38°, being a fall of 47°·7, and even this difference was exceeded in some places; the temperature continued below the average till the end of the month with the exception of the three days the 26th, 27th, and 28th. The atmospheric pressure was below till the 3rd, and generally from the 16th. The fall of rain was generally above the average. On June 1st, and again on June 28th, thunderstorms were general over England, with heavy falls of rain at some places. At some stations the amount of rain on the 28th exceeded two inches. In consequence of the dry spring the hay harvest was very light.

Third Quarter.—The weather in *July* was cold, showery during the first part of the month, and dry at the end. The temperature of the air was below the average on every day excepting the 3rd, 4th, 7th, and 31st, and particularly so from the 14th to the 21st. The atmospheric pressure was generally below the average till the 20th, and above from the 21st. The fall of rain at most stations was less than the average. The S.W. wind was prevalent in the first part of the month, and the N.E. after the 20th. There was very little thunder. The hay crop was generally light.

The weather in *August* was very variable. In the south it was a moderately warm month, with frequent rain; in the north the first fortnight was generally bright, and the last week was cold, wet, and unsettled over the whole country. The temperature of the air about London was generally above the average from the 14th to the 25th, and generally below on all other days. The atmospheric pressure was above the average till the 12th day, and below, with the exception of the 16th, 20th, and 21st, from the 13th day, and particularly

so at the end of the month. The fall of rain was above the average at nearly all stations. The wind was mostly from the S.W.

The weather in *September* was dull and wet during the first week, then dry, with occasional bright sun till the 19th, and generally wet and dull from the 20th. The temperature of the air was below its average till the 9th, from the 14th to the 18th, and from the 28th, and above from the 10th to the 13th, and from the 19th to the 27th. The atmospheric pressure was, with the exception of a very few days, below the average all the month. The fall of rain was somewhat above the average. The prevalent wind was from the S.W. The month was not favourable for harvest work.

Fourth Quarter.—The weather in *October* was very cold till towards the end, when there were three or four warm days, with frequent rain throughout the month. The temperature of the air was constantly below the average to the 27th ; on some days the deficiency exceeded 10°. The atmospheric pressure was below the average on every day excepting the 11th, 12th, and from the 17th to the 20th. The fall of rain was above its average. In Yorkshire the fall was especially heavy on the 13th, 14th, 15th, and 16th. There were great floods in that county, causing considerable loss to farmers.

The weather in *November* was mild and damp, with very little sunshine. The temperature of the air was generally above its average, excepting from the 18th to the 25th. The atmospheric pressure was below its average till the 6th, and from the 12th to the 16th, and above on other days. Rain fell frequently in small quantities.

The weather in *December* was dry, cold, and foggy. The temperature of the air was mild, and above the average from the 15th to the 21st. Till the 14th the temperature was below the average, and particularly so from the 4th to the 10th. On the 22nd frost set in with severity, and continued to the end of the month, the average deficiency for these ten days being 9°·1. The lowest temperature in the month occurred on the 27th or 28th. At Guernsey the lowest temperature was 31°·9 ; at stations south of latitude 51° it varied from 20° at Truro to 24° at Eastbourne ; betwen 51° and 52° it varied from 11° at Salisbury and Barnet to 19° at Barnstaple ; between 52° and 53° it varied from 10° at Rugby to 23° at Lowestoft ; between 53° and 54° it varied from 14°·5 at Halifax to 25° at Llandudno ; at Carlisle Mr. Cartmel registered — 1° ; at Stonyhurst the lowest was 14°·3 ; at Carlisle the minimum on the grass was — 9°. The atmospheric pressure was generally below the average from the 3rd to the 13th, and from the 29th to the 21st, and generally above on all other days. The rainfall was below the average, and very little fell during the latter half of the month.

RECENT AGRICULTURAL INVENTIONS

The subjects of Applications for Patents from Dec. 12, 1892 *to Mar.* 18, 1893.

N.B.—Where the Invention is a communication from abroad, the name of the Inventor is shown in italics, between parentheses, after the name of the applicant.

Agricultural Machinery and Implements, &c.

No. of Application.	Name of Applicant.	Title of Invention.
Year 1892.		
22807	HUNT	Cutting, crushing, or pressing hay, &c.
23395	LORRAIN (*Dupré*)	Straw-shaker.
23515	RUNDLE, R.	Seed-sowing machine.
23531	CLARK, F.	Root-cutters.
23701	PERKINS, J.	Hay-presses.
23467	BROWN, T. S.	Mowing machines.
23806	RICHTER, F.	Threshing machines.
23858	RICHMOND, J. G.	Machine for splitting beans, &c.
23882	SCHNACKENBURG, L.	Weeding machines.
23890	BLACKSTONE, E. C.	Hay-tedders, &c.
23998	FAIRWEATHER, J.	Topping, tailing, and lifting turnips.
24028	WALKER, C.	Drying and conditioning wheat, &c.
24050	STEWART, J. C.	Husking or cleaning seeds.
Year 1893.		
747	GRIFFIN & CULPIN	Controlling the rakes of reaping machines.
927	CLAYTON, J.	Plough.
936	WARTZE, H.	Seed and manure drill.
1047	WETTER, J. (*Knoche*)	Distributing manure.
1146	BENSTED, H. T.	Training hop plants.
1722	SMITH, R.	Distributing manure.
1764	CHIESA, P.	Ploughs.
2067	BEEKMAN, G.	Harvesting machines.
2113	JEWELL, F., & CLEAVE.	Chaff-cutting machines.
2216	HOLT, J.	Digging potatoes.
2948	WEBB, J.	Fixing seed-box to plough.
3400	COTTIS, C.	Horse-hoes, &c.
3667	HARDINGHAM, G. G. H. (*Mechwart, Austria*)	Machine diggers.
4572	GEKELER, A. G.	Potato-planter.
4812	HUGHES, E. G.	Protecting seeds from birds, &c.
4816	YATES, T.	Sowing clover, &c.
4982	WEEKS & SON, LTD.	Washing hop plants, &c.
5100	WOODS, E.	Tool for securing wire in training hops, &c.
5131	ROBINSON, E.	Plough.
5202	LUND, J. H.	Potato-sorter.
5451	SUTTON, M.	Machine for hoeing turnips, &c.
5712	MAYNARD, R.	Feed rollers of chaff cutters.

Stable Utensils and Fittings—Horse-shoes, &c.

No. of Application.	Name of Applicant.	Title of Invention.
Year 1892.		
22792	KENNEDY, J., & anr.	. Shoeing horses.
22829	LITOUX, V. M. E.	. Harness.
22930	WILLIAMSON, W. N.	. Preventing horses slipping, &c.
22986	SMYTH, W. H.	. Horse-shoes.
23009	HIBBERT, T., & anr.	. Pneumatic panel for riding saddles, &c.
23015,	GOULD, H. T., & anr.	. Harness buckles.
23025	LAMBERT, R.	. Hame-fasteners.
23032	HUGHES, F.	. Horse-collars.
23038	SCOTT, J.	: Stirrups.
23076	MAIR, W. J.	. Shoeing horses with nailless horse-shoes, &c.
23190	HEATON, R.	. Horse-shoes.
23205	PIMBLEY	. Horse-shoes.
23253	SHIRLEY	. Facilitating the shoeing of horses.
23265	SANDS, W. H.	. Ice cogs for horse-shoes.
23471	KLOOS, E.	. Horse-shoes.
23475	BERGER, E., & anr.	. Shoes with removable calks.
23551	BROUGHTON, J. & P. T.	Harness, tugs, &c.
23559	BENEDIKT, J., & anr.	. Stopping runaway horses.
23605	ANGOVE & anr.	. Safety stirrup-hook.
23623	BARNSBY, J. N.	. Saddle-trees.
23690	BREMNER, A. H.	. Curry-comb.
23753	DE MONTAIS, A., & anr.	Shaft carriers of harness.
23816	SAMS, A.	. Fixing plates and pads to horse-shoes.
23854	MCCORMACK, J.	. Shoeing horses.
23885	HICKINBOTTOM, T.	. Horse-shoes.
23990	SMYTH, W. H.	. Frosting horse-shoes.
24043	WHEELER, H. B.	. Saddles.
24090	DAY, J. T.	. Riding saddles.
Year 1893.		
152	LEIGH, H. H. (*Lindholm, Finland*)	. Horse-shoes.
195	PEAKE, M. A.	. Curing crib biting and crib sucking.
277	KIRKBY, F., & anr.	. Shoes to prevent concussion and slipping
291	FELSTEAD, A.	. Horse-shoes.
378	OFFORD, T.	. Horse-shoes.
421	HANDLER, O., & anr.	. Horse-shoes.
436	LATTA, R.	. Air-inflated riding saddles.
578	CHARLESWORTH, A.	. Hames.
843	WHEELER, G. N.	. Suspending nose-bags.
928	QUINTON, J. H.	. Horse-hitching device.
1061	BEECHING, W. & S.	. Fasteners for bridles and reins.
1145	MONSALLIER, J. J.	. Stopping runaway horses.
1157	CUTTS, J.	. Administering physic balls to horses

No. of Application. Year 1893.	Name of Applicant.	Title of Invention.
1185	BIRD, F. H.	Riding saddle-trees.
1307	HOLST, L. J. R.	Horse-collars, &c.
1321	MAIN, B. & T. C.	Horse-collars, &c.
1324	CLAYTON, T. C, & anr.	Anti-slipping elastic horse-shoes.
1345	LAMBERT, W. Y.	Horse-shoes.
1469	CULPIN, A.	Bridle, bit, and check-rain appliance for controlling spirited horses.
1782	BARBIER, L.	Harness.
1783	HEWITT, J.	Safety saddle-bars.
1858	RISDON, J.	Horse-shoes.
1866	MALET, H. S.	Attaching stirrup leather to saddle to prevent the rider being dragged when thrown.
1874	PIGOT, M.	Horse-shoes.
1947	SHOVE, W.	Horse-shoes.
1953	CHATTERTON, J. B.	Nose-bags.
2019	COATES, A. (*Coates*)	Horse-shoes.
2114	ZIEGLER, A. J., & anr.	Mouth speculum for horses, &c.
2136	CHILES, G. P.	Nose-bags.
2144	WILTON, H. S.	Extensible girth for saddles.
2175	FINUCANE, P.	Horse-shoes.
2268	HORN, W. W. (*Burwell*)	Hitching buckle.
2417	BISHOP, A. E.	Bit.
2312	SANDS, W. H.	Horse-shoe cogs.
2512	DUNNACHIE	Controlling pulling horses.
2711	FECHNER, A.	Roughing horse-shoes.
2729	EDGE, W. C.	Horse-shoes.
2802	HAYES & others	Riding saddles.
2861	BIEBUYCK, G.	Safety saddle-bars.
2960	WELCH & HAYCOCK	Horse-shoe.
2969	RICKETTS, A.	Pole-chain releaser for fallen horses
3047	SCOTT, J.	Safety stirrup.
3097	MARTIN, J. M.	Ladies' riding saddles.
3359	REFARDT & MEIJER	Girths.
3441	STEVENS, A. C.	Clincher horse-shoe.
4279	WILLIAMS, E. F.	Horse-shoe.
4305	HODGSON, R.	Knee-cap.
4340	MARTIN, J. M.	Automatic stirrup bar.
4481	BROWNE, N. (*Franke, Germany*)	Preventing horses bolting.
4535	PARRY, J., & VEALE	Rubber pads for horse-shoes.
4725	CLINCH, J.	Applying roughs to horse-shoes.
4727	CLARK, A.	Harness.
5579	JERROM & SNELL	Safety saddle bar.
5668	DAGG, A. R.	Riding saddles.
5671	PEGG & MILLS	Anti-asphalte horse-shoe.

Carts and Carriages.

No. of Application.	Name of Applicant.	Title of Invention.
Year 1892.		
23060	BOYES, W.	Shackles and trace hooks of vehicles.
23160	FRIS, A. A.	Trace springs.
23667	WOOD, A.	Instantaneously detaching the chains or straps used for yoking horses to the pole-head of a van, &c.
23668	WOOD, A.	Detaching the traces from the splinter-bars of carriages.
23721	THOMPSON, W. P. (*House, U.S.A.*)	Horse-hitching and checking device for vehicles.
Year 1893.		
198	EAGLESON, W. H.	Brake mechanism for waggons.
700	LEFÈBVRE, T. L.	Carrying and releasing from harness the shaft of vehicles.
707	BIRD, W.	Securing waggon covers.
1245	GOODEY, M.	Wheels for carriages.
2436	CROSS, F.	Skids for cart and waggon wheels.
2581	PAETZ, W.	Waggon for harvesting corn, &c.
3167	DEACON, O. D.	Self-acting brake for waggons, &c.
3236	LEACH, J.	Carts.
3421	WADSWORTH	Tumbler carts.
5092	ROTHWELL, A.	Wheels for light vehicles.
5523	GROOM, W.	Tip carts.

Dairy Utensils, &c.

Year 1892.		
23109	BELGROVE, W.	Testing the quality of milk.
23557	GELDARD, G. R.	Testing for water in butter.
Year 1893.		
476	WHITEMAN & COX	Securing the lids of milk churns.
1012	CADOGAN, J.	Churning apparatus.
1120	COTTON, G.	Lids and necks of railway milk cans.
1319	CADOGAN, J.	Churn dash.
1975	BAMFORD, S. B.	Milk cans.
2087	JEDBURGH, W. S.	Butter churns.
2250	KITSON, P. H.	Churn.
2343	DOWSE, G. A.	Covers or lids of milk cans (churns).
2542	NAHM, A. N.	Ascertaining percentage of fat in milk, &c.
2804	MCDONNELL	Package or wrapper for butter.
3296	EVANS, A. T.	Cheese vat.
3419	WISE, W. L. (*Guruprasad Sing, India*)	Churns.
4280	DOWSE & COMBES	Milk cans.
4370	WELCH & POSTT	Milk cans.
4450	WELLS, G.	Milk cans.
4558	SHIELS, A.	Teat cups for milking machines

No. of Application.	Name of Applicant.	Title of Invention.
Year 1893.		
5493	BOULT, A. J. (*Baumann Germany*) . .	. Centrifugal machine for separating liquids.
5516	ROBINSON, A. .	. Aërating and cooling milk.
5527	MOUNTFORT & PRIOR	. Treating cream and making butter.
5738	JONES, F. G. .	. Cream separator.

Poultry and Game, &c., Appliances.

Year 1892.		
22831	SWAN, J. . .	. Preserving eggs.
22888	PAYNTER, F. G. .	. Feeding pheasants or young poultry.
Year 1893.		
127	MITCHELL, F. S. .	. Chicken coops.
361	DEAN, B. J. . .	. Automatically exposing food for poultry, &c.
4540	BRAYFORD. N. .	. Fowl- and pigeon-house door frame.
4711	YOUNG, T. . .	. Foster mother.
5019	WALSH, P. . .	. Incubators.
5135	HERBERT, F. .	. Combined incubator and foster mother.

Miscellaneous.

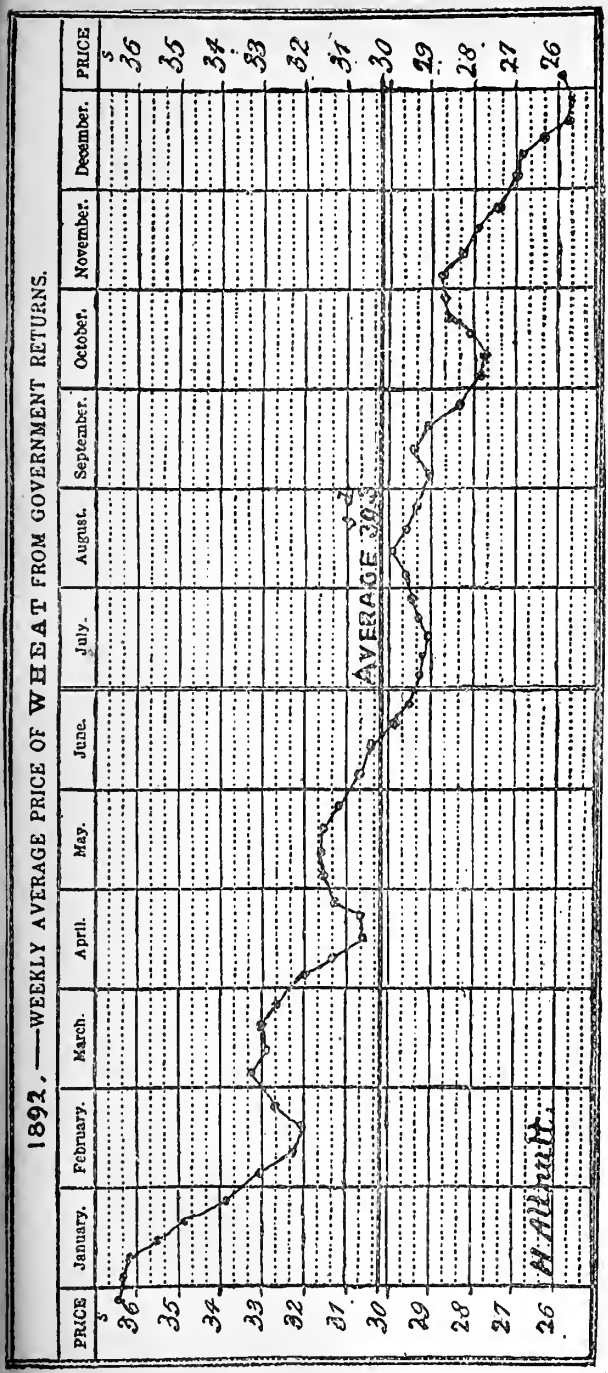
Year 1892.		
22906	MACDOUGALL, I. & J. T.	Protecting cattle from the weather.
24092	SILVER, W., & others	. Shearing and clipping machines.
Year 1893.		
1650	COURTENAY, R. H.	. Means for growing crops one above another in the open field, and irrigation of same.
1979	PHILLIPSON, B. R.	. Food for cattle, pigs, and poultry.
2127	CLARK, J. J. . .	. Securing tethering rings to dog benches.
2680	FORRESTER, T. .	. Horse-clipping and sheep-shearing machines.
2881	NELSON, W., & anr.	. „ „ „ „
2990	ROBERTSON, A. .	. Improved sheep dip.
3459	MCKENZIE . .	. Overhead halter-rope or stall-tie.
4343	LANGDON, H. P. .	. Preventing bees swarming.
4782	BIBBY, J. . .	. Compressed feed-cakes for cattle.
4812	HUGHES, E. G. .	. Protecting seeds from birds, &c.

Numbers of Specifications relating to the above subjects Published since December 10, 1892.[1]

Specifications of 1892.

947, 1017, 1109, 1648, 1968, 2297, 2865, 2949, 3303, 3330, 3409, 3592, 3628, 3687, 3742, 3751, 3876, 4168, 4304, 4329, 4564, 4717, 4725, 5250, 5284, 5888, 6071, 6365, 6729, 6817, 7006, 7038, 7130, 7289, 7357, 7429, 9207, 9720, 11534, 17569, 17659, 18907, 18909, 19345, 19449, 20409, 20511, 20564, 20622, 20837, 21010, 21147, 21625, 21710, 21888, 21942, 22296, 22755, 24092.

[1] Copies (price 8*d.* each, post free) may be obtained at the Patent Office (Sale and Store Branch), 38 Cursitor Street, London, E.C.



THE PRICE OF GRAIN IN 1892.

AVERAGES FOR 1892.

	s.	d.
Wheat	30	3
Barley	26	2
Oats	19	10

(*Each space between the lines of the diagram represents fourpence.*)

THE diagram, showing the weekly Imperial average price of *wheat* during the past year, exhibits a most remarkable downward course, totally unlike any preceding year we remember. The average price for 1892 has fallen no less than 6*s.* 9*d.* a quarter below that of 1891; in this latter year the average price was 37*s.*, but in the past year it was only 30*s.* 3*d.* a quarter! The highest weekly average was 36*s.* 4*d.* on January 2, and the lowest was 25*s.* 8*d.* a quarter on December 31 last, being a fluctuation of 10*s.* 8*d.*; in 1891 the range was 9*s.* 5*d.* a quarter. The annual average price of *barley* was 26*s.* 2*d.* a quarter, being only 2*s.* a quarter under that of 1891. The highest price was 29*s.* 5*d.* on January 23, and the lowest 21*s.* 1*d.* on July 30 last, being a fluctuation of 8*s.* 4*d.*; in 1891 the range was 7*s.* 4*d.* The annual average price of *oats* has been almost stationary; it was 19*s.* 10*d.* for the past year against 20*s.* in 1891. The highest price was 22*s.* 2*d.* on June 18, and the lowest 16*s.* 3*d.* on December 31 last, being a fluctuation of 5*s.* 11*d.*, whereas the range was 4*s.* 10*d.* in 1891. The Imperial average price of English corn in 1892 was—Wheat, 30*s.* 3*d.*; Barley, 26*s.* 2*d.*; and Oats, 19*s.* 10*d.* a quarter. We see in Willich's Tithe Tables that the Septennial Tithe Rent-charge is 1*l.* 3*s.* 0½*d.* lower this year than last, it being 75*l.* 18*s.* 3¼*d.* in that year, whereas it is now 74*l.* 15*s.* 2¾*d.* per 100*l.* The average for the 57 years from the Commutation in 1836 is 99*l.* 15*s.* 5*d.*

HENRY ALLNUTT.

STATISTICS AFFECTING BRITISH AGRICULTURAL INTERESTS.

TABLE I.—*Average Prices of British Corn per Quarter (Imperial Measure) as received from the Inspectors and Officers of Excise conformably to the Act of* 45 & 46 *Vict. ch.* 37, *in each Week of the Year* 1892.

[*From the "London Gazette."*]

Week ending	Wheat		Barley		Oats		Week ending	Wheat		Barley		Oats	
1892	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	1892	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
January 2 .	36	4	29	3	20	10	July 2 . .	29	3	23	4	21	8
January 9 .	36	2	29	2	20	6	July 9 . .	29	2	24	4	21	7
January 16 .	35	6	29	3	20	7	July 16 . .	29	1	22	4	21	5
January 23 .	34	10	29	5	20	4	July 23 . .	29	3	22	10	21	0
January 30 .	33	10	28	9	20	3	July 30 . .	29	5	21	1	21	6
February 6 .	33	1	28	7	20	2	August 6 .	29	7	23	8	21	6
February 13 .	32	3	28	5	19	8	August 13 .	29	11	22	9	21	5
February 20 .	32	1	28	0	20	0	August 20 .	29	7	24	6	21	9
February 27 .	32	8	27	10	20	1	August 27 .	29	4	23	11	21	2
March 5 . .	33	3	27	9	20	5	September 3 .	29	1	24	2	20	3
March 12 .	32	11	27	11	20	2	September 10 .	29	5	27	8	20	2
March 19 .	33	0	27	6	20	6	September 17 .	29	1	27	11	19	4
March 26 .	32	8	27	9	20	4	September 24 .	28	4	28	3	18	10
Average of Winter Quarter	33	9	28	5	20	4	Average of Summer Quarter	29	3	24	4	20	11
April 2 . .	32	0	27	8	20	5	October 1 .	27	10	27	11	18	0
April 9 . .	31	4	26	11	20	2	October 8 .	27	9	27	11	17	11
April 16 . .	30	7	26	10	20	7	October 15 .	28	1	27	6	17	8
April 23 . .	30	8	25	11	20	7	October 22 .	28	7	27	9	17	11
April 30 . .	31	3	26	7	21	0	October 29 .	28	8	27	9	17	11
May 7 . .	31	6	25	10	20	7	November 5 .	28	9	27	7	17	9
May 14 . .	31	7	25	2	21	4	November 12 .	28	3	27	4	18	0
May 21 . .	31	6	24	10	21	3	November 19 .	27	11	26	7	18	0
May 28 . .	31	2	25	7	21	8	November 26 .	27	5	26	0	17	7
June 4 . .	30	8	24	6	21	4	December 3 .	27	0	25	5	17	2
June 11 . .	30	5	25	2	21	8	December 10 .	26	10	25	1	17	4
June 18 . .	29	10	23	8	22	2	December 17 .	26	4	24	6	16	10
June 25 . .	29	6	23	4	21	10	December 24 .	25	9	24	6	16	10
							December 31 .	25	8	24	3	16	3
Average of Spring Quarter	31	0	25	6	21	2	Average of Autumn Quarter	27	6	26	5	17	6

TABLE II.—*Annual Average Prices and Quantities of British Corn sold in the Towns in England and Wales from which Returns are received under the Act of* 45 *&* 46 *Vict. ch.* 37, *in each of the Years* 1882 *to* 1892.

[*From the "London Gazette."*]

Year	Wheat	Barley	Oats	Wheat	Barley	Oats
	s. *d.*	*s.* *d.*	*s.* *d.*	Qrs.	Qrs.	Qrs.
1882	45 1	31 2	21 10	1,903,858	1,873,820	211,699
1883	41 7	31 10	21 5	2,901,146	2,575,528	408,471
1884	35 9	30 8	20 3	2,833,132	3,149,341	492,918
1885	32 10	30 2	20 7	2,739,515	2,765,500	393,042
1886	31 1	26 7	19 0	2,739,822	2,474,466	367,083
1887	32 6	25 4	16 3	2,495,124	2,589,667	309,478
1888	31 10	27 10	16 9	2,427,861	1,911,835	255,726
1889	29 9	25 10	17 9	2,945,408	3,329,814	415,783
1890	31 11	28 8	18 7	3,439,699	3,327,991	599,033
1891	37 0	28 2	20 0	3,248,743	3,255,518	561,713
1892	30 3	26 2	19 10	3,052,879	3,493,634	492,166

TABLE III.—*Returns published pursuant to the Corn Returns Act*, 1882, *and to Act of* 6 *&* 7 *Wm. IV. for "Commutation of Tithes in England and Wales," showing what has been, during the Seven Years ending Christmas Day in each Year, the Average Price of an Imperial Bushel of British Wheat, Barley, and Oats, computed from the Weekly Averages of Corn Returns in each of the Years* 1886–92.

[*From the "London Gazette."*]

Year	Average (Septennial) prices per bushel		
	Wheat	Barley	Oats
	s. *d.*	*s.* *d.*	*s.* *d.*
1886	4 11	3 10	2 7½
1887	4 8½	3 8½	2 6¼
1888	4 5½	3 7½	2 5
1889	4 2¼	3 6¼	2 4¼
1890	3 11¾	3 7	2 3¾
1891	4 0½	3 5¼	2 3½
1892	4 0	3 4¼	2 3¼

TABLE IV.—*Average Prices of Wool in each of the undermentioned Years.*

Year	ENGLISH[1]				AUSTRALASIAN	SOUTH AFRICAN
	Leicester	Half-breds	Kent	Southdown		
	Per lb. *d.* *d.*	Per lb. *d.* *d.*	Per lb. *d.* *d.*	Per lb. *d.* *s.* *d.*	Per lb. *s.* *d.*	Per lb. *s.* *d.*
1886	9 to 9¾	9½ to 10¾	9¾ to 10½	9½ to 1 0¼	0 9¼	0 9¼
1887	9¾ ,, 10¼	10 ,, 11¼	10¼ ,, 10¾	10¼ ,, 1 0¾	0 10½	0 10½
1888	9¼ ,, 10	9½ ,, 10½	9½ ,, 10¼	9¾ ,, 0 11¾	0 10¼	0 9¾
1889	9¾ ,, 10½	10¼ ,, 11	10¼ ,, 10¾	10¼ ,, 1 0½	0 10¼	0 10¼
1890	10 ,, 10½	10¾ ,, 11½	10¼ ,, 11	11 ,, 1 1	0 11	0 10½
1891	9⅛ ,, 10	10 ,, 11	9½ ,, 10¼	10½ ,, 1 1	0 9¾	0 9¾
1892	8½ ,, 9	9¾ ,, 10¼	9¼ ,, 9¾	10½ ,, 1 0½	0 9	0 9½

[1] The prices of English wool have been calculated from the list given weekly in the *Economist* newspaper.

TABLE V.—*Summary of Agricultural Produce Statistics* (**Wheat Barley,** *and* **Oats**) *in England, Wales, Scotland, and Great Britain, for* 1892.

WHEAT

—	Estimated Total Produce		Acreage		Estimated average Yield per Acre	
	1892	**1891**	**1892**	**1891**	**1892**	**1891**
England . . .	Bushels 55,107,186	Bushels 68,694,456	Acres 2,102,969	Acres 2,192,393	Bushels 26·20	Bushels 31·33
Wales	1,318,763	1,461,740	55,278	61,590	23·86	23·73
Scotland . . .	2,134,983	1,971,067	61,592	53,294	34·66	36·98
Great Britain . .	58,560,932	72,127,263	2,219,839	2,307,277	26·38	31·26

BARLEY

—	Estimated Total Produce		Acreage		Estimated average Yield per Acre	
	1892	**1891**	**1892**	**1891**	**1892**	**1891**
England . . .	Bushels 59,527,968	Bushels 60,900,824	Acres 1,709,587	Acres 1,772,432	Bushels 34·82	Bushels 34·36
Wales	3,350,862	3,438,620	114,520	117,101	29·26	29·36
Scotland . . .	7,622,732	7,789,651	212,703	223,265	35·84	34·89
Great Britain .	70,501,562	72,129,095	2,036,810	2,112,798	34·61	34·14

OATS

—	Estimated Total Produce		Acreage		Estimated average Yield per Acre	
	1892	**1891**	**1892**	**1891**	**1892**	**1891**
England . . .	Bushels 73,266,495	Bushels 69,786,176	Acres 1,765,463	Acres 1,672,835	Bushels 41·50	Bushels 41·72
Wales	7,976,830	7,698,529	233,399	234,055	34·18	32·89
Scotland . . .	35,051,664	34,901,557	998,683	992,239	35·10	35·17
Great Britain . .	116,294,989	112,386,261	2,997,545	2,899,129	38·80	38·77

TABLE VI.—*Number and Value of Live Cattle, Sheep, and Swine imported into the United Kingdom in the undermentioned Years.*

[*From Trade and Navigation Returns.*]

	—	Number			Value		
		1890	1891	1892	1890	1891	1892
					£	£	£
Oxen and Bulls	From Denmark	21,238	8,602	901	245,578	91,481	9,455
	„ Spain	8,071	7,662	1,591	132,450	134,971	27,655
	„ Canada	109,610	98,376	90,012	1,739,718	1,629,975	1,458,142
	„ United States	384,198	314,228	392,679	7,351,981	6,053,483	7,470,333
	„ Other Countries	13,401	11,635	5,098	213,051	183,136	95,957
	Total	536,518	440,503	490,281	9,682,778	8,093,046	9,061,542
Cows	From Denmark	32,699	11,998	844	357,584	129,355	8,942
	„ Sweden	1,660	293	45	18,551	3,366	504
	„ Canada	10,859	9,148	7,934	152,580	140,655	118,807
	„ United States	441	667	255	7,234	10,386	4,439
	„ Other Countries	3,487	3,208	1,428	59,229	52,335	24,108
	Total	49,146	25,314	10,506	595,178	336,097	156,800
Calves	From Denmark	22,021	6,263	260	79,308	22,756	880
	„ Holland	33,424	34,168	762	143,781	126,776	3,484
	„ Canada	840	765	293	1,683	1,261	761
	„ Other Countries	644	394	135	2,819	1,638	544
	Total	56,929	41,590	1,450	227,591	152,431	5,669
Sheep and Lambs	From Denmark	139,465	65,368	* 38,529	203,449	95,561	48,100
	„ Germany	—	—	—	—	—	—
	„ Holland	119,669	208,443	6,686	319,490	441,867	14,877
	„ Canada	42,640	31,633	15,743	83,656	61,337	29,939
	„ United States	3,904	10,537	2,829	7,900	17,948	5,854
	„ Other Countries	52,780	28,523	15,261	81,817	46,302	25,469
	Total	358,458	344,504	79,048	696,312	663,015	124,239
Swine	From Denmark	1,420	—	—	5,671	—	—
	„ Holland	362	540	24	1,205	1,808	86
	„ United States	1,086	—	2,568	4,054	—	8,003
	„ Other Countries	1,168	2	1,234	3,544	1	4,376
	Total	4,036	542	3,826	14,474	1,809	12,465
Total value of all kinds		. .	. .	. .	11,216,333	9,246,398	9,360,715

* Mostly imported from Iceland. That island, in these Returns, is included with Denmark, and animals from Iceland are allowed to be landed.

TABLE VII.—*Quantities and Values of Corn, Meat, Food Products, Kingdom in the Year* 1892, *with the*

[*From Trade and*

	Quantities			Values		
	1890	**1891**	**1892**	**1890**	**1891**	**1892**
ANIMALS, LIVING (for food):—	No.	No.	No.	£	£	£
Oxen and Bulls	536,518	440,503	490,281	9,682,778	8,093,046	9,061,542
Cows	49,146	25,314	10,506	595,178	336,097	156,800
Calves	56,929	41,590	1,450	227,591	152,431	5,669
TOTAL CATTLE	642,593	507,407	502,237	10,505,547	8,581,574	9,224,011
Sheep and Lambs	358,458	344,504	79,048	696,312	663,015	124,239
Swine	4,036	542	3,826	14,474	1,809	12,465
TOTAL	..	..	..	11,216,333	9,246,398	9,360,715
CORN:—	Cwt.	Cwt.	Cwt.			
Wheat	60,474,180	66,312,962	64,896,799	23,584,616	29,448,204	24,857,902
Wheat Meal and Flour	15,773,336	16,723,003	22,106,009	9,074,290	10,184,887	12,267,453
Barley	16,677,988	17,465,698	14,277,342	4,985,406	5,941,833	4,313,452
Oats	12,727,186	16,600,394	15,661,394	3,908,497	5,475,734	5,013,551
Peas	1,842,488	2,419,381	2,501,492	605,099	862,427	863,235
Beans	3,344,918	3,672,413	4,442,439	993,505	1,206,916	1,365,221
Maize	43,437,834	26,825,625	35,385,224	9,863,034	8,411,763	9,425,211
Maize Meal	57,145	55,700	173,664	30,060	39,740	70,426
TOTAL	154,335,075	150,075,176	159,444,363	53,044,507	61,571,504	58,176,451
MEAT:—						
Beef, Salted	274,726	247,759	275,464	381,734	356,022	388,690
„ Fresh	1,854,593	1,920,511	2,079,637	3,923,015	4,038,487	4,413,148
Mutton, Fresh	1,656,419	1,662,994	1,699,966	3,447,776	3,282,001	3,447,102
Bacon	3,790,570	3,510,209	3,881,375	6,978,061	6,650,324	7,930,121
Hams	1,209,446	1,204,803	1,253,132	2,869,115	2,791,437	2,963,712
Pork, Salted (not Hams)	254,857	226,798	228,324	341,424	296,932	306,250
„ Fresh	45,295	127,518	132,107	109,834	302,725	310,165
Meat, unenumerated—Salted or Fresh	103,881	113,357	150,603	227,572	255,898	344,957
Meat preserved otherwise than by Salting	734,811	776,261	799,501[1]	1,946,195	1,888,067	1,951,755[2]
Rabbits	143,641	103,685	107,630	398,098	286,981	303,262
TOTAL	10,068,239	9,893,895	10,607,739	20,622,824	20,148,874	22,359,162

[1] Beef, 557,548 cwt.; mutton, 68,412 cwt.; other sorts, 173,541 cwt.
[2] Beef, 1,321,100*l.*; mutton, 139,202*l.*; other sorts, 491,453*l.*

and Articles affecting Agriculture, imported into the United Kingdom in the Corresponding Figures for 1890 *and* 1891.

Navigation Returns.]

	Quantities			Values		
	1890	1891	1892	1890	1891	1892
DAIRY PRODUCE :—	Cwt.	Cwt.	Cwt.	£	£	£
Butter	2,027,717	2,135,607	2,182,999	10,598,848	11,591,181	11,965,284
Margarine	1,079,996	1,235,430	1,305,350	3,083,731	3,558,203	3,712,884
Cheese	2,144,074	2,041,317	2,232,814	4,975,234	4,815,369	5,417,777
TOTAL	5,251,787	5,412,354	7,731,163	18,657,813	19,964,753	21,095,945
POULTRY, &c. :—						
Poultry and Game, alive or dead	—	—	—	497,858	456,979	583,430
Eggs	Gt. Hunds. 10,291,246	Gt. Hunds. 10,681,137	Gt. Hunds. 11,139,419	3,428,802	3,520,918	3,793,018
TOTAL	—	—	—	3,926,660	3,977,897	4,376,448
FRUIT, VEGETABLES, &c. :—	Bushels	Bushels	Bushels			
Apples (raw)	2,574,957	3,147,373	4,514,700	786,072	1,033,997	1,353,812
Other Fruit (raw)	3,584,668	3,490,211	2,872,970 [1]	1,806,811	1,762,406	1,414,473 [2]
Onions	3,871,195	4,281,046	4,420,276	724,020	733,845	724,140
Potatoes	Cwt. 1,940,100	Cwt. 3,192,836	Cwt. 3,008,336	714,257	1,196,824	950,062
Vegetables, unenumerated (raw)	—	—	—	773,590	932,887	1,016,280
Hops	188,028	195,264	187,507	877,704	980,045	960,180
TOTAL	—	—	—	5,682,454	6,640,004	6,418,947
OTHER ARTICLES :—	Cwt.	Cwt.	Cwt.			
Lard	1,273,236	1,051,284	1,239,051	2,091,704	1,720,051	2,223,011
Flax	1,800,469	1,681,225	1,711,144	2,856,276	2,775,189	2,673,771
Wool, Sheep and Lambs'	Lb. 630,236,298	Lb. 715,470,802	Lb. 737,594,063	26,945,057	27,856,556	26,827,098
Wood & Timber :	Loads	Loads	Loads			
Hewn	2,278,374	2,251,577	2,469,140	5,004,554	4,508,787	4,905,846
Sawn or Split, Planed or Dressed	4,778,314	4,378,452	5,094,309	11,092,221	9,379,808	11,180,141
Staves	155,995	130,101	136,063	669,243	590,543	593,539
Oil-Seed Cake	Tons 280,616	Tons 270,671	Tons 311,872	1,743,279	1,843,286	2,147,099
Seeds : Clover and Grass	Cwt. 379,589	Cwt. 256,920	Cwt. 297,323	758,294	552,977	635,125
„ Cotton	Tons 314,050	Tons 350,445	Tons 409,668	1,749,215	2,047,747	2,363,375
„ Flax and Linseed	Qrs. 1,932,035	Qrs. 2,200,112	Qrs. 1,902,152	3,949,104	4,564,569	3,735,441
„ Rape	230,547	261,169	244,167	416,377	388,446	315,484

[1] Cherries, 216,990 bus.; Plums, 413,315 bus.; Pears, 637,211 bus.; Grapes, 764,432 bus.; unenumerated 841,022 bus.

[2] Cherries, 134,847*l.*; Plums, 199,953*l.*; Pears, 296,545*l.*; Grapes, 394,987*l.*; unenumerated, 388,141*l.*

TABLE VIII.—*Quantity and Value of Dead Meat imported into the United Kingdom in the Four Years*, 1889–92.

[*From Trade and Navigation Returns.*]

Thousands ("000") omitted.

DEAD MEAT	1889		1890		1891		1892	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
BACON :—	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
From United States	2,548	4,810	2,935	4,891	2,675	4,518	2,896	5,354
„ Other Countries	950	2,477	856	2,087	835	2,132	985	2,576
Total	3,498	7,287	3,791	6,978	3,510	6,650	3,881	7,930
BEEF :—								
Salted — From United States	254	352	263	359	235	335	267	376
Salted — „ Other Countries	11	19	12	23	13	21	8	13
Salted — Total	265	371	275	382	248	356	275	389
Fresh — From United States	1,270	2,812	1,693	3,630	1,748	3,745	1,952	4,206
Fresh — „ Other Countries	110	203	162	293	173	293	128	207
Fresh — Total	1,380	3,015	1,855	3,923	1,921	4,038	2,080	4,413
HAMS :—								
From United States	873	2,217	1,094	2,584	1,117	2,580	1,131	2,669
„ Other Countries	104	284	115	285	88	211	122	295
Total	977	2,501	1,209	2,869	1,205	2,791	1,253	2,964
MEAT, Unenumerated :—								
Salted or Fresh — From United States	22	48	17	33	20	40	21	46
Salted or Fresh — „ Other Countries	69	149	87	195	93	216	130	299
Total	91	197	104	228	113	256	151	345
Preserved, otherwise than by Salting — Beef [1]	..	..	551	1,424	527	1,210	558	1,321
Preserved, otherwise than by Salting — Mutton [1]	..	..	79	182	92	221	68	139
Preserved, otherwise than by Salting — Other Sorts [1]	..	..	105	340	157	457	174	492
Preserved, otherwise than by Salting — Total	643	1,632	735	1,946	776	1,888	800	1,952
MUTTON, Fresh :—								
From Holland	78	175	116	275	57	128	165	393
„ Australasia	613	1,292	897	1,823	1,063	2,109	977	1,981
„ Argentine Republic	395	750	435	823	436	791	471	866
„ Other Countries	141	362	208	527	107	254	87	207
Total	1,227	2,579	1,656	3,448	1,663	3,282	1,700	3,447
PORK :—								
Salted (not Hams) — From United States	192	283	205	282	170	234	162	233
Salted (not Hams) — „ Other Countries	194	393	95	59	184	366	66	73
Salted (not Hams) — Total	386	676	300	341	354	600	228	306
Fresh — From Holland	90	..	26	62	90	216	93	214
Fresh — „ Belgium	15	..	11	27	31	76	22	56
Fresh — „ Other Countries	12	..	8	20	6	11	17	40
Fresh — Total	117	288	45	109	127	303	132	310
RABBITS :—								
From Belgium	113	309	129	357	84	234	89	248
„ Other Countries	11	32	14	41	20	53	19	55
Total	124	341	143	398	104	287	108	303

[1] Not separately enumerated prior to 1890.

TABLE IX.—*Quantities and Values of Butter, Margarine, Cheese, and Eggs imported into the United Kingdom in each Year from* 1890 *to* 1892 *inclusive.*

[*From Trade and Navigation Returns.*]

—	QUANTITIES			VALUES		
	1890	1891	1892	1890	1891	1892
BUTTER	Cwt.	Cwt.	Cwt.	£	£	£
From Sweden	224,235	234,987	228,885	1,175,722	1,269,187	1,243,016
„ Denmark	824,749	876,211	863,522	4,422,257	4,865,840	4,848,735
„ Germany	104,450	115,509	124,233	544,271	615,791	713,859
„ Holland	156,069	146,539	141,838	792,786	770,460	750,314
„ France	525,105	535,196	542,687	2,847,144	3,038,063	3,027,648
„ Canada	15,155	46,267	59,571	60,739	187,392	255,752
„ United States	84,553	63,693	46,846	322,385	251,750	191,139
„ Other Countries	93,401	117,205	175,417	433,544	592,698	934,821
Total	2,027,717	2,135,607	2,182,999	10,598,848	11,591,181	11,965,284
MARGARINE	Cwt.	Cwt.	Cwt.	£	£	£
From Norway	15,084	26,466	25,426	45,578	77,863	70,477
„ Holland	1,001,968	1,104,050	1,196,756	2,804,675	3,093,595	3,360,707
„ France	44,331	69,016	56,002	175,383	263,574	192,675
„ Other Countries	18,613	35,898	27,166	58,095	123,171	89,025
Total	1,079,996	1,235,430	1,305,350	3,083,731	3,558,203	3,712,884
CHEESE	Cwt.	Cwt.	Cwt.	£	£	£
From Holland	292,215	307,925	273,822	723,105	763,387	678,575
„ France	40,364	43,748	45,605	127,832	138,486	143,208
„ Canada	837,890	857,841	1,038,599	1,914,232	1,991,597	2,493,625
„ United States	919,408	774,893	818,433	2,081,546	1,779,260	1,961,407
„ Other Countries	54,197	56,910	56,355	128,519	142,639	140,962
Total	2,144,074	2,041,317	2,232,814	4,975,234	4,815,369	5,417,777
EGGS	Great Hundreds	Great Hundreds	Great Hundreds	£	£	£
From Russia	1,059,239	1,439,954	1,254,323	287,157	383,791	352,905
„ Denmark	1,145,258	1,161,174	1,247,968	359,759	395,963	413,469
„ Germany	2,915,491	2,714,028	2,751,340	868,655	781,903	827,295
„ Belgium	1,927,477	1,765,441	1,985,768	585,032	539,666	629,264
„ France	3,089,255	3,119,754	3,512,174	1,270,092	1,259,099	1,437,203
„ Other Countries	154,526	480,786	387,846	58,107	160,496	132,882
Total	10,291,246	10,681,137	11,139,419	3,428,802	3,520,918	3,793,018

TABLE X.—*Value of Corn imported into the United Kingdom in each of the Five Years* 1888–92.

[*From Trade and Navigation Returns.*]

	1888	1889	1890	1891	1892
	£	£	£	£	£
Wheat	21,971,331	22,530,838	23,584,616	29,448,204	24,857,902
Wheat Flour	9,530,800	8,559,563	9,074,290	10,184,887	12,267,453
	31,502,131	31,090,401	32,658,906	39,633,091	37,125,355
Barley	6,069,190	4,968,947	4,985,406	5,941,833	4,313,452
Oats	4,588,712	4,472,598	3,908,497	5,475,734	5,013,551
Maize	6,881,307	8,580,080	9,863,034	8,411,763	9,425,211
Maize Meal	8,046	19,365	30,060	39,740	70,426
Beans and Peas	1,625,835	1,676,736	1,598,604	2,069,343	2,228,456
Total of Corn	50,675,221	50,808,127	53,044,507	61,571,504	58,176,451

TABLE XI.—*Quantities of Wheat and Wheat Meal and Flour imported into the United Kingdom in each of the Five Years* 1888–92 ; *also the Countries from which they were obtained.*

[*From Trade and Navigation Returns.*]

(Thousands ("000") omitted.)

	1888	1889	1890	1891	1892
Wheat from—	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Russia	21,369	21,322	19,389	14,553	4,363
Germany	3,265	2,539	1,101	714	606
France	20	127	1	126	26
Turkey	182	667	900	1,510	494
Roumania	1,419	2,862	4,654	1,088	738
Egypt	730	325	425	937	385
United States	14,647	17,016	17,201	24,195	33,881
Chili	1,486	573	24	2,120	2,288
British India	8,189	9,217	9,112	13,006	12,496
Australasia	2,316	1,406	3,058	2,086	2,017
British North America	1,089	1,168	1,128	3,174	3,875
Other Countries	2,513	1,380	3,482	2,804	3,728
Total Wheat	57,225	58,602	60,475	66,313	64,897
Wheat Meal and Flour from—					
Germany	1,109	1,155	895	365	163
France	102	91	103	44	40
Austrian Territories	1,946	1,838	1,370	1,218	977
United States	12,557	10,068	12,026	13,703	19,468
British North America	785	1,169	933	1,029	1,360
Other Countries	414	378	446	364	98
Total Wheat Meal and Flour	16,913	14,699	15,773	16,723	22,106

TABLE XII.—*Number of Horses, Cattle, Sheep, and Pigs imported into Great Britain from Ireland in each of the Years* 1885–91.

[*From Agricultural Returns.*]

——	1885	1886	1887	1888	1889	1890	1891
HORSES:							
Stallions . . .	64	43	68	67	80	105	125
Mares	11,603	12,497	11,801	12,388	13,647	14,625	14,055
Geldings . . .	16,496	16,239	15,769	17,373	18,097	19,422	19,216
Total . .	28,163	28,779	27,638	29,828	31,824	34,152	33,396
CATTLE:							
Oxen, Bulls and Cows — Fat . .	243,348	285,156	331,119	282,537	248,362	216,339	240,183
Store. .	342,938	388,917	302,878	405,540	372,682	360,758	323,075
Other cattle .	1,884	1,247	2,283	2,941	1,432	1,152	3,985
Calves	52,300	42,069	32,973	47,698	47,367	53,449	63,559
Total. . .	640,470	717,389	669,253	738,716	669,843	631,698	630,802
SHEEP:							
Sheep	430,410	493,983	321,644	400,836	373,313	387,220	569,698
Lambs	198,680	240,230	226,924	236,748	240,374	249,761	323,477
Total. . .	629,090	734,213	548,568	637,584	613,687	636,981	893,175
PIGS:							
Fat	370,639	391,509	438,155	495,680	428,103	543,417	459,596
Store.	27,925	29,776	42,765	49,292	45,448	59,745	43,988
Total . .	398,564	421,285	480,920	544,972	473,551	603,162	503,584

TABLE XIII.—*Number of Horses, and their Declared Value, imported into, and exported from, the United Kingdom, in each of the undermentioned Years.*

[*From Agricultural Returns and Trade and Navigation Returns.*]

Year	IMPORTED		Year	EXPORTED	
	Number	Value		Number	Value
		£			£
1888	11,505	192,624	1888	12,880	848,311
1889	13,832	277,388	1889	14,266	984,611
1890	19,404	336,496	1890	12,916	687,978
1891	21,715	436,128	1891	11,238	525,041
1892	21,026[1]	425,336	1892	11,232	563,181

[1] NOTE.—The countries from which horses were *imported* in 1892 were as follow:—Germany, 11,642; Denmark, 1,209; Holland, 1,291; France, 629; Belgium, 500; United States of America, 1,076; Canada, 1,745; and 2,934 from other countries.

TABLE XIV.—*Quantities of Certain Articles of Foreign and Colonial Production imported into the United Kingdom in each of the Years* 1889–92.

[*From Trade and Navigation Returns.*]

——	1889	1890	1891	1892
Bones (whether burnt or not) tons	62,855	69,949	82,945	63,008
Guano . . . . . tons	26,804	28,005	23,623	27,874
Cotton, Raw . . . cwt.	17,159,316	16,011,350	17,811,476	15,850,324
Hemp . . . . . cwt.	1,973,210	1,890,367	2,055,382	1,857,017
Hides untanned: Dry . „	575,158	455,098	453,268	368,191
„ „ Wet . „	647,250	584,948	555,692	540,284
Petroleum . . . gallons	102,647,478	104,809,146	130,615,360	130,188,085

TABLE XV.—*Number of Carcasses of Frozen Mutton imported into the United Kingdom from the Countries named in each Year from* 1880 *to* 1892.

[*From Messrs. W. Weddel & Co.'s "Review of the Frozen Meat Trade,* 1892," *corrected to date.*]

Year	From New Zealand	From Argentine Republic	From Australia	From Falkland Islands	Totals
1880	—	—	400	—	400
1881	—	—	17,275	—	17,275
1882	8,839	—	57,256	—	66,095
1883	120,893	17,165	63,733	—	201,791
1884	412,349	108,823	111,745	—	632,917
1885	492,269	190,571	95,051	—	777,891
1886	655,888	434,699	66,960	30,000	1,187,547
1887	766,417	641,866	88,811	45,552	1,542,646
1888	939,231	924,003	112,214	—	1,975,448
1889	1,068,286	1,009,936	86,547	—	2,164,769
1890	1,533,393	1,196,531	207,984	10,168	2,948,076
1891	1,894,105	1,111,137	334,684	18,897	3,358,823
1892	1,539,605	1,247,861	504,738	17,818	3,310,022

TABLE XVI.—*Home Product and Importations of Sheep and Mutton (United Kingdom) in each Year from* 1883 *to* 1892.

Year	Population at the middle of each year	Number of sheep and lambs enumerated annually in June (from *Agric. Returns*)	Number assumed to be slaughtered annually, *i.e.* 40 per cent. of those enumerated	Number of live sheep imported in each year	Number of carcasses of frozen mutton imported in each year
1883	(estimated) *35,612,000*	28,348,000	11,339,200	1,116,000	201,791
1884	„ *35,962,000*	29,377,000	11,750,800	945,000	632,917
1885	„ *36,325,000*	30,086,000	12,027,200	751,000	777,891
1886	„ *36,707,000*	28,955,000	11,582,000	1,039,000	1,187,547
1887	„ *37,092,000*	29,402,000	11,760,800	971,000	1,542,646
1888	„ *37,454,000*	28,939,000	11,575,600	956,000	1,975,448
1889	„ *37,809,000*	29,485,000	11,794,000	678,000	2,164,769
1890	„ *38,187,000*	31,667,000	12,666,800	358,458	2,948,076
1891	(census) 37,704,283	33,534,000	13,413,600	344,504	3,358,823
1892	(estimated) *37,900,000*	33,643,000	13,457,200	79,048	3,310,022

JOURNAL

OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

HOP CULTIVATION.

CONTENTS.

INTRODUCTION.

As there is a considerable demand for detailed information upon the cultivation and management of hops, in the methods of which many changes and improvements have been made of late, this account has been prepared at the request of the Royal Agricultural Society, in whose Journal there has been no full description of all the branches of this subject since the elaborate contribution by Mr. Rutley in 1840 on *The Best Mode of Managing Hops*. In 1864 Mr. J. P. Smith wrote a capital paper for the Journal (vol. xxv.) on the *Hop Cultivation* of Worcester, and

the present writer recorded in 1870 (vol. vi., 2nd series) *Recent Improvements in the Cultivation and Management of Hops* in its pages, and again in 1890 (vol. i., 3rd series) gave a short sketch of the progress of this industry entitled *Fifty Years of Hop Farming*. He also wrote an article on *Hop Cultivation* for the *Journal of the Bath and West of England Society* in 1881, and reprinted in 1880 a series of articles written for the *Country Brewers' Gazette* entitled *Hops from the Set to the Skylights*. Beyond these papers there is not much literature of a practical nature upon the subject. *The Hop Farmer*, by J. Lance, published in 1838, gives full particulars of hop growing and hop drying, but these naturally are not up to date. *A Treatise on the Cultivation and Management of Hops* was written by Mr. H. M. Mainwaring in 1855: this chiefly relates to methods in use in Herefordshire and Worcestershire. Mr. P. L. Simmonds wrote *Hops, their Cultivation, Commerce, and Uses in Various Countries*, in 1877, which deals more with commercial than cultural points.

History.

Hops have been grown in England since the beginning of the fifteenth century. Hasted, the historian of Kent, states that a petition was presented to Parliament in 1442 against the hop plant, which was termed a "wicked weed."[1] Hops are first mentioned in the English laws in 1552, the fifth year of the reign of Edward VI., when some privileges were given to "hop grounds." There was a hop plantation in the village of Bourne near Canterbury, in the reign of Queen Elizabeth, as may be proved by old records, and in the year 1603 a code of penalties was enacted against the importation of spoiled and adulterated hops; from this it may be inferred that the English hop grounds did not produce enough hops for the home requirements, and that foreign importers, as sometimes in these days, sent rubbish to the English markets.

Hop gardens, *humularia*, for yielding hops for making beer, existed in Germany as early as the ninth century, according to old documents in the Freisingen collection written in the time of Ludovicus Germanicus.[2] Hops were used in the Netherlands for brewing beer in the commencement of the fourteenth century, and the technical knowledge, or at all events improved

[1] *The History and Topographical Survey of the County of Kent.* By E. Hasted, Esq., F.R.S.

[2] Beckmann's *History of Inventions*, vol. ii. p. 380.

technical knowledge of their cultivation and management, was without doubt brought from the Netherlands by the Walloons, who introduced many other cultures, plants, and manufactures into Kent.

A pamphlet upon hops, the first work published on the subject, was written by Reynolde Scot, printed by Henrie Denham, "dwelling in Paternoster Rowe at the Sign of the Starre," in 1576, and dedicated to the "Right Worshipfull Mayster William Lovelace Esquire, Sergeaunt at Lawe," who lived at Bethersden in Kent, and is advised by Mr. Scot in his dedication to "looke downe into the bowels of your grounde and to seeke about your house at Beddersden for a convenient plot to be applyed to a Hoppe garden."[1] This quaint writer evidently thought highly of hop land, as he says, "One acre of ground and the third part of one man's labour, with small coste beside, shall yealde unto him that ordereth the same well fortie marks yearly and that for ever," or about 26*l.* 13*s.* Tusser, who wrote in the middle of the sixteenth century, alludes frequently to the various operations connected with hop culture.[2]

In his curious *Way to get Wealth*, written in 1668, Markham has an interesting description of hop husbandry, in a chapter headed "The enriching of all manner of barren grounds, and so to make it fruitfull to bear Hopps."[3] In the *Riches of a Hop Garden Explained*, dated 1729, Professor Bradley holds that

> It is time to come more immediately to the purpose of planting the hop, which, considering the small space of ground it takes up in comparison to other plants and small expense of planting, the prodigious profit to the proportion, and the great advantage it brings to the crown of Great Britain is well worth the consideration. For even ground that was never before esteemed worth a shilling an acre *per annum* is rendered worth forty, fifty, or sometimes more pounds a year by planting hops judiciously upon it, which motive induces me to give a work of this nature to the public. At the first time when hops were planted with us they were sold at 1*l.* 6*s.* per hundred, as it is observed in one of my memorandums of early date, and it is also remarked by the same curious observer that an acre of ground cultivated for hops shall bring to the owner clear profit about 30*l.* yearly, for a long season; but I have known hop-grounds that have cleared above 50*l.* yearly per acre to be sold at the first hand.[4]

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[1] *A Perfite Platforme of a Hoppe Garden.* By Reynolde Scot, 1576.

[2] *Five Hundred Points of Good Husbandry.* By Thomas Tusser, Gentleman, 1557.

[3] *A Way to get Wealth, containing six prineipal vocations or callings in which every good husband or housewife may lawfully employ themselves.* By Gervase Markham, 1668.

[4] *The Riches of a Hop Garden Explained.* By R. Bradley, Professor of the University of Cambridge, and F.R.S.

The Hop Districts of England.

From the time when hops were "fetched out of Flanders" into Kent, this county has been the principal English hop-producing district up to this date. According to the latest returns (1892) of the Board of Agriculture, there were 34,052 acres of hop land in Kent, out of 56,259 acres in the whole of England, and this proportion has been maintained for many years. The Kentish acreage has fluctuated with the rest of the English acreage. In 1863 there were 36,367 acres; in 1873, 39,040 acres; in 1883, 42,737 acres. It may be seen that hops are grown in the same parishes in Kent as at the beginning of this century. There were 290 then, there are 296 now.

The hop-growing limits are defined somewhat sharply by geological conditions. For instance, in the district between Chatham and Faversham, and from Faversham nearly to Canterbury, extending for some miles, chiefly below the London, Chatham and Dover Railway, the finest hop land in England, or, as some hold, in the world, is situated. The soil is clay, loamy clay, and sandy loam upon the Thanet, Woolwich, and Oldhaven beds, which crop up here and overlie the Chalk on the "backbone of Kent." As the Chalk appears again with a thin and gradually decreasing surface of loam, the hop land becomes less valuable, and at a short distance from this point hops are not cultivated at all until, *longo intervallo*, the "Bastard" East Kent district begins, where the hops produced are of inferior quality as compared with East Kent hops proper, being grown upon useful, somewhat heavy soils, lying for the most part upon the belt of Gault alternating with the Folkestone beds intervening between the Chalk and the Weald Clay. Below Canterbury there is a district between Challock and Barham where hops of first-class quality are grown, upon loams of a lighter character resting on the Chalk. The crops here are not so heavy as those yielded on the deep loam and brick earth in the Faversham district, and the plants will not take such long poles, but the quality is most excellent.

"Bastard" East Kent hops form a line of demarcation between East Kent hops proper and those known as Mid Kents, which are for the most part produced upon the soils of the Lower Greensand formation—the loams, and clay loams, and hassocky detritus of the Hythe and Folkestone Beds and the Atherfield Clay—between the Chalk and the Wealden formation, running from Lenham nearly to Tonbridge. A small part of the Mid Kent district is upon the Weald Clay, but it is Weald Clay modified and improved by admixture with Greensand soils.

The area upon which "Wealds" are grown lies between Edenbridge in the west and Ashford in the east, extending southward to Tunbridge Wells, Lamberhurst, and Hawkhurst, on the borders of Sussex. The soils are argillaceous clays and sandy clays, more or less tenacious and stiff, with occasional patches of loam and alluvium, upon the Weald Clay, the Tunbridge Wells Sand, the Ashdown Sand, and the Wadhurst Clay; the three last being varieties of the Hastings Sand. Much of this hop land gives large crops in kindly seasons, far larger than those in other parts of Kent.

There are two other small districts in Kent, one known as West Kent, running from Westerham to a little beyond Sevenoaks, and northerly to Orpington and the surrounding parishes. The best land is upon the curiously narrow strip of Gault of the Upper Greensand, alternating with a broader strip of various Lower Greensand soils cropping up between the Chalk and Weald Clay. The Gault here is not anywhere wider than five miles, and the Sandgate Beds and Atherfield Clay running parallel with it are not more than seven or eight miles in width. The other district, whose hops are styled North Kents, embraces an expanse of Chalk hills with hop grounds at distant intervals, between Farningham and Rochester. It is only in places where the marl on the Chalk is least tenacious that hops are grown. In some spots, as at Cobham, Southfleet, Gravesend, there are outcrops of Thanet Sand where clay loams suit hops well.

Sussex has always ranked next to Kent in respect of its hop acreage, which has ranged between 7,000 and 11,000 acres during the last thirty years. The acreage has increased considerably since the beginning of the century, but the list of parishes, as in Kent, in which hops are cultivated, remains almost the same now, being determined by geological conditions. Though without doubt the farmers of Sussex imitated their close neighbours in the Weald of Kent, and, having the same kind of land and equal opportunities of getting plenty of wood for drying[1] and for poles, planted hops extensively, they did not extend their culture across the boundary of the Upper Cretaceous formation. They confined their hop land to the soils of the Lower Cretaceous formation—the Tunbridge Wells Sand, the Wadhurst Clay, and the Weald Clay—and to the rich alluvium of river courses in the eastern part of the county, where heavy yields are produced in good seasons. And to this day the same boundary is observed.

[1] In the early days of this cultivation hops were dried with wood. The old "cockles," or stoves, were made for this.

It must not be concluded that hops can be well or profitably grown on any of the soils that have been indicated as suited for their production in Kent and Sussex; for it happens frequently that the land in some parts of a parish will grow them well, while in other parts they prove a failure. On one side of a river the land occasionally is far more fitted for hop growing than that on its opposite side. Even in adjoining fields this one will produce good hops while that one will not. So much depends upon the situation, and the composition of the soil, and especially upon its substratification, because the hop plant likes a permeable subsoil.[1] It is supposed by many that hops will do well in any part of hop-growing districts, but the fact is that there is a very small extent of land thoroughly suitable for hops beyond that which is now in cultivation. In most of the parishes the present plantation has been determined by selection, and the survival of the fittest. When the least depression has occurred, the unsuitable land has been promptly grubbed.

Next in importance to Sussex come Herefordshire with 6,797 acres, and Worcestershire with 3,369 acres. Both these counties show an increase in their hop acreages since 1871, and a considerable increase since 1850. Here again it is found from an examination of old lists, that the hop-growing parishes detailed therein are almost identical with those in which hops are now grown. The hop grounds, or "yards," of Herefordshire and Worcestershire are situated upon the eastern side of the former county, extending as far as Leominster, Ross, and Hereford; and upon the western side of the latter county, mainly upon the better marls of the New Red Sandstone, and soils formed of the débris of Cornstones of the Old Red Sandstone formation, and the rich and extensive alluvial deposits by the courses of the rivers Wye, Lug, Teme, and Severn, and other rivers and streams.[2] A small part of the Worcestershire hop plantation in the direction of Pershore is upon clays of the Lias formation, but hops do not thrive so well as upon the Triassic and Keuper systems in the west of the county.

In Hampshire and Surrey there has been but little increase or change in the extent of the hop land during the last thirty or forty years. The 2,775 acres in Hampshire are situated

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[1] Marshall, in his *Economy of the Southern Counties* (1798), says: "Hops require not only an absorbent but a calcareous base. No art has been discovered to induce lands with non-calcareous subsoils to endure in this crop."

[2] Dr. Nash in his exhaustive *History of Worcestershire* (1781) describes the Teme as watering "fine meadows, a rich country, and one particularly famous for its many hop yards."

about ten miles north, south, and east of the town of Alton. Surrey hop land, of which there are now 1,955 acres, is located between Farnham and Guildford, and within eight or nine miles of Farnham in a south-eastern direction. Here, in both of these hop districts, as in all others, it is found that little or no addition has been made to the number of hop-producing parishes during the last 100 years, though in many of these the acreage has considerably increased. Here also, as in other instances, the limits of the hop plantation are sharply demarcated by peculiarities of soil. The Hampshire hop land is for the most part upon the strip of Upper Greensand which runs out below the Chalk escarpment,[1] whose soil is particularly rich in phosphoric acid and silica. This soil, the celebrated "Malm," has been formed by the débris of a soft white rock, having the appearance, to a casual observer, of chalk or limestone. Gilbert White calls it "a kind of white land neither chalk nor clay but kindly for hops. . . . This soil produces the finest hops."[2] Messrs. Way and Paine writing of this land say :—

> In the parish of Farnham this bed traverses its whole extent from east to west coinciding with the line of the very best hop-grounds, those which are perennially continued under hop culture. This is a remarkable circumstance tending to confirm the opinion of the profuse abundance of phosphoric acid in the soil, as well as the facility with which the hop-plant appears to be able to assimilate the acid it naturally contains. For the analysis of the hop proves it to be a great consumer of phosphoric acid, annually carrying off many pounds per acre, in addition to the quantity abstracted by the bine and leaves.[3]

Aubrey, the historian of Surrey, shows that the value of this "Malm" for hop growing was known in the sixteenth century. Camden writes that "near Farnham, hops are growing nearly in as plentiful a manner as in any parts of England."[4]

From the descriptions given of the centres of hop cultivation in England, it will be seen that the hop land is upon soils of the Wealden formation, except in the case of Herefordshire and Worcestershire. From these descriptions, and a study of surface maps of this formation, it will appear that in almost all cases, and particularly where the best hops are grown, there are exceptional conditions of soil or subsoil.

It must not be inferred that there is no other land than

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[1] *The Geology of the Weald.* By W. Topley, F.G.S.

[2] *The History of Selborne.* By Gilbert White.

[3] *On the Phosphatic Strata of the Chalk Formation.* By Messrs. Way and Paine, vol. ix., 2nd series, Journal of the Royal Agricultural Society.

[4] *Magna Britannia et Hibernia, Antiqua et Nova.* Camden, vol. v. p. 395

that in the charmed districts enumerated where hops can be successfully grown. Mr. Topley remarks upon this[1]:—

> Hops take up a large area in Kent, next to which county come Sussex and Hereford. Besides those counties, it is only in Surrey, Hants, and Worcester that hops are grown in any quantity. The unequal distribution of this crop is very remarkable, as there appears no sufficient reason why it should not be cultivated in other districts. Everywhere below the Chalk escarpment hops might probably be cultivated with success, and the vale of Pewsey, for instance, would seem especially suited for them.[2]

There are, no doubt, other districts where hops could be produced, but their introduction into new localities would be attended with great initial expense. Oasts, hopper houses, and other buildings must be provided, and skilled labourers introduced, and, as will be seen later on, the cost of hop cultivation increases year by year. The cultivation of hops has been tried in many counties, notably in Nottinghamshire and Essex, and has been abandoned.

Some of the hop grounds in the best districts are more than 100 years old. In some cases there is no record of the date of the first planting of certain Golding grounds in East and Mid-Kent, Farnham, and in Herefordshire, by the river Teme, where it is said the land will grow hops for ever. It is, however, being discovered by hop planters that the plants in such very old grounds do not crop well, and are more liable to blight and mould, and less able to resist these attacks and climatic variations. In several cases of very old grounds a sacrifice has been made, the plants have been grubbed up and change of crop has been resorted to for a time with much advantage.

In order to show the fluctuations in the hop acreage and hop yield in England the following table is given:—

Year.	Area, acres.	Total yield, cwt.
1800	38,436	500,000
1820	50,048	275,000
1840	44,085	68,000
1860	46,272	107,000
1880	66,703	473,000
1892	56,259	413,259

The maximum area was 71,789 acres in 1878. It may be added that in 1872 hops were grown in twenty-three counties, while in 1892 there were but eleven counties in which they were cultivated, and the whole acreage of five of these only amounted to 198 acres.

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[1] *On the Agricultural Geology of the Weald.* By W. Topley, F.G.S. Journal of the Royal Agricultural Society, vol. viii., 2nd series, 1872.

[2] I have seen splendid samples of hops grown in the Vale of Pewsey. C. W.

Varieties of Hops and Modes of Planting.

It is well known in practice that the seeds of hop plants cannot be depended upon to reproduce plants similar to those from which the seeds are taken. New varieties are by chance occasionally obtained from seeds, but no attempts have been made in the direction of artificial fertilisation of hop plants to obtain new sorts. These have been evolved by careful and close processes of selection, by means of which desired characteristics, as early and late maturity, and variations in the form and arrangement of the strobiles or cones, have been acquired. White's Early Golding was developed thus, and the Buss's Golding of late habit; also the Fuggle's Golding, which has now again become the fashionable variety, on account of its success in 1892. There are not many varieties of hops in this country, though it is said that there are as many as 160 different varieties in the world;[1] and it is thought that valuable kinds might be obtained by crossing approved varieties.

Sets are cut in the early spring from the hills, or stocks, from the strong fibrous growth at the bases of the bines of the previous season. Lengths of from six to eight inches of these are put in a nursery at once, and are fit to plant out in the subsequent autumn. Planters are in these days very particular as to their sets, and are careful that those they plant and those with which they replace the dead stocks are good and true to variety. Experience has taught them that this is of the first importance in ensuring a "level growth" and a series of uniform samples.

Sometimes when sets are very dear the pieces of root cut off in the spring are planted out at once without having been put in a nursery. This is risky, especially in a dry summer season.

Two bedded sets[2] of fair size are quite sufficient to form a stock, and are much better than three or four sets.

The fashion as to varieties changes in accordance with the circumstances of the demand. Until the last year or so hops of the finest quality were required by the brewers. Land which produced these was at a premium. The East and Mid Kent and Farnham planters were in the ascendant and planted the best varieties, as Bramlings, and others of Golding character. Producers of more common hops, in the Weald of Kent, Sussex, and elsewhere, were disposed to consider their occupation gone, and made some efforts to improve their quality. But now this has

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[1] *The Varieties of Hops.* Photographed and published by H. Braungart, Weihenstephan, Germany.

[2] "Bedded" sets are those which have been grown in a nursery.

changed for the nonce. Fine-flavoured hops full of aroma seem just now to be only required for pale ales and export ales, and for the comparatively small quantity of stock beer now brewed. For beer for quick draught common hops, it is said, are good enough. There has been a large demand for these of late, and they have made prices relatively higher than those of the finer sorts. Varieties of common hops have therefore been extensively planted even in districts producing hops of fine quality, and among them the Fuggle's Golding, as cropping heavily, has been largely selected. Many planters, however, refuse to make any alteration in this respect, as they say that there will be a reaction, when the market is crowded with common hops.

In East Kent the prevailing varieties are Goldings of several kinds, Bramlings, Cobb's Early Goldings, Petham Goldings, Canterbury, and Old Goldings. Bramlings and other Goldings are still generally grown on the best land; Whitebine Grapes and Grapes on that of not so good quality.

In Mid Kent, Goldings, Bramlings, Grapes, and Jones are principally cultivated. Fuggle's Goldings are now being planted rather extensively.

The Golding is undoubtedly the best English hop, having unsurpassed aroma and brewing value. Marshall writes:—[1]

> The Golding is a sub-variety, I understand, of the Canterbury hop which was raised by a man still living—Mr. Golding, of the Malling quarter of this district, Kent—who observed in his grounds a plant of extraordinary quality and productiveness, and marked it and propagated from it, and furnished his neighbours with cuttings.

This variety has small compact cones, shaped somewhat like a filbert, of a light golden colour when ripe. The cones do not cluster together, but grow in bunches of two or three cones. Bramlings are Goldings of slightly different shape, coming earlier to pick, having valuable Golding attributes. White's Early Golding is the earliest hop with Golding characteristics, but it is rather delicate, and a shy bearer.

The "Grape" and "Whitebine Grape" are very useful hardy sorts, having large cones growing to a very great size in some soils, and hanging in clusters like grapes. There are other kinds of Grapes, as the Farnham Whitebine, full of quality and a very good bearer. Cooper's White is a rather early variety. Mayfield Grape is a hardy, useful, prolific kind.

Buss's Golding and Fuggle's Golding have not many Golding qualities. They are rather coarse, coming to pick later than Goldings, but they are good cropping sorts, especially the

[1] *The Rural Economy of the Southern Counties.* By Mr. Marshall, 1798.

Fuggle's Golding, and are not as a rule so disposed to blight and mould as others.

The Jones is a very useful hop, yielding well on some soils. It has large cones, and when grown on good land has much quality.

There are very early and common varieties as Prolifics, Meophams, and others, which yield large crops of inferior quality, and are not much in favour with brewers when other kinds are available at reasonable rates.

The "Mathon," which originated in Mathon, a parish in Worcestershire, and is peculiar to that county and Herefordshire, approaches nearly in flavour to the East Kent Golding.

In Sussex and the Weald of Kent, the "Colegate" is grown, but not nearly so extensively as twenty-five years ago, and many planters are eliminating it altogether and planting Fuggle's, Hobbs's, Henham's, and Buss's Golding. It comes to pick latest of all hops. It is accurately described by Mr. Rutley as

> A variety first propagated from a plant growing wild in a hedge on a farm at Chevening in Kent, by a gentleman of the name of Colegate. It is a very hardy but backward hop, and will grow on any soil; it runs much to bine, and requires as long poles as Goldings. The hop is generally very small, when quite ripe before it is picked; they have a rich, thick appearance when dried, but the smell and flavour are not good, and some brewers object to them.[1]

Hops of a Golding type are cultivated on the best soils in Hampshire and Surrey, and Grapes, as the ordinary Grape, and Williams's Whitebine Grape, and the Grape Green Bine, Henham's and Fuggle's have been planted on the poorer soil. There has been a disposition of late, in Herefordshire and Worcestershire, to plant hops of Golding character, and to improve the quality generally of the growths of these counties, which find much and increasing favour among brewers. At the same time early varieties, as Meophams and Prolifics, have been put in to some extent, and Fuggle's, which are coming into favour.

As a rule, hops are now planted six feet apart each way, or 1,210 hills, or stocks, per acre. It is found that this number of hills is quite sufficient, and that as many hops can be grown on this plant as upon a closer plant, especially if cocoa-nut fibre string is fixed on the tops of the poles. In Herefordshire and Worcestershire the number of hills is smaller, varying from 889 to 1,000 hills; but the planters have latterly set them more closely together.

Old pastures and old apple and cherry orchards are well

[1] *On the Best Mode of Managing Hops.* By Mr. Rutley. Journal of the Royal Agricultural Society of England, 1840.

suited for planting with hops. Their situation, aspect, and soil are almost always good, as our forefathers planted their fruit trees in the best and most sheltered spots. The land should be ploughed deeply, with a subsoil plough following, or it should be trenched deeply. The former method is preferable and less costly. When land is trenched, unless the superficial soil is very deep, it often happens that a tenacious or heavy subsoil is brought to the surface, while the good upper soil is buried, so that the texture of the soil is spoilt and probably made unkindly for working. The land is set out for planting with a line in which, at equal lengths, according to the number of hills required to the acre, stitches of red worsted are put. At each point indicated by the worsted stitch, a stick is placed in the ground as the centre of the hill. The "setting out" must be performed with mathematical accuracy for cultivating with horses or steam between the rows and, especially in these days when mildew and blight are general, for the passage of sulphurators, and of horse-washing machines, whose delivery would be affected by the plants being out of true line.

Planting should be done in October and November. Square holes are made with a spade, with the sticks placed by the setter-out as their centres, and the sets are pressed in firmly with the hand and foot, an inch or two of the sets being above the ground. A good spit of farm-yard manure is put into each hole where the land is stale and poor. Before being planted the sets must have their roots well trimmed and the dead bines cut off. In the spring, a small pole is put to each hill and the bines are tied to it. The ground between the rows and close round the hill must be kept clean by nidgetts (horse-hoes) and hand hoes. It is better not to put any crop, as turnips, potatoes, &c., between the rows, for hops are a most exhausting crop. Poles, two or three to a hill, and twelve, fourteen, or sixteen feet long, according to the variety of hop, are carried on to the ground during the following winter, and in the ensuing summer the hop plants will bear a good crop if well-manured and not over-poled.

Dressing.

Dressing, or cutting, is usually done in March, or early in April, when the ground will work down well, and before the plants have sent forth shoots. The hills [1] are opened, and the

[1] In the summer, the bases of the plants are "earthed up" by putting four or five shovels of earth over them among the bines, to protect the "crowns" from wet, and to encourage a growth of fibre for propagation. Hence the term "hill."

earth upon the stock is moved with an ordinary three-pronged hoe. All the fibrous growth is cut off close to the ground with a peculiar knife (fig. 1), having a thin, sharp, hooked blade, and fine earth is drawn over the cut stocks with a little hoe (fig. 2), and they are neatly ringed round. It is well not to "dress" hop plants too early, as if the shoots or bines are forward, they are exposed to the action of spring frosts which will either cut them up, or blacken and spoil them, or make them "sticky," unkindly, and more liable to blight and mildew.[1] The French vine cultivators dread the influences of white frosts upon the young and tender shoots of the vines, which are most pernicious, especially if the sun shine on them while they are covered with dew. On the other hand, if the plants are dressed very late, and cold dry weather come in May, as is sometimes the case, the bines get behind and

FIG. 1.—Dressing Knife.

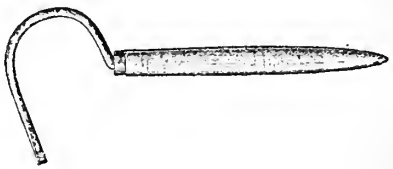

FIG. 2.—Hoe.

cannot make up for lost time. But most planters now hold that moderately late is better than too early dressing.

Care must be taken in dressing not to cut the stocks too low, thus getting them too much below the ground level, nor too high, so that they are much above it. The dressing knife should be kept very sharp to give a clean cut, as in all pruning. Reynolde Scot says with regard to dressing:—

> You must, at the first time of cutting and dressing, with a sharpe knife cut away all such rootes and sprynges as grewe the year before out of your settes within one inch of the same. Every yeare after you must cut them as close as you can to the olde rootes even as you see an osyer-bed cut.

He adds:—

> At what time soeur you pull downe your hylles cut out your rootes before the end of March, or the beginning of April, and then remember the wynde.[2]

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[1] In the terribly mouldy year 1880, it was noticed that hop plants which had been dressed exceptionally late escaped mould to a considerable extent, and planters who adopted this late dressing were convinced that it was the cause of their comparative immunity from mould.

[2] *The Perfite Platforme of a Hoppe Garden.* By Reynolde Scot, 1576, p. 41.

Poling.

In no part of hop farming has there been so much improvement and change as in poling, or providing supports for training the plants. Until a comparatively recent date, poles pitched into the ground in the spring and removed in the autumn were the only modes of supporting and training the plants. Now there are systems of wire fastened to permanent uprights, and methods of cocoa-nut fibre strings and wires combined, also fixed to permanent uprights. These will be explained later on. An extraordinary use is made of cocoa-nut fibre string tied to the tops of the ordinary poles, and carried from pole to pole across and down the rows of poles. The bines after reaching the tops of the poles make their way on to the strings, and are sometimes tied on to them by women on folding ladders, made specially for the purpose. Festoons are made by the bines from pole to pole, and the hops upon them are full of quality and strength, as they get all the air and sunshine available; whereas, without these strings the bines are crowded together in a mass between the poles, so that sunshine and air are limited and the hops are poor and light. The adoption of this means of training the bines upon strings has largely increased the production of hops in this country. A clever instrument fixed to a long handle, termed a "stringer," has been devised by which a man can rapidly put the strings from one pole to another.[1]

Poles are used of sizes according to the variety of hop and the nature of the soil. Goldings take two or three 16 ft. poles in Mid Kent and parts of East Kent, but in some districts of East Kent 14 ft. and even 12 ft. poles are put to them. In Hants and Surrey, Goldings take poles from 14 ft. to 16 ft., and even 18 ft. in some districts. In Worcestershire and Herefordshire 14 ft. poles are used for Goldings. Grapes generally take poles of from 11 ft. to 14 ft., according to the locality. Jones take poles 10 ft. to 11 ft. long, and Colegates from 14 ft. to 16 ft. Sometimes Goldings have two poles to each hill in one row and three poles in the next row, and so on alternately. Two poles to each hill are generally sufficient for Goldings, especially where the stringing system is adopted. In poling it is essential to keep the poles wide apart at the tops, in order that the bines may not grow together in masses and obstruct air and light. This is most important, and it is curious to note that it is a point made by that close observer Reynolde Scot, who says in

[1] Cocoa-nut fibre strings are also frequently tied about half-way up each pole, and carried on to the tops of the poles of the next hill, and vines are trained on them when the poles are furnished.

his *Perfite Platforme of a Hoppe Garden*, "Let the Poales of euery hill leane a little outwarde one from another." As the plants are set out with mathematical precision it is absolutely necessary that the poles should be pitched[1] with the greatest regularity, so that the plants may not be gradually drawn from their proper position by careless and irregular poling. It is desirable that the workmen should use a garden line which, stretched from hill to hill, may indicate the exact places where the poles should be pitched. Now that hop washing by horse-machinery has become very general, it is imperative that the hills should be correctly in line and the poles set as much in line as possible, in order that the spray from the delivery tubes and jets of the machine may be distributed evenly.

Poles form an expensive item. The first outlay to furnish an acre of hop land with poles may be put at from 20*l.* to 30*l.* for the smaller poles, and from 35*l.* to 45*l.* for larger poles. The price per 100 at this time (1893) ranges between 10*s.* and 30*s.* Not long since the range was between 17*s.* and 55*s.* per 100. In 1790 Mr. Marshall says, "The price of poles varies from 14*s.* to 40*s.* per 100 according to size and quality." The annual cost of replacing poles is from 2*l.* to 4*l.* per acre.

Hop poles are now universally dipped in creosote, which effectually preserves their ends or "feet" in the ground, and just above the ground, from the effects of damp. Upon most hop farms there is a "dipping tank," either fixed in brickwork or portable, into which the poles are stood upright in gently simmering creosote to a depth of from $1\frac{3}{4}$ feet to 2 feet, for at least twelve hours. This practice has caused a vast saving of expense to hop planters. Ash, fir, and chestnut grown on some kinds of land are considered the best for poles. Chestnut on some soils is without heart and sappy. Maple, oak, red birch, alder, willow, white birch, and hornbeam follow in order.

Arrangements of Wire and String.

Many arrangements of wire and string on permanent uprights are in vogue. As a rule, they are only adopted by planters who farm their own land, or who have long leases, because the first cost is heavy. Their chief advantages are that the hops are not so much battered by the winds which invariably prevail while hops are ripening, as those grown upon poles, and the hops are better grown, have more condition, and are developed earlier. There is a saving of labour to some extent in this permanent system, as the poles have not to be put up

[1] This is done with a pitcher with a wooden cross-bar as a handle.

annually. On the other hand, more tying is requisite, because the bines do not go up string and wire so well as up poles.

One arrangement of wires and string is much adopted in East Kent. It consists of stout posts set at the end of every row of hop stocks, and fastened with stays to keep them in place. At certain intervals in each row a post of similar size is fixed. From post to post in the rows wires are stretched at a height of half a foot from the ground and at a height of six feet from the ground, and again from the tops of each post; so that there are three lengths of wire in all. Upon these wires hooks are fastened or "clipped" at regular intervals, so that cocoanut fibre string can be threaded on to them horizontally from the lower to the next wire, and in a vertical direction from this wire to the top lateral wire of the next row. The string as threaded on the

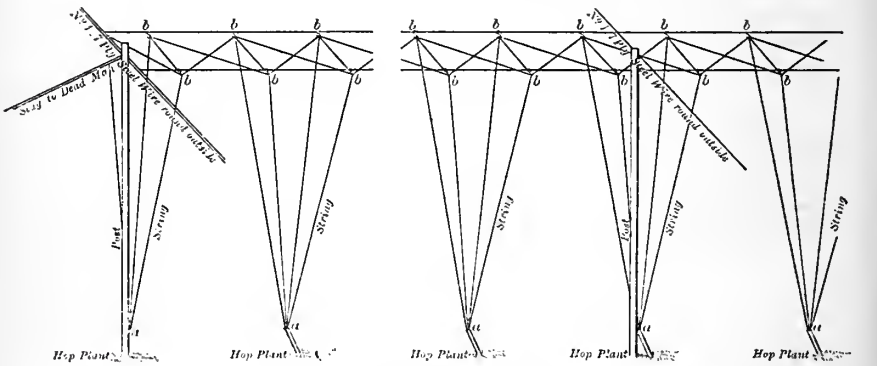

FIG. 3.—Arrangement of Wires and String.

hooks is continuous, no knots are necessary, and it is put on the hooks of the top wires with a "stringer." The first cost of this is about 40*l.* per acre.

Another method is known as Partridge's patent (fig. 3), and prevails in Worcestershire and Herefordshire, whilst it is now extensively made use of in Kent and Sussex. Stout posts are placed at the ends of each row of plants, and at intervals where requisite. Wires are fastened to the tops only of these posts, and cocoa-fibre strings are fastened by pegs to the ground close to each hop stock (fig. 3, *a*, *a*, *a*), and to the wires at the tops of the posts, at *b*, *b*, *b*. This is more simple and less expensive than the first described system, costing from 24*l.* to 28*l.* per acre. In this case the plants require to be well "lewed", as the wind blows the strings about, being so light.

Tying.

Hop bines are tied to the poles by women. Now and then it happens that men do this in seasons when the weather is forcing, but it is essentially woman's work. Before tying it is well to have the strongest rank-growing, "pipy" bines pulled out by careful men who know what they are about, as such bines are frequently unfruitful. If the bines are strong, two are tied up to a pole in three-pole work, that is when three poles are put to each stock. In the case of two-pole work three bines are put to a pole, but different planters have different ideas on this. The hop plants climb with the sun, in contradistinction to the French bean and convolvulus, which twine in the opposite direction. Directly they have been tied to the poles, the "heads" or leading shoots grow upwards and onwards, their curious, almost instinctive habit of revolving helping them to find and lay hold of the support as they grow. Darwin gives most interesting descriptions of this peculiar habit of the hop plant. In one he writes:

> When the shoot of a hop (*Humulus lupulus*) rises from the ground, the two or three first joints, or internodes, are straight, and remain stationary; but the next, formed while still very young, may be seen to bend to one side, and to travel slowly round towards all points of the compass, moving like the hands of a watch with the sun. . . . The first purpose of the spontaneous revolving movement, or, more strictly speaking, of the continuous bowing movement, directed successively to all points of the compass is, as Mohl has remarked, to favour the shoot finding a support.[1]

As Darwin adds:—

> This is admirably effected by the revolutions carried on day and night, a wider and wider circle being swept as the shoot increases in length. This movement also explains how the plants twine; for when a revolving shoot meets with a support, its motion is necessarily arrested at the point of contact, but the free projecting part goes on revolving.[2]

This explains how it is that the hop bines after they have been once tied to the poles keep to them. When the support has been found by the leading shoot in its revolutions, the recurved hooks with which it is furnished lay hold of the pole and keep to it with tenacity. By reason of this admirable provision of nature the tyers have in ordinary circumstances but little trouble after the bines have once been tied. They fasten a

[1] *The Movements and Habits of Climbing Plants.* By Charles Darwin, M.A., F.R.S.

[2] Sachs in his *Text Book of Botany* thus describes this revolving motion of the hop plant: "As new internodes develope from the bud they begin to revolve, while the third or fourth ceases to do so, becomes erect and manifests another form of movement, becoming twisted until its growth ceases."

rush, not with a knot but with a "half hitch," round the bines to each pole, two or three bines as the case may be, about $1\frac{1}{4}$ feet to 2 feet from the ground. In a week or two another rush is put two feet higher up to keep the bines in their places. After this, unless the bines are "sticky" from white frosts, or their "heads" have been blown away from the poles by persistent winds, but little further attention is necessary. When the bines are out of reach and each pole is well furnished, those that remain on the stock are cleared out.[1] Later on, when a new growth appears, it is checked by earthing or putting a few shovels of earth over each stock in the beginning of July. Well-harvested supple rushes are best for tying. Bast used by gardeners, and matting shreds, will serve. String of any kind will not answer, as it expands and contracts too much with weather changes.

Much depends upon the manner in which tying is performed. Inexperienced tyers must be prevented from putting up rank "pipy" unfruitful bines, and supervision exercised to ensure each pole getting its proper complement of bines. In seasons when there is a deal of bine, careless tyers recklessly pull out handfuls without considering what they will require for furnishing each pole, and are left at last with short, uneven, poor bines. Many planters set a man specially to superintend tyers. This is an excellent and economical practice.

Ladder Tying.

After the bines have reached the tops of the poles and the cocoa-nut fibre strings, women are employed to tie those there which show signs of falling away or slipping down, and to fasten them to the strings which are now almost generally stretched from pole to pole. They have light folding ladders and short step-ladders for this operation, which is of the greatest importance, and pays over and over again for being carried out thoroughly.

Manures.

Professor Way calculated that by an average crop of hops, equal to a little over 7 cwt. per acre, 11 lb. of silica, 10 lb. of phosphoric acid, 16 lb. of potash, 5 lb. of lime, and smaller quantities of other mineral substances, are taken from an acre of land.[2] Mr. Nesbit had previously made analytical experi-

[1] This is the ordinary practice, though there are a few planters who think it better not to pull away all surplus bines, and twist them in a knot and earth them in, or let them run on the ground.

[2] *Report on the Analysis of Plants.* By Professor Way. Journal of the Royal Agricultural Society of England, vol. ix., 1st series.

ments upon hop plants, which showed that very large quantities of mineral matter are required for a crop of hops. Of these, as Mr. Nesbit points out, the most important are silica, phosphoric acid, lime, potash, phosphate of iron, and magnesia. His conclusion is that :—

As the produce of a hop crop is almost wholly exported from the farm, it must be evident that unless the mineral matter is replaced, the richest soil would eventually be impoverished by the growth of this plant. This undoubtedly is the cause of the necessity for manuring this plant so highly.

Professor Brazier, who occupied the chair of Chemistry at Marischal College, Aberdeen, made analyses of the bines, leaves, and cones of Kent Goldings and Sussex hops, in 1880, with the following results :—

The Bine yielded 5·57 per cent. of ash.
The Leaves „ 23·45 „ „
The Cones „ 8·38 „ „

The ashes of these gave the following percentages :—

I.—Kent Goldings.

—	Bine	Leaves	Flowers
Chloride of sodium	5·75	2·08	2·31
Chloride of potassium	4·25	7·00	1·90
Potash	16·79	2·36	25·53
Lime	43·66	54·63	21·73
Magnesia	10·12	7·16	7·14
Oxide of iron	1·04	0·86	1·81
Phosphoric acid	11·26	4·24	18·16
Sulphuric acid	2·61	3·51	5·31
Silica	4·52	18·16	16·11
	100·00	100·00	100·00

II.—Sussex Grape Hops.

—	Bine	Leaves	Flowers
Chloride of sodium	5·07	4·79	3 08
Soda	2·00	0·20	—
Chloride of potassium	—	—	0·34
Potash	31·66	12·95	38·26
Lime	35·46	44·97	15·10
Magnesia	6·59	7·60	6·49
Oxide of iron	0·82	0·81	1·51
Phosphoric acid	10·10	5·86	18·71
Sulphuric acid	2·55	3·09	3·67
Silica	5·75	19·73	12·84
	100·00	100·00	100·00

These analyses show that there is a considerable difference in the composition of the ashes of different kinds of hops, and of hops grown upon different soils.

If hop land is to retain its power of producing hops satisfactorily and sufficiently, the various necessary mineral substances must be supplied by means of manures containing them. Some soils have a larger natural supply of certain of the essential constituents of hops than others, and the manures therefore must be suited to their conditions. For example, clay soils contain a larger amount of potash than calcareous soils, while calcareous soils have naturally a greater quantity of phosphoric acid than clay soils. The good supply of phosphoric acid in the best Greensand soils makes them especially suitable for hop production.

Besides the mineral or inorganic matter that must be supplied, large amounts of organic matter are necessary to force luxuriant crops of rich quality. This is conveyed by means of ammonia and carbonic acid.

Among the chief manures applied to hop land is farmyard manure. Although styled farmyard manure, this in reality comes to a great extent from the stables and cowsheds of London and large towns, at least within reasonable distance of the hop plantations. Many of the large hop planters in Kent have given up fattening cattle, and purchase "London manure," which costs from 6*s.* to 7*s.* 6*d.* per ton. From 15 to 25 tons are put on per acre. In Sussex, Worcestershire, and Herefordshire most of the planters still make farmyard manure of the old-fashioned type.

For the most part farmyard manure is dug in during the winter. Sometimes it is carried on between the rows of poles in the summer, by means of narrow trolleys drawn by a horse, and spread over the whole of the ground, or only put round the hills. In the former case it is worked in by the nidgetts. In the latter case it is dug in with the spud, or hoed in with the Canterbury hoe.

For winter use the other manures are, woollen rags, shoddy, the refuse of cloth factories, put on at the rate of from one to two tons per acre. This costs from 2*l.* to 4*l.* 4*s.* per ton, and contains from 5 to 9 per cent. of ammonia, which should be guaranteed. Fur waste from furriers' shops is a fine manure when pure, costing from 4*l.* 15*s.* to 7*l.* per ton, used at the rate of from 10 to 20 cwt. per acre according to quality. There are many other of these bulky manures, as "fleshings," hair, "scutch" and "trotters," which are good if pure and not too wet and heavy. These must be put on early, as they decompose slowly. Fish of various kinds, sprats, mussels, "five-fingers," &c., are very largely made

use of in Kent, being put on during the winter at a cost of from 3*l.* 15*s.* to 4*l.* 10*s.* per acre.

Of manures used in the spring and summer there are many kinds. Special hop manures are numerous, made of various proportions of superphosphate, kainit, nitrate of soda, or sulphate of ammonia, which hop planters had better manipulate for themselves, as they will then know they are pure and in the desired proportions. Rape dust, however, is the most valuable manure, and by far the most generally adopted for summer priming. It appears to suit all localities, and gives a quick, continuous and rich supply of nitrogenous food to the plants just when they require stimulating most. From 8 to 15 cwt. per acre are put on round the hills and dug or hoed in. Guano is also approved of in some localities, and nitrate of soda in dry seasons. In very many cases hop land is manured well in the winter, and again in the summer, particularly if there is any indication of weakness or flagging energy in the plants.

Basic slag has been tried with some advantage in soils not abundantly supplied with phosphoric acid, as, for instance, those in the Weald of Kent and Sussex. As Sir John Lawes has pointed out, there can be no question concerning the efficacy of slag as a cheap substitute for superphosphate.

Cultivation.

Hop land is dug by hand in the late autumn and winter with the spud (fig. 4), and farm-yard manure, rags, shoddy, fish, and other heavy manures are dug in then. It is thought best by many planters to dig as early as possible, especially if there is much chickweed, *Stellaria media*, the most common and troublesome weed in hop plantations, which takes much out of the land in mild and open winter seasons. In some districts hop land is ploughed,

Fig. 4.—Hop Spud.

but as the poles are placed in conical stacks, like wigwams, at regular intervals upon the ground, a large part cannot be got at by the plough, nor can the spaces between the hills be touched—one way at least. Ploughing is a very unsatisfactory process, and in the end is nearly as expensive as digging, and should only be adopted when labour is scarce. Hop land is somewhat extensively ploughed in Herefordshire, Worcestershire, and Sussex.

Directly the poles are up and the bines out of the way a large

shim [1] or horse hoe (fig. 5) is put deeply into the ground, drawn by two and in some districts by three horses, to break it up

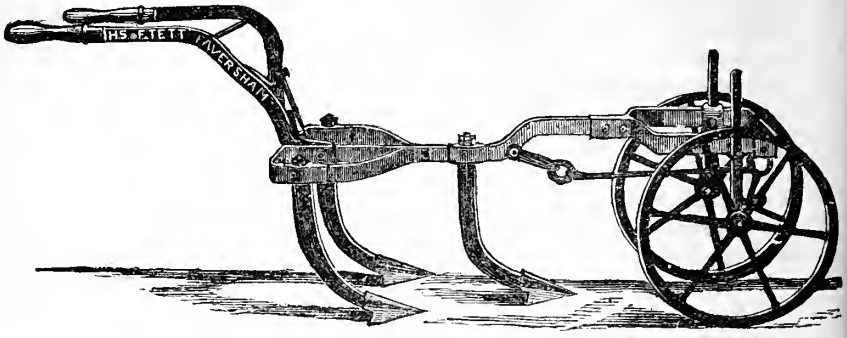

FIG. 5.—Hop Shim.

thoroughly. After this a smaller horse-hoe or nidgett (fig. 6) drawn by one horse is held to be sufficient by many planters,

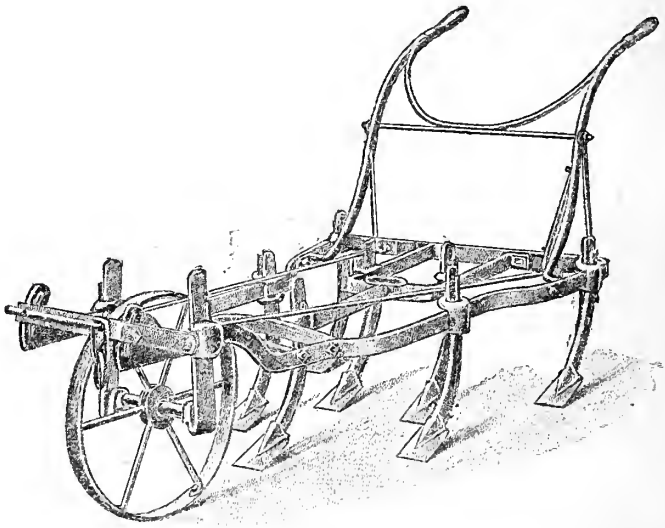

FIG. 6.—Nidgett.

and is used at intervals during the season, deeply at first and until the middle or the end of July, in order to get a deep tilth of triturated soil—"crumb," as it is termed. Some planters

[1] A "shim" means in some districts a very strong horse-hoe for two or more horses, or steam, in deep soils without rock and stones.

continually stir hop land deeply throughout the summer. Others stir in this way until the middle of July, and only very lightly afterwards, in order not to disturb or break through the network of fibres running through the soil just beneath the surface in every direction. In summer it is unlikely that the soluble elements of manures could be washed down to the roots of the hop plants, and it would seem that those fibres are the only means of conveying the manurial elements to them. No one who has not seen the masses of these delicate fibres, mere filaments, traversing every part of the surface soil in a well-cultivated and well-manured hop ground, would believe in this extraordinary provision of nature.

It would seem to be utterly wrong to deliberately disturb this host of foragers, yet it is the practice of some planters to have the nidgetts put in deeply just when the fibres are in full work, and tear them up in quantities. The reason for this has never been logically demonstrated, and it would appear to be more rational to let the fibres work without interruption, and to

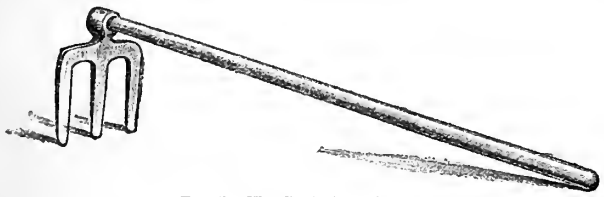

FIG. 7.—The Canterbury Hoe.

merely skim the ground in the late summer with nidgetts having wide hoes to keep down the rapidly-growing weeds.

Nidgetts do not cover all the ground, as they cannot be drawn close to the poles. A space around the hills must be tilled by hand. This is dug round with the spud, directly after the poles are set up. After this it is prong-hoed with the Canterbury hoe, an admirable tool (fig. 7), once or twice during the summer.

If the ground is hard, and weeds are very rampant, the ordinary "plate" hoe is used. Manure, as rape dust, is frequently chopped in with the Canterbury hoe in summer.

On some very extensive hop farms shimming, or nidgetting, is done by steam, especially at first, when the ground is hard and weatherbound. This is arranged as in the case of ordinary steam-ploughing and scarifying.

The object of all enlightened planters in these days is to get as good a tilth as possible, and to have a depth of at least a foot of triturated earth in every part of the ground, for the fibres to work in, and for absorbing and retaining heat and moisture.

Earthing.

Earthing, or putting earth over the stocks between the poles, is done by placing four or five shovels of fine earth over them in June to keep the bines in their places and to ensure a growth of roots for cuttings, or sets. It also stops the extraneous growth of bines from the stocks, which would exhaust them, and keeps them in their places.

Washing for Aphis Blight.

This has become in recent years almost a necessary operation, as the "hop fly," or aphis, known by the systematic name of *Phorodon humuli*, makes its appearance every season. This aphis, called by Lance "the barometer of poverty,"[1] before methods of preventing its increase were discovered, often changed in a few weeks the appearance of the whole of the plantations, from the prospect of a bounteous crop to the blackness of utter blight. For instance, in 1823, the aphides were so persistent that only 1 cwt. 1 qr. 5 lb. were grown per acre. In 1825, the worst attack on record, only 1 cwt. 8 lb. were yielded per acre.

Until 1860 there were no means known, in any degree efficacious, of checking the progress of these aphides, and the planters bore the periodic inflictions without seriously attempting to avert them. The practice of washing or spraying the plants with insecticides, or insectifuges, was introduced about twenty-eight years ago, and it is now regularly adopted by planters as soon as there are signs of blight. It has been found by experience that directly aphides are seen on the plants, washing should be at once commenced, because of their extraordinary power of reproduction described by Professor Owen as follows:—

> The first formed larva of early spring procreates not one, but eight larvæ like itself in successive broods, and each of these larvæ repeats the process; and it may be again repeated in the same geometrical ratio until a number which figures only can indicate and language almost fails to express is the result.[2]

If the aphides once get ahead, it is most difficult to clear them off, and at the same time the plants have lost sap and become unhealthy from their action. Spraying, or washing, as it is generally called, must be repeated again and again, if fresh aphides appear. During the last three or four years, some planters have washed their hop plants all over three and even four or five times in the same season. This entails an expense of at least 2*l.* per acre

[1] *The Hop Farmer.* By J. Lance, 1838.
[2] Owen, *On Parthenogenesis.* Van Voorst: London, 1849.

each time of washing. If water has to be fetched from distances this expense is, of course, increased. Water has been laid on for the purpose by some planters to convenient places near their hop grounds. Quassia and soft soap solutions are generally made use of for washing, in the proportion of from 4 lb. to 8 lb. of soft soap, and the extract of from 8 lb. to 10 lb. of quassia chips to 100 gallons of water. The soft soap retains the bitterness of the quassia upon the bines and leaves, making them unpleasant for the aphides, which are thus starved out. Many of the winged as well as the wingless aphides are also washed off in the spraying process, and in the later stages the foulness upon the leaves, caused by the excreta and "honeydew" from the aphides, is removed, renewed health and vigour being given to the plants. But good managers now do not allow the aphides to remain long enough to produce this state.

Soft soap, of the quantity required, is dissolved in a large tub of warm water, and the solution is well stirred. Quassia chips are boiled to extract their bitter principle. This extract and the soap solution are mixed together in proper proportions and put into the water-carts as they are brought alongside, nearly filled with water. The jolting of the carts on their way to the hop ground serves to mix the materials together.

Upon smaller hop farms hand-washing machines are employed, worked by three men—one to push the machine and pump, and one on each side with a long hose to distribute the wash over the plants. Other men bring the wash in pails to the machine, as required, from tubs set at the ends of the hop grounds.

The machines used are large-sized garden engines, with strong pumps and broad wheels. A very useful machine of this kind is shown in fig. 8, p. 242, which, from its narrow shape, may also be utilized in fruit plantations.

Various nozzles are used to distribute the liquid. Most have a simple aperture. Some have a chamber or arrangement to divide the stream and send it forth in spray. This is the proper method. By the use of single jets a great quantity of liquid is required. The main object is to cover every particle of leaf and bine surface with spray, or mist, and it is contended by many that forcing up single streams violently is a great waste of material, and does not achieve the desired end. The Riley nozzle is a good nozzle, and there are several imitations and adaptations of this of more or less merit.[1]

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[1] As to machines, nozzles, &c., see *Methods of Preventing and Checking the Attacks of Insects and Fungi*. By Charles Whitehead. Published for the Royal Agricultural Society by John Murray, Albemarle Street. 6*d*.

Upon larger farms horse-machines are adopted. They are long tanks upon two wheels, fitted with strong pumps moved by the wheels, which force the liquid through rows of tubes having holes perforated in them, and adjusted so that the wash is sent up evenly over the plants.

In a horse hop-washing machine lately patented by Mr. Muirhead, of Maidstone, rows of pipes, which can be easily adjusted, having chambered nozzles, are substituted for the perforated tubes

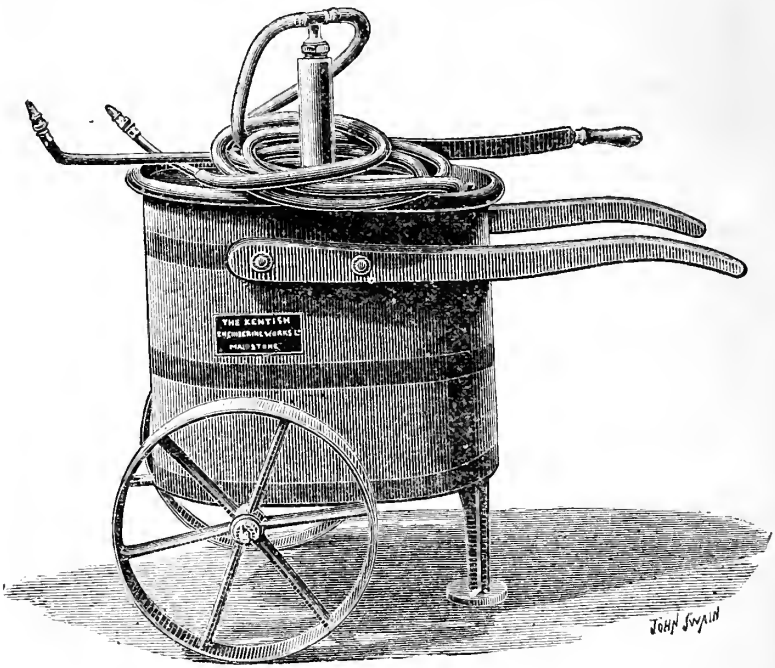

FIG. 8.—A Hand Hop-washing Machine.

arranged in rows. This machine will distribute from 100 to 350 gallons per acre, being intended, as its name of "Mistifier" implies, to diffuse liquid in a dense mist. The ordinary horse hop-washing machines put on from 500 to 700 gallons per acre. There are two sizes of these machines, one requiring two horses and the other only one.[1]

The expense of washing with these machines is not much less than by hand; but the advantage of them is that a large

[1] The cost of horse hop-washing machines is from 35*l.* to 48*l.*

breadth of land can be got over quickly, and before the aphides can do any serious injury to the plants.

It is difficult to explain the reason of the continuous visitations of hop aphides. It is supposed to be from the numbers of damson and plum trees that have been planted in many places in the vicinity of hop plantations; as it has been demonstrated by Professor Riley, the United States entomologist, that the winged female aphides migrate from the hop plants to damson and plum trees in the autumn, and place their eggs thereon. From these eggs, according to the great authority cited, winged viviparous females come in the spring, and fly to the hop plants, and begin at once to produce larvæ, termed lice by hop planters. It is held by some that the larvæ hibernate in or round the roots of the hop plants, as they have been seen upon young bines as early as March.

Wireworms.

These do much harm, sometimes, to young hop plants, and may be entrapped by putting pieces of mangel wurzel, swede, potato, or rape cake round the hills, which must be examined, and the wireworms picked from them twice a week.

Jumpers.

The jumper, *Euacanthus interruptus*, a species of the Cicadæ,[1] is most troublesome to the young bines, especially on light and stony soils. It pierces the bines with its sucking organ, or rostrum, causing the sap to exude, and frequently much weakens the plants.

Many can be taken by holding tarred boards near the poles and tapping these with a stick, making the jumpers leap into the tar. Washing with soft soap and quassia mixed, as for aphides, has been found efficacious, and with soft soap and paraffin at the rate of 2 or 3 quarts to 100 gallons of water.

Red Spider.

The Red Spider, *Tetranychus telarius*, is most destructive in very hot summers. It gets under the leaves, extracts their sap, and makes them drop off. In Germany its action is called fire-blast—*Kupfer-brand*. Since washing for aphis blight has been so generally adopted, red spider has not been so troublesome,

[1] *Monograph of British Cicadæ or Tettigidæ.* By George Bowdler Buckton, F.R.S.

as it cannot bear moisture. Bines should be cleared away at once from infested land and burnt, and the ground well limed and dug early, so as to cover up the dead leaves soon. The land should be kept free from weeds, as the spiders hibernate upon them. Infested plants should be washed with carbolic acid and water.

Hop Flea.

This insect, *Haltica concinna*, allied to the turnip flea-beetle, or turnip fly, *Haltica nemorum*, very often seriously attacks hop bines just after they have sent forth shoots, and completely stays their growth. Sometimes it follows the bine throughout the season, and finally gets into the cones and much injures them. To prevent their attacks, all old bines should be carefully removed, as the fleas winter in them. The ground should be well pulverised, and soot and lime mixed and put on where the plants are attacked.

The insects described above are those most troublesome to hop planters. There are others, but they need not be mentioned here, except a tiny fly, or rather its maggots, which do much mischief just when the cones are ripening, by mining their strigs, or stems, entailing premature and rapid decay. It is not known exactly to what species this fly belongs, and it is feared from its habits that there is no remedy against it. As it evidently hibernates in the ground in the vicinity of the hop hills, caustic applications might be of some use, but the larvæ and pupæ are most minute.

Beneficial Insects.

Among the insects that infest cultivated crops some are found to be most useful in reducing the numbers of those that are especially injurious. Unfortunately, it frequently happens that such valuable friends are not distinguished from foes, and either no attempts are made to encourage their increase, or they are recklessly confounded and destroyed with their bad companions. In the case of the hop plant, there are several kinds of insects peculiarly beneficial. Chief among these are some species of the *Coccinellidæ*,[1] whose dusky, six-legged larvæ, termed "niggers" in the hop districts, devour aphides in all stages with the greatest voracity. Foremost among these "ladybirds" is the species distinguished as *Coccinella septempunctata*, which is red, with seven black spots. Its larva is half an

[1] Professor Forbes of Illinois, U.S., found that some species of the *Coccinellidæ* feed upon the spores of certain fungi.

inch long, having red and yellow marks upon it. The other species are smaller. One has only two spots; another has four. In hot, dry weather ladybirds appear in great quantities. Their little conical yellow eggs can be seen fastened in groups of from six to twelve on the under sides of the hop leaves. From these, tiny larvæ emerge, and immediately begin to scour the plants for aphides. Ladybirds should be preserved, not only in hop-producing districts, but everywhere, as they feed indiscriminately upon all kinds of aphides infesting field and garden crops, and although they may be sometimes rather unpleasant in houses, where they frequently hibernate, they should not be killed. Housekeepers often sweep them—these *bêtes à bon Dieu*, as the French call them—from their winter retreats in the corners of sunny windows and behind window shutters, and other places, and, in barbarian ignorance, put them into the fire.

There are two or three species of ichneumon flies which

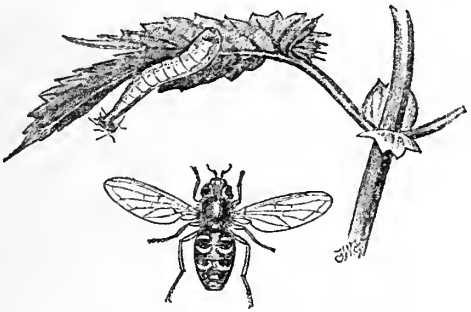

Fig. 9.—Syrphus pyrastri. Fly and larva, magnified.

destroy hop aphides by depositing eggs within their bodies at various stages of their life history. If aphides upon hop plants are examined, red spots can be often seen upon their backs. These are the larvæ of ichneumon flies, in the act of consuming their hosts.

Larvæ of species of the Hemerobiidæ (lace-wing flies), notably *Chrysopa perla*, nearly three-quarters of an inch long, ugly-looking, and so ferocious and rapacious that the French term them *lions des pucerons*, also destroy quantities of aphides, and must not be mistaken for enemies.

Another friend of the hop planter is the greenish larva of the large, pretty dipterous fly known as *Syrphus pyrastri* (fig. 9). This larva is about three-fourths of an inch in length, with the anterior part of its body tapering to a point. Its mouth is provided with a three-pronged harpoon, by means of which it transfixes the aphides. After it has transfixed them, it flourishes them in the

air in a triumphant manner, and devours them with marvellous speed. Being without eyes, it makes sweeping motions on every side with its head, and nearly the whole of its body, as shown in fig. 9, in order to find aphides near to it. The quantity of aphides consumed by one of these larvæ is extraordinary. It clears a hop leaf in a few minutes, and proceeds to another. Yet specimens of these have been sent to the writer with the suggestion that they were new foes of the hop plant. The larva of a kindred fly termed *Syrphus balteatus* is also useful, but is not so generally found in hop plantations. It may be stated here that the larva of *Syrphus pyrastri* will eat almost every kind of aphis, and was found in exceeding quantities last year (1892) upon wheat plants infested with *Aphis granaria*.

Mildew.

Mildew, or mould, as it is usually termed by planters, is frequently a serious scourge, which not only reduces the crop but materially damages its quality, and there is not at present a remedy for it that is perfectly efficacious.

Mildew is caused by the action of a fungus, styled scientifically *Sphærotheca castagnei* or *Podosphæra castagnei*, belonging to the group of fungi known as Ascomycetes, and to its division of Erysipheæ, according to De Bary's classification.[1] The vine mildew, *Oidium Tuckeri*, which causes much harm in French and German vineyards, also belongs to the group of the Erysiphæ, but this must not be confounded with the other fungus, *Peronospora viticola*, far more injurious to vines than *Oidium Tuckeri*.

This fungus is propagated by germs, or spores, carried in the air to the hop plants, upon which they speedily germinate, sending haustoria, or suckers, through the epidermis of the leaves. De Bary shows that the conditions necessary for the germination of the spores are pretty much the same as for seeds, namely, a certain temperature and a supply of oxygen and moisture. When the spores find congenial hosts, hyphæ are put forth, forming the mycelium, an aggregation of white threads, which appears upon hop leaves attacked by the mildew. Haustoria from the mycelium permeate the tissues of the leaves and live upon them.[2] Much harm is not, however, occasioned by the fungus upon the leaves, but when the burr, or incipient cone, begins to form, it is frequently infected at once by the spores of

[1] *Vergleichende Morphologie und Biologie der Pilze.* Von A. De Bary. 1884.

[2] The hop fungus, *Podosphæra castagnei*, is epiphytic, that is, it lives upon the plant and not within it, as the endophytic potato fungus, for example.

the fungus from the leaves, which fasten upon its stalk and the bases of the forming bracts, and stop its growth, so that it ultimately shrivels up. Or the fungus attacks the fully-developed cones on their stalks and the bases of the bracts where there is a good supply of sap, reducing them to decay in a short time.

After a while the whiteness of the mildew becomes brown from the formation of perithecia, or cases containing an ascus, or bag of eight spores, upon the mycelium. The spores remain in the bag until circumstances favour their further development. De Bary points out that this period of rest coincides with periods of vegetation and seasons in many fungi of this group, and it may be assumed that the resting spores of the hop mildew are dormant during the winter, as in the case of the rose mildew, *Podosphæra pannosa*, resting in the asci or bags, upon dead hop leaves and bines, or upon the pieces of bine left on the stocks, or on weeds, such as groundsel, so prevalent in hop grounds, plantain, dandelion, and others, or upon the ground.[1] The asci may be carried in the air to the hop plants in the spring, and, bursting, deposit their spores upon the leaves. After these have established mycelia, or centres, continuous generations of spores will be discharged if the surroundings are favourable, and conveyed by breezes to infect other plants. As is well known to planters, in some seasons mould does not "run:" that is, infection is not continued, from climatic influences, or other reasons that have not been determined. White spots appear on the leaves, but the cones escape; while in other seasons infection is rapid and disastrous, extending from the leaves to the burr and cones.

Prevention.—Hop bines from infected grounds should be burnt in order that all the asci upon them may be destroyed. Every particle of dead bines should be cut away in the early spring and burnt. Quicklime may be put over the hills in the winter. Sets or cuttings taken from plants that have been infected are very likely to spread infection. It is said that mould was introduced into Sussex with cuttings of new varieties.

It would be well to dip suspected sets or cuttings in a solution of sulphate of lime, or sulphate of copper; or lime and sulphur mixed should be dusted thickly over them.

Weeds should be kept from hop grounds, especially the dandelion, *Taraxacum dens leonis*; groundsel, *Senecio vulgaris*; and other composite plants; and plantain, *Plantago*; which are hosts of the fungus.

[1] Mohl says the spores of the Erysipheæ winter on the ground, as well as on the decayed leaves of their host plants. *Ueber die Traubenkrankheit.* Von Hugo Mohl, *Botanische Zeitung*, Berlin, 1874.

Remedies.—Sulphur is the only remedy that has been found of any efficacy. This is largely used in Kent and Sussex, but not nearly so extensively in Hants, Surrey, Herefordshire, and Worcestershire. Some planters put on black sulphur, *Sulphur vivum*, at first, and then finely-sublimated sulphur, flowers of sulphur. Others make use of flowers of sulphur only as being lighter and more adhesive to the leaves. This form of sulphur is much preferable, as it contains, if good, 95 per cent. of sulphur, while the black common sulphur only contains 55 to 70 per cent. of sulphur. The application is made by day now, almost invariably, and as far as possible in sunshine. From 40 lb. to 60 lb. of sulphur are applied per acre at each sulphuring. When the plants are fairly up the poles, the first sulphuring is given. About three weeks or a month afterwards it is repeated, and frequently again three weeks later, if there is the least indication of mildew.[1] If mildew persists sulphuring is continued, and even when the cones are out—though this is avoided if possible, on account of the objection of brewers, who aver that the particles of sulphur retained upon the cones affect the fermentation of the beer.

Sulphur acts by the evolution of sulphurous acid gas, which is destructive to fungoid life. The sulphur is volatilized by the influences of moisture and heat, and sulphurous acid gas is given off. In very cold, dull, summer seasons, the action of sulphur is most weak. In hot weather there is a considerable evolution of this gas, whose fumes can be smelt on passing by sulphured hop plants. It has been noticed that sometimes, in very hot, dry weather, the action of sulphur seems most inefficient; this is probably because there is not sufficient moisture to cause adequate volatilization. The uncertainty of volatilization and want of concentration of the sulphurous acid gas upon the fungus make sulphuring a rather unsatisfactory operation, and frequently entail the necessity of doing it over and over again, without apparent advantage. But it is the only remedy known that is in any way efficacious as against mildew; and independently of this, its application to hop plants is considered to impart vigour to them in some mysterious manner, in the same way that sulphate of copper dressings preserve the green colour and luxuriance of potato plants.

Sulphur is applied to hop plants by a machine drawn by a horse between the rows. This is light of draught, having two large wheels, upon which there is a hopper where the sulphur is

[1] This is the practice of the French wine-growers, who sulphur vines for the vine mildew three times at regular periods in the growth of the vine.

placed. A fan within this, moved rapidly by cog-wheels connected with the travelling wheels, drives the sulphur through a blast-pipe, from which it is distributed in a dense wide-spreading cloud. An arrangement to regulate the supply can be adjusted while the sulphurator is moving. About five acres per day can be sulphured with this machine, which costs about 12*l.*

Sulphate of copper has been tried for hop mildew, but only to a very small extent. It would seem that a happy combination of sulphate of copper with the soft soap and quassia solution used for aphis blight ought to have the result of stopping both mildew and blight. Experiments in this direction will be made in the ensuing season.

"Lewing."[1]

Wind has a baneful effect upon hop plants when the burr is forming, and afterwards in all stages of the growth of the cones. It hinders their full development, and when they are getting ripe the heavy gales which invariably come towards the end of August make them brown by bruising them. Many kinds of screens, or "lews," are adopted to lessen the force of the wind; some natural, as quick hedges, in parts of Kent, which grow as high as twenty to twenty-five feet in some districts, and rows of Lombardy and other kinds of poplar. Others are made of high poles set closely together, or of hop plants put as near to each other as possible, and trained up poles pitched close together round the outsides of hop grounds. Light cloth of a coarse mesh, made of cocoanut fibre, is stretched about twelve feet wide at about eight feet from the ground[2] upon wires fixed to permanent poles, in those parts of the hop ground exposed to the prevailing wind. Where considerable lengths of this are put up, strong posts are required at intervals between the poles, or the whole screen will go down with a mighty smash. "Lewing," or screening, in this way, is expensive, but it is now adopted by most of the large planters.

Picking.

Hops are not, as many suppose, distinct flowers, but strobiles, or collections of imbricated scales, or bracts, under which are yellowish, aromatic, lupulinic glands. These strobiles are like the cones of firs, being in reality the fruit of the hop-plant rather than its flower, which is inconspicuous and

[1] In Pegge's *Alphabet of Kenticisms*, "lew" is given as meaning sheltered. The word is used in Kent as a verb, noun, and adjective.

[2] This is generally made in widths of six feet, and costs about a shilling per running yard.

situated at the base of the bract. The time for picking these strobiles is indicated by their change from a light gold colour to a somewhat deeper hue, also by their closing up at the tips and making a rustling sound when touched. Their seeds are firm and dark-coloured when the strobiles are fit to pick. At the same time, it must be said that hops "go off" so fast in these degenerate days, and get brown so soon, that in many cases they have to be picked before they show these indications of ripeness. Light-coloured hops are in much demand also for pale ales; consequently many planters begin to pick as soon as the hops will take the fire, and before they are actually ripe, though this entails a sacrifice of weight and brewing power.

Picking now generally begins from about the commencement to the end of the last week in August. In hot seasons early hops are ready even before these dates, such as Meophams, Prolifics, and White's Early Goldings. Bramlings follow on quickly in order of ripening. Then come Grapes and Goldings of various kinds. In Herefordshire and Worcestershire, after Meophams, etc., Bramlings and Cooper's Whites follow on, then Mathons and Fuggle's.

Planters, as far as possible, arrange their plantations so as to have a regular succession at picking time. As a rule, the picking season lasts about three weeks. Formerly it lasted five or six weeks, when brown samples were in considerable demand, but now these are difficult to sell, and there is a general rush to get the hops picked as quickly as possible.

The hop-picking season is a great harvest for the labouring classes in the hop districts, and all with one accord turn out to this work, which is light and pleasant. Besides the inhabitants proper, crowds of immigrants swarm to many of the hop-producing villages in Kent and Sussex from London, and in Herefordshire and Worcestershire from Birmingham, Wolverhampton, and other large towns. In Hants and Surrey pickers come to the hop gardens from the neighbouring villages and small towns. At least 60,000 strangers come into Kent and Surrey from the courts and alleys of London and elsewhere by special "hoppers'" trains, at cheap rates, and by road. These are provided with lodgings, straw for bedding, faggots for fuel, and water for cooking and washing, by the planters. The lodgings are, ordinarily, rows of single rooms or compartments, seven feet by nine feet, each having a door, built of brick, or stone, or lath and plaster, with slate, tile, or corrugated iron roofs.[1] Some

[1] The Sanitary Authorities in the hop districts have codes of bye-laws regulating the accommodation for hop-pickers

planters provide bell tents, but they are not quite fit for women and children in wet seasons. Cooking-houses are also provided lean-to buildings with open fronts, with chimneys, and rows of hooks to hang cooking-pots upon. Accommodation for hop-pickers entails considerable expense upon the owners and occupiers of hop farms, especially as it is required by public opinion that this should be fit and proper for human beings. Upon some farms in Kent as many as 1,500 strangers are annually employed and housed.

The pickers are told off in companies of eight to ten, under the charge of a "binman," who pulls up the poles for them, and holds the pokes, or sacks, when the measurer comes round to measure the hops picked. The binman cuts the bines about 3 ft. from the ground and pulls up the poles with a wooden lever with iron teeth, termed a "dog," and carries them to the pickers, who pick them into a bin, a long, light, wooden frame with a sacking bottom, or in some places into a basket. It is a good method when hops are picked before they are quite ripe, or if the plants are weak, to cut the bines 5 ft. or 6 ft. high and push the part with hops upon it up and over the poles with forked sticks. By this the lower portion is kept to the poles, and the bines do not bleed or lose sap nearly so much as if they are cut close and lie on the ground.[1] This is extensively adopted in many of the hop-producing districts. Two pickers take one bin. Bins are used in many parts of Kent and in Sussex, Worcestershire, and Hereford. In East Kent the hops are picked into large baskets holding 5 bushels. In Hampshire and Surrey they are picked into baskets holding 7 bushels. When picked, the hops are measured from the bins or baskets into "pokes," "greenbags," or sacks, holding 10 bushels.[2] The measurer, who measures the hops for six or seven companies, is accompanied by a boy who enters the number of bushels picked in a book kept by each picker, and also in a book retained by himself.

Before a ground is picked, it is divided or set out into as many small "sets," or portions, of 100 hills, as there are companies, for which lots are drawn by each binman, so that there may be no wrangling over good or bad sets. It is necessary to supervise hop-pickers with close care and to see that they pick the hops free from leaves, and singly, and not in bunches.

[1] This practice is of very ancient origin, as Reynolde Scot wrote in 1576. "Then you may with the forked ende thrust up or shove off all such stalks as remayne upon eche hoppe poale." *Op. cit.*

[2] In Hampshire and Surrey these sacks are called "sarpliers," and hold fourteen bushels.

Leaves show in the samples and spoil their appearance; besides, buyers object to pay for leaves.

Calculations as to the number of pickers required are based upon the amount of kiln accommodation upon each plantation and the probable out-turn of the crop in bushels. The price paid to pickers runs from $1\frac{1}{4}d.$ to $3d.$ per bushel. The average price is $2d.$ per bushel. When the hops have been measured, they are taken to the oast-houses in the "pokes," "greenbags," or "sarpliers," and put on the kilns at once in the morning. In the evening, as the kilns are not free till past midnight, the pokes are placed upon scaffolds round the oast-house so that the hops may not heat, as they would if laid on the ground, which must be avoided.

Drying.

Everything depends upon the drying of the hops. They may be grown to perfection, being bright, aromatic and full of lupulin, but if they are not dried enough, or if they are too much dried, these qualities are sacrificed. It may be said that, as a rule, hops are dried too rapidly and at too high a temperature. This is to a great extent necessitated by the limited amount of kiln accommodation, as kilns are expensive to build, and landowners somewhat naturally object to put up more than a certain number, as hop growing is a most speculative business and the kilns can hardly be turned to other purposes.[1] It is therefore the general practice to load each kiln twice a day, so that each loading gets about ten hours' drying. In these circumstances, during almost the whole of this time of drying it is necessary to maintain a high temperature of from 120 to 140 degs. Fahr. By this great and continuous heat a serious waste of valuable and essential principle is entailed. Hops that are dried by sun heat and air in Germany have much higher percentages of essential oil, and other principles valuable in brewing, than the finest East and Mid Kent hops that have been dried at high temperatures. Spält hops do not contain naturally a larger proportion of these principles than those of Kent; but in the former the slow mode of desiccation preserves their intrinsic qualities, while in the latter the merciless treatment of stewing or baking to which many of them are subjected causes the absolute, visible loss of lupulin, or gold dust, besides the escape of ethereal essences. English hops dried slowly at a temperature never rising beyond 100° Fahr. were found on analysis to contain

[1] Hop kilns are occasionally used for malting barley for cattle food, for drying corn in the sheaf in wet seasons, and for storing apples.

larger quantities of resin, oil, and bitter principles, and at the same time considerably less moisture, than Spält hops dried by the same process. Worcester hops dried in this gradual manner were found to be infinitely richer in desired qualities, and to have far less moisture than those from Kent—East, Mid, and the Weald—Sussex, Bavaria, Belgium, and America, dried according to the ordinary practice.

The kilns for drying hops are of simple construction, being occasionally square, but more frequently round chambers, from 16 to 20 feet in diameter, with stoves or fire-places in them, and from 14 to 18 feet high; at this height a floor of narrow joists or oast laths, an inch and a-half or so apart, is laid over the chamber. At this point the sharply-sloping roof commences,

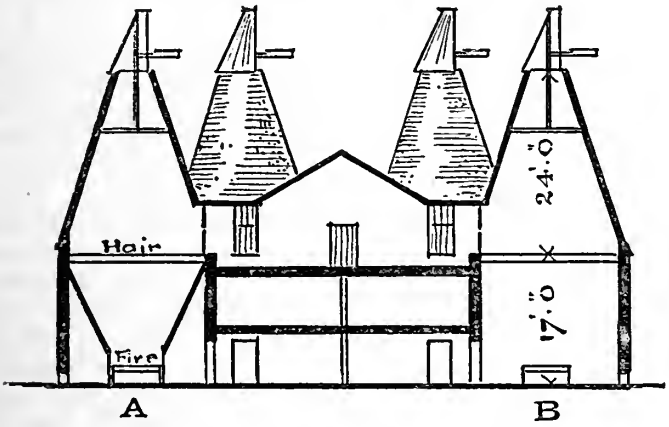

FIG. 10.—Section of Group of Kilns and Cooling Room.

being carried up to an apex with a circular aperture of from two to three feet, upon which a cowl is fixed. The roof is from 20 to 26 feet high. A section of a kiln is given in fig. 10, B, in which the relative height of the various parts is indicated.

The kiln or chamber is in some cases merely a room with open iron stoves in it, as shown in the two lower kilns of the ground plan D in fig. 11, and in fig. 10, B, having holes at intervals in the walls just above the ground-level to allow the admission of cold draughts to drive up the hot air through the hops above. Over the open stoves, iron plates are hung five or six feet from the floor, to break and distribute the volume of heat from the stoves. The cold air currents can be regulated by shutters over the draught-holes.

It is better that the stoves in the chambers should be set in

brickwork, forming an inner circle (fig. 10, A, and the two upper kilns, fig. 10), so that the hot air is more concentrated, while

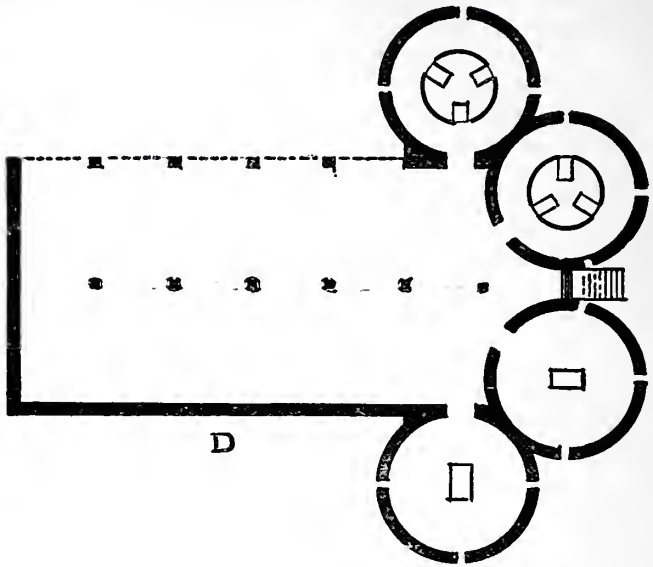

FIG. 11.– Ground Floor of Kilns and Cooling Room.

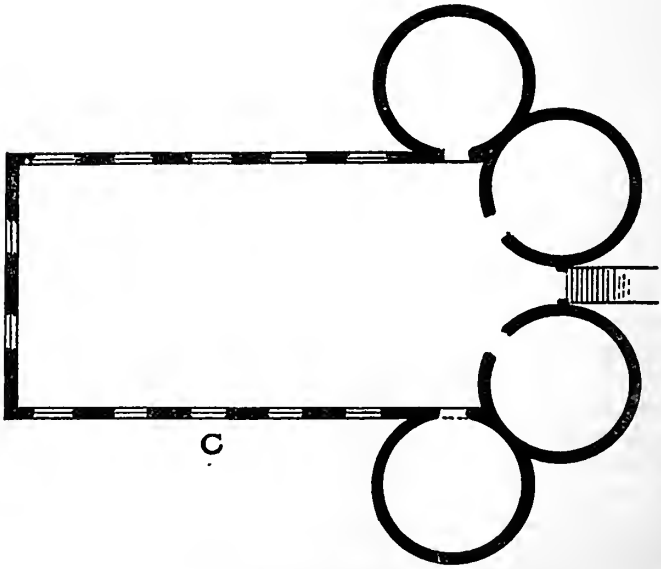

FIG. 12.—Upper Floor of Kilns and Cooling Room.

the cold draughts do not mingle with it directly and diminish its heat. Upon the floor of joists or oast laths horsehair cloth is nailed to prevent the hop dust from falling through, and to keep the hops from burning (fig. 10, A).[1]

Welsh anthracite coals are generally used for drying. Coke is mixed with these coals by some planters. In Worcestershire and Herefordshire a good deal of coke is burnt. Charcoal is employed extensively to keep the fires going, and many dryers put much on the fires, as it is considered that it makes the hops soft. For the first hour or two the fires are ashed up and allowed to glow gradually, so that the heat is increased slowly. A temperature of from 120 to 130 deg. Fahr., and even higher, is reached, and must be maintained in order to dry the hops, laid at from 8 to 10 inches thick upon the floors, in less than 12 hours, and so that the kiln may be loaded twice in the 24 hours.[2] This temperature, as has been pointed out before, is too high. The hops would be far better in every respect if they could be slowly desiccated at a temperature of from 80 to 100 deg. Fahr. But this would take 18 or 20 hours or more, and would necessitate a double amount of kiln accommodation, as the hops must be picked within a very short time.

Sulphur is burned on the fires generally in all districts. It is put on soon after the hops are on the kilns, when they have begun to reek; and again later on, when the hops are turned, another quantity is put on the fires. From 10 to 20 lb. of best "Virgin roll" brimstone are burnt for each kiln load. Sulphurous acid gas is generated from the burning sulphur, which has a strong acid reaction and has in a degree the effect of bleaching the drying hops. This action of sulphur is limited, as the fumes being driven off by the air currents cannot be properly concentrated upon the hops; but planters have considerable faith in the virtue of sulphur fumes for imparting a yellow colour to the cones, and in bleaching those that have been made brown by sun and wind. The application of sulphur to drying hops does not injure them for brewing in any way. No sulphur is retained in or on the cones. This process must not be confounded with that of throwing up powdered sulphur over the plants for mildew, some of which may possibly be retained in the strobiles in cases where sulphuring is done when these are formed.

Two kilns of 20 feet square, or of 18 feet diameter, would suffice for 20 acres of hop land. These, with suitable cooling

[1] These figures of kilns and cooling rooms (10, 11, 12) were kindly drawn for me by Mr. Hubert Bensted of Maidstone.

[2] As a rule, kilns are loaded about noon and midnight.

rooms, would cost 500*l*. If the hops are dried at a lower temperature, the kilns must be doubled.

Several systems of drying hops at comparatively low temperatures have been introduced, some of which have been patented, but not one has been adopted extensively. The late Mr. Hopkins, of Worcester, invented a process of drying by means of a rapidly-revolving fan, which drives currents of heated air through the hops, arranged in two series of trays, one above the other. When the lower tray of hops is desiccated, it is drawn out and the upper tray is let down into its place. The hops are taken directly on the tray to the pressing machine, without having been trodden on, or turned, and without any loss of quality or flavour by the volatilization of oil and resin, and as whole as when they were picked.

Upon ordinary kilns the hops have to be turned over while drying that they may all be thoroughly desiccated; this naturally breaks them and causes the "gold dust," or lupulin, to escape; and the process of clearing the kilns and of pushing the dried hops to the presses, in many cases a considerable distance, further disintegrates them. A kiln floor of wrought iron rods with strong iron supports has been patented by Messrs. Hetherington, of Alton, arranged so that when the hops are dried the hair cloth upon which they are lying is drawn out by a drum with pulleys and chains, and the hops are delivered by the sides of the presses as whole as when they were put on, or they fall into a receiver, if the presses are distant, and are carried in it.

Above the floor, and well above the level of the drying hops, a light tramway is fixed to carry a trolley for the dryer to get upon to see how the hops are drying, and to turn them without trampling on and breaking them. Very good samples have been seen from kilns fitted with this patent, the hops being whole and, consequently, having retained their lupulin.

Pressing.

Hops, after being dried, are now generally packed quickly into the pockets, and not left long to cool, as formerly. Extensive cooling rooms are therefore not required. No hops are trod by men's feet into the pockets in these days. They are invariably pressed into them by a machine, as shown in fig. 13.

Pressing machines are made upon the same principle as that in fig. 13, and differ only in details.[1] A circular foot, just large enough to go into a pocket which is 3 feet in diameter, is fitted to a ratchet

[1] Pressing machines complete cost from 14*l*. 10*s*. to 20*l*.

lever, worked up and down by handles. This is fixed immediately over the pocket hole cut in the floor of the cooling room. The pocket is fastened to a movable frame or collar, to keep it firm to the floor while it is being filled. After it is pressed full, the collar, is taken off and the mouth sown up. A "lug," or ear, is left on each side of the mouth. At the lower end two "corners" are made by putting a few hops in and tying them tightly with string. According to Act of Parliament (Vic. 29, cap. 37), the name of the parish in which the hops are grown must be legibly marked upon each pocket, together with its weight and the name of the planter. It is illegal to mix hops of different qualities and values.

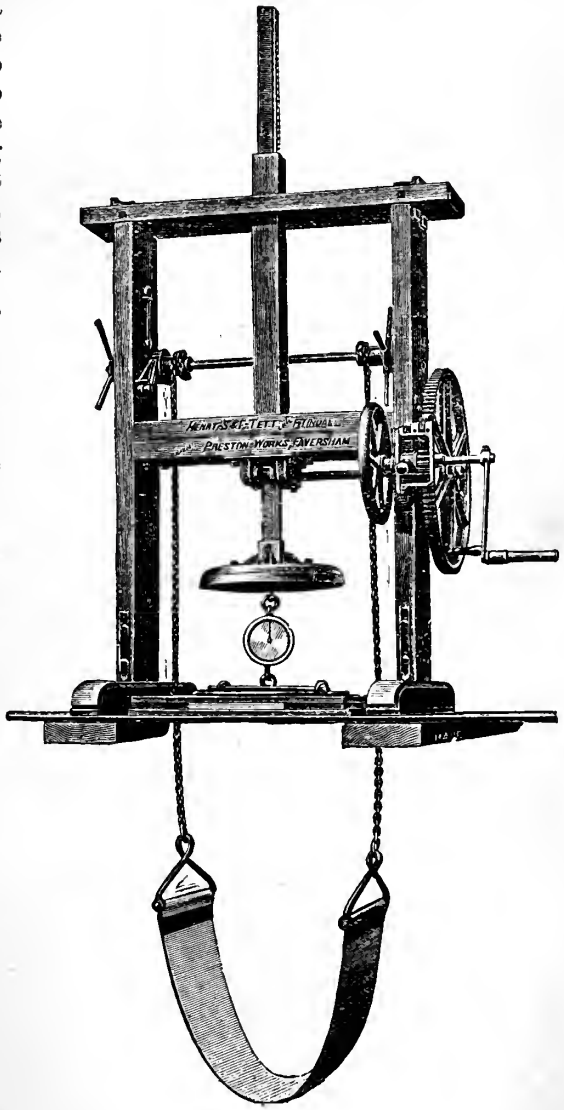

FIG. 13.—Hop Presser.

Pockets are made of coarse, thick sacking, costing about 5*d.*

per yard. They are rather over 6 feet long, and about 3 feet in diameter.

When the crop is picked, the pockets are generally sent at once to the Borough, the great centre of the hop trade, either for sale, or to be kept properly in well-aired and well-ventilated store rooms. If the hops remain long in the store room attached to oast houses, they frequently become crusted from damp and want of aeration.

For sale purposes a sample is taken from each pocket. Sampling is a delicate operation, requiring great care and nicety. A clumsy sampler will soon take off many shillings per cwt. from the look of the hops by want of skill in his manipulation. A good sampler, on the other hand, will give a good "face" to the samples, and make as much of the hops as possible. The process is as follows. The pocket is laid down with the seam side uppermost. The seam is cut a foot and a-half towards the middle of the pocket, its edges being fastened back with iron pins. An extractor with sharp knives and lever handles is thrust in, and a wedge of hops is drawn out. This is reduced with a sharp knife to a square of five or six inches by the sampler, who takes care to leave a smooth, uncut face. All the perfections and imperfections of management, colour, and character can be seen by the face, while the thickness, quantity of seed, "condition," and state of maturity at picking time, are indicated from the sides of the sample cleanly cut by the knives of the extractor.

In a perfect sample the cones, as seen on the face, should be whole, with the strigs or stalks completely free from mois ture, and the lupulin or "gold dust" adhering to the bracts A very few leaves should be seen, and the cones should be sing.e and not in bunches, and of a pale gold colour. An aromatic odour should pervade it, without the slightest trace of the sweet, "gingerbready" smell, like heated clover hay, indicative of too much fire. Upon rubbing down some of the sample in the hand, there should oe no fibrous residue, but the whole should chaff finely, leaving a yellowish resinous deposit on the fingers. A well-managed and properly desiccated sample is most elastic, and can be compressed by the hand into a small compass, re-bounding to its original size when the compression is removed. This is a valuable indication of judicious drying.

Many of the Kent and Sussex hops are sold by sample by factors in the Borough to merchants, who sell them to the brewers. Some are sold direct to brewers by the planters. This practice is becoming more frequent; by it the planters save

the factor's commission, and the brewers have not to pay for merchant's profits.

A certain part of the Hampshire and Surrey hop crop is sold at Weyhill fair in October.[1] The rest is sent to London. In Herefordshire and Worcestershire many planters take their hops to Worcester, where there is a hop market, and the hops are sold to merchants and brewers, and weighed at the public scales.

The Cost of Hop Production.

The cost of hop production has greatly increased within the last thirty years, on account of the enhanced price of skilled labour, the necessity of employing expensive methods to combat the attacks of insects and fungi, and the generally improved style of farming which has been rendered imperative in consequence of the competition of foreign countries.

It costs from 20*l.* to 25*l.* to plant and establish an acre of hop land, including manure, ploughing, subsoiling, setting-out, planting, purchase of sets, cultivating, rent, rates, &c. Sometimes sets cost 10*s.* per hundred, which would be equal to 12*l.* 10*s.* per acre for sets alone, but their average price is 5*s.*, or 6*l.* 5*s.* per acre for a six-feet square plant. Lance, in his *Hop Farmer*, put the cost of planting an acre of hop land at 18*l.*, in 1838. Mr. Buckland estimated this at 22*l.* 15*s.* per acre in 1845,[2] including draining.

To this first cost must be added the amount for equipping the hop land with proper poles required at the end of the first year. This, as shown before, ranges between 20*l.* and 40*l.* per acre, according to the sizes of the poles.

Hop land costs close upon 35*l.* per acre annually, taking an average of the whole of the districts. On highly-farmed hop land in East and Mid Kent the cost per acre often amounts to 40*l.* per acre. The average cost, put at 35*l.*, is made up of the items set forth in the table on p. 260.

In 1798 Mr. Marshall put the yearly expense of hop land in Kent at 22*l.* per acre, exclusive of all charges connected with picking, packing and selling, which he estimated at 1*l.* per cwt.[3] Mr. Mainwaring reckoned that the total cost of producing 8 cwt. of hops per acre in Worcestershire was 24*l.* in 1855,[4]

[1] A percentage of pockets representing each growth is "pitched" at Weyhill fair in barns.

[2] *On the Farming of Kent.* By George Buckland. Journal of the Royal Agricultural Society, vol. vi., 1st series, p. 287.

[3] *Rural Economy of the Southern Counties.* By Mr. Marshall, 1798.

[4] *A Treatise on Hops.* By T. Mainwaring, Worcester, 1855.

but practical Worcester planters say that a crop of 8 cwt. per acre now costs from 30*l.* to 35*l.*

ANNUAL AVERAGE COST OF AN ACRE OF HOP LAND.

	£	.	d.
Manure (winter and summer)	6	10	0
Digging	0	19	0
Dressing (or cutting)	0	6	0
Poling, tying, earthing, ladder-tying, stringing, lewing	2	3	0
Shimming, nidgetting, digging round and hoeing hills	3	0	0
Stacking, stripping, making bines, &c.	0	17	0
Annual renewal of poles	2	10	0
Expense of picking, drying, packing, carriage, sampling, sale, &c., &c., of an average crop, of, say, 7 cwt. per acre	10	5	0
Rent, rates, taxes, repairs of oast and tacks, interest on capital	6	0	0
Sulphuring	1	0	0
Washing, say	1	10	0
Total	£35	0	0

PROFITS AND PROSPECTS.

Hop farming is a most speculative business, on account of the precarious character of the crop, and the heavy expenses connected with its production, as well as the peculiar fluctuations of the hop market, due in a great degree to the unsatisfactory practice of the chief part of the crop being sold by the growers in October and November, through factors, to a very limited number of hop merchants. These are, as a rule, men of large capital, and are able by action or inaction to influence materially the prices of hops, to some extent irrespective of the positions of supply based on production, and demand based on the actual requirements for consumption. The growers in these circumstances frequently will not take prices thus offered, and in many cases miss the market, and have to take much lower rates later on.

Sometimes large profits are made—of from 50*l.* even to 100*l.* per acre—by fortunate individuals or good managers, who have grown large crops in seasons when the general yield has been short. Upon the whole, taking the average of the past few years, hop growers have fared better than other agriculturists, and it seems probable that hop growing will continue to be remunerative if the growers do not extend their acreages beyond their capital and plant hops in unsuitable land, and if the foreign importations do not materially increase. The importa-

tions have averaged 193,943 cwt.[1] per annum during the last ten years. The chief exporting countries are Belgium and Holland, from which quantities of hops of inferior quality are sent. America comes next, and Germany next.

The following table shows the quantities of hops exported from each country into Great Britain in 1891, and their value:—

HOPS IMPORTED INTO GREAT BRITAIN IN 1891.

	Cwt.	£
Belgium and Holland	77,992	346,776
United States of America	80,226	426,068
Germany	17,199	91,689
France	15,893	94,813
Russia	301	1,135
Other foreign countries	16	116
Total	191,627	960,597

In 1892 the quantity of hops imported into Great Britain was 187,507 cwt. Their value, and the details as to the countries from which they were exported, have not yet been published.

It is estimated that the total amount of hops grown in England during the last ten years, ending 1892, is equal to 4,852,381 cwt., or an annual average yield of 485,238 cwt. The quantity of hops required on an average for a year's consumption in Great Britain is estimated at between 600,000 cwt. and 650,000 cwt.[2]

In order to show the extent of hop cultivation in the world, the figures published in 1892 by Messrs. Barth, German hop merchants, may be quoted. According to these, there are 287,395 acres of hop land in the world, of which 229,895 acres are in Europe, 55,000 in America, and 2,500 in Australia.

A further interesting estimate, issued by Messrs. Barth, shows that the total produce of the world's hop land was 1,566,000 cwt. in 1892, while the total consumption of hops for the same year is put at 1,624,000 cwt.

The prices of hops fluctuate exceedingly, ranging from 2*l.* 10*s.* to 5*l.* per cwt. in abundant seasons, to 20*l.*, and even 30*l.* in those when the yield is very small. The average price of the last thirty years is about 7*l.*, and if the average crop is reckoned at 7 cwt. per acre, there does not appear to be a large margin

[1] Against this must be set 8,947 cwt., the annual average amount of foreign hops exported from Great Britain during the past ten years.

[2] From the total available supplies of English and foreign hops imported into England, 127,920 cwt. of English and foreign hops exported from Great Britain during the last ten years must be deducted; or 12,792 cwt. per annum.

for profit, though some growers do far better than others in the same seasons, and in their turn they fare worse.

Prices of hops also vary according to the district in which they are grown, and their variety. Generally East Kents make from 15*s.* to 25*s.* per cwt. more than Mid Kents, which are worth from 10*s.* to 1*l.* per cwt. more than Weald of Kent and Sussex hops. Hants and Surrey hops range in value between East and Mid Kents, and Worcester and Hereford growths, as a rule, rank with the latter of these in price.

CHARLES WHITEHEAD.

THE PROGRESS OF LEGISLATION AGAINST CONTAGIOUS DISEASES OF LIVE STOCK.

I.

THE losses which have been sustained through the ravages of imported diseases amongst the flocks and herds of the United Kingdom since the first outbreak of that very infectious and contagious disorder popularly termed "foot-and-mouth disease" until the present day cannot be estimated, inasmuch as no complete records were obtained until after the Contagious Diseases (Animals) Act of 1878 came into operation. That they amount in the aggregate to hundreds of millions sterling is beyond question. Ruinous as these losses were to stock owners, and seriously as the cost of meat to the consumers was enhanced by the repeated and severe outbreaks of disease, no attempt was made by the Legislature to deal with the latter until after the visitation of cattle plague in 1865, and then only by half-hearted measures, the outbreaks being represented to be spontaneous and the tracing of their origin being not even troubled about.

Of these disorders, *foot-and-mouth disease* was the forerunner, and imposed far greater losses upon the country than all the other diseases combined. As, however, it was not so fatal as other disorders, it was not seriously considered, and was even treated with levity by some agricultural writers.

It is noteworthy that its first outbreak occurred in the year of the establishment of the Royal Agricultural Society of England; and in the Appendix to the first volume of the Society's

Journal the Veterinary Committee of the Society, in concert with Professor Sewell, of the Royal Veterinary College, report upon it as an "epidemic among cattle," giving "a concise and practical statement of its symptoms and treatment for the information of the members," this being followed by "recommendations of the simplest remedies at present in use for arresting the progress of the disorder." It was added, "The Committee would strongly recommend the disordered animals to be kept apart from the other stock, as there is much doubt whether the disease does not partake both of an epidemic and infectious character."

In the Appendix to the second volume of the Journal a further report is given. Circulars having been sent to each member of the Society "containing queries for information on the nature and extent of the prevailing epidemic among cattle and other domestic stock," nearly 700 communications were received and generalised by Professor Sewell in the report, dated July 17, 1841.

This report states that foot-and-mouth disease first appeared in England in 1839, that nearly the whole of those who sent communications had suffered from its attacks, and that "all kinds of stock were indiscriminately attacked, even poultry, dogs, cats, and deer." One correspondent "stated that himself and all his family and domestics were attacked in consequence of using the milk of his diseased cows." It was believed that neither situation, nature of the soil, nor general features or aspect of the country afforded any exemption from the disease, neither had the quarter from which the wind blew any influence. The "inflammatory action was more intense and the disease more fatal among animals that travelled to fairs or markets, by which it was introduced into premises and farms heretofore exempt, and thus became disseminated in healthy districts." "Fever was increased by fatigue in travelling; the feet became acutely inflamed, causing the hoofs to shed or exfoliate, and many animals were in consequence slaughtered on the roads."

In those days there were no laws for the prevention of cruelty to animals, and it is said that, after business, baskets full of sheeps' trotters were swept together in the sheep pens of the Old Smithfield Market. Such was the revolting cruelty to which the dumb animals were subjected.

The information obtained by the Veterinary Committee of the Royal Agricultural Society left but little room for doubt respecting the infectious and contagious nature of the disease, but the circulation of the report was almost exclusively limited to the pages of the Journal of the Society.

The same year that witnessed the outbreak of foot-and-mouth disease in England saw the introduction of *pleuro-pneumonia* into Ireland by means of a Dutch cow.

With regard to pleuro-pneumonia among cattle, Mr. George Waters, veterinary surgeon, in his prize essay in this Journal (Vol. IX., 1848, p. 343) says, "It first appeared in this country about the year 1841, previous to which period it had existed and committed great ravages among the cattle in Ireland and on the Continent; and in England a very great proportion of the whole number of cattle which have been affected have died." Whilst, however, pleuro-pneumonia claims cattle only as its victims, foot-and-month disease attacks all ruminating animals, pigs, and even, it has been said, man himself.

Although the Privy Council had powers [1] placed in their hands, under the Act 12 Victoria, cap. cvii. (1848-49), to prevent the spreading of contagious or infectious disorders amongst cattle, sheep, and other animals, they did not make use of them, and the diseases were allowed to spread themselves throughout the length and breadth of the land, without their contagious nature, or even the source of their introduction, being inquired into.

The importation of *sheep-pox* in 1847 was the next serious trouble, and is thus reported upon in the Journal (Vol. XVIII., 1857, p. 203) by Professor Simonds:—

> It was ascertained in the most conclusive manner that it had been introduced here by some "Merinos" which had been shipped at Tönning on the coast of Denmark, and also by some others shipped at about the same time at Hamburg for the supply of the English market, and in whose systems the disease was incubated. From the free commingling of these foreign sheep with our own breeds in the London cattle market, and also from the circumstance that many of them were purchased by farmers as "stock sheep," the small-pox was soon spread over a great extent of country, proving destructive to life in numerous instances at the rate of even 90 per cent. This state of things was met by legislative enactments with a view to arrest the progress of the disease, and happily they proved of essential service in so doing. By the expiration of the third year from the outbreak scarcely an instance of the disease could be met with in any part of the country, and this notwithstanding that tens of thousands of animals were to our own knowledge affected in the year succeeding its introduction.

It is obvious what an advantage it would have been to the nation at large had these legislative enactments been extended to cattle and swine. About the year 1843 my attention was drawn to an outbreak of pleuro-pneumonia in a dairyman's herd at Hereford, where the entire number of 22 milch-cows

[1] No *special* powers were, however, assigned to the Privy Council till 1868 with regard to pleuro-pneumonia, and till 1878 with reference to foot-and-mouth disease.—Ed.

succumbed to that disease, which was allowed to run its course not only without restriction, but fresh virus was repeatedly and uninterruptedly imported from foreign countries, through the medium of animals brought in with the object of meeting the food requirements of the increasing population of the country. The fact was entirely overlooked that the losses imposed by the diseases often far exceeded the value of the animals imported.

That careful writer of bygone days, Youatt, in his treatise on *The Breeds, Management, and Diseases of Cattle*, published in 1834 under the auspices of the Society for the Diffusion of Useful Knowledge, made no mention of foot-and-mouth disease, but related what he justly designated an interesting account of pleuro-pneumonia, written by M. Lecoq, a teacher in the Veterinary School of Lyons. Had his teaching been closely followed when the early outbreaks of the disease occurred in the United Kingdom, the waste of many millions of the nation's wealth would have been avoided, and the sorrows inflicted upon the owners of stock in seeing their animals swept away by disease, against which they were powerless to guard, would at the same time have been averted. No rigid inquiry appears, however, to have been made into the first outbreaks; neither was there any attempt to prohibit further importations of these malignant contagious and infectious diseases.

It was unfortunate that Professor Simonds, in the same article that he wrote (Journal, Vol. XVIII., 1857, p. 201) upon the outbreak of sheep-pox, said, respecting foot-and-mouth disease and pleuro-pneumonia:—

> It is worthy of a passing remark that neither of these was an imported disease. It was not until several months after pleuro-pneumonia had established itself in the country that an alteration took place in the tariff by which live stock came in free of duty, and up to that time the high rate of duty prevented any importations of foreign cattle or sheep being made. This fact in itself is sufficient to prove that the malady was not imported by foreign cattle.

This statement from so high an authority was freely used to confound the efforts of those whose energies were directed to remedy the evils under which stock-owners were suffering. The value of Dutch cattle as heavy milkers being well known in those days to the dairymen of London, and the first outbreak recorded of foot-and-mouth disease having occurred at Stratford, in Essex, these facts taken together form a strong presumptive argument that a diseased animal or animals had been smuggled in. If no such trade had been carried on, they would not have been appreciated for their milking properties.

The origin of these diseases not being traced, they were con-

sidered to have arisen spontaneously, and persons who entered upon the very precarious occupation of farming were told that they must be prepared to submit to such diseases as a part of the ordinary casualties of their business. No sanitary regulations were enforced for cleansing and disinfecting the conveyances used for cattle, or other living animals, either by sea or by land. Consequently railway cattle-trucks and the yards or pens used in the loading and unloading of animals, and the vessels employed for their transit by sea, were each and all in a disgusting state of filth, and as such were hotbeds of disease.

In December 1862, at the invitation of the late Mr. Holland, M.P., subsequently President of the Royal Agricultural Society in 1874, I attended a conference at Evesham on the tenant-right question. The next day, when we were looking round his farm and homestead, Mr. Holland's herdsman drew his attention to the fact that his grand lot of fat Shorthorn oxen that were prepared for the Christmas market had that morning been attacked with foot-and-mouth disease. The late Sir John Pakington, M.P. (afterwards Lord Hampton), was of the party, and I at once embraced the opportunity of pressing upon the attention of these distinguished members of Parliament the state of the flocks and herds of the country, and the necessity for an Act being passed to correct the many evils to which they were unrestrictedly exposed. The next session a Bill was introduced by Mr. Holland and Sir William Miles; but, like many other private Bills, with no further result.

The following year Mr. Bruce (now Lord Aberdare) and the late Sir George Grey, Home Secretary, introduced two Bills, one to deal with the home traffic, the other with the importations. These Bills were read a second time on the 9th of March, 1864. When introducing them Mr. Bruce submitted an estimate obtained from a Live Stock Insurance Company showing that the aggregate annual losses from deaths due to contagious diseases amounted to 6,120,000*l*. Nothing was included in that estimate for loss of dairy produce, loss from sterility in breeding animals, or for deterioration, which in the case of foot-and-mouth disease was often very serious, and usually equivalent to the whole of the summer's grazing.

When the former Bill was before the House of Commons a special meeting of the London Farmers' Club was convened to consider its provisions. A very general expression of opinion prevailed against it, on account of the proposed interference with animals when suffering from foot-and-mouth disease. The arguments were, that, however well animals might be when sent from home to the London market, they would contract the disease

during transit, and if not sold at the first market they would most assuredly be down with the disease before the next market day, and the owners would then be unable to sell or remove them. A deputation was appointed to wait upon the Home Secretary, in order to convey to him the feelings of the Club. The result was that the Bill was dropped, and when the outbreak of *cattle plague* occurred in the following year the Government said "they had not sufficient power to deal with it."

As recorded in the Journal, Vol. XVII., 1856, the following communication was received from the Foreign Office, June 12, 1856 :—

I am directed by the Earl of Clarendon to transmit to you, to be laid before the President and Council of the Royal Agricultural Society, the accompanying copy of a despatch from Colonel Hodges, Her Majesty's Consul-General at Hamburg, enclosing a second report from the British Vice-Consul at Lübeck respecting the contagious disease that has broken out among the cattle at Mecklenburg.—E. HAMMOND.

The despatch contained a full and elaborate description of the disease, which left no room to doubt that it was the Steppe murrain, or rinderpest, popularly called Cattle Plague. It was officially sent to the Foreign Secretary, who was in the unfortunate position of having no authority in connection with the Government to whom to forward it. He therefore had no other alternative than to send it on to an independent body outside the Government, it being a far too important matter to be totally disregarded. Eventually an arrangement was entered into by the Councils of the Royal Agricultural Society of England, the Highland and Agricultural Society of Scotland, and the Royal Agricultural Improvement Society of Ireland, to send, at their joint cost, Professor Simonds to make the necessary inquiries and report thereon. The repeated warnings as to the rapid approach of the malady had excited great alarm throughout the United Kingdom, and the official report was looked forward to with more than ordinary interest.

The inquiries and investigations extended over a very large area of Europe, and Professor Simonds was enabled to state (Journal, Vol. XVIII., 1857, pp. 268–70) as the result of his researches :—

That all the countries of Northern and Western Europe from which cattle are exported to England are perfectly free from the rinderpest. . . . That in the greater part of the official despatches and reports which have been forwarded to the Government, and by them transmitted to the Royal Agricultural Society of England, the rinderpest has been confounded with pleuro-pneumonia, "Milzbrand," and other destructive maladies to which cattle are liable. . . . That no fear need be entertained that this destructive pest will reach our shores. Its present great distance from us would of

itself afford a fair amount of security; but when we add to this that no cattle find their way from there directly or indirectly to the English market, and also that in the event of the disease spreading from Galicia it would have to break through hundreds of military *cordons* one after another before it could possibly reach the *western side* of the German States, and, moreover, that for years past commerce has been unrestricted with regard to skins, hides, bones, &c., of cattle from Russia and elsewhere, all alarm, we believe, may cease with reference to its importation into the British Isles.

The satisfactory nature of this report served to allay the feeling of alarm that had been created, coming, as the report did, from one in whom the country placed implicit confidence, and whose characteristic care was so well known. But, unhappily, it was only for a short time.

Professor Gamgee had foreseen the danger that threatened the nation by both sea and land, and he repeatedly sounded a warning, to which little attention was paid, for he was looked upon as an alarmist. The false feeling of security thus engendered continued until July 4, 1865, when Professor Simonds detected some decided cases of rinderpest in London cow-houses, near the Metropolitan Cattle Market. The valuable information he had obtained during his researches in 1857 was then brought to bear for the benefit of the country, but the false feeling of security was not easily dispelled, and he too was called an alarmist notwithstanding that the wolf was at the door. His counsel of the pole-axe, as the only remedy, brought upon him unmeasured insults in the columns of certain agricultural papers, and the whole of the veterinary profession were held up to ridicule for their ignorance in not being able to do more than prescribe the pole-axe and advocate the adoption of rigid precautionary measures.

It is not by any means clear from whence the rinderpest was introduced. That it came by sea all agree, and the generally accepted opinion is that it was brought into the Metropolitan Market with a cargo of cattle shipped at Revel. Some 2,000 cows are reported to have died of the disease in the first month within the metropolitan area. In the same brief space of time it had spread over a large area of Great Britain, and crossed the sea from London to Holland, Belgium, and France.

Although the Act 12 Vict., which expired on September 1, 1850, was from time to time continued by divers subsequent Acts, empowering the Privy Council to prevent the spreading of contagious or infectious disorders among sheep, cattle, and other animals, and to inflict penalties not exceeding 20*l.* for any breach of their order, no efficient staff was appointed, and when the outbreak of cattle plague occurred all was chaos. But in July

1865 a veterinary department was formed, for which were secured the services of Professor Simonds and Professor Brown, as veterinary advisers. Dr. Williams, who was then private secretary to Mr. Helps, the Clerk of the Council, acted as secretary to the new department, and a staff of veterinary inspectors was appointed. Colonel Harness, of the Royal Engineers, who had had extensive experience in official work, was some time afterwards appointed Secretary to the Cattle Plague Department, and Dr. Williams, who really acted as assistant secretary, was retained with the singular title of medical adviser, for the short time during which Colonel Harness remained in office, resuming the post of secretary when Colonel Harness gave up the charge of the department. The Privy Council issued in rapid succession orders that were neither understood nor acted upon, and thus, finding them quite unavailing, they solicited the Queen to issue a Royal Commission to investigate the origin and nature of the disease, and to frame regulations for checking its progress.

On August 30, 1865, the Veterinary Committee of the Royal Agricultural Society issued an appeal to its members, urging them to co-operate with the Government and with other agricultural societies in their efforts to suppress the disease. This timely appeal was accompanied by a series of precautionary measures, but with little result.

The report of the Royal Commission appeared in November, but, whilst it brought no relief, it confirmed the worst opinions that had been expressed by Professor Simonds and others that the pole-axe was the only remedy. While one section of the Commission very wisely recommended the stoppage of all cattle traffic, the other members advised placing the responsibility for this in the hands of the local authorities. The latter recommendation found favour with the Government, and with a most disastrous result, as shown by Mr. Howard Reed's table of outbreaks, which appeared in the Journal (Vol. II., 2nd Series, 1866, p. 234).

Although the experience, as recorded, of the visitations of the plague in the past century furnished a valuable guide, it was not acted upon. Had it been adopted as a guide for extermination, much distress would have been averted. Deputation after deputation waited upon the Government officials to urge the adoption of stringent measures respecting the importation, the transit, and the sale and removal of stock. They were received with the usual courtesy, but no beneficial result followed the interviews. Meanwhile Scotland had adopted, with success, the remedy of slaughter.

At last, on February 7, 1866, an important deputation from the county of Leicester was received by the Prime Minister, Earl Russell. Mr. Albert Pell, a member of the deputation, addressing the Premier, put him and the Government in possession of facts with reference to previous invasions of rinderpest in England, in the last of which the disease had been stamped out by slaughter. This was followed by the great national Conference instigated by Mr. Pell, held in St. James's Hall on the next day, and presided over by the Earl of Lichfield. The resolutions passed at the Conference were on the following day submitted to the Home Secretary, Sir George Grey, and so forcibly were the views of the Conference enunciated that a Bill was introduced for stamping out the plague, and for compensating from a special rate the owners of the cattle killed for that purpose. When introducing the Bill Sir George Grey stated that a great change had come over his mind within a very brief space of time respecting the cattle plague. The Bill was rapidly passed through both Houses of Parliament, and received the Royal Assent on February 20. Its provisions were promptly enforced, and their effect was soon seen: the cattle plague was exterminated, and simultaneously the country was rendered nearly free from both foot-and-mouth disease and pleuro-pneumonia by the end of the year.

The agitation just referred to gave birth to the Chambers of Agriculture. Mr. Charles Clay, of Walton, Wakefield, addressed a letter (dated January 26, 1866) to *Bell's Weekly Messenger* suggesting that a meeting should be held at the Salisbury Hotel, Fleet Street, to consider the desirability of establishing a "Farmers' League or Chamber of Agriculture." The meeting took place on February 6, two days before the Cattle Plague Conference, but only nine persons attended. I was called to the chair, and drew up the resolution, setting forth the object of the Chambers, which has formed the basis of their operations until the present time. It was that "the object of the Central Chamber of Agriculture shall be to watch over all measures affecting the agricultural interests both in and out of Parliament, and to take such action thereon as may seem desirable for the benefit of agriculture." The necessity of such an organisation had long been felt. There were numerous farmers' clubs in different parts of the kingdom besides that in London, yet no effort had been made to bring them into harmony with each other so that their opinions could be ascertained upon any great question, affecting their general interest as a body, until the establishment of the Chambers of Agriculture. The basis of their operations was of the most comprehensive kind, embracing as it did the interests

of landlord, farmer, and labourer. Mr. Clay undertook the arduous duties of honorary secretary *pro tem.*, and sent a circular letter, accompanied by the objects in view, to farmers' clubs, agricultural societies, and numerous agriculturists. A large number of favourable replies having been received, a meeting was advertised to be held on May 23 at the Salisbury Hotel, and it resulted in the unanimous resolve to form a Central Chamber. Each person present paid his pound, and Mr. Pell was unanimously elected President. Several affiliated chambers were quickly formed, and the first general meeting was held on December 12, 1866.

Naturally, the first work of the Chamber was to press for legislation for the future guarding of the flocks and herds of the nation against the importation of foreign diseases, and to so regulate the internal cattle traffic as to minimise the risk of spreading diseases such as had for so many years inflicted serious losses throughout the country. This was the state of affairs at the close of 1866.

The circumstance that the stamping out of cattle plague was so nearly coincident with the extermination of the other diseases brought many converts to the principle of including foot-and-mouth disease within the scope of legislation, and for extending the same regulations to Ireland as to England.

As a safeguard against the importation of foreign contagious diseases the Chambers pressed for waterside markets with abattoirs attached, for the sale and slaughter of the imported animals from diseased countries. The necessity of having a Minister of Agriculture was seriously felt and earnestly set forth, and on April 26, 1883, the Prime Minister, in reply to my question, announced it to be Her Majesty's pleasure to appoint a Board of Agriculture. Valuable as that concession was, it by no means met what was considered to be an urgent necessity, viz., a Minister of Agriculture. The correctness of these views has been exemplified during the last and present Parliaments by the manner in which the last and present Ministers of Agriculture have discharged the duties attached to the office.

Although the diseases, which had proved so disastrous for more than a quarter of a century, were so nearly exterminated under the cattle-plague regulations, the re-admission of European cattle was soon followed by the re-introduction of the diseases referred to. So rapidly, indeed, did foot-and-mouth disease spread throughout Great Britain, that in 1870 there were 82 counties infected, and the returns showed 457,564 animals diseased, whilst in 1871 there were 92 counties infected and 691,560 animals diseased. Large as these numbers were,

Professor Brown added to his report the statement that the actual total was probably double that reported. The labour attached to obtaining the returns was too great for the limited number on the staff at the Privy Council office, and Professor Brown reported that they were under the necessity of discontinuing their inquiries.

In 1872 cattle plague was again introduced, but quickly stamped out. The late Mr. John Algernon Clarke, who contributed many able papers to *The Journal of the Royal Agricultural Society*, wrote in February, 1869:—

> That without any larger consumption of sheep and cattle food than at present we may so augment our annual home production of meat that the increase would exceed our total yearly importation. And to secure this grand result all that we require is a reasonable measure of success in saving from destruction those wasted portions of our flocks and herds which, after being reared and fed upon valuable food, now perish by preventable diseases.

He then quoted:—

> a computation of the Cattle Insurance Company that 960,000 cattle died of pleuro in the six years preceding the outbreak of rinderpest, while only 552,763 cattle were imported during the same period;

and gave the actual losses of the Norwich Insurance Company as 63¼ per cent. of cattle in 1858, 45 per cent. in 1859, and 47 per cent. in 1860. He added:—

> Mr. Robert Kilby deduced from a very extensive inquiry which he instituted in all the counties of the kingdom that during the last twenty-eight years pleuro-pneumonia destroyed twenty times the number of cattle officially returned as losses during the two years of cattle plague. That in his belief foot-and-mouth disease has done more than even cattle plague and pleuro towards raising the price of butcher's meat.

Finding that the obtaining of official returns of the attacks of foot-and-mouth disease for 1872 was abandoned, I undertook the task for my own county, and sent printed forms into every parish and hamlet of Herefordshire, with a circular letter asking for the information. The returns thus obtained were not by any means complete, which probably arose from the fear that advantage might be taken of those who had not made the proper returns in the first instance. Incomplete, however, as they were, they showed that there were 34,212 cattle attacked and 2,047 died; 107,789 sheep attacked and 1,876 died; 8,220 pigs attacked and 1,523 died. A Committee of the Herefordshire Chamber of Agriculture, presided over by Mr. Rankin, now M.P. for the Leominster division of Herefordshire, estimated the losses sustained by that visitation to be 155,226*l.*

In giving my evidence before the Select Committee of the House of Commons which sat in 1873 I submitted the details of that estimate, and, comparing the numbers of cattle, sheep, and swine in the county with the statistical returns of their numbers in Great Britain, showed that the comparative estimate of loss sustained by the nation amounted to 13,071,392*l.* During the same year the value of the cattle, sheep, and swine imported into Great Britain from foreign countries, according to the returns of the Board of Trade, was 4,606,582*l.*, being only slightly in excess of one-third of the estimated losses sustained in Great Britain, independent of those in Ireland.

The Committee in their report said:—"Evidence of much weight, both by agriculturists and professional witnesses, was given, tending to show that such enactments as would be required to exterminate foot-and-mouth disease would meet with such strong opposition that they would be difficult, if not impossible, to carry out." They therefore recommended "that the Privy Council should cease to issue orders for the check of this disease."

The late Mr. James Howard, in his evidence before the Select Committee of the House of Commons which sat in 1877, on being questioned respecting the 1872 visitation of foot-and-mouth disease in Bedfordshire, said, "at the lowest estimate it entailed a loss of 60,000*l.* upon his county." As the area of Bedfordshire is only a trifle more than half that of Herefordshire, and as the number of cattle in that county are considerably less than half, and the sheep only about half of those in Herefordshire, his estimated losses strikingly confirmed the estimate which I submitted, and which at the time was considered by the Committee to be too high.

Although the evidence given before the several Committees was very conflicting, it tended to educate the country. The evils arising from the numerous local authorities appointed to administer the Acts of 1869 and 1870 were clearly shown. The action of the ninety-two county authorities, who were more conversant with the losses imposed upon the nation by the diseases, was frustrated by the 330 borough authorities, who were induced to look with a jealous eye upon any measure calculated to interfere with the trade of the country, and all who were connected with the foreign cattle trade were eager in their endeavour to show that any interference with their trade would enhance the cost of meat to the consumer. Politicians, too, who had struggled to obtain Free Trade in meat and corn, stoutly maintained that the object was Protection by a side wind, not giving themselves time to consider the evils

attendant upon the waste of the home produce, and the necessity of guarding it against such waste.

Cattle plague having been again imported in 1877, the country was further alarmed. The measures adopted for stamping it out, although only a few months in operation, were attended with a similar effect in reducing in a marked manner the other diseases. This fact further strengthened the hands of those who for so many years had earnestly appealed for the extermination of these diseases by wise, well-considered laws.

A Select Committee of the House of Lords was appointed in 1878 to consider the Contagious Diseases (Animals) Bill, and to report. Previous to the passing of that very excellent Act 41 & 42 Victoria, cap. lxxiv., they ordered the Bill to be reported, with some amendments.

The Act came into operation on October 1, 1878, and at the close of 1879 foot-and-mouth disease was so nearly exterminated (according to the report of the Veterinary Department of the Privy Council) that it was looked upon as a thing of the past. In fact England and Wales was declared free on January 17, 1880, and, there is no reason to doubt, would have remained so had it not been for the importation of the disease in a cargo from France, landed at Deptford, September 20, 1880. In a few days it was reported as being in a London dairy-shed. The Metropolitan Market was then open. The same salesmen and butchers travelled to and fro between Deptford and Islington. The same drovers attended the cattle in the lairs at each market, feeding and watering, without resort to any precautionary measures; and it is difficult to conceive a more certain means of spreading a disease which is so contagious that Professor Simonds has stated he could convey it on the end of his walking-stick. The number of cases rapidly increased, and by the close of the year the returns of the Veterinary Department showed that the number of animals attacked in 1880 was 32,378; in 1881, 183,046; in 1882, 37,950; in 1883, 461,145; and in 1884, 28,221; making a total of 742,740 in the five years.

This unsatisfactory state of affairs formed no matter for surprise when an examination was made of the returns of the animals imported while suffering with the disease. These show that in 1880 there were 155 landed with foot-and-mouth disease; in 1881, 4,977; in 1882, 595; in 1883, 1,172; and in 1884, 138, making a total of 7,037.

At the close of 1879 Ireland was rendered free, and Scotland had been free for about twelve months—an advantage enjoyed by the latter country until the spring of 1882, when two cases occurred which were quickly got rid of. Ireland continued free

until January 1883, when a bull sent from Westmoreland, under special licence of health, contracted the disease *en route*, and in less than three months the following counties were declared infected: Antrim, Armagh, Cavan, Dublin, Kildare, Mayo (South), Meath, Roscommon, Tyrone, and Wicklow. In the first week of February 1883 some cattle were sent from Dublin to Glasgow, and from thence by rail to Edinburgh. They were divided into two lots and sent to different farms. Each lot was attacked, and the disease spread with great rapidity; according to the returns for March 23 of that year it was reported from the counties of Aberdeen, Ayr, Banff, Dumbarton, Dumfries, Edinburgh, Fife, Forfar, Haddington, Kircudbright, Lanark, Linlithgow, Perth, Renfrew, Stirling, and Wigtown.

On May 8, 1883, I had the honour of introducing a deputation to the Lord President of the Council, placing before his Lordship the very serious outbreaks that had occurred, and praying that the importation of live animals from countries in which foot-and-mouth disease was known by the Privy Council to exist might be discontinued. The deputation was received with every courtesy, but unfortunately the importation of animals suffering with the disease continued, and it was felt that nothing short of the Act of 1884 would prove a safeguard against this very contagious disorder. Strenuous opposition to the Bill was raised by the Foreign Cattle Trade Association.

That otherwise able statesman, Mr. W. E. Forster, intro duced a large deputation to the Lord President of the Council on March 24, 1884, and presided at a very important conference at the Westminster Palace Hotel on the same day. He also took a prominent part at another conference presided over by Mr Lyon. Unquestionably his earnestness in the canse was based upon a misconception of the whole subject, although as a former Vice-President of the Privy Council, and as having presided at the Meetings of the Committee which sat in 1873, he had every opportunity of making himself fully acquainted with the matter in all its bearings, and should not have fallen into the error of endeavouring, as he did most earnestly, to excite the feelings of the public by telling them that, should the Bill pass in the form proposed, meat would be 2*s.* 6*d.* a pound—in fact, that it would create a meat famine in London. His arguments were met at a conference held in St. James's Hall and presided over by Mr. Chaplin, who also introduced a counter-deputation, equally influential, to the Lord President of the Council.

I met the misleading statements by showing, in a printed circular addressed to each member of Parliament, that the average price of meat was lower when the flocks and herds of the

country were healthy than when disease prevailed, and further that when disease abounded there was a considerable increase in the importations. The tabulated extract given below from the official returns will most strikingly show the important value to be attached to the maintenance of health. In 1883 very serious losses were sustained from the prevalence of foot-and-mouth disease, but there was no appreciable loss from that disease after 1884. Of pleuro-pneumonia there were 931 animals attacked in 1883, and 2,437 in 1887. In 1883 there were 11,225 swine attacked with swine fever, and 41,973 in 1887. Therefore the losses sustained with pleuro-pneumonia and swine fever were much more severe in 1887 than in 1883, and as deaths from each of these diseases are about 80 per cent. of the animals attacked, there was a considerable sacrifice of animal food from these outbreaks. Nevertheless these, when compared with the losses arising from foot-and-mouth disease, sink into comparative insignificance :—

Statement of the Quantities and Values of the Live Animals for Meat, and of Dead Meat, imported into the United Kingdom in the Years 1883 *and* 1887.

	1883 Number	1887 Number
Live cattle	474,750	295,261
„ sheep	1,116,115	971,404
„ pigs	38,863	21,965
	Cwt.	Cwt.
Dead meat	6,050,148	6,573,866
	£	£
Value of live animals	11,983,754	6,149,048
„ of dead meat	16,254,964	14,344,295
	28,238,718	20,493,343

This shows a national saving of 7,745,375*l.*, notwithstanding that there had been an increase of about 1,250,000 in the population.

The following statement will show the effect that foot-and-mouth disease had upon the wholesale price of meat, which, to the consumer, means much more, as the butcher calculates his profit upon the capital invested :—

Average Prices of Imported Dead Meat.

	1883 £	*s.*	*d.*	1887 £	*s.*	*d.*
Beef, fresh, per cwt.	2	16	2	2	5	0
„ salted „	2	3	9	1	10	6
Mutton, fresh „	2	18	10	2	0	1
Pork, fresh „	2	12	6	2	9	4
„ salted „	1	18	8	1	8	8
Bacon „	2	13	1	2	2	2

The published averages of wholesale prices in the Metropolitan Cattle Market show a difference of about 2*d.* per lb. more in 1883 than in 1887 for all kinds of meat.

Valuable as agricultural statistics are now generally admitted to be, the collection of them was at the outset by no means popular, and the first Returns of 1866 are most incomplete. Since that date they have been year by year rendered more reliable, and through them the enormous value of the interest at stake has been ascertained. Major Craigie, in his address to the Croydon Farmers' Club, November 21, 1889, said:—

> That the home meat crop represented 638,000 tons of beef, 362,000 tons of mutton, and 265,000 tons of pig meat, total 1,315,000 tons; that the foreign live imports represent 137,000 tons, and the dead meat 336,000 tons. That, out of every 100 lb. of butcher's meat consumed in the United Kingdom, nearly 74 lb. are produced from our home stock, 19 lb. are imported as dead meat, and just over 7 lb. arrive "on the hoof."

This careful statistician added:—

> If we may rely on these figures, the contention of those who ignorantly resent precautionary interference on sanitary grounds with the free entrance of imports, no matter what are the dangers thereby run, is reduced to an arithmetical absurdity. In order to make sure of no diminution, even temporary, in the yearly volume of that 7 lb. of meat in every 100 lb. which live importations mean, our rulers are to be asked to imperil by foreign diseases the 74 lb. produced at home.

The supposed conflicting interests of the 330 borough authorities as against the 92 county authorities were associated with the reluctance which each felt in enforcing the provisions of the Act of 1878, which placed the cost of compensation for slaughter upon the rates for an object that was purely national, and were given as the reason why the Act was never rigidly enforced. It became manifest that pleuro-pneumonia would not be exterminated unless it was taken in hand by a central authority and compensation was provided from the national exchequer. A large deputation, consisting of members of the Royal Agricultural Society, the Central and Associated Chambers of Agriculture, and other important bodies, waited upon the Lord President of the Council, with the result that in 1890 an Act was passed to carry these objects into effect. The Act came into operation on September 1, 1890, with a most successful result. No case of pleuro-pneumonia has occurred in Ireland since September 26, 1892, and Great Britain would have been rendered free about the same period had it not been for two cargoes of cattle from Canada landed at Dundee. They were sold and removed from the lairs on October 6; the following day one of the animals was noticed to be ill, and on October 8 a veterinary surgeon was consulted, who pronounced it to be a decided case of pleuro-pneumonia. The

animals dispersed were closely followed and slaughtered; three others were found to be affected, also one native cow that had been in contact with the Canadian cattle. The promptitude shown in following up the different lots and carrying into effect the provisions of the law averted the threatened danger.

The dairy-sheds in London, Edinburgh, and Dublin were very prolific nurseries of pleuro-pneumonia. In each of these great cities inoculation was resorted to, and various scientific men were warm in their advocacy of it. But inoculation has been tried the world over, and no country in which it has been adopted has been rendered free from the disease. So far back as 1851 that illustrious patron of all that was good and useful, the Prince Consort, saw the reports of Dr. Willem's discovery of inoculation as a preventive of the malady, and induced the Council of the Royal Agricultural Society to send Professor Simonds to Belgium to inquire into it. Upon his return he made many minute examinations and tried numerous experiments which are recorded in his elaborate reports in the Journal (Vols. XIII. and XIV., 1852-53). It may be added that the experience of the last forty years in that country, the home of its birth, confirms the correctness of these reports.

It is hoped that the disease which has inflicted such serious losses throughout the United Kingdom for fifty-one years is now exterminated,[1] and, let us trust, never to return. It has involved a long and trying struggle to attain this happy result.

One solitary outbreak of foot-and-mouth disease in January 1886 records the date of the extermination of that dreaded disorder, and marks the fallacy of the doctrine, so long held, of its spontaneous origin. But, unfortunately, after upwards of six years' immunity from its ravages, an outbreak occurred among some Dutch cattle in the Metropolitan Cattle Market on February 4, 1892, to the dismay of the nation at large. The value of having a Minister of Agriculture of Cabinet rank was then quickly manifest. The advantages of the immunity from the disease that had been enjoyed by the country for the previous six years had so taken possession of the public mind that only one desire prevailed throughout the length and breadth of the land, and that was for the speedy and complete extermination of the disorder. The market was closed and no animal was allowed to be removed. The whole of the veterinary staff of the Board of Agriculture was at once set in motion, and the most energetic measures were taken to trace every animal that had escaped from the market before the latter was closed by the

[1] As to recent outbreaks of pleuro-pneumonia at Barnsley and Hendon see Appendix, p. lxix.—ED.

authorities. So rapid was the spread of the disease that reports of outbreaks came in quick succession from Kent, Surrey, Sussex (East), Midlothian, Essex, Middlesex, Sussex (West), York (West Riding), Lanark, Westmoreland, Renfrew, Chester, Perth, Lancaster, and from Midlothian of a second outbreak; but in every instance the disease was dealt with as a fire would be, and its complete extermination was secured on August 27. Notwithstanding the energy displayed, there were 95 outbreaks, 5,265 animals attacked, 585 diseased animals slaughtered, and 151 died. A further alarm was caused at the close of the year by an outbreak in a cowhouse in North London. Nine cows were killed on New Year's Day; six of these were diseased. Every precaution was taken and the disease was stamped out. On February 17, 1893, a further outbreak was reported from Guestling, six miles from Hastings. Happily it was of a mild type, and being isolated, slaughter was not resorted to. Fortunately the cattle recovered, and no bad result has followed that diversion from the previous course of action.

Reports having reached the Government early in 1892 of the very serious prevalence of the disease amongst the flocks and herds of every country in Europe, excepting Iceland, the provisions of the Act of 1884 were enforced, and all importations from these countries were prohibited. Yet no inconvenience has been experienced, although only a few years have passed since the whole of our foreign meat importation came from them. The requirements of the nation have been met by a greatly increased home production, without waste from disease, and by dead meat largely imported from the United States of America, Australasia, and the Argentine Republic, with small supplies from other countries, whilst the price of meat has been lower than for the last forty years.

The manner in which the late and the present Ministers of Agriculture have met each crisis, and the zeal of the staff attached to the Board of Agriculture in tracing the numerous cases of foot-and-mouth disease, and the widespread localities to which the Canadian cattle were removed, cannot be too warmly acknowledged as commanding the lasting gratitude of the country.

The date of the introduction of *swine fever* has not been determined; but that it existed as far back as 1865 cannot be doubted. In that year the late Dr. Budd, of Clifton, who held that a close relationship existed between it and typhoid fever in man, called the attention of agriculturists to it, and his views were shared by Professor Simonds. It is known that it was prevalent in the United States of America before any account appeared

of it in the United Kingdom, and at a time when considerable numbers of swine were sent to England. In 1878 it was added to the list of contagious diseases, and returns were ordered to be made of its outbreaks. The twelve years of these published returns record 272,878 animals as having been attacked; and as about 80 per cent. of those affected die, it becomes apparent that a further serious calamity has befallen the nation, and regret arises that more decided steps than those adopted are not enforced to stamp it out. The same difficulty is experienced as was so long suffered to stand in the way of exterminating pleuro-pneumonia—namely, conflicting local authorities and compensation for slaughter from the local rates. It has been stated that difficulties present themselves in connection with swine fever that did not exist in the case of pleuro-pneumonia. These difficulties have, however, been surmounted in my own county, as they surely could be in others.[1]

Anthrax is another new disease, supposed to have been introduced with foreign wool. When the first outbreaks were reported it was usually considered that it was only a more virulent form of quarter-ill, with which it has been confounded by some members of the profession; but that feeling is now altogether dispelled—quarter-ill attacks cattle only, and rarely affects animals exceeding two years old. Anthrax kills both young and old, and all animals of the farm are susceptible; in fact it becomes difficult to specify the animal that is not subject to its deadly attack. It has long been known as the wool-sorters' disease in London and other places where foreign wools are manipulated. The wool-sorter who may happen to have a scratch upon his hand that he may bring into contact with a spot of dry blood on the wool he is sorting unknowingly inoculates himself, and death is the usual result. In 1889 my friend Mr. White, Manor Farm, Zeals, Wilts, lost a calf very suddenly, and he concluded it was quarter-ill. By some means his pigs obtained access to the calf and soon showed symptoms of the disease; their throats became much swollen, and his veterinary surgeon pronounced it to be quinsy. The pigs died shortly afterwards. His cows were turned to graze where the pigs had died; one morning a cow was found dead. A man had the cow to boil for his pigs, and they died, and so did the man's cats. More cows became ill, and twelve cows in all died. He lost two valuable horses and his son's hunter.

[1] A Departmental Committee of the Board of Agriculture was appointed on February 7, 1893, to inquire into and report upon Swine Fever. The Report is referred to on p. 438.—Ed.

Professor Penberthy, of the Royal Veterinary College, was sent for, and he recommended the whole herd to be inoculated. This was done upon M. Pasteur's system, and only one cow died after the operation, and that one was supposed to have been previously affected; inoculation being a preventive, not a curative remedy. Anthrax is now added to the list of scheduled contagious diseases in animals.

Severe as the trial of the cattle plague was, so long as it lasted, it did more to educate the public mind than all the losses that the country had previously suffered amongst its flocks and herds, and induced the study of certain animal diseases that the faculty had previously paid but little attention to.

The diagnosis of diseases is now better understood, as is also their pathology; the theory of spontaneous generation has been upset and the true origin of many diseases discovered. The microscope has revealed numerous secrets as to the germs of diseases which could not have been brought to light in any other way. Let us hope that these valuable researches may be continued to the relief of the suffering of the dumb animals and for averting severe losses to owners of live stock.

T. Duckham.

II.

In the past, legislation for the prevention of animal plagues appears to have been adopted exclusively in cases of emergency. Only in modern times do we meet with Acts of Parliament dealing with the whole subject, and conferring powers on administrative bodies to be exercised as occasion may demand.

At the end of the last century *scab* or *mange* in sheep appears to have attracted attention, and a measure was passed by the Legislature to deal with that disease. The Act of 38 George III. cap. lxv. June 21, 1798, provides that sheep or lambs affected with scab shall not be exposed on common lands, and it was further required that sheep, when turned out to graze on common lands, should be marked with the owner's initials, obviously for the purpose of securing the identification of offenders against the Act.

There is no account of any Orders of Council, or of other means of enforcing the Act, and it is probable that very little attention was paid to its provisions.

The importation of sheep affected with *sheep-pox* in 1847 created great alarm among flockmasters on account of the rapid spreading and fatal character of the disease, and in 1848

a Bill was introduced and subsequently became law. This Act, 11 & 12 Victoria, cap. cv. September 1848, gave powers to the Queen in Council to prohibit the importation of sheep, cattle, and other animals, or to admit them after quarantine, for the prevention of contagious diseases. On the same date the Act 11 & 12 Victoria, cap. cvii., came into operation, and provided for the passing of Orders in Council to prohibit or regulate the movement of animals, including horses; also of meat, hides, fodder, and other things likely to spread contagion. It further made it an offence to expose diseased sheep in markets. The Act was to remain in force till September 1, 1850, but it was continued by other Acts till 1853, when the Act 16 & 17 Victoria, cap. lxii., was passed.

More than one of the recent writers on the contagious diseases of animals have referred reproachfully to the supineness of the Privy Council in not taking action under this Act to check the progress of the diseases which were then existing among farm stock. But a candid critic reading the Act would be forced to admit that its provisions were directed specially to the prevention of sheep-pox, which is the only disease mentioned in the Act.

It is true that general powers referring to other animals were conferred on the Privy Council. The powers were, however, limited to the prohibition of movement of animals, and of substances which might carry infection.

There can be no doubt that the Legislature was fully aware that pleuro-pneumonia and foot-and-mouth disease had prevailed in various parts of the country during eight or nine years. It is also perfectly evident, from the wording of the Act, that the Legislature did not contemplate the extinction of those maladies by the general adoption of repressive measures. Long after the passing of the Act of 1848 the contagious nature of pleuro-pneumonia was still emphatically denied by many practical men and doubted by most, whilst foot-and-mouth disease was lightly regarded as an affection which cattle took naturally, as children take whooping cough and measles. It was, moreover, always alleged that animals did so much better after they had gone through an attack; a doctrine which was stoutly maintained by an influential deputation of farmers who came to the President of the Board of Agriculture in the spring of 1892 to complain not of the injury done by foot-and-mouth disease, but of the losses which farmers sustained from the restrictions on the movement and sale of their animals. Had the Privy Council of five-and-forty years ago attempted to arrest the progress of pleuro-pneumonia and foot-and-mouth disease by slaughter and stopping

the free movement of animals, they would have raised a storm of opposition which would have rendered the effort futile. But, in truth, until the ravages of cattle plague in 1865-66 led to apprehensions for the safety of the cattle population of this kingdom, the idea of the general adoption of measures for the extinction of disease was never entertained.

The Act 16 & 17 Victoria, cap. lxii. August 4, 1853, which has already been mentioned, continued the provisions of the former Acts, and prohibited the exposure of diseased animals, especially horses affected with *glanders*, in markets or on commons.

Cattle plague was introduced in 1865, and began to spread extensively owing to the absence of any restrictions on the movement of diseased or infected animals. Some time was spent in making inquiries as to the nature of the disease, and an Order was passed calling upon owners of diseased cattle to give notice of the existence of disease; this, however, they neglected to do, preferring to send their stock to market as soon as a case of cattle plague was detected.

The measure 29 Victoria, cap. ii. February 20, 1866, entitled The Cattle Diseases Prevention Act, was more comprehensive in its scope than any of the former Acts of this century. It constituted local authorities of boroughs, counties, and the Metropolis. Part I., referring to slaughter of cattle affected with cattle plague, was to cease to operate on April 15, 1866, but the rest of the Act continued in force to June 1, 1867.

Slaughter of diseased cattle was made compulsory, and the Act gave power to slaughter cattle which had been exposed to infection, whilst compensation was provided for out of the rates. This Act also provided that all Orders passed previously to this enactment should be deemed to be authorised by this Act.

The Act 29 Victoria, cap. xv. April 23, 1866, amended the Act 11 & 12 Victoria, and empowered the Privy Council to make regulations for the movement of animals. It also confirmed certain Orders made under the previous Act.

The Act 29 & 30 Victoria, cap. cx. August 10, 1866, amended the former Act in regard to payment of expenses.

By the Act 30 & 31 Victoria, cap. cxxv. August 1867, local authorities were called upon to keep one inspector at all times appointed. It was likewise provided that a declaration of the existence of cattle plague should constitute an infected place.

Foreign animals were also dealt with in this Act, powers being given to define parts of ports for the landing of foreign animals. For the first time *pleuro-pneumonia* was mentioned,

and it was made an offence for cattle affected with that disease to be exposed in any market.

In the Act 32 & 33 Victoria, cap. lxx. August 1869, several new provisions were legalised, and all former Acts were revoked. Disease was defined to mean *cattle plague*, *pleuro-pneumonia*, *foot-and-mouth disease*, *sheep-pox*, *sheep-scab*, and *glanders*, and any disease which the Privy Council might by order specify. Power was given as to limits of ports for the landing of foreign animals.

The principle of the Act in regard to foreign animals was that of free importation, with power for the Privy Council to prohibit or subject to quarantine or slaughter, as circumstances might render necessary. In short, the Act of 1869 was the most complete measure which had ever been passed for dealing with diseases of animals.

Under the provisions of the Act of 1869 *farcy* was declared by Order of Council, which came into operation in July 1873, to be a disease for the purpose of the Act.

The next Bill, which was introduced by his Grace the Duke of Richmond and Gordon, K.G., marked a further advance in sanitary legislation. It arose from the circumstance that *cattle plague* was again introduced into England in 1877, and a Select Committee was appointed to inquire into the matter, with the result that landing of foreign animals for slaughter only was affirmed as a principle, which was embodied in the Act of 41 & 42 Victoria, August 16, 1878. Free importation or quarantine on the one hand, and prohibition on the other, were provided for under exceptional circumstances.

Under the provisions of the Act of 1878 cattle plague was to be dealt with by the Privy Council. Local authorities were ordered to slaughter cattle affected with pleuro-pneumonia, and power was given to slaughter cattle which had been exposed to infection. Infected places were to be declared in foot-and-mouth disease, but no reference was made to slaughter. In fact, when the Bill was in Committee the promoters gave a distinct undertaking that slaughter was not contemplated in foot-and-mouth disease.

Since the Act of 1878, which repealed the Act of 1869, other diseases than those above named in the definition of disease (*i.e.* cattle plague, pleuro-pneumonia, foot-and-mouth disease, sheep-pox, sheep-scab, and glanders) have been added to the list. *Swine fever* was declared to be a disease, for the purposes of the Act of 1878, by an Order of Council which came into operation in December 1878.

Anthrax and *rabies* were declared to be contagious diseases

for the purposes of certain sections of the Act of 1878 by Orders of Council which came into operation on October 1, 1886.

The next measure of importance was the Act 47 Victoria, cap. xiii. May 19, 1886, which provided that the Privy Council should prohibit the landing of animals from any country, or any part thereof, whenever they were not satisfied that the circumstances were such as to afford a reasonable security against the introduction of foot-and-mouth disease. This was the chief provision of the Act, which only contained six sections.

The Act 47 & 48 Victoria, cap. xlvii. August 7, 1884, was for the purpose of enabling local authorities to transfer the whole, or parts, of their districts for the purposes of the Contagious Diseases (Animals) Acts.

The Act 49 & 50 Victoria, cap. xxxii. June 25, 1886, amended the Act of 1878 in some important details. It provided for the formation of an infected circle round an infected place: also it gave the Privy Council power to extend the definition of animals so as to include all four-footed beasts, and it transferred the power to deal with dairies and milk shops to the Local Government Board.

The Act 53 & 54 Victoria, cap. xiv. July 4, 1890, which was known as the Pleuro-pneumonia Act of 1890, transferred the powers of local authorities to slaughter and pay compensation in pleuro-pneumonia to the Board of Agriculture, and provided for the payment of compensation out of money voted by Parliament for the purpose.

Under the provisions of the Act 55 & 56 Victoria, cap. xlvii. June 27, 1892, the Board of Agriculture was empowered to use the sums voted for purposes of pleuro-pneumonia for payment of the costs incurred in dealing with foot-and-mouth disease. They were also empowered to slaughter diseased animals and animals in contact, and to pay compensation for animals slaughtered.

In the period comprised between 1865 and 1893 a complete change has been slowly developed in the agricultural mind in reference to the method of dealing with animal plagues. When, nearly thirty years ago, the proposition to slaughter in cattle plague was made, it was received with something like a feeling of horror and was denounced as barbarous. Now a strong remonstrance is uttered at the want of energy displayed by a department which suffers an animal with what was once called the benign foot-and-mouth disease to live. This progress in sanitary education has been slow, and it is not yet complete. In

fact, it may be affirmed, on the sure basis of observation and experience, that every step which has been taken by the central authority to arrest the progress of disease has been always abreast, if not in advance, of the public opinion of the day.

G. T. Brown.

GAMBLING IN FARM PRODUCE.

Origin and Description of the System.

During the last twenty years a system of trading in some of the principal farm products, and a few other leading commodities of the world, has sprung into existence, the most important features of which are the forestalling of the crops by selling them before they are grown, the sale for future delivery of goods which the sellers do not possess, an enormous amount of re-selling without the transfer of the commodities, rampant speculation, a method of "hedging," conducted after the professional betting-man's plan of book-making, and the establishment of clearing-houses in which a daily or weekly settlement of sums due on variations in prices is effected. This is known as the option or future system.

There is some uncertainty as to the precise date of its origin. Mr. C. W. Smith, Editor of Whitaker, Whitehead & Co.'s *Weekly Trade Finance and Cotton Circular*, who has written a book [1] on the subject, says that cotton was sold on the future system in England between 1866 and 1870 to a small extent, actual shipments being made, however, against all contracts. Between 1870 and 1876, he adds, these contracts took the form of "options," but only a few firms dealt in them. In the latter year a special form of contract for these dealings in cotton was prepared to prevent abuse. In about the same year the system came into use in the United States in connection with wheat, maize, and certain other commodities, and possibly it was known in connection with cotton at least as early as in this country. Indeed, America has usually been credited with the invention of the system, and it is only Mr. Smith's statement with respect to cotton which appears to traverse that impression. At any rate, it was in the United States that the system first sprang up in connection with grain and some other ordinary products of the farm. It was not until 1883 that a

[1] *Depression in Trade, Land, Agriculture, and Silver.* London: Sampson Low, Marston, & Co.

clearing-house for the settlement of the contracts, based on the system in question, was established in Liverpool, and by that time wheat and maize were embraced by it. There was not much done as regards grain under the system, however, even in Liverpool, before 1889. In 1888 the London Produce Clearing House was registered for the settlement of contracts in wheat, coffee, beet sugar, tea, silk, and silver.

As far as grain is concerned, however, the option system has made hardly any headway in London. No transactions in it take place on Mark Lane, though there are some on the Baltic, and the leading firms, as a rule, will have nothing to do with it. Liverpool is the only market in England in which the system has been extensively introduced into the grain trade. In the first instance, the system appears to have been the legitimate one of selling commodities for future delivery, the seller actually delivering at the date specified; but it was not long before what American farmers denounce as the abuse of "wind selling" or "flat selling" sprang up, extending to abominations of open gambling, which even the defenders of the system themselves do not excuse.

In order to render the operation of the system clear to those who have not studied it, it is necessary to define the principal terms which belong to it. Put in the fewest words, an "option" is an agreement whereby one party secures the option of selling to or buying from another party a given quantity of a certain commodity at a future date or within a future period at a fixed price. A "future" is an agreement whereby one party agrees to sell and deliver to, or buy and receive from, another party a given quantity of a certain commodity at a future date or within a future period, at a fixed price. As a matter of fact, at the present time there is no difference between an option and a future, whether there ever was any difference or not. Until an effort was made to diminish the abuses of the option system, it was optional on the part of one of the parties to a transaction whether he would deliver or receive the commodity nominally dealt in, or pay or receive the difference between the price named in the contract and the current price at the date of its maturity; but it is said that no exchange or board of trade in the United States now recognises a contract in which ultimate delivery is optional. In the regular gambling-houses, outside the recognised exchanges, an option has the signification above referred to, no produce ever being delivered. But now, in the regular exchanges, the only option openly recognised is as to the precise date, within a month, at which delivery shall take place. According to agreement, say in a June option, the buyer or seller has the

option of selecting any day in June for the delivery of the commodity. It is precisely the same with a future, and thus, so far as the rules of the corn exchanges are observed, there is no difference in effect between an option and a future. Moreover, by whichever name the contract is called, there is the same opportunity of abuse, and the opponents of the system declare that settlements are made in the great majority of instances without any delivery of the produce nominally dealt with in the contract.

In Senator Washburn's Anti-Option Bill, which was passed by the Senate in the last session of Congress, the following definitions appear :—

1. That for the purpose of this Act the word "option" shall be understood to mean any contract or agreement whereby a party thereto, or any party for whom or on whose behalf such contract or agreement is made, contracts to have or give, to himself or another, the option to buy or sell at a future time any grain or other commodity mentioned in Section 3 of this Act.

2. That for the purposes of this Act the word "future" shall be understood to mean any contract or agreement whereby a party agrees to buy or agrees to sell and deliver at a future time to another party any articles mentioned in Section 3 of this Act, when at the time of making such contract or agreement the party so agreeing to make such delivery, or the party for whom he acts as agent, broker, or *employé*, in making such contract or agreement, is not at the time of making the same the owner of the articles so contracted and agreed to be delivered, or unless the articles so contracted to be sold and delivered shall subsequently be actually delivered to the purchaser for manufacture or consumption.

Now, as already intimated, an option as here defined is not openly recognised by any corn exchange or board of trade in the United States. It is to be presumed, however, that those who drafted the Bill had reason to believe that such contracts were common, or they would not have thought it necessary to legislate against them.

The articles named in the Bill are "wheat, corn (maize), oats, rye, barley, cotton, and all other farm products. Also pork, lard, and all other hog products." It must not be understood, however, that all these commodities are dealt with under the option system. The object was, no doubt, to make the section comprehensive, so as to prevent the system from extending. The following are lists of the commodities dealt with under the system in question:—America: wheat, maize, oats, cotton, coffee, sugar, pork, bacon, lard, and petroleum. England: wheat, maize, cotton, beet sugar, coffee, tea, silk, and silver. Iron, tin, and copper warrants also come under the same system.

Before proceeding to deal in detail with the recognised option and future system, I will briefly mention some of the worst abuses into which it has degenerated in connection with what

are called "bucket shops," the existence of which has already been rendered illegal in some of the States. The origin of the term "bucket shop," used in America to designate a place in which gambling in grain and other options is carried on, has been explained by a prominent "operator." It originated, he says, in Chicago, where the Board of Trade would not allow a deal of less than five thousand bushels. In order to catch men of small means, what was called the "Open Board of Trade" was organised, and commenced business in an alley under the Board of Trade rooms. There was an elevator to carry members of the Board to the rooms above, and occasionally a member would call out, "I'll send down and get a bucketful pretty soon," referring to the speculators in the "Open Board of Trade" room. Hence the term "bucket shop" came to be applied to the latter establishment, and soon spread till it was used to describe all similar price-gambling institutions.

An explanation of some of the technicalities of these bucket shops, known as "privileges," "calls," "puts," "straddles," and "spreads"—terms in common use in America among all kinds of speculators, in the share market as well as in the grain, cotton, and pork trades—has been given, as follows, in a New York paper :—

A "privilege" is a contract by which the maker of it agrees to sell to the holder of it, or to buy from him, say a certain number of quarters of grain (which scarcely ever actually changes hands, differences in price only being paid), or shares in a specified stock, at a certain price, and at any time within a stated period.

A "call" is a privilege bought of the maker at a certain price, and the owner of it is privileged to call for a certain quantity of whatever is sold, at a given price, within a given period. For instance, if A be the maker of the privilege, B may buy of him, at a commission agreed upon, the privilege of calling 10,000 bushels of red winter wheat during a certain period at 85 cents, though it may be only 80 cents when he enters into the agreement. If the price rises above 85 cents, B may call upon A to deliver the 10,000 bushels at 85 cents, or pay him the difference between the value of the quantity at that price and its value at the enhanced price. If the rise does not take place, B loses the commission he has paid to A.

A "put" is precisely the converse of a call, the holder of it being entitled to deliver a specified quantity of the stock or commodity speculated in within a given period at a certain price. If the price falls, he gets the difference.

A "straddle" is a combined put and call, and the premium to the maker is high, as he stands to lose if the market goes up or down within the period of the bargain, and only wins when it remains stationary, even then getting nothing beyond the premium. The holder may call upon him to sell at the price named if the market rises, or to purchase at the same price if the market falls.

A "spread" is an extension ot a straddle to a certain range of prices, within which the maker is safe, though he loses if the market goes above the maximum or falls below the minimum.

These transactions are acknowledged, even by the defenders of the option system, to be pure gambling in prices. Having briefly described them, it will not be necessary further to allude to them, and it will be understood that the rest of this article refers to transactions carried out in the regular exchanges of the country.

The technical terms used in connection with the speculative market system in America are so numerous that a regular glossary is necessary to enable persons not connected with the trade to understand market reports which appear in American papers, and even those which are telegraphed to English journals. At my suggestion Mr. C. W. Smith has prepared a list of these terms for publication in a book[1] which he is about to bring out, and I give below those which have not already been explained :—

A "Bull" is a person who buys options and futures for a rise in the market.

A "Bear" is a person who sells what he has not got in the shape of options and futures for a fall in the market.

A person is said to be "long" when he holds options and futures unsold.

A person is said to be "short" when he has sold options and futures which he will have to buy back.

A "Scalper" is a person who either sells short options or futures or buys long with the view of scalping an infinitesimal profit on the transaction.

A "Jobber" is a person who deals in options and futures with a view of making small profits, and generally winds up his transactions at the end of each day.

A "Dealer" is a person who is open to buy or sell options and futures at the smallest fraction over or under the market value.

A "Wrecker" is a determined operator who wrecks the market in options and futures in any way he can to obtain his ulterior object.

A "Manipulator" is a person who manipulates the market in options and futures, up or down, with a view of obtaining his ulterior object.

A "Cornerer" is a person who enters into enormous operations in options and futures with a view of artificially raising values, and with the ulterior object of cornering, not only the trader and consumer, but also those who have sold short, and thus compelling all classes to buy back from him at the artificial values ruling during the time he is making his corner. The cornerer lays his plans months before he actually intends to corner certain months.

A "Speculator" is a person who buys options and futures for a rise, or sells them for a fall.

A "Plunger" is a desperate, unprincipled gambler who plays for large stakes at the risk of utter ruin, but with the chance of making a fortune.

A person is said to be "unloading" when he is reselling his options and futures previously bought.

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[1] *Commercial Gambling: the Principal Cause of Depression in Agriculture and Trade.* By C. W. Smith. London: Sampson Low, Marston, & Co.

A person is said to be "covering" when he is buying back his options and futures previously sold.

"Short selling" is selling options and futures a person has not got in the hope of being able to buy back at less money at a decline in the market.

"Rigging the markets" is putting them up or down in futures and options artificially with some ulterior motive.

A "Syndicate" or "Ring" is composed of many persons who have combined to rig the market in futures and options up or down by dealing in enormous quantities.

"Bolstering" the option and future markets means trying to support them by artificial manipulation.

"Hammering" the option and future markets means trying to depress them by artificial manipulation.

"Switching" is a form of gambling which means reselling one month's options and futures previously bought and replacing them with those of a distant month, or buying back what a person has previously sold and selling again for a more distant month.

A "Margin" is a sum of money deposited by an operator in futures as a security for the payment of differences in prices that may become due from him during the currency of a contract. A margin may be increased if prices turn against the operator, or diminished if they turn in his favour.

A "Stop Order" is a form of gambling which means that a person can gamble in options or futures with minimum losses by giving orders that directly the loss has reached the sum stipulated the said contracts are to be closed at once.

"Gambling on specified margins" means that directly the margin is gone the brokers have orders to close the options and futures at once.

A "Clearing-house" is an institution whereby all option and future contracts are liquidated, and where any actual produce tendered against such contracts is tendered according to the rules of the institution. In this way 80 to 90 per cent. of the future and option contracts bought and sold for delivery in each month of the year between the various members can be liquidated, and against these no produce is ever tendered.

"Ringing-out" is a transaction whereby one contract of a given month is set against another contract of the same month between two parties trading together. The transaction is also known as "sets-off."

The "Settlement System" is an institution in connection with the clearing-house whereby the balances of all cash differences between all parties trading together are paid in or received on the basis of values fixed by a committee of this institution on a fixed day of each week, and thus each account is balanced daily or weekly to a penny. By this means operators in futures and options can only lose one day's or week's differences in case of a member declaring himself bankrupt, and unable to meet his differences.

A "Carrying Charge" (I may add) is a small amount paid to the person who really or nominally holds the commodity while a contract is maturing. It is paid in the form of a premium on the price of a distant "future."

For some years past the future system has been rapidly extending in the United States, and an agitation against it has for some time been carried on by American farmers and their representatives in Congress. Almost universally farmers appear to be of opinion that the system is injurious to their interests, and of this view both the late Secretary of Agriculture and the

Statistician of his Department were strong supporters. The history of the attempt at legislation against the system may be briefly described. Two Bills have been before Congress. The first was originally prepared by Mr. August Post, Secretary of the National Farmers' Alliance, by which body it was endorsed. It was introduced to Congress by Mr. Butterworth, and, on his retirement, Mr. Hatch of Missouri took charge of the measure, with such good effect that it passed the House of Representatives in 1892 by a large majority, but failed to reach the Senate before the adjournment. Mr. Washburn, of Minnesota, introduced a similar measure in the Senate, and this was passed just before the end of the session, and sent to the House of Representatives. In order to obtain a hearing for it out of the regular order of business, it was necessary to obtain a majority of two-thirds. On a motion for the consideration of the Bill being put before the House, 172 members voted for it, and 124 against it. Thus the measure was shelved on account of the majority being insufficient for the suspension of the regular order of proceedings in its favour; but it is understood that it will be reintroduced this year. There is very little difference between the two Bills. Both practically prohibit options and futures, as defined in almost similar terms, by requiring any dealer in these contracts to pay a licence of $1,000 per annum, and a tax of five cents per pound on the articles which are sold by weight, and twenty cents a bushel on those which are sold by measure. These taxes would be entirely prohibitory, as they are meant to be. The dealers are further requested to register themselves and all their transactions in options and futures; and, in at least one of the Bills, they are required to keep their books in a specified manner under the supervision of the revenue authorities.

It is important to observe that neither of the Anti-option Bills would prohibit future contracts if the seller has the produce dealt in; but there is some difference between the two in other respects. Under Mr. Washburn's Bill the contract would not be a future as defined in the Bill—"if the articles contracted to be sold and delivered shall subsequently be actually delivered to the purchaser for manufacture or consumption." Thus, under this Bill, a person possessing a commodity can sell it to anyone for future delivery without restriction; but if he has not the article in his possession, he may sell it and afterwards buy and deliver it only to a manufacturer or consumer—not to a speculator. It is provided in the Bill that it shall not apply to any contracts made with the United States, or any State, county, or municipality; nor to the contracts made by farmers for the sale and delivery of goods in actual course of production by them. In Mr. Hatch's

Bill there is no exception in favour of the manufacturer or consumer, everyone being practically prohibited from selling for future delivery unless he is the owner of the goods, or has acquired by purchase the right of their future possession under a contract previously made.

Some idea of the extent to which the future system prevails in the United States may be obtained from a statement of the recorded sales of wheat at the New York Produce Exchange during the first half of 1887, given by Mr. Steevens, the Editor of *Bradstreet's*, in an article which he published some time ago in the *Quarterly Journal of Economics*. The spot sales amounted to 48,836,360 bushels, and the sales of futures to 867,594,740 bushels. Although he is a defender of the future system, he says:—

> The future sales as reported are nearly double the total reported harvest of wheat in the United States in 1886. During the same half-year the cash sales at St. Louis were 5,675,000 bushels, and the sales of futures 134,720,000.

Mr. Steevens goes on to say:—

> It is undoubtedly well within the limits of probability to assert that future sales of wheat at St. Louis, Chicago, and Toledo, with trading at leading Atlantic ports, aggregated during the first half of 1887 considerably in excess of two thousand million bushels of wheat; in other words, that they more than equalled the total production of wheat in the world in 1886.

It is to be observed that this total is for half a year only, and if for the whole year it was double, it amounted to about nine times the total production of wheat in the United States in the preceding harvest. But even this statement does not fully show the extent to which transactions are multiplied under the option system. Mr. Davis, of Kansas, says that by far the greater portion of the wheat grown in the United States is distributed from the local markets, and does not reach the Board of Trade markets at all; also, that a very large proportion of the wheat does not reach the lowest grade dealt with under the option system. He quotes from a report of the Chicago Board of Trade, showing that during five years ending with 1888 11,040,000,000 bushels of wheat and maize were grown, of which only 1,077,000,000 bushels, or 9·8 per cent., reached the eight interior Board of Trade markets, and much of this was doubtless counted twice, as grain is shipped from one market to another. He goes on to say that the grain reaching the seaboard markets cannot be counted, as it has been included once, if not twice, at interior points; and hence it follows that less than ten per cent. of the wheat and maize produced is sold in the

Board of Trade markets. Therefore, if we put the statements of Mr. Steevens and Mr. Davis together, it appears that the sales of futures in a year are about ninety times the amount of grain actually disposed of in those markets. For Mr. Steevens states in effect that these future sales are nine times the total crop, and Mr. Davis declares that less than a tenth of the total crop is passed through the market in which futures are sold. This calculation, it will be observed, is not made on my authority, but is a deduction from the statements of two eminent authorities in the United States, one an advocate and the other an opponent of the option system.

Of course, the point of these statements is that an enormous preponderance of the business done under the future system is what is called "wind-selling"; that is, business in which no commodities pass from one party to the other. Even if there be delivery of a particular lot of produce on the maturity of a contract terminating three or four months ahead, it may be sold and re-sold any number of times in the interval, and delivery probably will not take place in respect of one of the intermediate sales; and who is to ensure that delivery takes place at the maturity of a contract, provided that the two parties to it agree to settle by a balance in money instead of by the delivery of the commodity?

At a conference of the National Board of Trade on the Anti-Option Bill, held last year, Mr. Davis said that 95 per cent. of the wheat that reached Chicago in the preceding week would not grade: that is to say, it was not good enough in quality to rank as No. 2, the lowest grade in which option-trading is carried on. He added that 98 per cent. of the wheat grown in Kansas in 1892 was below grade, and had to be sold by sample. Yet, he went on to say, the prices of the entire crop were ruled by those prevailing for the very small proportion of the crop sold many times over under the option system; for it is only the price of graded wheat which is quoted in the market reports.

The proportion of the American wheat crop moved to this country directly under the option or future system cannot be stated; but the whole of the quantity exported is moved on the basis of prices prevailing for options as a general rule, although sometimes prices are relatively higher in America than they are in England. The option system has extended to some other European countries besides England, and notably to France; but apart from the proportion of grain exported under the system, the prices of options and futures in America rule the prices of wheat and maize throughout the civilised world to a great extent, and especially when, as is generally the case, the American

surplus is absolutely necessary to meet the demands of European consumption.

Indian wheat to a great extent is sold under the future system; but in all cases, I believe, there are actual shipments against the contracts.

The question of the validity of contracts for future delivery has been the subject of conflicting decisions in the courts of different American States; but in the Supreme Court of the United States, in a case decided in 1884, the American law was authoritatively stated by Mr. Justice Matthews as follows:—

> The generally accepted doctrine in this country is, as stated by Mr. Benjamin, that a contract for the sale of goods to be delivered at a future day is valid, even though the seller has not the goods nor any other means of getting them than to go into the market and buy them; but such a contract is only valid when the parties really intend and agree that the goods are to be delivered by the seller and the price to be paid by the buyer. And if, under guise of such a contract, the real intent be merely to speculate in the rise or fall of prices, and the goods are not to be delivered, but one party is to pay the other the difference between the contract price and the market price of the goods, at the date fixed for executing the contract, then the whole transaction constitutes nothing more than a wager, and is null and void. And this is now the law in England, by force of the statute of 8 & 9 Vict. c. 109, s. 18, altering the Common Law in that respect. (Benjamin on Sales, 541, 542, and notes to fourth American edition by Bennett.)

Such a transaction as is declared valid in this judgment would be equally valid under the Anti-Option Bill, provided that the goods were delivered to a manufacturer or consumer, but not otherwise.

At the Conference of the National Board of Trade, already referred to, Mr. Raymond, of Chicago, a defender of the option system, described the process of "ringing-out" as follows:—

> Suppose that there were a million bushels of wheat which were sold ten times. That represents contracts for ten million bushels outstanding. The clerks who represent the members of the Boards of Trade in these transactions come upon the Board, and they say to Mr. Jones: "You owe Mr. Smith one million bushels of wheat." "Yes, sir." "Well, Mr. Smith, you owe Mr. Doe a million bushels of wheat. Mr. Jones owes it to Mr. Smith at a certain price, and Mr. Smith owes it to the next man at a certain other price." So the boys find out nine or ten men in this ring in which this million bushels of wheat are concerned, and they finally find what the cost to each gentleman is, so that in the closing of that transaction when the delivery day comes, instead of one seller delivering the invoice to the first man and taking his million bushels in grain, the receipts are figured up, including storage, and he gives his cheque for the amount, and so with the next man and the next, so that the wheat passes around from the first man to the last, each intermediate man getting the respective amount due to him for the difference in price.

At the same Conference Mr. A. J. Sawyer, of Minneapolis,

one of the most extensive buyers of grain in the United States, in defending the option system, said that the option was a negotiable contract, as "sacred" as any bank bill. He added :—

> It goes from one man to another until it is probably transferred hundreds of times. That is what makes this enormous short selling that you are talking about. There are probably not less than 75,000,000 of these contracts floating around from one man to another on the Boards of Trade of Chicago, Minneapolis, and New York.

Mr. Sawyer was probably referring to options of all kinds, and not to those relating to grain only; but his statement is notable as that of a defender of the option system, as it shows in even a more striking manner than the accounts of the opponents of the system the multiplicity of the transactions carried out in connection with a single lot of grain. According to Mr. Sawyer, a lot of five or ten thousand bushels of wheat may be nominally transferred hundreds of times. In the great majority of instances, however, no particular lot of grain or other produce is in view in connection with a future contract, but only a given quantity of a certain grade.

Now let us endeavour to imagine what takes place in connection with a wheat option for 5,000 bushels made on July 1, to terminate in October, the seller to have the option of fixing the particular date in October when delivery shall take place. Let us further suppose that there is a particular lot of grain which is transferred from one man to another until fifty men are interested in it, including the first seller. We have here forty-nine pairs of men, as every man except the first and last is a member of two pairs. For example, A sells to B, B to C, C to D, and so on until the fiftieth man is reached. Therefore there are forty-nine pairs of men whose interests are opposed as far as this particular transaction is concerned, one of each pair being interested in a rise, and the other in a fall of prices, after he has entered into a contract. Now, wherever the option or future system is in extensive operation, there is a daily or weekly settlement through a clearing-house, and the daily or weekly differences in price have to be settled between each of those forty-nine pairs of men on each settlement day. If the price advances above that at which the option is sold, every one of the forty-nine sellers has to pay the difference on 5,000 bushels to every one of the forty-nine buyers, because if he had to get the wheat to deliver he would have to pay so much more for it; and if the price falls, every one of the forty-nine buyers has to pay the difference to every one of the forty-nine sellers, because the price he has agreed to pay is so much more than the price at which the wheat could be bought. This is done to minimise

risks, which might become very heavy during the whole period of the contract. As every one of the fifty men interested in the transaction, except the first and last, is both buyer and seller, forty-eight of them pay one man and receive from another, if there be any difference in price above or below the price agreed upon in each case, on every settlement day during July, August, September, and part of October, though possibly for only one day in October; and the first and last man have each to pay or receive. This shows how enormous the complications may be upon a sale of 5,000 bushels of wheat. But this is by no means all the complications involved, for every one of the fifty men may "hedge" more or less, to protect himself agaisnt loss on the transaction, by buying or selling other options. Of course the multitudinous transactions are simplified by means of the clearing-house; but the effect is the same as if each man had to pay all those to whom he owes, and receive from all who are indebted to him. In this country, at least, it is not usual for any particular lot of grain to be transferred as supposed under the future system; but the effect of the usual transactions is as above described, except that thousands take place without any delivery of grain whatever.

It is customary among some English importers of grain to hedge by selling options or futures in this country or in the United States—usually in this country. For example, if an importer buys 10,000 quarters of wheat abroad, rather than risk the whole amount that he would lose if a fall took place, he sells an equal quantity of wheat in the shape of futures at the highest price he can get. If he sells the futures at the same price as he has paid for the grain, he covers his risk entirely, and stands to win at least as much on the former in the event of a fall in price as he will lose on the latter. Indeed, a series of falls will be more to his advantage than a series of advances, because he cannot get any profit on his grain till it arrives in this country, and for every advance in price he will have to pay cash on his futures, which might be inconvenient; whereas, in the event of a heavy fall, he might buy in his futures on very advantageous terms, wait for a temporary turn in the market in order to sell again, and then look forward to another fall to enable him to repeat the manipulation. In short, what suits him best is a series of falls, with brief recoveries or partial recoveries at intervals. But a continuous fall will be more advantageous to him than a continuous rise.

From the preceding statements it will be gathered that there is a very large number of men, especially in the United States, engaged in purely speculative trading in grain and other

products. Of course there are often many transfers of a lot of wheat in markets conducted under the old system of trading; but anything approaching to the number which take place in the principal markets of the United States and in Liverpool would never have occurred under the old system. Nine-tenths of them, and possibly ninety-nine hundredths, are altogether unnecessary for distributive purposes. Whether they can be defended on other grounds I am not just at the present moment considering. It is clear, at any rate, that the vast majority of men engaged in the option business are pure speculators upon prices, whether they are to be called gamblers or not. When fifty men are engaged in a transaction respecting 5,000 bushels of wheat, as supposed in an example given above, only the first and last can actually handle the grain; and as for all the rest, to all effects and purposes they might just as well have been speculating upon a horse-race as upon the price of wheat.

Connected with the option system is the trick which is known as "cornering." No doubt corners were effected long before options were invented, although they were not known by the name at present given to them. It is no new thing for men to endeavour to buy up a commodity which is supposed to be scarce or likely to become so in order to create a monopoly or partial monopoly, and command their own price. But formerly, when this was done, it was a case of enormous risk. Moreover, it could not be carried out except by men possessed of a large amount of capital. But now, under the system of hedging and weekly or daily settlements, the risk of cornering is greatly minimised, and men are helped by bankers or brokers to effect corners, and in many cases men of straw, or at any rate men in an utterly unsound financial condition, have managed to carry on a corner for some time. It does not follow that such attempts at partial monopoly are more likely to be successful than they were under the old system of trade. On the contrary, there is such an enormous amount of scheming against anything of that kind by the men whose interest it is to depress prices, that it is probably more difficult to effect a successful corner than it ever was before. But the risk to the persons who attempt it is, as has been stated, less than it used to be; while, on the other hand, the risk to other persons is much greater.

So far, I have endeavoured as simply as possible to describe the option and future system, to show the extent of its operation, and to explain the method in which it is worked. It is time now to examine the arguments put forward for or against the system, and in doing so I shall condense the evidence given by a number of authorities in the United States, and a few in this country.

Arguments in Defence of the System.

First let us see what is said in defence of the system, and in opposition to the Anti-Option Bill. One of the most redoubtable defenders is Mr. Albert C. Steevens, the Editor of *Bradstreet's*, from whose article in the American *Quarterly Journal of Economics* I have already quoted. The article was written before the Anti-Option Bill was introduced, and before the agitation against the option system had assumed the importance which it has now attained. Apparently it had not occurred to Mr. Steevens when he wrote that the strongest argument against the system was that it tended to reduce prices, for he takes pains to plead that the system is an advantageous one as far as the consumer is concerned. He says:—

> A broad view of the equities of trade in this line (wheat) must place especial emphasis on the need for all natural or artificial aids or devices tending to cheapen the cost of flour to the consumer.

Again he says in reference to a wheat corner that had been attempted shortly before he wrote:—

> While, therefore, the extra prices paid for grain by speculators—participants in the clique movements of Chicago and San Francisco—were in fact distributed among farmers in the West and North-west and on the Pacific coast, the price for wheat averaged much lower than it would have been likely to except for the attempts to corner, which reflects itself in cheaper bread for millions.

He denies that the system is one of mere gambling in prices. All future contracts, he says, in New York and Chicago contemplate the actual delivery of the grain, and the intermediate re-sales of options and futures he regards as practically transfers of the grain, although there is no actual transfer. In summing-up the advantages of the system, he declares that "it furnishes a ready market to the producer who can no longer carry necessary surplus stocks; it affords a means of transporting wheat from far-distant countries at a fixed price delivered at a minimum of loss through fluctuations of prices while in transit; it enables the trade to collect enormous stocks of wheat and carry them over from seasons of plenty to seasons of scarcity without losses to producers, millers, or consumers (when considered over considerable periods of time); that the tendency is to equalise prices the world over; and that in the long run these results have enured to the advantage of the consumer, because, like any other improvement in production or distribution, the elaborate organisation of trade cheapens the product for him."

Mr. Steevens admits that there are numbers of traders in the

produce exchanges who sell and buy wheat with no intention of being connected with the work of moving the crops—speculators pure and simple. At times, he says, a group of them may sell futures furiously, merely for the purpose of depressing prices. Should buyers be scarce, this would be likely to result in prices going down, when the sellers might, as they frequently do, cover their short sales at a profit; or the intention may fail utterly, as is more often the case, unless action is based on the broader conditions of the market, and aided by special influence or better insight into the demand and supply of the near future. But, he contends, the volume of trading in futures is not made up of transactions of this character—an opinion in which he is distinctly opposed to many other authorities. Mr. Steevens condemns corners, but contends that men who deal in futures are the chief agents in breaking them.

Mr. Sawyer, of Minneapolis, whose opinion has been previously quoted, declares that the Elevator Company of which he is the President could not hold the enormous amount of wheat which they carry unless they could sell futures against it. At the time when he was speaking there were 92,000,000 bushels of wheat in sight, which he said was evidence of the fact that the world could not consume wheat as fast as it came forward. The speculator, he added, was the only man who could hold this wheat, and, unless he could sell futures against it, he would not hold it except at a lower price than he gives under the future system.

Mr. Raymond, of Chicago, made use of similar arguments at the Conference of the National Board of Trade, in which Mr. Sawyer took part. What surprised him, he said, was that the producers of grain who wanted buyers and competition and an outlet for their grain should propose to cut off "the most active class of buyers that exist in the world, namely, the speculative buyers." Every short sale that was made, he declared, furnished an increased demand for the farmer's product, and, if you cut off more than one-third of this demand, the farmer would suffer the depreciation of the value of his produce to just that amount.

Mr. Bacon, of Milwaukee, declared that the free selling of all agricultural and other products for future delivery without restriction or restraint produced a higher average price than would be obtained in the ordinary mercantile method of trade. The trade in grain and other agricultural products, he said, differed from other commodities in that it reached maturity and arrived for sale all at once. As soon as the grain is harvested, he added, the farmer desires to realise upon it, and his property is consequently rushed to market, probably two-thirds of the entire

crop of grain being sold within three or four months of harvest, and it would be impracticable to carry this enormous bulk of product in the ordinary methods of mercantile trade. Unless that property could be disposed of to persons who do not want it, he went on to say, except for the purposes of making a profit on it, the prices would be depressed, certainly 10 per cent., and probably 25 per cent.

Another argument frequently used is that if the Anti-Option Bill were passed the farmers would be at the mercy of combinations of millers.

Again, it is said that importers of wheat in foreign countries would not dare to buy large quantities except at very low prices, lest there should be a heavy depreciation in price during the time occupied in the shipment of the grain, unless they could hedge as they do now by the sale of futures.

It has already been stated that the late Secretary of Agriculture, as well as the late Statistician, was a strong supporter of the Anti-Option Bill, and on several occasions they have both declared that the tendency of the option system was to depress prices. But the new Secretary of Agriculture, Mr. Morton, in an interview reported in the *New York Tribune*, said that one of the first things he intended to do after getting into office would be to let the farmer know that his (the farmer's) ideas needed changing, and that anti-option legislation was injurious to all those engaged in agricultural pursuits. He added:—

> The Anti-Option Bill, instead of doing the farmer any good, would result in his injury. What the farmer needs, if he only knew it, is increased speculation in agricultural products, instead of a law to stop speculation. The farmers, instead of being supporters of this Bill, should be the chief ones to oppose it, because the farmer would be injured more than anybody else if the measure became a law. On the Boards of Trade and on the Produce Exchanges of the country speculation in agricultural products is carried on, and the result is that the prices of these products are stimulated by that speculation. Put a stop to speculation in wheat, corn, cotton, pork &c., and the result will be to decrease the farmers' business. If there were no Boards of Trade or Exchanges the big millers of the Northwest could dictate prices to the farmers, and, of course, the latter would suffer.

A leading member of one of the largest wheat-buying firms in this country, whose opinion I asked on the effect of the option system, declared that he believed that, in the long run, it had no effect upon prices. His firm is one of the few great grain firms in London which have had extensive dealings in options. A few other members of the grain trade also expressed a like opinion. One of the best authorities as a writer upon the grain trade in this country says:—

With regard to options, I am of opinion that in years of abundance and cheapness they do undoubtedly depress values, but that in a year of scarcity, "bear" dealings in options have but little effect.

Another grain-trade authority writes to me as follows :—

I have not followed the question of late, because the plant does not grow here (in London); the climate is not suitable for it. The attempt to acclimatise it in London, although backed by some great capitalists, has signally failed, and there is now only the Indian parcel business, which is free from the worst features of the gambling affairs. As to options as they exist in the United States, there can be little doubt of their object. It is to create extremes of value out of which the lucky gamblers may win. I think the tendency is quite as much in one direction as in the other.

Before examining these arguments I will give some of the opinions of opponents of the option system.

Evidence Against the System.

Mr. Jeremiah Rusk, the late Secretary of Agriculture, has on several occasions strongly denounced the system of gambling in grain prices, on the ground that it caused an enormous fictitious supply, and therefore tended to lower prices. In reply to the objection that the corresponding fictitious demand and the corners got up by speculators had a tendency to enhance prices, he said that whenever this result occurred it was after the farmers had disposed of all, or nearly all, their grain.

Mr. J. R. Dodge, late Statistician of the Department of Agriculture, in a recent address to the National Grange, alluded to the existence of the "swarming thousands of speculators, under the innocent disguise of brokers, in every city, not to receive and forward grain, but to bet upon its future price, producing nothing, neither cultivating nor carrying to market a single bushel." "Yet," he added, "these thousands live upon the finest of the wheat."

One of the most powerful writers against the option system is Mr. C. Wood Davis, of Kansas, a very extensive farmer, and a capable statistician. I have before me several articles of his upon this subject, but shall only be able to give the gist of his more important arguments. In the first place, in reply to the contention as to the impossibility of marketing all the grain produced in the United States at the time when most of it is disposed of by the farmers without the option system, except at very low prices, Mr. Davis quotes, as previously stated, from the report of the Chicago Board of Trade for 1888 to show that during the five years ending with that year over 11,040,000,000 bushels of wheat and maize were produced, of which only

1,077,000,000 bushels, or 9·8 per cent., reached the eight interior Board of Trade markets. All the rest, or 90·2 per cent., was distributed without the aid of the option system. Hence he contends that it is absurd to say that wheat and maize cannot be disposed of under the ordinary system of trading.

Mr. Davis declares that no more wheat is handled in Chicago at the present time than was handled in the year 1880, when the option system was only in its beginning; and that if the grain could be dealt with in the old-fashioned way in 1880, there is no reason why it could not be distributed in like manner at the present time. Any man, he says, who can raise $250 to be put up as a margin can go upon the Board of Trade and offer for sale wheat that he never saw. Great numbers of people are trading in this way, and Mr. Davis contends that the enormous fictitious sales of wheat which take place must tend to lower prices. New York, he adds, sold more wheat in one day than could be delivered in twelve months. The commissions alone on fictitious sales, he complains, reach five million dollars per annum, and these are five million reasons why the men who deal in options should wish the system to be continued, and also five million reasons why the farmers should desire to get rid of the system. A young man, he says, with good lungs and 2½ cents (for a margin), can produce a bushel of wheat more quickly than he can; and, he adds:—

> When Dunham & Co. failed in Chicago their cash capital was $25,000 and they carried 10,000,000 dollars' worth of short grain, which was brought into competition with my actual grain on a margin of 2½ cents a bushel.

He declares that in 999 out of every 1,000 transactions under the option system the seller neither owns nor expects to own the grain he contracts to deliver, and the buyer does not expect to receive the grain he has contracted to receive and pay for, the tacit understanding being that at the maturity of the contract the difference between the contract price and the current price of maturity should be settled between them. With respect to the manner in which the option system depresses prices, Mr. Davis declares that nine-tenths of the time more option dealers are interested in depressing prices than in advancing prices, so that the weight and influence of this speculative body is almost constantly exerted in attempting to run prices down. His arguments on this point of the question are so pithy that I make no apology for quoting some portions of them as they appeared in the *Albany Cultivator*:—

> First comes the constitutional bear, who, from long habit of thought, or a pessimistic mental tendency, has come to believe prices are always too

high; then the professional bear, who, knowing it is easier to depress than advance prices, sells below the current price property he does not own, and whose winnings depending upon lower prices, exerts all his ingenuity in exaggerating the extent of the supply and fabrication of such reports of failures, panics, stringent money markets, and the great breadth of, and favourable conditions surrounding, the growing crops as will tend to cause the "longs" to become panic-stricken and throw their holdings on the market and thus depress prices to a point that will enable him to win. Next comes the speculator, who, being convinced prices are too low and must advance greatly, intends to profit by the expected rise, but, being "out of the market" and desiring to get in as cheaply as possible, becomes an active and unscrupulous bear, exerting himself to the utmost to depress prices that he may buy the more cheaply and increase his margin for winnings. Thus the efforts of nearly all the devotees at this singular commercial shrine make for lower prices, being effectually aided by a constant fear, on the part of holders, that prices will recede and entail loss.

The bears act upon the knowledge that men can be terrorised into selling, and any improbable tale of disaster will have an influence; hence, when they raid the market the air is thick with rumours of failures, panics, and widespread commercial disaster, coupled with the offering of more grain than there is in the country; the result being that the bull becomes, in turn, nervous, timid, and then panic-stricken, and, being unable to respond to calls for increased margins, throws his grain overboard adding greatly to the swelling tide, and helping further to depress the price. Large holdings of fictitious products on the part of the bulls are as great a menace to the stability of prices as are the immense offerings of the bears, and when forced overboard, by bear strategy, result in disastrous effects upon prices and the prosperity of the producer, the prices for whose products are determined by these operations.

The senseless terror which seizes the bull, often caused by his inability to respond to calls for margin, is one of the most serious phases of option dealing, making of the bull a most effective instrument in producing a rapid and great shrinkage in values; hence, the operations of the speculative bull and bear are equally to be deprecated and equally harmful.

How different is the course of the legitimate dealer owning or having the means of producing the commodities offered for sale! All his efforts are directed towards securing good prices, steadiness in demand, and freedom from rapid and wide oscillations in values. The seller who is an owner of property never depreciates its value, nor does he depress prices by offerings of impossible quantities which it would be impracticable to deliver.

Writing again on the subject in November last, Mr. Davis said that while the merchants, millers, spinners, and exporters were ever working for lower prices that their contracts may return to their possession at a good round profit, there remain only the isolated and powerless producers interested in maintaining or advancing prices. He remarked that he was long puzzled by the apparently anomalous action of buyers of actual grain. Apparently they should be interested in advancing prices after they have bought, and yet their every utterance was of a character to depreciate the property they owned. The mystery was solved to him when he ascertained that the moment one of

these "receivers," as they are called, has bought a quantity of grain he hedges by selling a future against it, and he has no further interest in the price of the actual grain, while he has an abiding and intensely absorbing interest in depressing the price in order that he may buy in his outstanding contracts at a profit. The price the receiver pays the farmer, Mr. Davis goes on to say, is regulated by the price of options, and it matters not to the receiver how low that price may be so long as he hedges at once and can drive the price to a still lower level when taking in his contracts, and this work he is always engaged in.

The clearness and comprehensiveness of Mr. Davis's arguments render it unnecessary to quote many other American opponents of the option system whose evidence I have before me.

The opinions of a few merchants on the London Corn Exchange have been quoted in defence of the option system; but many more whom I consulted on the subject declared strongly against it. Several said that the best firms on Mark Lane would have nothing to do with the option dealers, and that any firm dabbling in options was regarded with suspicion. It was also said that nearly all the London firms who had dealt in options had burnt their fingers. The system, it was remarked, did not work well with legitimate trading, and it was only those who made a study of it, and devoted themselves entirely to it, who could hold their own in it. The prevalent opinion among the merchants consulted was also to the effect that the option system tended to lower prices, because the men selling enormous quantities of fictitious grain were all concerned in the depreciation of prices after they had sold, and the buyers, importers, and millers had no power against these speculators, while many of them become speculators themselves, and interested in a fall at least as much as in a rise, by selling futures against their purchases.

The only writer in this country who has dealt with this option system in a detailed and comprehensive manner is Mr. C. W. Smith, late of Liverpool. In the first book which he published on the subject he stated that when the system was extended to Liverpool he was a member of a firm of brokers in that city, and that for some time he strongly opposed the new method of trading. He found, however, that he must adopt it unless he intended to be crowded out of his business, and when he retired from the firm with which he was connected he had been engaged in option trading about fifteen years. He commenced, he says, as a "bull," but soon found that the

"bulls" almost always got the worst of it. Since making that discovery he has been a persistent "bear," greatly to the profit of those with whom he was concerned, and to the advantage of his own business. He is convinced that the option system is not only the cause of ruin to a great number of people engaged in the speculative trade, and to others with whom they are connected in business, but also that it is in great measure accountable for the agricultural and commercial depression which has prevailed for so many years in this and other countries. He has, therefore, made it his business to denounce the system under which he was formerly engaged, and in the second book which he has written on the subject he has gone into great detail in exposing its methods and effects.

Among the statements made in Mr. Smith's second book (*Commercial Gambling*) are some which may be briefly given in substance. He says that in a falling market, importers are protected by their sales of futures, taking daily or weekly cash differences as the market falls. This shows clearly how it is that importers who might be supposed to be on the side of the bulls, really become bears in respect of the options which they sell against their importations. Conversely, in a rising market, importers are often in difficulty if they are men who deal in options, as they have to buy back the futures they have sold, because they cannot realise quickly enough their actual stocks on the same parity of values as the rise in the market for futures. Therefore, to create cash to pay into the clearing-house, they must sell part of their actual stocks at the best price they can get, or buy back their futures, and then, when the market turns once more, the futures have to be sold again at the best price that can be got, and so on. An importer, it may be observed, can take his time to buy, as a rule; but he is often a compulsory seller, unless he happens to be a man of great capital. Mr. Smith gives these examples as showing, not only that the option system tends to reduce prices, because it is the interest of almost all classes of men engaged in the business to run them down, but also because it causes panics which tend, in their turn, to reduce prices. The option system, he says, where it has become common, has driven the old class of merchants, men of large capital, out of business, and has admitted a number of mere men of straw. As an example of this, he states that a panic in the cotton trade was brought about by a couple of bank clerks who robbed their employers of 180,000*l.* to pay their differences in the clearing-house, the result being extensive failures, and the ruin of many men of business. In special seasons, Mr. Smith remarks, when speculation is rampant, extra carrying premiums, from 5 to 6

per cent., on futures are sometimes paid, and these, of course, induce men to hold grain or other commodities; but usually there is no extra premium, and sometimes futures are actually at a discount, or lower than spot prices, so that there is no inducement whatever to hold actual stocks of grain. It might be supposed that corners were advantageous to producers, but it is pointed out that they never take place until the farmers have sold most of their grain; so that, if a rise is kept up for a time because of a corner, the farmers seldom get the benefit of it. Moreover, the knowledge that there is an immense accumulation of grain or any other commodity, owing to a corner, paralyses trade, because business men are afraid of a sudden unloading, which would swamp the markets. At any moment a corner may break down, quite against the wish of those who are conducting it, and the collapse in prices in such a case is disastrous to a large number of people. Mr. Smith, in his new book, sums up his arguments in the following statements, which he claims to have proved:—

1. That the option and future contracts were adopted in America at about the time of the origin of the present depression—say from 1875 to 1876.
2. That, as the option and future contracts became more popular in America and England, the depression increased—say from 1876 to 1880.
3. That, as the option and future contracts, combined with the registered settlement system, became common both in America and England, and the moving and importing of all the important crops of the world became usual on this basis, year after year the depression has increased—say from 1882 to 1888.
4. Since 1888 the depression has intensified, and has culminated in 1892 and 1893 in universal depression all over the world.
5. That the various markets for produce, where these systems were first adopted, have been the first to feel the effects of them; and that the industries indirectly affected thereby gradually fell into the same state of depression.
6. That the various markets and industries specially dwelt upon, which are the leading ones of the world, have all been hampered and ruined in many years by corners, manipulations, and syndicates, and have in consequence suffered from this cause, and such operations are solely traceable to the option, future, and settlement systems.
7. That the values of all such commodities, after having been fictitiously raised by such artificial means, have eventually fallen to a much lower basis than they would have done, under the power of the settlement system, had not the artificial rise taken place.
8. That the wholesale markets, where speculation and gambling have been most notorious, on the basis of the option, future, and settlement systems, have been most depressed and panic-stricken.
9. That the several trades and industries act and react upon one another; hence all have suffered under this option, future, and settlement system.
10. That after fifteen years' experience of the option, future, and settlement systems in America and England, the land which grows the produce has at last been reduced into a state of panic, threatening not only the prosperity of each trade, but also that of the nation itself.

11. That the values of those imported products which are not affected by options, futures, or settlements have not been subjected to such depression or suffered as much from panics as those affected by such systems, although, of course, the values of all such commodities have suffered from the effects of the depression in other articles with which they are more or less associated. The same remark applies to the various industries connected with such products.

12. That supply and demand of late years have not been the means, as of old, of regulating the values, but that prices have been regulated by option and future contracts, which are only gambling contracts; hence the values of the speculative paper contracts of the markets of America and England have absolutely been the regulating medium of the value of the produce grown by the farmer, and eventually have regulated the value of the land that produces the same.

13. That the values of certain agricultural produce, such as oats, barley, &c., have not suffered to the extent of wheat and maize. Why? Because the crops of these articles are not moved to this country on the basis of the future, option, and settlement systems, there being no gambling institutions in this country for such articles. The same remark applies to other agricultural produce; but of course the values of all have suffered in sympathy with the fall in wheat and maize.

14. That the option, future, and settlement systems have invariably depressed the values of all commodities, independently of the size of the crop.

15. That the option, future, and settlement systems have already been the means of forcing producers to take a counter artificial step, in order to try and raise values of their produce by curtailing the sizes of their crops and outputs.

Readers who are desirous of becoming thoroughly acquainted with the details of the system under notice may be referred to the book from which these conclusions are taken, written by a man who "knows every rope in the ship."

Conclusions.

It is time now to examine the evidence for and against the option system. It appears to me that Mr. Davis in America and Mr. C. W. Smith in England have clearly disposed of all the arguments of the defenders, not to mention the numerous other witnesses who are on the attacking side. It must be borne in mind that all the attacks on the option system are directed against the purely speculative operations which take place under it, and in all cases in which I have spoken of men as attacking the option system this was meant. No one objects to a man who wants corn, pork, cotton, or sugar buying it for future delivery at a fixed price. It is often necessary for him to do so, in order that he may know at what price he can afford to resell. For example, a miller has to enter into contracts for the delivery of flour for two or three months to come, and before he can safely fix the price he wants to know what he will have

to give for the wheat. In short, the attack is upon precisely those abuses of the future trading system which the Anti-Option Bill prohibits. This explanation is necessary in passing judgment upon the controversy which has been given in a brief form in the preceding portion of this article.

With respect to the assertion that the principal grain crops of the United States could not be moved in the autumn without the aid of the option system, Mr. Davis has sufficiently disposed of it by showing that only a very small proportion of this grain comes under the system. His opponents rejoin to the effect that, although none of the wheat which does not grade up to No. 2 is sold in options, those who purchase it sell options of graded wheat by way of hedging, and that if they could not do this they would not be able to carry the great bulk of the ungraded grain through the winter, unless they could buy it at a sufficiently low price to protect themselves against risks. This is by far the most important argument in favour of the option system. If examined, however, it will be found to be inconsistent with other statements made by those who use it. If an elevator company buy a million bushels of ungraded wheat, what is to prevent them from selling it for delivery months ahead at fixed prices to different buyers who want it? They could sell it by sample, or as an inferior grade, as they actually do sell it when it is sold for delivery. As possessors of the wheat, they would be entitled under the Anti-Option Bill to sell it for future delivery to anyone. Why should it be necessary for them to sell, nominally, graded wheat which they have not got, under the option system? If delivery be the essential feature of every future contract, as the defenders of the option system pretend, why cannot these holders of ungraded wheat sell futures of what they possess and can deliver, as well as futures of what they do not possess, and yet, according to the gentlemen referred to, will be bound to deliver ultimately? There cannot be any reason for their preference for the latter, except that they will not be bound to deliver it at all. In an ordinary season America grows no more wheat now than she produced twelve or thirteen years ago, when the option system had made very little headway; and if the grain crops could be moved then without the new system, why should it be necessary at the present time?

As to the statement that elevator companies, millers, and speculators would pay less than they pay now for wheat to hold through the winter, if they could not protect themselves by means of options, the fact is clear that they pay very much less now than they paid when they had not the advantage of the

system. Moreover, as already stated, they could sell futures to the full amount of the grain in their possession for actual delivery any number of months ahead; and if the gambling element of the option system were destroyed, there is no doubt that they would sell futures in this way. Legitimate speculation in the purchase of wheat beforehand without any hedging has been knocked on the head by the gambling system, and would be restored by the abolition of that system. The system has rendered the markets in which it prevails the playground of gambling tricksters, and has gone far to render legitimate trading altogether unsafe. It has broken down all confidence in the old system of judging as to the probable course of trade, based upon present and prospective supplies and demands. These influences, I am convinced, have had a far more potent effect in depressing prices than any risk of holding wheat through the winter could possibly have if business were conducted in the old-fashioned way. Even if it be true that men who hold large stocks of wheat until they can be sent into consumption would want to make larger carrying charges than they make at present under the hedging system, there appears to me every reason to believe that such extra margins of profit would be trifling in comparison with the advantages to be obtained through the abolition of a system which tends to lower prices all round, probably to an enormous extent.

The contention that there is no such thing as mere "wind-selling," or gambling in prices, in any regular market, because delivery is always "contemplated," is clearly a mere subterfuge, as it is admitted that there is no delivery in forty-nine future contracts out of fifty, or perhaps in ninety-nine out of a hundred. It will not do to say that in the cases in which delivery does not take place there is a nominal transfer of produce which is ultimately delivered to someone, because this is true only in cases in which a specified lot of produce is sold and resold many times, while in the vast majority of instances no particular lot is ever in view, but only a certain quantity of a given grade. A may sell 10,000 bushels of No. 2 American red wheat, nominally for July delivery, to B, who in his turn sells 5,000 bushels of the same grade to C for August delivery and 5,000 bushels to D for September, while C and D in their turn may sell various quantities of the same grade for different months. In all probability the wheat in sight when A's July delivery would be due would all have been disposed of before C's September delivery took place; so that it would be nonsense to say that the wheat A sells is merely transferred, instead of being delivered to B. All the men may settle in differences of price,

and not one may have any intention of handling the grain. Any buyer can insist on delivery, it is true, and this is all that the much-vaunted rule of the Exchanges or clearing-houses amounts to. The fact remains that the vast majority of dealings in options or futures in America, Liverpool, or London are settled without delivery. I have before me the rules of the Liverpool and London Clearing-houses in relation to grain, and in both settlement without delivery is clearly provided for. Mr. C. W. Smith, who has operated in Liverpool for many years, says that 95 per cent. of future contracts are settled without any transfer of produce; and one of the highest authorities in London tells me that in the London Produce Exchange the business done nominally in grain is "purely an option business." "Any buyer may demand delivery," he adds; "but no one does." The options are simply hedges against actual imports, or purely gambling ventures.

Another argument of the defenders of the system is that it multiplies the number of persons willing to buy the farmer's produce, and that therefore it must be beneficial to him. To say the least, this argument is neutralised by the counter contention that the system puts an enormous amount of fictitious grain on the markets, which, *per se*, must tend to depress prices.

Now let us consider the contention of those who declare that in the long run the option system makes no difference to prices, or that if it tends to depress them in periods of plenty, it also tends to enhance them in a corresponding degree in seasons of scarcity.

At first sight it might appear to anyone not conversant with the details of the option system that, as in every contract there must be one person interested in a rise of prices and one interested in a fall, as far as that particular contract is concerned, and that therefore in the whole mass of contracts there must be as many interested on one side as on the other, the influences of the two sets, so far as men have power to affect prices, must precisely neutralise each other in the long run. I have never seen the argument put in this form by defenders of the system; but it has occurred to myself as the most plausible of any that they could possibly use. Its fallacy lies in the fact, previously alluded to, that in the speculative market the "bears" in the long run must be stronger than the "bulls." One reason is, that a great number of those who rank on the "bull" side, such as millers who purchase corn for manufacture, and merchants who import it for distribution, are not, as a rule, men who make a business of manipulating the markets. Those of

them who buy in the old-fashioned way, as a great majority of millers and importers in this country still do, are not acting "bulls" at all, although in the equal division which it has been said there must be among those who are interested in a rise or in a fall in prices they rank on the "bull" side. As to those who hedge against their future purchases, they are the weakest of sellers, as they are often compelled to sell quickly after making a large purchase, in order to meet their settlements. Thus, while they are waiting to buy they are interested in a fall, and when they have bought they help to create a further fall by their anxiety to sell in order to hedge. Having hedged, as explained in an example given on a preceding page, they are interested in a fall rather than in a rise. Indeed, in the event of a great drop in price taking place, the men who have bought futures of them may be constrained to settle up prematurely on terms highly advantageous to them. Moreover, they can make their sales of futures much more extensive than their purchase of grain, if they see a chance of gain by so doing, and then they join the "bears" in effect, to run down prices.

Then we have the fact that the trickery which is rampant under the system, the frequent collapses of men of straw who are introduced by it, and the panics which are got up artificially, or which occur on the collapse of attempts to corner a commodity, all tend on the side of the "bears." On the other hand, the worst tricks of the "bulls," the corners which they get up, have really a more damaging effect upon prices than anything which the "bears" can do; for, so long as a corner exists, no confidence can be felt by legitimate traders in the course of prices for a single day to come, as a break-down may occur without an hour's notice. I think it is perfectly clear, then, that there is no such equality between the opposing forces under the option system as has been suggested.

So far as traders or speculators can influence prices, as they frequently can by means of false reports, or by tricks in buying or selling for that distinct purpose, a comparison of the old and new systems clearly shows that the latter has been a disadvantage to producers. Under the former, everyone who bought grain or other produce to resell in its raw form, or as a manufactured commodity, was interested in an advance of price, and a continuously rising market was invariably advantageous to all dealers. But now, under the new system, where it prevails, there must be, to say the least, as many operators, in the long run, interested in a fall as there are dealers who will be benefited by a rise. In other words, under the old system, all dealers in

produce in the long run were "bulls," whereas under the new system at least half are "bears." Speculators under the old-fashioned method of trading might desire a fall in prices before buying heavy stocks; but as soon as they had bought they were anxious to see an advance. They were only temporarily interested in a fall, while now they may be, and many of them are, interested in a constant fall. This comparison appears to me to prove to demonstration that the option system has tended to depress prices, so far as the influence of dealers can depress them.

Let us consider for a moment to what extent operators can influence prices. It may be said that, in the long run, values must be ruled by supply and demand; and this, with qualifications, may be admitted. But, in the first place, the "long run" is one which commonly leaves the farmer out of any advantages secured under it, as the gamblers in the prices of farm produce are frequently able to manipulate the markets during the period when most farmers are selling their grain. Moreover, by their individual tricks or combinations these men create a constant feeling of insecurity which tends permanently to depress trade. Again, the system under which they operate is in itself a cause of depression, because it admits men of no capital worth mentioning as speculators under it, and the frequent failures of such men to meet their obligations under the daily or weekly settlement system are causes of occasional panics and permanent distrust, which prevent advances that might take place under sound conditions of trading. The system has led, too, in Liverpool, as well as in the United States, to what may be termed a regular state of market warfare, rather than trading. Great operators and "rings" are constantly plotting deliberately to ruin others, no trick being too abominable for them to descend to in effecting their purpose. At one time they sell frantically in order to create a panic, instructing their brokers to buy in for them far more than they have sold when prices have been brought low enough. This may be done to break a "corner," ruining the men engaged in it, and to acquire it on their own account. At another time they may buy with apparent eagerness, leading scores of gulls to follow their example, and suddenly turn round and sell to an enormous extent, when they have artificially advanced prices. Such tricks are fatal to sound trading, and drive capital out of the business in which they are practised, leaving it mainly to become the sport of gamblers.

It is a notable fact, and very remarkable if it be an example of mere coincidence, that the commodities which come under the

option system have fallen in value during the last ten or fifteen years to a greater extent than other articles of farm produce. There have been temporary advances in two of the products referred to, due to exceptional scarcity (as in the case of the flesh of the pig at the present time) or to gigantic speculation; but, as a rule, the fact is as above stated. Space forbids me to prove this statement by figures, and it is hardly necessary to do so, as anyone familiar with the prices of farm products will see at once that it is correct.

The American Anti-Option Bill will probably become law during the present year, and this will be a great gain. But there is a possible danger for European countries in the prospect. It may be that the stoppage of the gambling system of trading in America, its chief home, will knock it on the head altogether; but, on the other hand, it is possible that this will only cause its transportation. For example, Liverpool may take the place of Chicago as the great centre of option trading. Whether this be an imaginary or a real danger, there can be no question upon a point to which I wish to draw the special attention of British agriculturists. It would greatly strengthen the hands of the opponents of the gambling system in America if we, in this country, followed their example in demanding legislation against it. Immediate legislation, of course, is out of the question, and what I desire to induce agriculturists to ask for promptly is the appointment of a Select Committee to inquire into the subject.

There is, surely, substantial reason for a Parliamentary inquiry. In the Liverpool and London markets there are, as has been shown, good grounds for believing that the practices in question are conducted in a manner which, if not demonstrably illegal, is highly objectionable from many points of view. Apparently the law is not stringent enough to suppress the evils, as it fails to put down gambling of the more familiar kind. The subterfuges which are resorted to under the system indicated would probably render a conviction for gambling difficult, if not impossible.

But, apart from the objection to gambling in principle, there is every reason to affirm that farmers and landowners, and labourers through them, and, indeed, all who are connected with the land, are seriously injured by the system of gambling in farm produce, which artificially depresses prices and restrains legitimate trading; and that system, therefore, should be stopped before it becomes more extensive than it is in this country. That this would be proved by a Parliamentary inquiry I have no doubt whatever, and therefore I desire nothing better than

the appointment of a Select Committee of the House of Commons to investigate the question, with power to examine witnesses engaged in, or otherwise conversant with, the system of trading in options or futures.

WILLIAM E. BEAR.

MANAGEMENT OF DEVON CATTLE.

UNDER three heads are most conveniently classified the various systems of managing Devon herds in the counties of Devon, Somerset, Dorset and Cornwall, the principal Devon-breeding districts of England. Each separate object for which a breed is kept must be considered as the "final cause" (in the philosophic sense of the term) of the system of management designed to secure that object. Where we find a plurality of objects, we find also a combination of different systems of management.

Practice is best learned from practice, and from its results. Speculation and theory are well in their place; but we must see facts, and observe the relations of cause and effect, to get a grasp of the true principles of successful practice. For this reason the plan here adopted is to briefly consider the different classes of objects which the owners of Devons have in view, and then to give details of actual management in a few representative herds, pointing out, so far as may seem necessary, the reasons for variations of practice. We shall thus see how the Devon is treated, first, as a beef breed; secondly, for dairy purposes; and thirdly, for the maintenance of the highest qualities by the production and supply of first-rate pedigree bulls. The third section comprises also notes on management for competition in the show-yard.

I. BRED FOR THE BUTCHER.

In nearly all the earliest notices of the Devon breed in its old headquarters, within an area described by Arthur Young as of about 45 miles in length by 22 in breadth, in North Devon and the adjoining parts of West Somerset, the Devon is represented as excellent for beef and for labour, but not of much use for milk. It was then, as it still is, famous for its grazing properties, and for the prime quality of the meat, cheaply produced. The team oxen, mostly fed off at the age of five or six years, some a year earlier, reached, of course, weights to which the Devon is

now seldom grown. Working Devon oxen, killed at the age of six years, sometimes weighed from sixty to seventy score. In many of the steer-breeding herds of the present time, milk has the same subordinate place in the economy of management which it held in the days of the ox-team.

The quality of Devon milk is unquestionably good, and always was so. This is a fact, bearing, no doubt, upon the superior grazing powers of the breed. The rich sustenance supplied to the calves of every successive generation in the early stages of growth lays upon the frame of the calf the foundation of a generous muscular superstructure, and gives the aptitude to fatten readily. Starting with this advantage, the Devon steer-breeder has to see that in the after-treatment he does not throw it away. The loss of the mellow calf's-flesh grown upon milk is a waste for ever. The steer calves, after weaning (and the same rule applies to those fed from the pail), are usually treated more liberally than the heifers, to keep them going forward, without a check, in the direction of their destination. But the heifers intended for the breeding of steers should not be impoverished; nor, on the other hand, should they be so kept as to favour the growth of too much fat and proportionate deterioration of the muscle, or lean meat. The system, which long practice has established by successful results, of keeping the future dams of steers in gentle and constant growth, and in moderate condition as they grow, conforms to the demands of that law of nature which rules the transmission of characteristics modified, and of characteristics acquired, under domestication; the law by which a race, wild or subjugated, free, or under human control, adapts itself to the circumstances of life.

In some herds we find that the cows, excepting any reserved for the supply of the house, do little or no more than rear their calves, either by suckling, or by what they yield to the hand; but the milk-yield of the Devon appears to have increased generally from its average quantity 80 or 100 years ago, so far as we can judge, by comparison of the reputation of the Devon in former times with what we see in the herds of to-day.

There are two systems of rearing in steer-breeding herds—the suckling system and hand-feeding. In the former the calves are weaned at ages ranging usually from three to four or five months; some cows rear more than one calf, setting free others for the supply of the house, or for any additional profit which may be got through the dairy. Indeed, the dairy and the production of beef often divide in various proportions the attention of the farmer; so that between the dairy business proper and the business of exclusive beef-making there are so many

degrees that the classification of herds is not always easy. In considering here the more distinctively beef herds, we must not overlook the extent of the connection of many of them with the dairy.

When the calves are weaned the cows usually are milked for the supply of the house. The cows go out daily, and in winter have a night and morning feed in the stalls, straw and roots before calving, and hay and roots after they have calved.

Under the hand-rearing system, the calves are brought up on skim-milk, with roots, hay and a little corn; or, if the milk is wanted for other purposes, gruel is substituted. They are turned out for a short time during the first summer; and the rule to "always keep them growing" is steadily observed by the best managers. When taken into their winter quarters, the steers are put together apart from the heifers, and begin to experience the luxuries preparatory to early death. The extra feeding here begins. There is at this point divergence of the systems of practice, some breeders not allowing their steers to go out any more, but feeding them off for slaughter at ages varying between twenty months and two years; whilst others run them on another year and send them to the butcher at a little before, or about, three years old. The time of clearing out is necessarily dependent in some measure upon local circumstances. Where these are favourable, the advantage to the producer would seem to be in the earlier clearance, as the increase in value in proportion to the cost of keep is greater in the earlier than in the later periods of growth. In support of this view, the opinion of an authority to whom the writer is indebted for much valuable information, and whose practical knowledge is very extensive, covering widely separated districts, may be here cited. Mr. Edwin F. Maunder, Lord Alington's able agent at Crichel, discussing the question, expresses a strong preference for the practice of getting the steers out at the early age.

II. The Devon for the Dairy.

Dorsetshire, the principal home of the dairy Devon, has long possessed herds of red cattle approximating more or less closely to the Devon type, and has also from an indefinitely early period drawn renovating blood from the herds of North Devon and West Somerset. The management, however, has varied widely from that of the beef-producing herds in the ancient headquarters of the breed. In some parts of Devonshire, too, and elsewhere, herds of pure-bred Devons, managed specially for dairy purposes, have been long established.

The dairy properties of the breed were brought out much by the Earl of Leicester, who, as Mr. Coke, in the early part of the present century, had a splendid Devon herd at Holkham, and encouraged his Norfolk tenantry and cottagers to keep Devons, and, also, notwithstanding the poor reputation of the breed in that day for the dairy, to look to the Devons, under suitable management, as profitable dairy stock. In Essex, too, about the same time, the capabilities of the Devons for dairy purposes were recognised, and those capabilities evolved by treatment of the cattle, and training of their pure-bred offspring as dairy stock. Lord Western, as stated by Youatt, Mr. Conyers, of Copt Hall, as recorded by the same and older chroniclers, and some other purchasers, gave them in that county a trial, with ample success.

The Dorsetshire system was described in *The Journal of the Royal Agricultural Society of England*, in the years 1853 (Vol. XIV.) and 1855 (Vol. XV.), by Mr. Louis H. Ruegg; and in 1878 (Vol. XIV., 2nd series) by the late Mr. John Chalmers Morton. Very little change has taken place since then, so far as the writer could ascertain, in the course of recent inspection of Devon herds, but that the average price paid for cows let by the farmers by the year to dairymen has varied with the changing values of other commodities. Mr. Ruegg gives 8*l.* 10*s.* to 10*l.* as the range of price forty years ago. Mr. Morton, at the later date, says it was then from 12*l.* to 13*l.* Now, probably 11*l.* to 12*l.* would be nearer the mark, more or less according to the character of the cows and the situation of the dairy with reference to facilities for disposal of dairy products. There are also some slight variations in the agreement between the farmer and the dairyman regarding extra food for the cattle and the repurchase of the calves required by the farmer for breeding stock; but these are matters of detail affecting the amount of the final settlement between the two rather than the year's value of each cow. The dairy herd let by the farmer to the dairyman consists of, say, 25, 30, 40, or 50 cows. A farmer with a herd of 100 dairy cows would probably divide it into two or three portions, and let them to different dairymen. The same dairyman will sometimes rent a herd year after year from the same farmer, taking often several years consecutively some of the same animals, and, when in treaty for the renewal of his hiring, will occasionally make special request that certain cows which have done well for him shall be included. The letting is from Candlemas to Candlemas; but where it is continued from year to year, nothing occurs in the herd to indicate a break, or to distinguish the closing of one year and the opening of another. The cows go

on milking and calving in the ordinary course just in the same way as if only one man had an interest in them, the "barreners," and any which have failed to give satisfaction, being duly returned to the farmer, who fills their places with fresh cows or heifers. As he usually reserves a few cows for his own house dairy, he has one or two to spare as vacancies in the let dairy herd occur; and his heifers are in turn coming on to fill the places of the cows drafted off to the butcher.

The cows calve mostly from Christmas to the early part of May, and the owner takes at a fixed price all the heifer calves he wishes to have. The steer calves are eagerly bought up at good prices. A competent authority, well acquainted with the agriculture of Dorset, and having no personal interest in the Dorsetshire dairy business, estimates the average price of the bull calves to be reared as steers, taken by the purchasers at a week old, at two guineas each. This, checked by other estimates, appears to fairly represent the value. The heifer calves are fed by the dairyman upon skim-milk until passed over to the farmer, who allows, very commonly, a quarter's rent of the cow, as the value of the calf when delivered to him; but as some farmers who possess herds of superior breeding, and occasionally rear a bull or two for sale or home use, desire the choicest heifer calves to be rather more generously kept, they arrange with the dairyman for extra feeding and allow proportionately more as the value of the calves receiving it. The farmer bears all risks of the cows and finds all food excepting cake, which the dairyman, if he wishes to use it, buys at his own cost, unless by special arrangement the farmer agrees to pay a portion of the value. The food of the cows, of course, is mainly comprised in the allotment of land to the dairyman's use, the acreage being reckoned according to the number of cows let to him.

III. Bull-breeding and Exhibition.

Both the breeders of dairy Devons and the breeders of Devon grazing stock have occasional recourse to what are called the bull-breeding herds, for sires qualified to keep the breed up to its recognised standard of merit. These are herds in which the breeder's ostensible aim is to maintain by selection and management the highest refinement of type, the model form, and the truest symmetry in the flesh parts as well as in the structure of the frame.

As owners of "bull-breeding" herds are mostly either themselves exhibitors, or breeders of animals exhibited by purchasers, management for competition in the show-yard may be con-

veniently noticed in this section. In such herds the manager's efforts are constantly directed to the "education" of young animals, his object being to get them as well forward as he can in condition. The calf must come into the world as early as possible in the year. Every day of January is precious time; every day lost is so much time given away to the enemy, because the ages of animals at the principal shows are reckoned from the birthday of the year. Against an animal calved on January 1, one calved on December 31 following would have to compete; and the judges, whilst making fair allowance for differences of age, are not bound to foresee precisely the progress of an animal during the next twelve months. The younger animal may improve vastly in that time, and at the end of it stand far ahead of its present older rival; on the other hand, it may grow worse instead of better. When there is nearly a whole year's difference between the two, the younger must have immensely superior merit to beat the older, and each month, week, and day of course affects its chance of winning.

The calf, usually, is allowed to remain with its dam for a few days, and then put in the calf-pen and brought to her twice daily. The suckling period commonly extends over three or four months; but if, as the calf grows, it shows promise of distinguished excellence, it is allowed to have milk as long as it will, and is not limited to one cow. Some calves are successfully reared by hand for exhibition; and some breeders prefer this method for bull calves, not that it is better for the calves, but that it is decidedly better for the cows, which often get much knocked about when the young bulls, no longer infants, put their masculine strength into the calf's instinctive butting as it sucks. Breeders generally, however, hold that there is nothing like milk received through the natural process of sucking for giving what is termed "bloom" to the calf. In the notes which follow, the different views and consequently varying practice of breeders upon this question will be noticed, especially one breeder's opinion that "live" milk, whether directly from the cow or from the pail, is essential to the maintenance of the calf's "bloomy" appearance.

The calves of both sexes have hay and sliced roots with a little corn as soon as they will eat them. The crowding of calves should be avoided, and plenty of exercise and fresh air are necessary to their thorough well-doing, whether the calves be intended for exhibition or for breeding purposes only. Unless the blood be duly charged with oxygen through the lungs, perfectly healthy growth is obviously impossible, the vital powers are impaired, and the result must be injurious to the

future progeny; whilst, as regards the show-yard, the loss of the robust character, and the substitution of flabby fat for good flesh, ought to tell against an animal when it goes into the ring. From want of sufficient exercise, too, the legs become weak and crooked. Now the end of bull-breeding is the production of sires able to do real good; to give muscle whilst they impart the readiness to fatten; so that the stock of those sires may be fit for either the home grazier or the colonial or foreign feeder, and equal to the task of finding their living, whether their destiny leave them in native pastures or take them to lands where they have to roam in search of sustenance. There is also the dairy side of the question; and it is needless to show why bulls for dairy herds should be at least as healthily reared as the bulls for the steer-breeder's use.

A very good custom is that of giving the calves a run out in a yard by day for an hour or two after they are a month or six weeks old. Early calves also do well if allowed to run in a paddock by day in May; and in June the heifer calves may, and often do, remain out at night. A paddock run for young bulls a few hours every day during their first summer is excellent for healthy development.

Some breeders prefer to turn the cow and calf together, and let the calf help itself. This system will commend itself to those who wish to follow nature as far as they can in the artificial conditions of domestication. It tends to keep the calf's underline straighter than when the meals are fewer and heavier, because the food, taken oftener and in smaller quantities, does not swell the paunch so much. The assumption is, moreover, that food taken frequently at the bidding of the appetite, gives a larger proportion of nourishment to the calf and a smaller proportion of waste than food taken twice a day in quantities beyond the animal's powers of absorption into the blood within the time in which the food remains available.

We need not here further linger upon the calf's first summer. In the following winter the heifer calves (or quey calves, or cow calves, as they are variously called) are placed in yards and fed upon hay and roots, and they have, or should have, a daily run out, the bull calves, and any intended for feeding as steers, having more liberal treatment. In this treatment we are for the moment losing sight of the calves selected for exhibition (if such there be in the herd), and are considering only the future breeding stock and the surplus males disposed of eventually as steers, either store or fat. In the spring next ensuing, the heifer calves are turned out to grass as soon as the grass-growth and the weather permit; and in the succeeding autumn they are

brought in to be fed upon straw and roots, and have a run out during the day. Close confinement, and everything of the nature of pampering, for stock heifers—and the remark applies to all breeding stock—should be avoided. Forcing for show appears to be a necessary practice, too often followed by evil results.

The heifers are usually from two years and nine months to three years old when they produce the first calf. We have seen already that in steer-breeding herds the cows, as their calves are taken away, are milked for the dairy of the house. In herds from which animals are exhibited, such cows frequently have to help forward any specially promising calves intended for the shows; and the system of feeding for exhibition may be here described in a few words, none, perhaps, more significant than those of the late Mr. James Davy, of Flitton in North Devon, whose immense success in the show-yard induced a visitor at Flitton, when looking at the superb yearling heifers, to ask of him the secret of feeding to such perfection. "My friend," Mr. Davy replied, in his characteristic manner, "*I have been grinding up sovereigns for them.*"

Illustrative Notes.

Mr. W. S. Perry, of Whiterow, Lew Down, Devon, although a breeder of high-class pedigree Devons, does not extensively adopt the suckling system. He has a theory that suckled calves do not get capacity to clear off as much coarse food as they should dispose of to make the best profit from farming in his particular district (and, of course, under similar conditions, in other districts); so he hand-rears, for the purpose of bringing out a keen and healthy appetite. His general plan is to wean at ten days old.

In the old home of the North Devon breed we find in the principal breeding herds very little high keeping, either of calves or of older animals. Take North Molton district, for example; there is the historic homestead of Champson, where Mr. Francis Quartly acted his great part towards the preservation and restoration of the Devon breed of cattle, and where his nephew, Mr. John Quartly, is still the owner of an important herd bred from the old "Quartly" stock. The calves at Champson are suckled for only a short time, weaned and moderately kept during their growth; and their owner declares that their predecessors were treated with still less liberality. Messrs. Tapp, Mogridge, and other breeders act upon somewhat similar rules of light expense in rearing, with faith in the great maturing power of the Devon upon grass.

Mr. R. J. Stranger, whose three generations of family experience in Devon breeding and management at his present residence, the Court House, North Molton, link him with breeders of the time when the Devon had no recorded history, keeps his cattle in the same plain way, within a narrow range of variation in details. Occasionally he will feed an animal for show, and have the satisfaction of prize-winning; but such instances are exceptional. His herd is composed of steady-going breeders, and their produce reared in the ordinary course of farming in that district. A neighbour of his, Mr. Charles Voysey, of Upcott, who combines the breeding of cobs and ponies and of Exmoor sheep with steer-breeding and dairy farming, and supplies butter to the town of Ilfracombe, has part of his stock at home and part out on allotments upon Exmoor, where the Devons certainly learn to be hardy; he used to summer-graze his home-bred steers and sell them out, grass-fed, in August and September, when they were $2\frac{1}{4}$ years old, at about 20*l.* each; but he has recently changed his practice a little and disposed of them as "stores." A little to westward of this district, that is Barnstaple way, Earl Fortescue's seat, Castle Hill, is the home of a good herd of Devons, kept more liberally, but still with a view to the maintenance of as good a milk-yield as may be consistent with prime sirloins. The herd is kept to a limited number, and the annual sales of the surplus by auction afford excellent and encouraging opportunities to the tenant-farmers to improve their herds.

North-west of Barnstaple is the Heanton herd of Sir W. R. Williams, Bart., a grand show herd. The cows, at the close of the show season, are turned out to grass, and all is done that thought and experience can suggest to minimise the strain of the show-yard training upon the constitution.

Mr. N. Cook, of Chevithorne, Tiverton, breeds a herd of between seventy and eighty cows, let in dairies of under and over a score in each, to four dairymen, and has a dairy of his own besides. The longevity of the Devon, under conditions favourable to health, is here exemplified in the great ages of some of the cows, one of which at the age of nearly twenty years was still included in one of the dairies when the herd was recently seen. The rearing of the dairy cow is, of course, much more favourable to vital power and to prolonged fecundity than the rearing, for example, of heifers for show. There is no forcing in it; the strength is not mortgaged to secure an over-rapid growth, and the work of the vital organs is not hindered by excess of inside fat.

Mr. Benjamin Bucknell, of Holcombe Barton, although under a Somerset post-town, is still within the boundaries of

North Devon. His, too, is a dairy herd, inherited from his father; and it is let upon the system prevailing in Dorsetshire, at a rent of 11*l.* or 12*l.* for each cow. Two acres, one for hay and one for pasture, are allowed to each cow; all straw is found, and roots are given to the dairyman sometimes, but they are not in the contract. There is a good understanding between the farmer and the dairyman, and, whilst the one is ready to act with reasonable liberality, the other is not unduly exacting or expectant. When the dairyman requires cake, he and the farmer each pay half the cost. The calves are born mostly from Christmas to Lady-Day or the beginning of April, and steers of $2\frac{1}{2}$ years old fed to go at Christmas, realise 30*l.* apiece. Oxen used to be worked upon the farm, and old team oxen were in those days sold at six years weighing up to somewhere about 70 score each.

A dairy herd of Devons has been kept for many years by the Directors of Convict Prisons, at the Government Farm, Princetown, South Devon. It was founded by, and until recently was under the control of, Mr. Alexander Watt, now holding the stewardship of the Muncaster Estate in Cumberland. Mr. Watt, among his contributions to the agricultural and live-stock literature of the country, supplied the manual on *Dairy Farming in Devonshire*, to which, through the Devon County Agricultural Association, the 50*l.* prize given by Mr. Seale-Hayne, M.P., was awarded a few years ago. In that work, describing the class of farm most suitable for a dairy herd, he refers to a subject which the intelligent and observant dairy-farmer will recognise as of general importance, whether the stock be of the Devon or of any other breed. He says in substance (p. 11) that temperature, and its influence upon the productive powers of the dairy herd, are too little thought of; and that, whilst ample shelter is provided against cold, the necessity of shade from heat is too often overlooked, although excessive heat causes a great amount of suffering to the cattle, and consequently of loss to their owner.

Somewhere about 20 years ago Mr. Watt began (see pp. 50 *et seq.* of his manual) a series of what he considers full and exhaustive trials of the capabilities of North Devons, South Hams, Polled Scots, Ayrshires, Jerseys, and Shorthorns, for dairy purposes; and he came to the very decided conclusion that, for a Devonshire dairy, Devons are the best. Three North Devons of a good milking strain, he ascertained, can be kept on the same food as two Shorthorns or two Ayrshires, during their period of lactation, and each Devon yields weekly $1\frac{1}{2}$ to $2\frac{1}{2}$ lb. more butter than either a Shorthorn or an Ayrshire cow; whilst of the

"lease" cows (a term understood to mean the barren cows) of these three breeds, the Devons were the most forward for grazing purposes. The Polled Scots were in most respects found about equal to North Devons; their milk was equally rich, but the quantity less and period of lactation shorter. The Jerseys, he admits, will, in a suitable climate, beat every other breed both for quantity and richness of milk; but would have to stop indoors sometimes, every winter, when Devons could go out, and are of comparatively small value to the butcher at last.

Against the supposition that milk and beef cannot be had together, either in one animal or in one breed, Mr. Watt throws the full weight of his opinion and experience. He has proved to himself that they may be developed jointly by breeding and treatment for their combination.

Upon many points of detail which it is impossible to introduce here, Mr. Watt gives very useful hints. There is the lump of rock salt which no manager who knows his business will omit, unless he have some other way of supplying to his cattle the quantity of salt necessary to robust health. Free exercise and pure water are also strong points in his view of good management. In his directions about the rearing of calves the remarks upon cleanliness deserve special attention.

There is one point which perhaps might be added. Ventilation and drainage are uppermost subjects with every good manager; but we seldom find due attention paid to the value of *light*. This will be found to bear consideration; and whilst we touch upon the admission of daylight to buildings where live-stock dwell, let us remember the importance of a good aspect,—one which allows the sun itself to look in. The vitalising power of *sunlight* is probably one of the greatest of the neglected truths of the art of live-stock management. How many a healthy animal, which under trying circumstances becomes sickly, would never become so; how many a sickly animal, which dies, would recover, if this were better understood and more generally regarded!

In Somersetshire the aim for a larger Devon than that of the colder parts of the North of Devonshire has to some extent ruled both the breeding and the management. The North Devons and Somerset Devons, indeed, have become closely related by the frequent use of North Devon bulls to refine the character of the old Somersetshire Devon; but the soil, climate and treatment still favour the greater growth.

Mr. William Kidner, of Fennington, Kingston, Taunton, has a long-established general breeding herd for grazing and dairy purposes combined. The cattle are well bred, and pedigrees

registered in the herd-book. About twenty is the usual number of calves in the season, which usually is the interval between Michaelmas and Christmas; but as some cows take leave for leisure, there are a few stragglers dropping in all the year round. Those cows and heifers which calve within the prescribed months get (as a rule) in addition to hay, or hay and straw-chaff mixed as the case may be, from two to six, or in a few exceptional cases, eight pounds of either decorticated cotton cake, English cotton cake, bean or maize meal, or a mixture of two or more of these foods, whichever at the time appears to give best value for the cost.

If hay is plentiful and cheap, Mr. Kidner does not chaff it unless it is at all mouldy, in which case he chaffs and steams it, mixing with it more or less, according to circumstances, of barley or oat straw chaff, and after Christmas some pulped mangel, increasing the quantity of mangel as the season advances. Exceptional circumstances are met by impromptu variations of management. There can be no hard-and-fast lines in a land of widely varying seasons. The past winter (1892-93), for instance, brought exceptional scarcity of hay. The Fennington cows and heifers in milk had, therefore, no hay at all until after Christmas, and then only a very small quantity mixed with the straw before cutting; but a substitute was given in a somewhat larger portion of cake and corn—about 5 lb. each—some more, some less, with a run out to grass during the day. The rule always is to let the cows go out for a short time every day to get fresh air and exercise. In ordinary weather they stay out from about 10 A.M. to 4 P.M., but if the weather is bad they come in earlier.

The cows calving in early spring or autumn go out to grass. They do not get extra food unless very exceptional circumstances make it necessary—such as extreme scarcity of grass, or when they are to be grazed for the butcher after rearing their calves.

The calves formerly were hand-fed, but then four or five women were employed nearly all the year. In recent years the difficulty of getting female labour has caused a change in the management. Not one woman is engaged in farm work at Fennington even in haytime or corn harvest. The heifer and steer calves now are suckled by their dams, or by other cows, from $3\frac{1}{2}$ to 4 months. By that time they have been taught to eat from 2 to 4 lb. of linseed cake, bean or other meal. If hay is plentiful they get a little before going out. If there are any roots to spare—but this is not always possible at Fennington—they are, as far as they go, substituted for cake or meal.

The dairy must still be supplied, although the calves, for

the sake of convenience, under necessity, are reared by the cows. It is managed thus: The cows, being of good milking strains, can usually rear two or three calves each. The calves of some of the cows are, therefore, given to other cows, which suckle them together with their own, and to cows from which calves have been weaned. A cow may be seen sometimes suckling two calves together; sometimes a cow takes two or three calves in succession. The free cows are filling the dairy in the meantime. After rearing the calf or calves—one, two, three or more, as the varying case may be—the cows are milked until about six weeks from the time of calving again, some, by oversight, still longer, so that the suckling cows at last also add to the milk sent into the dairy. Very few cows "run dry" (cease to give milk) until they are intentionally "dried" in the usual way. Hand-milked cows usually breed again sooner than those which suckle the calves. Mr. Kidner seldom rears a bull, but when he does so the calf sucks some time beyond the age at which the heifer and steer calves are weaned.

The calves go out to grass (which is plentiful and good) as early as they can in the spring. Those which come in as yearlings, at the approach of the following winter, are wintered on hay. Later, as the spring comes on, they get a little mangel,—if the hay fall short, chaff, and sometimes a few roots pulped with it.

Any calves born out of the season between Michaelmas and Christmas necessarily require different treatment. A good many come between Christmas and May 1, and some between that date and Michaelmas. The youngest get a little cake in addition to hay, those of intermediate birth having their fare regulated according to age, in the winter.

Spring comes, and heifers and steers again go out to grass. As the year wanes, the heifers gradually go out in the fields by day, until about Christmas. Their principal food besides grass is barley straw, given whole, which Mr. Kidner prefers to chaffed straw, as they select the best and most digestible parts and leave the coarse thick ends for bedding. If the straw is sweet and good they do very well without either hay or cake, but when it is not so they have once a day either a little hay or an equivalent of either linseed cake or decorticated cotton cake or other concentrated food, with the addition of mangel after Candlemas.

The two-year-old steers have similar treatment but a larger proportion of hay or artificial food, and after March 1 no straw, but hay twice a day instead; and as the grass season comes round once more they are turned out and "finished off" at ages ranging from $2\frac{1}{2}$ to 3 years old, some, but very few, being re-

tained beyond that age up to $3\frac{1}{4}$ years. Only the choicest are taken in and fed until Christmas, when their weights range from forty to fifty score. The rest are all finished on grass alone, tasting neither cake nor corn, unless there is a bad grass year and extra food becomes necessary. Fed off on grass alone they weigh well up towards forty score, some making quite that weight. No stores are sold, but a few are bought and fed off with the home-bred steers.

The practice of Mr. W. Hancock differs in several important particulars from that which we have just considered, and for reasons which the circumstances rule. Mr. Hancock, resident in the town of Wiveliscombe, and not dependent on agriculture, is nevertheless an ardent agriculturist. His buildings and land (the Culverhay Farm) are in the precincts and immediate neighbourhood of the town, to which he supplies regularly a large quantity of milk, making thereby a substantial yearly addition to his income. The births average about thirty-five in the year, and are distributed over the twelve months, to keep the milk-supply as constant and as even as possible. All the calves are suckled by cows. In one respect the management resembles Mr. Kidner's; that is, in freeing some cows from nurse-duty to get their milk, and giving their calves to other cows, which rear two together, and sometimes, when one calf is weaned, take another in its place. The calves are weaned at the age of twelve or fourteen weeks. They are wintered on mangel, chaff, cake and oats or other corn, apportioned according to age. The larger calves go out to grass in spring, the smaller not until midsummer. The steers are sold off as stores at about two years old, excepting a very few selected for home feeding. The latter, almost entirely grass-fed, are taken in for only a short time at the last, prime steers, being well-bred and of a generous beef-making sort, although bred from capital dairy cows, thus confirming the opinion of Mr. Watt, already cited. These steers, and breeding animals also exhibited, bring home many prizes from the Dunster annual show in December. The general health-record of the herd is excellent. Losses from milk-fever are unknown, and "quarter-ill," a trouble in some parts of the West of England, has seldom appeared upon the Culverhay Farm.

Mr. Stephen Bailey, of Hornshay, Nynehead, Wellington, Somerset, has a representative steer-breeding herd, producing about twenty-five calves annually, which come not at any one season but all the year through. He inherited his herd, which was brought to its present home by his grandfather in the year 1802, and has still some of the old strain of blood, with important additions by purchase. For some years he tried Short-

horns upon the farm, but found that they could not compete with Devons for that district. His aim is to grow large, heavy-fleshed animals.

The calves are suckled the usual length of time (three or four months), a few cows being told off for the dairy, and their calves given to "stale" cows (cows which have reared calves from three to four months and, after the weaning, have still sufficient milk for a fresh calf); but each of the cows for the dairy has her own calf left with her a week or ten days to get the "beastings," or earliest milk, the calf's natural first food, for want of which, and from having the unsuitable milk of stale cows before the stomach is prepared for it, calves are often lost. The calves suckled by stale cows continue with them as long as the milk lasts, and they leave the cows, without giving any trouble, as their supply fails.

Mr. Bailey holds that for laying a good covering of flesh upon the bones, as the foundation of plentiful substance in the ripened animal, and a thick coat of hair over all to conserve the natural warmth, the calf, whether suckled or hand-fed, should have its milk "alive from the cow," not *dead* milk. By the suckling system he ensures that, and through the most natural process; and as his first object is wealth of beef, and the dairy only secondary, he adopts the practice here described. He has also strong views upon the economy of feeding generally, maintaining—no doubt correctly—the great importance of care in letting the animals have hay fresh from the stack, with all its tempting aroma. Winded or stale hay has lost part of its virtue and much of the tastiness which induces the animal to eat it heartily with relish. He does not care for pulping and chaff, but with the cake and corn given to his young stock uses roots passed through the cutter. The weaned calves from the turning out in May have their summer's run upon grass. For the first winter the year's produce is divided into two classes: (1) calves born between Michaelmas of the previous year and Lady-day; and (2) calves born between Lady-day and Michaelmas of the same year. Those in the first class, steers and heifers alike, have hay, cut roots (if plentiful) and a little cake; in the second class the same, but with special care, and "preference shares" in the roots, which, if scarce, are sometimes all apportioned among them, to the exclusion of Class 1. Their supply of cake is also on a rather more liberal scale in proportion to size. Second winter: all, hay once a day (this, when well got, is of good quality at Hornshay); barley straw *ad libitum* (of poor quality, low feeding value, in the district), and roots; or, to make up for any deficiency in roots, a little cake

or meal. The older steers are rather better kept than the heifers.

When the steers are to be fed off they are taken in and stall-fed upon hay, cake and corn, foreign barley, maize and oat meal, if cheap enough; in short, anything that is cheapest and good enough. In this district the steers are grown usually up to about forty score (100 st. of 8 lb.) when fat, under three years of age.

Messrs. G. D. and H. C. Hancock, of Halse, near Bishop's Lydeard, Somerset, the third generation of a family of Devon breeders upon the same ground, farm nearly 500 acres upon the four-course system. Besides the ordinary crops they grow flax; and this was the only place where the writer, in the course of an extensive recent tour of the principal Devon-breeding counties, saw the olden-time ox-team. The rainfall here is about thirty inches. In the seven years ending with 1890 the average was 29·46, the highest record being 36·94 in 1886, and the lowest 23·41 in 1887.

The principal calving-time is from about the middle of October until April 1, the height of the season and thickest crowding-in of births being in the months of November and December. The earlier calves are usually hand-reared, the later suckled by "stale" cows: kept on the cows about four months and weaned in the spring, then kept upon cut trifolium and mangel until haytime is over, when they are turned into the aftermath, to grow out until November. In that month taken in, the largest have, in open courts, the roughest of the hay, with mangel; a few of the youngest, better hay and a little corn. The after-treatment is, grass in the season; in winter straw and rough hay, mangel if plentiful, sometimes turnips. The cows in milk are out day and night from spring until the end of November. When seen in that month, still lying out, they were getting cabbage in addition to the grass they continued to find in the fields. In dry and fine winter weather they are turned out in the morning until midday, on rough days kept in. Their morning and evening meal is chaff and pulped roots, with 3 lb. of decorticated cotton-cake, and in the evening hay is added. The steers are fed off when rising three years old, the ploughing oxen at the age of five years. Husk is the only considerable annoyance as regards health, and that is mostly upon land where calves affected with it have been before; quarter-evil has been known, but is not common at Halse. Abortion, which seldom occurs, has been confined to heifers.

Mr. A. C. Skinner's herd at Pound, Bishop's Lydeard, prominently represents the exhibition and bull-breeding departments

of Devon herd-management and has produced many excellent dairy Devons. The calves are not so much timed for birth in or about January as those of many other show herds, yet about two-thirds of the number fall within the first half of the year. The early calves go out to grass in May, weaned at three months old. Bull calves, kept in, have six months' suckling, and as soon as they can take the whole of the cow's milk they may. Calves for show have the customary good living of their class. Stock heifers, first winter, have hay at night, grass by day, a few roots when grass is scanty, or sometimes cake instead; second winter, a run on grass, some barley straw, and a little hay. Steers are "kept going," which means liberally treated, to two or two and a half years old, excepting two or three months in the second summer, when they have grass only. They are then sold as they are "finished." A daily run on grass is the rule of the herd for all but bulls, cows "dry" for calving, and young calves.

Mr. T. H. Risdon, whose herd at Washford, kept for profit in the ordinary course of Somersetshire beef-making, has turned out many noted Smithfield Club winners, allows his calves, according to his object, and their ages and destinations, from four to nine months' suckling, weans them from the cows on grass in summer, and in winter gives hay and roots, with about two quarts of corn each towards spring. For a special reason all corn is given whole (even the pigs being fed on whole Indian corn), the straw given uncut and roots whole. The reason is this: he believes that the free flow of saliva and its mixing with the food is one of the conditions of perfect health and thriving; that mastication induces it; and that to lessen the labour of mastication is therefore to lessen the quantity of saliva, and proportionately to lessen the thriving of the animal. The leavings of the uncut straw served out as food are taken to the heap, and subsequently delivered as bedding in the straw-yards. He farms 280 acres, about one-half under the plough, and breeds some five-and-twenty calves each year.

Mr. George Risdon, at Dunster, West Somerset, upon a well-sheltered grazing farm, has, besides his bought-in steers, a small steer-breeding herd. His general system of rearing calves, born mostly in April and May, does not differ much from what we have already noticed; but as the calves, both heifers and steers, grow up, the yearlings run out all day in winter, and have only hay under cover at night, whilst the two-year-old heifers lie out of doors in winter, night and day. The two-year-old steers in winter lie in night and day, and are fed off, from two to three years old, on hay and roots, and out at grass about

May 1, or in April in a forward spring. The worst are sold off during summer, the better remaining at grass until October, when they are taken in and fed for Christmas. The best then go to Dunster Show, where Mr. Risdon has exhibited very successfully, and the Breed Cup and other prizes have been won at Islington by animals purchased from him, notably one or two of the Devon steers exhibited by Her Majesty the Queen.

Mrs. Merson, of Bickham, Dunster, having a rather more exposed situation, cannot keep the young animals out quite as Mr. George Risdon, her neighbour, does, but they have open yards under sheds, and are very hardily reared. The steers, grazed off at three years old, average fully 44 and sometimes up to 45 score.

Mr. Robert Case, of Withycombe, West Somerset, followed his father, who took the farm more than sixty-five years ago. He remembers when the hand-rearing of calves was the common practice of the district, "but now that people have grown so lazy," he says, "they suckle them." His cows, however, generally excepting heifers, have about half the milk taken from them before the calves are let out to suck. When the calves take to corn (bruised oats), barley meal, &c., they are weaned. After the first summer's grass, when taken in at nights, they are not allowed to go out on frosty mornings, but have hay under cover, going out later in the day if the weather be fine. Later, they stay in all day, living on hay alone until that becomes scarce, then on pulped mangel and straw chaff. But Mr. Case does not like chaff for young stock unless it be sweetened with barley meal or an equivalent. His grass-fed steers, finished without extra food, and sold off to the butcher when under three years old, make a money average of about 26*l.*

On the Brendon Hills, Somersetshire, at the height of 700 to 1,000 feet above the sea, Mr. William Oatway, of Leigh Barton, rears annually more than twenty pure Devons of the hardy, robust, active sort, yet good substantial animals. After they are taken under cover at nights, in November, they continue to go out by day. The management is the same as on some of the low-lying farms in the district between the Brendon Hills and the coast, *plus* the special care needed on so bleak a height, with liability to sudden storms from the sea.

On the same side of the Brendon range is Stamborough, the farm occupied by Mr. John Howse, a successful exhibitor, and it is needless to say that his prize-winners do not get their comely looks by lying out upon the heights. After the show season, however, they are all turned out to grass, excepting occasionally one kept in to go on with the training for show. The yearly yield

of calves is from thirteen to fifteen, some of which are suckled, some hand-reared. The ordinary breeding females are out by day, in by night, during winter, and at night have hay and roots; no cake or corn is given but to the show animals. The heifers calve at the age of three years.

At least two widely different systems are found in Cornwall. There is, for example, that adopted in the large and exceedingly choice bull-breeding herd of Mr. J. C. Williams, M.P., at Caerhays Castle, St. Austell, where the heifer calves are suckled for five or six months, the bulls longer, and all that is required of the cows as milkers is that they should rear their own calves; and there is that of the Callington district, illustrated by Mr. Dingle's herd at Darley. There the first necessity is to have stock either acclimatised by blood and birth, or by their antecedents so suited to the place that they are virtually the same as native cattle. Once established on the soil, the Devon does well there.

The Dorsetshire system is scarcely so much a system of managing Devons as of managing dairy cattle. The Devon has been found most profitable as a dairy breed, and thoroughly suited to that county, and there it is, occupying the place of various breeds and crosses which have been tried. There are, indeed, in Dorsetshire, some herds of registered breeding, such as Lord Portman's at Bryanston, the Hon. C. B. Portman's at Childe Okeford, Lord Alington's at Crichel, and Mr. Thomas Chick's at Stratton. These herds ensure a supply of good sires for the tenant-farmers of Dorset; but the great dairy herds of the county are mostly either unregistered or but partly registered, and the system of management has been already indicated. Many of those herds were seen in the neighbourhoods of Bridport, Dorchester and Cerne Abbas.

Summary.

If we take the whole range of these representative herds—and many more which might be added would only confirm, not alter, the evidence they afford—we can scarcely fail to allow that in the Devon breed are very extensive possibilities of adaptation, and that those possibilities depend upon intelligence and skill in the art of management.

We have seen the Devon in its most ancient character as a breed for beef; we have seen its capabilities in that direction evolved and improved by the manager's skill. In a great variety of circumstances it is found to yield, under suitable management, so much value for food consumed as to have won and retained

the exclusive support of the tenant-farmers of important beef-producing districts; and this often after experimental competition with larger breeds. "Whether they are required to graze the rich pastures of the Vale of Taunton Dene and those around Bridgwater, or the bleak hills of North Molton," a valued correspondent observes, "they readily adapt themselves to the varied conditions"; and they do so, we must here remember, in subjection to the power of control which man as a watchful manager possesses.

We have seen that, even in the steer-breeding or beef-producing herds, the dairy properties of the Devon are by no means lost while the breeder is busying himself with the increase of flesh; and we have further seen that, where the dairy is the main business, the Devon, with a little gentle persuasion in the way of altered treatment, comes forth an ample milker and a butter-cow of almost the first degree of excellence, yielding only to a breed which cannot for one moment compete with it for grazing.

WM. HOUSMAN.

ANBURY, CLUB-ROOT, OR FINGER AND TOE.

THIS disease, caused by *Plasmodiophora Brassicæ*, Woronin, shows itself by the tops of the attacked turnips becoming yellow and soft, and drooping in the heat of the sun. When the bulb is taken out of the ground the rootlets which issue from it, and through which the plant obtains its nourishment from the soil, are found to be covered with irregular warty excrescences. In the progress of the disease the bulb itself becomes rotten, and in the advanced stages a most offensive putrid odour is given off.

The warty growths on the rootlets and the offensive odour easily distinguish this disease from other injuries to the turnip, which have been included by some writers under one or other of the popular names given in the title of this paper.

Much attention has been given to this disease by practical agriculturists and scientific investigators. The earliest opinion in regard to anbury was that it was caused by insects. John Curtis, who has laid the farmer under such great obligations by his investigations into the insects of the farm, originally published in this Journal, has carefully examined this view in Vol. IV., 1843, pages 121–124, and concludes that, though

the diseased turnips are inhabited by multitudes of maggots, beetles, &c., these are not the cause of the disease. The insects he found in the root swellings were such as get their living from putrid substances, or carnivorous beetles attracted by the abundant supply of food which the helpless feeders on the diseased roots provide for them. He consequently considered that the insects were the effect and not the cause of the anbury. His theory of the disease was that it was due to peculiar conditions of the soil, induced probably by the repetition of certain crops, which caused the enlargement of the lateral roots, and these becoming woody stopped the flow of sap to the bulb. The turnip, thus ceasing to draw nourishment from the soil, died and rotted in the ground, and became a fit feeding place for a variety of insects.

This theory was generally accepted, and the facts collected by numerous agriculturists seem to confirm it. The most important and valuable inquiry in this direction was instituted by the late Dr. Augustus Voelcker, and published in Vol. XX. of the Journal (1859), pages 101–105. From analyses of the soils of a field in which the turnips were rendered useless from this disease he discovered that there was a very trifling amount of lime present, while in fields on the same farm in which the turnips were healthy there was a considerable quantity of limestone gravel. In two spots in the diseased field where he found healthy turnips the analyses of the soil showed the presence of a good deal of lime, the accidental introduction of which on these spots the farmer was able to explain. Dr. Voelcker concluded that the cause of anbury is justly referred in most instances to the absence or insufficiency of lime in light sandy soils.

It has since been observed that, in other places where anbury was prevalent, the outcrop of a bed of limestone in a field secured a healthy crop in that portion. And, further, that the application of lime, chalk, or marl has prevented the reappearance of the disease in fields where it had previously been present.

It has recently been asserted that the sulphur present in manures saturated with sulphuric acid favours the appearance of the disease.

The offer of a reward by the Russian Government for the discovery of the cause of anbury in cabbages led to the remarkable discoveries of Woronin which were published in 1877. The ravages of this disease had caused great destruction to the cabbages which are extensively cultivated in Russia. The work of Woronin was so thorough and exhaustive that the intervening years have not added to our knowledge of the disease, though

many independent observers have confirmed his conclusions. He found that anbury was due to an attack of a parasitic fungus which lived within the tissues of the roots. The nature of the disease will best be understood by the reader if the history of the parasite is traced from the germination of the seed, or more properly the spore, until the spores are reproduced.

The spore (fig. 1)[1] is a very minute, perfectly round and smooth ball. It is so small that it is difficult, if not impossible, to realise its size. Some help towards apprehending its minuteness may be obtained if we consider the number required to measure an inch, though we must use numbers that convey little meaning except vastness. Sixteen thousand laid touching each other in a straight line would measure only an inch; it requires 250 millions to cover a square inch, and no less than four billions (4,000,000,000,000) to fill up the measure of a cubic inch. Singly they appear colourless, but when aggregated in the cells of the diseased turnip where they are produced they exhibit a yellowish tint, which in contrast with the normal tissues gives a section of the swollen part of the root a clouded appearance.

FIG. 1.—Spores of the fungus magnified 1,000 times.

The spore consists of a particle of a somewhat uniform jelly-like substance called protoplasm enclosed in a delicate little round bag or cell. This corresponds to the seed stage of the life of a higher plant, and, like the seed of the pea or the turnip, the spore remains through the winter without germinating. It passes this period in the diseased turnip in which it is produced, or if that is destroyed it rests in the earth or the dung heap, or if the turnip be not so far destroyed that it is eaten by stock it passes through the intestinal canal of the animal without injury.

The spore germinates in the spring. The delicate covering bursts, and permits the passage out of the jelly-like protoplasm, and the round bag is left empty (fig. 2). There is no difficulty in observing this operation under the microscope; the spore being placed in a little water on a piece of glass will, at a suitable temperature, gradually push out the contents. The young plant, if we may call it so, is at this stage only a minute bit of unprotected jelly, resembling in its structure and actions the very simple animal—familiar to the student of the microscope in putrid infusions—which is named an amœba. Like this animal it is

[1] This and the other illustrations are reproduced from the text-book *Elements of Agriculture*, by W. Fream, LL.D., 4th edition, 1892, p. 308, London: John Murray.

able to move about, changing its shape and pushing out from the margin one or more processes which pull the mass after them. A fine hair-like cilium also assists it to move in the water. The spore from which the speck of living jelly escaped agrees with the spores of other minute plants, but this active stage of the organism agrees so closely with the amœba that the parasite and its allies are considered to be related to the animal as well as the vegetable kingdom, and have been named by De Bary, who has investigated their structure and history, *Mycetozoa*, that is, in English, fungus-animal.

FIG. 2.—Spores of the fungus germinating, and two free amœba-like specks of protoplasm.

This minute moving speck of naked protoplasm passes between the particles of the moist soil in search of a plant on which it can live. Like many other parasites it attacks only one kind of plant. The fungus causing the potato disease lives only on the potato and one or two of its allies; rust, mildew, smut, and ergot attack only cereals or other grasses. So this minute speck of living jelly passes by any roots that it may encounter in moving through the soil until it discovers those of some cruciferous plant. It attacks the turnip, cabbages of all kinds, Brussels sprouts, broccoli, cauliflower, kohl-rabi, swedes, also rape, and it has been observed on some wild plants of the same family, such as charlock, wallflower, candytuft, &c.

No doubt many of these amœboid specks perish in their journeyings through the soil, but the incalculable myriads of spores left by a crop of diseased turnips supply more than enough, after meeting all casualties, to attack the suitable roots within reach. And, lifted by the wind from the surface of a field, they are carried in the air, and spread the disease in fields where it was before unknown.

The passage of the speck of protoplasm into the root of the turnip or cabbage has not yet been observed, but numerous experiments have shown that it does get in, and almost certainly the entrance is secured through the root-hairs. Just behind the growing points of all roots there are to be found a great number of minute hairs whose function it is to assist the root in drinking in the water and the substances dissolved in it required by the plant for its food. Passing in through one of these hairs, and finding its way into a cell in the root, it begins to live on the protoplasm contained in the cell, and speedily increases in size, pushing out the wall of the cell, until it attains so great a dimension that it can be easily seen by the naked eye. Portions of this growing mass of protoplasm pass into other cells, and

repeat the story of the original speck. The root enlarges and the characteristic swellings are formed. The nourishment produced by the plant for itself is stolen by the parasite, and the plant becomes sickly, and, being unable to endure this persistent depletion, dies. The dead turnip, soon putrefying, becomes then the delectable feeding ground of numerous insects, mites, and eel worms; and when removed from the ground it gives off a most offensive fetid odour.

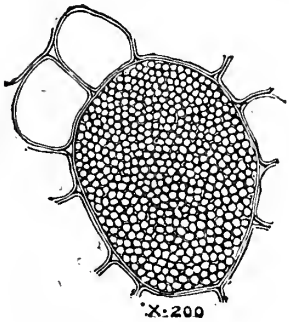


FIG. 3.—Large cell filled with the spores of the fungus.

The fungus which has caused the injury dies with its host plant. It is a parasite, and can live only on a living plant. But in the course of its life in the turnip a remarkable change has taken place in many of the large cells filled with the slimy protoplasm. The protoplasm becomes granular, each grain is then surrounded by a delicate cell wall, and the whole mass of jelly-like protoplasm is converted into myriads of minute spores. The large cell (fig. 3) with its contained spores has been happily compared to a very small bag filled with extremely small shot. In this spore condition the plant rests, resisting the action of rain and frost till the warmth of next spring starts it on its search after a cruciferous root.

The story of this parasitic fungus in some particulars is not unlike that of the equally remarkable injuries done to man and animals by minute living creatures having some relation to the *Mycetozoa*. The treatment of cholera, consumption, or splenic fever was somewhat in the dark till a few years ago, when it was discovered that those diseases were produced by different bacteria. In the course of medical practice some agents were discovered to have beneficial effects on the patients suffering from one or other of these diseases, just as it was found that anbury could be ameliorated, if not cured, by the application of lime. But the efficient treatment of the disease itself when developed has scarcely been improved, for it is as difficult to destroy the *Plasmodiophora* in the turnip without destroying the turnip as it is to destroy the bacillus of consumption without destroying the being in which it is living.

But a great advance has been made in preventing disease. The destruction of the bacteria which produce the disease is now diligently attended to, and the sick-room is no longer a centre for the distribution of the living bodies causing disease. So with

anbury. The true cause of the disease being known we are in a position better to determine how its spread can be prevented. It is obvious first of all that diseased turnips and cabbages should be thoroughly destroyed, and the most efficient agent is fire; or, put into a heap and mixed with gas lime or other lime, they might be applied without fear of injury to pasture land. But this cannot reach the spores that have fallen into the ground or been blown on it. We must find some cheap material within the reach of the farmer which when added to the soil will kill the spores either when they are at rest or after germination, when the naked protoplasm is pushing its way through the soil in search of the roots of cruciferous plants. Practical agriculturists appear to have found this in lime. There is abundant testimony that a judicious application of lime to a field where anbury has prevailed prevents its appearance in the succeeding crop. Carbon bisulphide when applied to the soil also kills the spores. Other substances may be equally efficacious, but this can only be determined by a series of careful experiments. The serious annual loss in the turnip crop would justify considerable trouble being taken in this direction.

WILLIAM CARRUTHERS.

THE SPRING DROUGHT OF 1893.

No two droughts are exactly alike, and yet when a drought occurs, almost the first desire of those who suffer from it is to know whether or not there is any precedent for it, and if so, when a similar one happened, and what were its effects? The answer to the second part of this question can be given much better by others[1] than by myself, and therefore I shall not attempt to deal with the subject of benefit or of injury.

Until quite recently—within the last ten or twenty years perhaps—no one had ever defined what constituted a drought; and, in the absence of a definition, terribly loose statements were made. Until the introduction of rain gauges (about 1666) no quantitative measurement of a drought was possible, and until about 1887 no definition had been adopted. Even in the

[*continued on p.* 349

[1] Attention may be directed to the following papers which have appeared in the Journal:—"Some of the Agricultural Lessons of 1868," by J. Chalmers Morton (Vol. V., 2nd series, 1869, p. 27); and "Effects of Drought of 1870 on Crops at Rothamsted," by J. B. Lawes and J. H. Gilbert (Vol. VII., 2nd series, 1871, p. 91).—ED.

Absolute Droughts				Partial Droughts				
Year	Began	Ended	Lasted Days	Year	Began	Ended	Lasted Days	Amount of Rain, in.
1800	June 30	August 17	49	1800	Jan. 27	March 9	43	·35
—	—	—	—	„	June 6	August 19	75	·60
1801	April 15	May 1	17	1801	April 8	May 11	34	·30
„	June 14	June 28	15	—	—	—	—	—
„	August 15	August 29	15	—	—	—	—	—
1802	March 3	March 18	16	1802	March 3	April 27	53	·51
„	Sept. 14	October 4	21	—	—	—	—	—
1803	Jan. 23	February 12	21	1803	July 30	August 29	31	·22
„	May 5	May 19	15	—	—	—	—	—
„	August 11	August 29	19	—	—	—	—	—
„	August 31	Sept. 15	16	—	—	—	—	—
—	—	—	—	1804	August 19	Sept. 28	41	·38
1805	May 19	June 5	18	1805	May 12	June 9	29	·23
„	Nov. 13	November 27	15	—	—	—	—	—
1806	June 5	June 20	16	1806	May 14	June 25	43	·37
„	Dec. 30	1807, Jan. 15	17	—	—	—	—	—
1807	April 17	May 2	16	1807	April 3	May 2	30	·17
„	June 14	July 14	31	„	June 14	July 28	45	·41
„	Dec. 9	December 25	17	—	—	—	—	—
1808	Feb. 16	March 18	32	1808	Feb. 16	April 3	48	·41
„	July 4	July 23	20	„	June 11	July 23	43	·36
„	August 14	August 30	17	—	—	—	—	—
„	Dec. 1	December 20	20	—	—	—	—	—
1809	March 3	March 22	20	1809	Feb. 16	March 23	36	·25
„	May 3	May 18	16	„	Sept. 28	November 3	37	·37
„	July 11	July 25	15	„	Dec. 21	1810, Jan. 30	41	·37
„	Oct. 1	October 16	16	—	—	—	—	—
1810	Jan. 9	January 30	22	1810	April 11	May 13	33	·19
„	March 12	March 26	15	—	—	—	—	—
„	April 17	May 2	16	—	—	—	—	—
„	May 21	June 9	20	—	—	—	—	—
1811	March 22	April 6	16	1811	March 8	April 11	35	·23
„	August 30	Sept. 20	22	„	August 20	Sept. 22	34	·31
1812	April 4	April 24	21	—	—	—	—	—
„	August 31	Sept. 16	17	—	—	—	—	—
„	Dec. 2	December 16	15	—	—	—	—	—
1813	Feb. 27	March 20	22	—	—	—	—	—
„	April 6	April 22	17	—	—	—	—	—
„	August 6	August 21	16	—	—	—	—	—
„	Dec. 18	1814, Jan. 3	17	—	—	—	—	—
1814	Feb. 15	March 1	15	1814	Jan. 29	March 1	32	·31
1815	August 29	Sept. 21	24	1815	June 20	July 18	29	·18
„	Nov. 16	December 2	17	„	August 24	Sept. 23	31	·17
1816	Feb. 7	February 26	20	—	—	—	—	—
„	March 18	April 6	20	—	—	—	—	—
„	Nov. 11	November 25	15	—	—	—	—	—
1817	March 9	March 23	15	1817	March 8	May 13	67	·63
„	March 27	April 29	34	—	—	—	—	—
„	Sept. 28	October 12	15	—	—	—	—	—
1818	Feb. 2	February 17	16	1818	May 14	July 10	58	·55
„	May 17	June 16	31	„	July 12	August 10	30	·18
„	Dec. 19	1819, Jan. 6	19	—	—	—	—	—
1819	August 14	August 29	16	—	—	—	—	—

MIDDLESEX, FROM 1800 TO 1839.

Absolute Droughts				Partial Droughts				
Year	Began	Ended	Lasted Days	Year	Began	Ended	Lasted Days	Amount of Rain, in.
1820	Jan. 3	January 17	15	1820	Feb. 25	April 4	40	·27
,,	March 2	March 21	20	—	—	—	—	—
,,	August 28	Sept. 14	18	—	—	—	—	—
1821	Jan. 16	February 19	35	1821	Jan. 16	March 1	45	·21
,,	June 12	June 29	18	—	—	—	—	—
1822	August 3	August 23	21	1822	Jan. 2	February 1	31	·29
,,	Sept. 6	Sept. 20	15	,,	May 11	June 9	30	·30
—	—	—	—	,,	Dec. 6	1823, Jan. 14	40	·34
1823	April 8	April 22	15	—	—	—	—	—
,,	June 10	June 25	16	—	—	—	—	—
,,	Nov. 8	November 27	20	—	—	—	—	—
1824	May 25	June 9	16	—	—	—	—	—
1825	March 14	April 20	38	1825	March 4	April 20	48	·40
,,	July 7	August 1	26	,,	June 5	August 1	58	·49
—	—	—	—	,,	Dec. 27	1826, Feb. 4	40	·31
1826	Jan. 5	January 20	16	1826	April 13	May 25	43	·38
,,	March 24	April 8	16	,,	May 31	July 20	51	·48
,,	June 7	July 12	36	—	—	—	—	—
1827	Jan. 24	February 25	33	1827	Jan. 11	February 25	46	·41
1828	Feb. 26	March 15	19	1828	Feb. 23	March 25	32	·29
,,	October 7	October 21	15	—	—	—	—	—
1829	Feb. 27	March 17	19	1829	Jan. 5	February 20	47	·40
,,	Nov. 27	December 15	19	,,	Feb. 27	March 27	29	·09
1830	Feb. 28	March 15	16	1830	Feb. 28	March 30	31	·17
,,	October 3	October 25	23	,,	Sept. 25	October 25	31	·27
,,	Dec. 28	1831, Jan. 17	21	,,	Dec. 18	1831, Jan. 19	33	·25
1831	April 10	April 25	16	—	—	—	—	—
,,	Dec. 21	1832, Jan. 8	19	—	—	—	—	—
1832	Feb. 12	February 29	18	1832	Jan. 28	March 3	36	·31
,,	March 25	April 10	17	—	—	—	—	—
,,	July 15	July 31	17	—	—	—	—	—
1833	Jan. 3	January 27	25	1833	July 22	August 29	39	·33
,,	March 1	March 16	16	—	—	—	—	—
,,	May 3	May 18	16	—	—	—	—	—
,,	July 24	August 15	23	—	—	—	—	—
1834	March 1	March 26	26	1834	Jan. 29	March 27	58	·55
,,	April 3	April 26	24	—	—	—	—	—
,,	May 19	June 2	15	—	—	—	—	—
,,	August 9	August 23	15	—	—	—	—	—
1835	April 6	April 20	15	1835	March 22	April 20	30	·25
,,	July 8	August 18	42	,,	June 27	August 18	53	·23
,,	Dec. 9	December 31	23	,,	Nov. 30	1836, Jan. 9	41	·21
1836	May 6	June 1	27	1836	May 6	June 16	42	·37
,,	July 29	August 13	16	—	—	—	—	—
1837	Feb. 24	March 11	16	1837	June 14	July 13	30	·28
,,	June 19	July 4	16	,,	Dec. 20	1838, Feb. 6	49	·26
,,	October 6	October 22	17	—	—	—	—	—
1838	Jan. 2	January 16	15	1838	March 6	April 6	32	·28
,,	March 17	April 6	21	,,	Dec. 7	1839, Jan. 20	45	·28
,,	May 3	May 19	17	—	—	—	—	—
,,	Sept. 7	Sept. 23	17	—	—	—	—	—
1839	Feb. 24	March 13	18	—	—	—	—	—
,,	April 19	May 7	19	—	—	—	—	—

Absolute Droughts				Partial Droughts				
Year	Began	Ended	Lasted Days	Year	Began	Ended	Lasted Days	Amount of Rain, in.
1816	March 21	April 6	17	—	—	—	—	—
1817	March 10	March 24	15	1817	March 9	May 8	61	·38
1818	May 19	June 13	26	1818	May 10	June 13	35	·28
,,	July 28	August 27	31	,,	July 13	Sept. 4	54	·37
—	—	—	—	1819	July 22	August 30	40	·20
1820	Jan. 4	January 19	16	—	—	—	—	—
,,	April 16	May 15	30	—	—	—	—	—
,,	August 31	Sept. 15	16	—	—	—	—	—
,,	Dec. 25	1821, Jan. 10	17	—	—	—	—	—
1821	Feb. 1	February 20	20	1821	Jan. 17	March 2	45	·40
,,	June 14	July 1	18	—	—	—	—	—
1822	Jan. 5	January 23	19	1822	Dec. 7	1823, Jan. 28	53	·40
,,	Dec. 20	1823, Jan. 4	16	—	—	—	—	—
1823	Jan. 6	January 28	23	—	—	—	—	—
,,	April 8	April 23	16	—	—	—	—	—
,,	June 11	June 25	15	—	—	—	—	—
,,	July 10	July 24	15	—	—	—	—	—
1824	Jan. 4	January 22	19	—	—	—	—	—
1825	March 14	April 13	30	1825	March 4	April 21	49	·37
,,	June 6	June 25	20	,,	June 6	August 4	60	·39
,,	July 10	August 2	24	—	—	—	—	—
1826	Jan. 8	January 23	16	1826	Jan. 7	February 13	38	·37
,,	March 26	April 9	15	—	—	—	—	—
,,	June 3	June 27	25	—	—	—	—	—
1827	Feb. 1	February 27	27	1827	Jan. 12	February 27	47	·37
,,	July 3	July 19	17	,,	May 29	June 27	30	·26
,,	August 19	September 9	22	—	—	—	—	—
1828	Feb. 2	February 19	18	1828	Jan. 18	February 19	33	·27
,,	March 1	March 16	16	,,	Feb. 23	March 25	32	·31
,,	Oct. 29	November 14	17	—	—	—	—	—
,,	Nov. 20	December 6	17	—	—	—	—	—
1829	Jan. 6	February 3	29	1829	Jan. 5	February 13	40	·39
,,	Feb. 28	March 17	18	,,	Feb. 28	March 28	29	·05
,,	Oct. 23	November 10	19	,,	Oct. 9	November 10	33	·20
,,	Nov. 28	December 16	19	,,	Nov. 14	1830, Jan. 14	62	·61
,,	Dec. 18	1830, Jan. 2	16	—	—	—	—	—
1830	Oct. 4	October 18	15	—	—	—	—	—
1832	Feb. 9	February 23	15	—	—	—	—	—
,,	March 25	April 14	21	—	—	—	—	—
,,	Sept. 13	Sept. 28	16	—	—	—	—	—
1833	May 3	May 18	16	1833	May 2	June 1	31	·23
,,	July 24	August 9	17	—	—	—	—	—
1834	March 7	March 21	15	1834	Feb. 25	March 27	31	·28
,,	May 20	June 3	15	,,	March 31	April 29	30	·26
,,	Sept. 28	October 13	16	—	—	—	—	—
1835	July 14	August 6	24	1835	July 8	August 22	46	·23
—	—	—	—	,,	Nov. 30	1836, Jan. 1	33	·27
1837	June 19	July 4	16	1837	March 14	April 20	38	·33
1838	Sept. 30	October 14	15	1838	March 6	April 6	32	·28
1840	Feb. 17	March 15	28	1840	Feb. 7	May 8	92	·90
—	—	—	—	,,	Nov. 22	December 29	38	·37
—	—	—	—	1841	May 9	June 21	44	·41
1842	May 28	June 13	17	1842	April 3	May 2	30	·29
,,	Oct. 1	October 18	18	—	—	—	—	—
1843	June 15	July 2	18	1843	March 1	March 31	31	·30

Absolute Droughts				Partial Droughts				
Year	Began	Ended	Lasted Days	Year	Began	Ended	Lasted Days	Amount of Rain, in.
1843	Dec. 10	December 30	21	1843	August 24	Sept. 28	36	·24
—	—	—	—	,,	Nov. 26	December 30	35	·29
1844	March 23	April 11	20	1844	March 11	June 23	105	1·04
,,	August 16	Sept. 5	21	,,	Nov. 14	1845, Jan. 10	58	·54
,,	Sept. 20	October 4	15	—	—	—	—	—
,,	Nov. 15	December 14	30	—	—	—	—	—
1845	March 24	April 8	16	1845	March 24	April 24	32	·28
,,	August 20	Sept. 4	16	,,	Oct. 11	November 18	39	·35
,,	Oct. 11	November 5	26	—	—	—	—	—.
1846	May 21	June 21	32	1846	May 20	June 21	33	·20
,,	August 21	Sept. 21	32	,,	August 19	Sept. 21	34	·29
1847	Feb. 19	March 5	16	1847	Feb. 17	April 10	54	·50
,,	March 12	March 27	16	,,	June 19	August 4	47	·42
,,	July 19	August 4	17	—	—	—	—	—
1848	April 29	May 20	22	1848	April 29	June 2	35	·29
1849	March 10	March 27	18	1849	May 30	July 18	50	·46
,,	June 13	June 29	17	,,	Dec. 19	1850, Jan. 18	31	·31
,,	July 1	July 16	16	—	—	—	—	—
,,	Dec. 25	1850, Jan. 15	22	—	—	—	—	—
1850	Sept. 4	Sept. 18	15	1850	Feb. 21	April 1	40	·37
—	—	—	—	1851	Nov. 11	December 21	41	·40
1852	March 2	March 29	28	1852	Feb. 1	April 28	88	·87
,,	April 1	April 28	28	—	—	—	—	—
,,	June 29	July 15	17	—	—	—	—	—
1854	March 27	April 12	17	1854	Feb. 16	April 21	65	·61
,,	August 25	Sept. 11	18	,,	August 6	Sept. 12	38	·38
1855	April 14	May 7	24	1855	March 17	May 8	53	·52
,,	June 20	July 9	20	,,	August 9	Sept. 12	35	·22
,,	August 25	Sept. 12	19	—	—	—	—	—
1856	Feb. 22	March 15	23	1856	Feb. 15	March 16	31	·27
1857	Feb. 12	March 7	24	1857	Feb. 1	March 13	41	·35
,,	April 24	May 10	17	,,	April 23	May 21	29	·12
,,	Nov. 7	November 22	16	,,	Nov. 26	1858, Jan. 29	65	·64
,,	Dec. 21	1858, Jan. 7	18	—	—	—	—	—
1858	Jan. 12	January 29	18	1858	Oct. 20	November 26	38	·33
,,	March 13	March 30	17	—	—	—	—	—
,,	Nov. 6	November 25	20	—	—	—	—	—
—	—	—	—	1859	Feb. 11	March 12	30	·28
1860	July 1	July 15	15	—	—	—	—	—
1861	April 7	April 22	16	1861	Jan. 2	February 12	42	·40
1863	June 27	July 20	24	1863	March 16	May 11	57	·46
—	—	—	—	,,	Dec. 4	1864, Jan. 12	40	·33
1864	April 17	May 1	15	1864	June 24	August 8	46	·43
1865	June 4	June 28	25	1865	August 24	October 8	46	·40
,,	August 29	Sept. 20	23	—	—	—	—	—
,,	Sept. 22	October 7	16	—	—	—	—	—
,,	Dec. 8	December 25	18	—	—	—	—	—
1866	July 7	July 26	20	—	—	—	—	—
—	—	—	—	1867	Oct. 28	November 29	33	·29
1868	June 4	June 19	16	1868	June 4	July 10	37	·33
,,	June 24	July 10	17	—	—	—	—	—
,,	August 28	Sept. 17	21	—	—	—	—	—
1869	June 25	July 12	18	1869	June 18	July 27	40	·36
,,	August 17	September 4	19	—	—	—	—	—

DROUGHTS AT THE ROYAL HORTICULTURAL

Absolute Droughts				Partial Droughts				
Year	Began	Ended	Lasted Days	Year	Began	Ended	Lasted Days	Amount of Rain, in.
1826	June 10	July 7	28	1826	Jan. 1	February 4	35	·35
—	—	—	—	,,	June 3	July 19	47	·38
1827	Jan. 17	January 31	15	1827	Jan. 11	February 26	47	·27
,,	Feb. 2	February 25	24	—	—	—	—	—
,,	August 22	September 8	18	—	—	—	—	—
1828	October 8	October 22	15	1828	Feb. 19	March 19	30	·26
,,	October 28	November 13	17	—	—	—	—	—
1829	January 9	January 25	17	1829	Jan. 4	February 19	47	·43
,,	March 9	March 27	19	,,	Feb. 27	March 27	29	·08
,,	Nov. 30	December 17	18	,,	Nov. 25	December 31	37	·24
—	—	—	—	1830	Feb. 27	March 31	33	·18
1832	March 25	April 10	17	1832	Jan. 29	March 3	35	·32
,,	July 15	July 31	17	,,	March 17	April 17	32	·28
,,	Sept. 14	Sept. 28	15	—	—	—	—	—
1833	May 4	May 18	15	1833	July 24	August 29	37	·15
,,	July 24	August 9	17	—	—	—	—	—
1834	May 18	June 2	16	1834	Feb. 6	March 27	50	·50
,,	August 9	August 23	15	,,	Sept. 12	October 16	35	·33
,,	Sept. 27	October 13	17	—	—	—	—	—
1835	Jan. 20	February 10	22	1835	March 18	April 28	42	29
,,	July 16	August 4	20	,,	June 27	September 2	68	·60
,,	August 8	August 22	15	,,	Nov. 30	1836, Jan. 10	42	·35
1837	June 18	July 13	26	1837	June 15	July 14	30	·22
—	—	—	—	,,	Dec. 20	1838, Feb. 7	50	·47
1838	Jan. 4	January 29	26	1838	March 17	April 19	34	·34
,,	May 2	May 18	17	,,	April 24	May 26	33	·32
—	—	—	—	,,	Sept. 28	October 26	29	·29
1840	Feb. 18	March 10	22	1840	Feb. 5	May 7	93	·83
,,	April 10	May 5	26	,,	Nov. 22	December 29	38	·30
,,	Nov. 23	December 7	15	—	—	—	—	—
1842	May 28	June 17	21	1842	March 26	May 4	40	·38
,,	October 1	October 17	17	—	—	—	—	—
—	—	—	—	1843	Nov. 26	December 30	35	·35
1844	August 20	September 3	15	1844	March 16	June 24	101	·99
,,	Nov. 22	December 14	23	,,	Nov. 15	1845, Jan. 10	57	·55
1845	Oct. 16	November 5	21	1845	Oct. 12	November 14	34	·34
1846	May 21	June 21	32	1846	May 20	June 21	33	·26
—	—	—	—	,,	Aug. 21	Sept. 22	33	·20
1847	March 13	March 27	15	1847	Feb. 17	March 27	39	·10
,,	July 20	August 3	15	—	—	—	—	—

SOCIETY'S GARDENS, CHISWICK, FROM 1826 TO 1869.

Absolute Droughts				Partial Droughts				
Year	Began	Ended	Lasted Days	Year	Began	Ended	Lasted Days	Amount of Rain in.
1848	April 29	May 18	20	1848	April 29	May 31	33	·28
—	—	—	—	1849	May 29	July 18	51	·45
1850	March 4	March 22	19	1850	Feb. 16	April 2	46	·42
,,	Sept. 2	Sept. 18	17	,,	August 22	Sept. 19	29	·24
1851	Sept. 5	Sept. 19	15	1851	August 30	Sept. 29	31	·28
—	—	—	—	,,	Nov. 9	December 20	42	·41
1852	March 31	April 16	17	1852	Feb. 9	April 27	79	·48
,,	June 29	July 13	15	—	—	—	—	—
—	—	—	—	1853	Nov. 27	1854, Jan. 3	38	·36
1854	Feb. 23	March 9	15	1854	Feb. 5	April 26	81	·77
,,	March 27	April 11	16	,,	Dec. 25	1855, Feb. 23	61	·58
,,	August 24	Sept. 11	19	—	—	—	—	—
1855	Feb. 7	February 23	17	1855	March 29	May 8	41	·38
,,	April 14	May 6	23	,,	Nov. 9	December 21	43	·38
—	—	—	—	1856	Feb. 13	March 15	32	·28
1857	August 16	August 30	15	1857	Jan. 27	March 7	40	·31
—	—	—	—	,,	Nov. 25	1858, Jan. 29	66	·65
1858	Feb. 15	March 2	16	1858	October 20	December 17	59	·52
,,	Nov. 6	November 24	19	—	—	—	—	—
1859	Nov. 7	November 22	16	—	—	—	—	—
,,	Dec. 7	December 22	16	—	—	—	—	—
1860	June 30	July 14	15	—	—	—	—	—
1861	Jan. 1	January 18	18	—	—	—	—	—
,,	April 4	April 21	18	—	—	—	—	—
1862	Feb. 1	February 15	15	—	—	—	—	—
,,	Nov. 10	November 25	16	—	—	—	—	—
1863	April 13	April 27	15	1863	Feb. 1	March 6	34	·34
,,	July 3	July 20	18	,,	March 16	April 27	43	·42
1864	April 6	April 25	20	1864	July 3	August 8	37	·36
—	—	—	—	,,	Dec. 1	December 30	30	·26
1865	June 4	June 27	24	—	—	—	—	—
,,	Sept. 22	October 6	15	—	—	—	—	—
1866	July 9	July 25	17	—	—	—	—	—
1867	June 16	June 30	15	1867	Oct. 28	November 29	33	·25
,,	Dec. 22	1868, Jan. 10	20	—	—	—	—	—
1868	May 30	June 19	21	1868	May 30	July 10	42	·33
,,	August 27	Sept. 17	22	—	—	—	—	—
1869	June 22	July 11	20	1869	June 18	July 27	40	·34
,,	July 13	July 27	15	—	—	—	—	—
,,	Aug. 17	Sept. 4	19	—	—	—	—	—

Absolute Droughts				Partial Droughts				
Year	Began	Ended	Lasted Days	Year	Began	Ended	Lasted Days	Amount of Rain, in.
1826	March 25	April 8	15	1826	Jan. 6	February 4	30	·29
,,	June 7	June 29	23	,,	April 13	May 23	41	·41
—	—	—	—	,,	June 3	July 20	48	·45
1827	Jan. 27	February 24	29	1827	Jan. 12	February 25	45	·38
1828	October 7	October 22	16	—	—	—	—	—
—	—	—	—	1829	Feb. 27	March 27	29	·08
—	—	—	—	,,	Nov. 26	December 29	34	·32
—	—	—	—	1830	Feb. 27	March 31	33	·24
—	—	—	—	,,	Sept. 25	October 24	30	·26
1832	March 25	April 10	17	1832	Jan. 28	March 2	35	·35
,,	July 14	July 31	18	,,	Sept. 1	Sept. 29	29	·27
1833	May 3	May 17	15	1833	July 23	August 29	38	·30
,,	July 29	August 17	20	—	—	—	—	—
1834	May 19	June 2	15	1834	Sept. 11	November 4	55	·53
,,	August 9	August 23	15	—	—	—	—	—
1835	July 14	August 6	24	1835	March 24	April 24	32	·32
—	—	—	—	,,	June 27	August 19	54	·38
—	—	—	—	,,	Nov. 30	December 31	32	·31
1836	May 7	May 21	15	1836	May 6	June 16	42	·39
1837	June 19	July 4	16	1837	June 14	July 13	30	·27
—	—	—	—	,,	Sept. 13	October 22	40	·39
—	—	—	—	,,	Dec. 20	1838, Feb. 6	49	·47
1840	Feb. 22	March 9	17	1840	Feb. 16	May 11	86	·83
,,	April 9	May 5	27	—	—	—	—	—
—	—	—	—	1841	May 20	June 18	30	·29
1842	May 28	June 17	21	1842	April 1	May 4	34	·33
,,	October 1	October 17	17	—	—	—	—	—
—	—	—	—	1843	Nov. 26	December 30	35	·32
1844	August 15	September 4	21	1844	March 26	June 16	83	·83
,,	Nov. 30	Dec. 14	15	,,	Nov. 15	1845, Jan. 10	57	·46
1845	August 27	Sept. 12	17	—	—	—	—	—
,,	Oct. 16	Nov. 5	21	—	—	—	—	—
—	—	—	—	1846	May 20	June 21	33	·21
—	—	—	—	,,	August 22	Sept 21	31	·28
—	—	—	—	1847	Feb. 17	March 27	39	·29
1848	April 29	May 17	19	1848	April 28	May 31	34	·34

Absolute Droughts				Partial Droughts				
Year	Began	Ended	Lasted Days	Year	Began	Ended	Lasted Days	Amount of Rain, in.
1849	June 30	July 16	17	1849	March 1	March 30	30	·30
—	—	—	—	„	May 29	July 17	50	·47
—	—	—	—	„	Oct. 14	November 12	30	·28
—	—	—	—	„	Dec. 17	1850, Jan. 17	32	·31
1850	Feb. 21	March 7	15	1850	Feb. 16	March 31	44	·41
—	—	—	—	„	August 22	Sept. 19	29	·23
1851	Sept. 2	Sept. 16	15	1851	Feb. 8	March 9	30	·29
—	—	—	—	„	July 26	August 23	29	·28
—	—	—	—	„	August 30	Sept. 30	32	·31
—	—	—	—	„	Nov. 10	December 20	41	·25
1852	March 13	March 28	16	1852	Feb. 10	May 11	92	·92
1853	August 1	August 15	15	—	—	—	—	—
1854	March 27	April 19	24	1854	Feb. 5	April 26	81	·70
„	August 24	Sept. 11	19	„	August 16	Sept. 13	29	·24
1855	Feb. 9	February 23	15	1855	March 18	May 8	52	·51
„	April 14	May 6	23	„	August 9	Sept. 11	34	·19
„	June 19	July 8	20	„	Nov. 9	December 22	44	·39
—	—	—	—	1856	Feb. 15	March 15	30	·14
1857	Dec. 22	1858, Jan. 6	16	1857	Jan. 25	March 12	47	·44
—	—	—	—	„	April 16	May 21	36	·28
—	—	—	—	„	Dec. 4	1858, Jan. 29	57	·57
1858	Feb. 15	March 2	16	1858	June 5	July 3	29	·19
—	—	—	—	„	Oct. 29	November 26	29	·29
1859	Feb. 20	March 6	15	—	—	—	—	—
1861	Jan. 2	January 18	17	1861	Jan. 1	February 12	43	·43
„	Jan. 20	February 4	16	—	—	—	—	—
„	April 4	April 22	19	—	—	—	—	—
„	Dec. 16	December 31	16	—	—	—	—	—
1862	Feb. 1	February 15	15	—	—	—	—	—
1863	April 12	April 27	16	1863	Feb. 3	March 5	31	·29
„	June 28	July 20	23	„	April 11	May 10	30	·29
—	—	—	—	„	Dec. 10	1864, Jan. 11	33	·25
1864	July 25	August 8	15	1864	July 4	August 8	36	·19
—	—	—	—	„	Sept. 22	October 20	29	·13
1865	June 4	June 26	23	1865	August 24	October 7	45	·22
„	Dec. 8	December 27	20	—	—	—	—	—

Droughts at Camden Square, North London, from 1858 to May 22, 1893.

Absolute Droughts				Partial Droughts				
Year	Began	Ended	Lasted Days	Year	Began	Ended	Lasted Days	Amount of Rain, in.
1858	Feb. 15	March 3	17	1858	June 5	July 3	29	·20
,,	March 10	March 30	21	,,	Oct. 29	November 26	29	·14
,,	June 14	July 3	20	—	—	—	—	—
,,	Nov. 9	November 24	16	—	—	—	—	—
1861	April 4	April 22	19	—	—	—	—	—
—	—	—	—	1862	Feb. 1	March 4	32	·31
1863	June 27	July 20	24	1863	March 15	April 28	45	·43
—	—	—	—	,,	June 20	July 20	31	·31
—	—	—	—	,,	Dec. 9	1864, Jan. 11	34	·33
1864	Sept. 23	October 14	22	1864	July 4	August 8	36	·29
,,	Oct. 27	November 12	17	,,	Sept. 22	October 20	29	·15
1865	June 4	June 28	25	—	—	—	—	—
1866	July 9	July 25	17	—	—	—	—	—
1867	June 16	June 30	15	1867	June 13	July 12	30	·28
—	—	—	—	,,	Oct. 30	November 29	31	·18
1868	June 5	June 19	15	1868	June 24	July 27	34	·21
,,	June 24	July 10	17	—	—	—	—	—
,,	Aug. 27	Sept. 16	21	—	—	—	—	—
1869	June 22	July 7	16	1869	June 16	July 26	41	·40
,,	Aug 14	September 4	22	—	—	—	—	—
1870	April 11	April 25	15	1870	March 27	April 25	30	·21
,,	Sept. 14	Sept. 29	16	,,	May 14	June 15	33	·20
1872	Aug. 10	August 24	15	1871	Nov. 16	December 18	33	·33
—	—	—	—	1873	Nov. 27	December 25	29	·21
1874	April 18	May 2	15	1874	Jan. 25	February 24	31	·31
—	—	—	—	,,	April 14	May 21	38	·30
—	—	—	—	1875	March 8	April 5	29	·25
1876	May 3	May 21	19	1876	June 23	July 27	35	·34
—	—	—	—	1879	Nov. 22	December 26	35	·30
1880	March 8	March 30	23	1880	Jan. 1	February 4	35	·31
,,	Aug. 9	September 5	28	,,	April 16	May 30	45	·29
—	—	—	—	,,	Aug. 8	Sept. 10	34	·30
1881	March 25	April 10	17	1881	March 24	April 22	30	·28
1882	Jan. 12	January 28	17	1882	Jan. 9	February 13	36	·24
1883	March 31	April 17	18	1883	March 20	April 17	29	·21
—	—	—	—	1884	July 28	August 26	30	·26
—	—	—	—	,,	Sept. 7	October 7	31	·30
1885	July 20	August 3	15	1885	July 14	August 11	29	·28
1886	June 23	July 8	16	1886	June 11	July 10	30	·22
1887	April 6	April 20	15	1887	Jan. 20	March 10	50	·49
,,	June 9	July 3	25	,,	June 4	July 14	41	·29
,,	July 30	August 15	17	—	—	—	—	—
1888	Oct. 13	October 27	15	—	—	—	—	—
1889	June 16	July 7	22	—	—	—	—	—
1890	Aug. 28	Sept. 16	20	—	—	—	—	—
1891	Feb. 8	March 6	27	1891	Jan. 31	March 6	35	·07
1892	March 28	April 11	15	—	—	—	—	—
,,	Dec. 15	1893, Jan. 5	22	—	—	—	—	—
1893	March 18	April 15	29	1893	Feb. 28	May 16	78	·73

present year 1893 I have seen many assertions as to absolutely rainless periods which are inaccurate. Or, to go back to February 1891, the man without a rain gauge, and the careless man with one, would each report "a rainless month," while the careful observer would have on one or two occasions just enough to give him a measurement of ·01 inch, and therefore he would not have the remarkable record. In fact, the more careful the observer the fewer the wonderful droughts that he will be able to report. I have no doubt whatever that early records of droughts must for this reason be received with caution, and, as I have already given a list of them from A.D. 298 to 1887 in *British Rainfall*, 1887, I think that I had better not reopen the question, but confine my attention to the present century, and to actual quantitative measures which are practically if not absolutely accurate.

As I have already stated, no two droughts are identical, and before any useful comparison can be made, some agreement must be arrived at concerning their classification. When dealing with the subject in 1887 I made two proposals which have never been challenged, and which may, I think, be regarded as being generally approved by British meteorologists. The following are the definitions:—

Absolute Droughts. Periods of *more than* 14 consecutive days without measurable rain.

Partial Droughts. Periods of *more than* 28 consecutive days, the aggregate rainfall of which does not exceed 0·01 inch per diem.

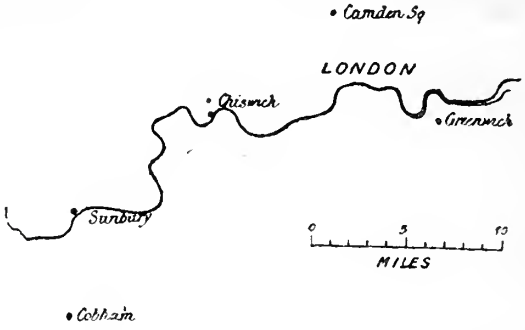
Any *accurately kept* record of rainfall will supply the data for making strictly comparable lists of the occurrence of each class of droughts. The "absolute" droughts can be taken out very easily; but the extraction of "partial" droughts requires care, as they can often be shifted a few days earlier or later by taking in small daily amounts at one end or the other.

I have had the droughts of each class taken out for several stations in and near London so as to cover the whole of the present century, and I have given the values *in extenso* in the preceding tables.

The position of the several stations is shown by the map on p. 350.

These tables supply a mass of information which it would take months to consider thoroughly. We have recently passed through a long, but (except perhaps locally) by no means unprecedented spring drought. I think, however, that before dealing with the drought of 1893 it will be well to refer to those *spring droughts* which most nearly resemble it.

I have italicised the words *spring droughts* because I find that there is a tendency to confuse the effects of drought and of high temperature. Droughts differ in their effects according to the weather which has preceded them, and according to the temperature during their continuance, and the effects, of course, differ enormously, according to the stage at which vegetation has arrived.



For these reasons I select, for special notice, only droughts, of sixty days or upwards, which have begun in February or March and finished in April, May or June. That the spring is the usual period for such droughts is strikingly proved by the fact that this limitation excludes only two out of the eight long partial droughts of the present century.

1817.

This partial drought began early in March, and lasted rather over two months.

Sunbury.—Partial drought lasted from March 8 to May 13, or 67 days, with a total rainfall of ·63 inch; and it included two absolute droughts (1) March 9 to 23, or 15 days, and (2) March 27 to April 29, or 34 days.

Greenwich.—Partial drought lasted from March 9 to May 8, or 61 days, with a total rainfall of 0·38 inch, and included an absolute drought of 15 days from March 10 to March 24.

1840.

A longer partial drought than that of 1893, but in other respects much resembling it. I have details from three stations:—

Greenwich.—Partial drought from February 7 to May 8, or

92 days, including an absolute drought of 28 days between February 17 and March 15.

Chiswick.—Partial drought from Feb. 5 to May 7, or 93 days, including two absolute droughts (1) Feb. 18 to March 10, or 21 days, and (2) April 10 to May 5, or 26 days.

Cobham.—Partial drought from Feb. 13 to May 8, or 86 days, including two absolute droughts (1) Feb. 22 to March 9, or 16 days, and (2) April 9 to May 5, or 27 days.

1844.

The longest partial drought on record, lasting *fifteen weeks*, or more than three months.

Greenwich.—Partial drought from March 11 to June 23, or 105 days, including an absolute drought of 20 days from March 23 to April 11. [*Note.*—The following autumn was very dry; there was an absolute drought of 21 days from Aug. 16, and another of 15 days from Sept. 20.]

Chiswick.—Partial drought from March 23 to June 24, or 94 days.

Cobham.—Partial drought from March 15 to May 26, or 73 days.

1852.

A spring drought rather earlier than that of 1893 and lasting longer.

Greenwich.—Partial drought from Feb. 1 to April 28, or 88 days, including two partial droughts of 28 days each—viz., March 2 to 29, and April 1 to 28. [June, August, September and November of that year had a rainfall above the average.]

Chiswick.—Partial drought from February 9 to April 27, or 79 days, including an absolute drought of 16 days from April 1.

Cobham.—Partial drought from Feb. 3 to April 27, or 84 days, including an absolute drought of 16 days from March 13 to 28.

1854.

The last spring preceding 1893 with a 60 days' drought.

Greenwich.—Partial drought from Feb. 16 to April 21, or 65 days, including an absolute drought of 17 days from March 27 to April 12. [There was an absolute drought of 18 days from Aug. 25 to Sept. 11 of that year.]

Chiswick.—Partial drought from Feb. 5 to April 26, or 81 days, including an absolute drought of 15 days from Feb. 23 to March 9.

Cobham.—Partial drought from Feb. 5 to April 26, or 81 days, including an absolute drought of 24 days from March 27 to April 19.

1893.

For comparison, I add the following:—

Greenwich.—Partial drought from Feb. 28 to May 16, or 78 days, including an absolute drought of 30 days from Mar. 18 to April 15.

Camden Square.—Partial drought from Feb. 28 to May 16, or 78 days, including an absolute drought of 29 days from March 18 to April 15.

Hence we see that of the six instances of partial droughts exceeding 60 days in spring, 5 cases occurred in the first 54 years, and only the present one in the last 40 years.

The Spring Drought of 1893.

The rainfall of January 1893 was near the average; that of February was in excess in almost all parts of England, and at its close the ground was wet generally.

As regards the drought itself I have thought it better to give the facts than any general remarks. I have, therefore, selected 24 stations, of which the equable distribution within England and Wales is sufficiently shown by the map on the opposite page, and have obtained from each observer the daily fall for the 92 consecutive days from March 1 to May 31, both inclusive.

The whole of these amounts are given in the folding table facing p. 354, falls of a tenth of an inch (10 tons per acre) or upwards being printed in heavy type.

The first feature which strikes one upon looking at the table is the frequent absolute rainlessness of the whole country, especially the thirteen days March 18 to 30, when there was but one shower of 0·03 inch at Newcastle-upon-Tyne, from April 3 to 14 (12 days) with nothing but 0·01 inch at Walmer, and May 4 to 13 with only 0·02 inch at Strathfield Turgiss.

Then there is the extremely small fall at all stations for the long period of $2\frac{1}{2}$ months—74 days—March 2 to May 14 inclusive, which was *less than a quarter of an inch at Walmer and Brighton, and less than half an inch* at the following stations, including the two just mentioned:—

	inch		inch
Walmer, Kent	0·22	Bury St. Edmunds, Suffolk	0·43
Brighton, Sussex . . .	0·24	Camden Square, London	0·44
Stroud, Gloucester . .	0·40	Strathfield Turgiss, Hants	0·47
Langton Herring, Dorset	0·42	Hitchin, Herts	0·49

These amounts range from about an eighth to a sixteenth of the average fall for that period.

Another very striking fact is the way in which what little rain did occur fell at intervals of a fortnight. If we strike out

the rain falling on the first and sixteenth of each month, and on one day on each side of those dates, we shall find that nearly all the rain is gone. This periodicity, though not so marked in the last fortnight, seems worthy of further study.

As regards absolute droughts, the longest was 35 days at Langton Herring, a few miles W.N.W. of Weymouth, where no rain fell from March 18 to April 21; and this was followed by a 14 days' absolute drought from April 30 to May 13.

Perhaps, however, the Brighton case was even more striking, for there a 30 days' absolute drought was broken by only 0·06 inch, and was immediately followed by another absolute drought of 28 days, so that we have 59 days with only one shower of 0·06 inch.

Even at the very wet station of Seathwaite, in Borrowdale, at the south end of Derwentwater, where the average annual rainfall is about 140 inches, there were four rainless periods of 13, 15, 8, and 12 consecutive days respectively, and there was a period of 29 days with only one day's rain (0·20 inch) in the middle of it.

The following table, giving the totals in each of the three months at each of the twenty-four stations, except Preston, focuses the information in the folding table, and shows plainly the districts where the deficiency has been greatest :—

Total Fall.

Stations	March	April	May	March to May	Stations	March	April	May	March to May
	in.	in.	in.	in.		in.	in.	in.	in.
Camden Square . .	·32	·24	·79	1·35	Cheadle	·78	·53	2·28	3·59
Walmer	·39	·03	1·37	1·79	Coventry	·41	·43	2·04	2·88
Brighton	·34	·06	·56	·96	Boston	·34	·15	1·22	1·71
Strath. Turgiss . .	·37	·12	1·01	1·50	Tickhill	·33	·30	1·92	2·57
Hitchin	·38	·25	·93	1·56	Preston	·80	·21	—	—
Bury St. Edmunds .	·32	·08	1·03	1·43	Ripon	·59	·61	2·55	3·75
Langton Herring .	·32	·15	1·13	1·60	Hull	·43	·38	1·07	1·88
Hartland Abbey .	·78	·51	2·27	3·56	Newcastle-on-Tyne	·59	·46	1·93	2·98
Bodmin	·39	·28	1·32	1·99	Haltwhistle . . .	·95	·78	2·62	4·35
Wells	·60	·13	1·16	1·89	Borrowdale . . .	8·67	1·59	5·75	16·01
Strond	·25	·04	1·79	2·08	Haverfordwest . .	1·24	·40	1·23	2·87
Church Stretton .	·72	·34	2·81	3·87	Llandudno	·77	·87	1·75	3·39

We have here evidence of two exceptionally dry months, followed in some districts by a third dry month (May), but in the N. and N.W. of England the deficiency in May has not been serious.

The area over which the drought has been severe is that S.E. of a line joining Cardiff to Hull, and it has been worst along the south coast from Dover to Exeter.

G. J. Symons.

June 12th.—I see it stated in many publications that "the drought continues." As a broad generalisation that is correct, but only as a vague general statement. The fact is that usually a drought breaks up with a week or a fortnight of drenching rain. There was a complete break in the drought at nearly every station in the days following May 15, and at two or three the fall even on a single day exceeded an inch, but these rains did little or nothing towards making up for the previous deficiency. With the exception of some thunderstorms on May 29, another partial drought began at many stations on May 21 and is in progress.

In a country in which no one will listen to any suggestion as to the expediency of making arrangements for water conservancy for agricultural purposes or for irrigation, two or three dry months naturally cause trouble. Now that there is a return to the type of weather which we had early in the century, some persons may consider whether drain tiles are the only things required for providing crops with the precise quantity of water needed for perfect growth—enough and not too much.

G. J. S.

THE SPRING DROUGHT OF 1893

Daily Fall of Rain at Twenty-four Selected Stations in England and Wales

[Falls of one-tenth of an inch (10 tons per acre) or upwards printed in heavy type.]

Table p. 354.

MARCH 1893

No. on Map		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	Camden Square	·13	·05	·05	—	—	—	—	—	—	—	—	—	·01	—	—	·07	·01	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	Walmer	·22	—	—	—	·01	—	—	—	—	—	—	—	·04	—	—	·11	·01	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	Brighton	·16	—	·01	—	—	·01	—	—	—	—	—	—	·04	—	—	·12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4	Strathfield Turgiss	·11	·04	·05	—	—	·01	·04	·01	·02	—	—	—	·02	·01	·03	·03	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5	Hitchin	·17	·02	·08	·02	—	—	—	—	—	—	—	—	—	—	—	·08	·01	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6	Bury St. Edmunds, Westley	·11	—	·05	—	—	—	—	—	—	—	—	—	·04	—	—	·07	·05	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7	Langton Herring	·08	—	·06	—	—	·07	—	—	—	—	—	—	—	·02	·01	·06	·02	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8	Hartland Abbey	—	·12	·25	—	—	·07	—	—	—	—	—	—	—	—	·19	·10	·05	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9	Bodmin	·09	·03	·04	—	—	·07	·01	·01	·01	—	—	—	·04	·03	·01	·04	·01	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10	Wells	·17	·09	·01	·06	—	·01	·02	—	·03	—	—	—	—	·04	·10	·04	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11	Stroud, Upfield	—	·10	·03	—	—	·06	·01	—	—	—	—	—	—	—	·01	·03	·01	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12	Church Stretton, Woolstaston	·03	·16	·15	—	—	·06	—	—	—	—	—	—	—	—	·12	·15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·05
13	Cheadle Heath Ho.	·03	·09	·12	·13	·01	·12	·02	—	—	—	—	—	—	·08	·07	·08	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·02
14	Coventry, Coundon	·06	·19	·08	—	—	—	·01	—	—	—	—	—	—	—	—	·04	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15	Boston	·15	·07	·06	—	—	—	—	—	—	—	—	—	—	—	—	·06	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
16	Healey Hall, Tickhill	·15	—	·08	—	—	·03	—	—	—	—	—	—	—	—	·01	·04	·02	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17	Preston, Heighton	·28	·02	·15	·04	·06	·04	·01	—	—	—	—	·01	—	—	·04	·05	·10	—	—	—	—	—	—	—	—	—	—	—	—	—	—
18	Ripon, Mickley	·32	—	·12	—	—	·03	—	—	—	—	—	—	—	—	·06	·06	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19	Hull, Pearson Park	·18	—	·09	—	—	·02	—	—	—	—	—	—	—	—	·10	·02	·02	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20	Newcastle, Town Moor	—	—	·45	—	—	—	—	—	—	—	·03	—	—	—	·05	·01	·05	—	—	—	—	—	—	—	—	—	—	—	—	—	—
21	Haltwhistle, Unthank Hall	·46	—	·08	·02	—	—	—	—	—	—	—	—	—	—	—	·28	·04	—	—	—	—	—	—	—	—	—	—	—	—	—	·07
22	Borrowdale, Seathwaite	4·12	·10	1·88	·55	·07	·10	·03	—	—	—	—	·10	—	·40	47	·61	·04	—	—	—	—	—	—	—	—	—	—	—	—	—	·20
23	Haverfordwest	·79	—	·09	·20	—	—	·09	·01	—	—	·01	—	—	—	—	·03	·01	·01	—	—	—	—	—	—	—	—	—	—	—	—	—
24	Llandudno	·08	·20	·19	—	—	·17	·03	—	—	—	—	—	—	—	—	·08	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·02

APRIL 1893

No. on Map		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Camden Square	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·03	—	—	·20	·01	—	—	—	—	—	—	—	—	—	—
2	Walmer	—	—	—	—	·01	—	—	—	—	—	—	—	—	—	—	·02	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	Brighton	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·06	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4	Strathfield Turgiss	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·09	—	—	—	—	—	—	—	—	—	—	—	—	·03	—
5	Hitchin	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·09	·01	—	—	—	·10	—	—	—	—	—	—	—	—	·05
6	Bury St. Edmunds, Westley	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·07	—	—	—	—	—	—	—	—	—	—	—	—	·01	—
7	Langton Herring	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·04	—	—	—	—	—	—	·11	—
8	Hartland Abbey	·09	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·31	—	—	—	—	—	—	·11	—
9	Bodmin	·06	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·10	—	—	—	—	—	·06	—	—	—	—	—	—	·06	—
10	Wells	·02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·03	—	—	—	—	—	—	—	—	—	—	—	—	·08	—
11	Stroud, Upfield	·02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·02	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12	Church Stretton, Woolstaston	·01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·18	·04	—	—	—	—	—	—	—	—	—	—	—	·09	·02
13	Cheadle Heath Ho.	·05	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·23	·13	—	—	—	—	—	—	—	—	—	—	—	·12	—
14	Coventry, Coundon	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·23	·05	—	—	·03	—	—	—	—	—	—	—	—	06	·06
15	Boston	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·11	—	·02	—	—	—	—	—	—	—	—	—	—	·02	—
16	Healey Hall, Tickhill	·02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·18	·09	—	—	—	—	—	—	—	—	—	—	—	·01	—
17	Preston, Heighton	—	·01	—	—	—	—	—	—	—	—	—	—	—	—	—	·03	·07	—	—	—	—	—	—	—	—	—	—	—	—	·10
18	Ripon, Mickley	·21	—	—	—	—	—	—	—	—	—	—	—	—	—	·03	·28	·07	·02	—	—	—	—	—	—	—	—	—	—	—	—
19	Hull, Pearson Park	·10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·12	·10	—	—	—	—	—	—	—	—	—	—	—	·04	·02
20	Newcastle, Town Moor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·04	·27	·03	·01	—	—	—	—	—	—	—	—	·02	—	·07	·02
21	Haltwhistle, Unthank Hall	·07	—	—	—	—	—	—	—	—	—	—	—	—	—	·05	·37	·15	·02	·01	—	—	—	—	—	—	—	—	·15	—	·03
22	Borrowdale, Seathwaite	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·24	·15	·01	—	—	—	—	·07	—	—	—	·20	·22	·56	·18
23	Haverfordwest	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·10	—	—	—	—	—	—	—	—	—	—	—	·04	·03
24	Llandudno	·02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·47	·06	—	—	—	—	—	·03	—	—	—	—	—	·16	·15

MAY 1893

No. on Map		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	Camden Square	·01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·06	·35	·04	·01	·03	—	—	·04	—	—	—	—	—	·25	—	—
2	Walmer	—	·02	—	—	—	—	—	—	—	—	—	—	—	·11	—	·30	·02	·03	·02	·51	—	—	—	—	—	·03	·02	·31	—	—
3	Brighton	—	—	—	—	—	—	—	—	—	—	—	—	—	·02	·12	·25	·03	·02	·05	—	—	—	—	—	—	—	—	·07	—	—
4	Strathfield Turgiss	·06	·01	—	—	—	—	—	—	—	—	—	·02	—	·01	·04	20	·34	·03	22	—	—	·05	—	—	—	—	—	—	—	—
5	Hitchin	—	—	·03	—	—	—	—	—	—	—	—	—	—	·01	·04	·50	·08	·01	·05	—	—	·02	—	—	—	—	—	·19	—	—
6	Bury St. Edmunds, Westley	·02	·12	—	—	—	—	—	—	—	—	—	—	·02	—	·27	—	—	—	·19	—	—	—	—	—	—	—	·07	·34	—	—
7	Langton Herring	—	—	—	—	—	—	—	—	—	—	—	·03	—	·12	·24	·58	·13	—	—	—	—	—	—	—	—	—	—	—	·03	—
8	Hartland Abbey	—	·06	—	—	—	—	—	—	—	—	—	—	—	·42	·02	·89	·51	·35	—	—	·02	—	—	—	—	—	—	—	—	—
9	Bodmin	—	·05	—	—	—	—	—	—	—	—	—	—	·01	06	·18	·22	·54	·21	—	—	·01	—	—	—	—	—	—	—	·04	—
10	Wells	—	—	—	—	—	—	—	—	—	—	—	·05	·06	·17	·18	·13	09	01	—	·07	·26	—	—	—	—	—	—	—	—	—
11	Stroud, Upfield	—	·04	·05	—	—	—	—	—	—	—	—	·02	·77	·12	·30	·32	·12	·03	—	—	—	—	—	—	—	—	—	02	—	—
12	Church Stretton, Woolstaston	—	·15	—	—	—	—	—	—	—	—	—	04	·25	·37	·36	·36	·99	·15	—	·03	·07	·01	—	—	—	—	—	·01	—	—
13	Cheadle Heath Ho.	—	·47	·14	—	—	—	—	—	—	—	—	—	·02	·04	·73	07	·32	·12	—	—	·12	—	—	—	—	—	—	·25	—	—
14	Coventry, Coundon	—	·10	·05	—	—	—	—	—	—	—	—	·18	·05	1·18	·03	·30	·13	—	—	—	—	—	—	—	—	—	—	·01	·01	—
15	Boston	—	·02	·28	·08	—	—	—	—	—	—	—	—	·01	·35	·07	·06	—	—	—	—	—	—	—	—	—	—	·18	·16	·01	—
16	Healey Hall, Tickhill	—	·06	·05	—	—	—	—	—	—	—	—	—	·04	·81	·09	·38	·03	—	—	·01	—	—	—	—	—	—	·20	·25	—	—
17	Preston, Heighton*	—	·10	·05	·03	—	—	—	—	—	—	—	—	04	·20	·72	·24	51	·20	·05	18	14	—	—	—	—	—	·01	—	—	—
18	Ripon, Mickley	—	—	·25	—	—	—	—	—	—	—	—	—	·14	1·14	17	·29	·24	—	—	—	—	—	—	—	—	—	·20	·12	—	—
19	Hull, Pearson Park	—	·04	·02	·08	·08	—	—	—	—	—	—	—	·03	·25	·12	·10	·17	—	—	—	—	—	—	—	—	—	·06	18	—	—
20	Newcastle, Town Moor	—	·20	·02	—	—	—	—	—	—	—	—	—	·07	·45	·23	·08	·60	—	·07	—	—	—	—	—	—	—	·19	·09	—	—
21	Haltwhistle, Unthank Hall	—	—	—	—	—	—	—	—	—	—	—	—	·09	·80	·14	·53	·25	—	·05	·05	—	—	—	—	—	—	·02	13	—	—
22	Borrowdale, Seathwaite	—	·90	—	—	—	—	—	—	—	—	—	—	·23	·02	1·00	·15	·50	·35	1·06	·81	·55	·03	—	—	—	—	—	—	—	—
23	Haverfordwest	—	·03	·11	—	—	—	—	—	—	—	—	—	—	·11	·17	·07	·20	·35	—	·14	—	—	—	—	—	—	—	—	·02	—
24	Llandudno	—	·48	·06	—	—	—	—	—	—	—	—	·29	·07	·13	·11	·02	·09	·45	—	·03	—	—	—	—	·02	—	—	—	—	—

* The Preston return for May not having arrived, the amounts for Lancaster are given instead.

G. J. Symons

Official Reports.

REPORT OF THE COUNCIL

To the Fifty-fourth Anniversary General Meeting of Governors and Members of the Society, held in the Hall of the Royal Medical and Chirurgical Society, at 20 Hanover Square, W., on Monday, May 29, 1893. (Adjourned from Whit Monday, May 22, 1893.)

THE Council have to report the following changes in the list of Governors and Members during the year which has elapsed since the last Anniversary Meeting in May 1892 :—5 new Governors and 611 Members have joined the Society, 8 have been reinstated under Bye-Law 12, and 8 Members have qualified as Governors ; whilst the deaths of 1 Honorary Member, 3 Annual Governors, 9 Life-Governors, 72 Life Members, and 123 Annual Members have been reported. A total of 5 Members have been struck off the books under Bye-Law 10, owing to absence of addresses ; 122 under Bye-Law 11, for arrears of subscriptions ; and 248 have resigned.

2. Through the death of the Duke of Bedford, a Member of the Council, the Society has lost a munificent patron. Since his succession to the title in the year 1891, the late Duke has borne the whole of the expenses in connection with the Society's Experimental Farm at Woburn, inaugurated by his father, and he has also, in other ways, manifested a deep interest in the Society's welfare. The Council report with great satisfaction that the present Duke of Bedford has not only joined the Society as a Governor in succession to his late brother, but has also expressed his wish to provide for the carrying on of the Experimental Farm at Woburn as heretofore.

3. Amongst other Governors and Members whose loss by death the Society has had to deplore since the beginning of the present year, are : the Earl of Derby, K.G. (a subscriber since 1849), Lord Northbourne, Lord Petre, Lord St. Oswald, the Hon. E. W. Lascelles, Sir W. Barttelot, Bart., M.P., Sir C. de Hoghton, Bart., Sir Henry F. Every, Bart., Sir John Gibbons, Bart., Sir William Smith, Bart., Sir A. B. Walker, Bart., Mr. S. H. Ashdown, of Wellington, Salop (a member since 1842), Mr. George Botham, of Slough (a member since

1840), Mr. Thomas Brown, of Uckfield (a member since 1841), Colonel F. Fane, of Fulbeck Hall, Grantham, Mr. R. G. F. Howard, of Temple Bruer, Lincoln, and Mr. Wm. Wakefield, of Kendal.

4. These and other changes bring the total number of Governors and Members now on the Register to 11,126, divided as follows :

25 Foundation Life Governors (Members elected before the granting of the Charter on March 26, 1840) ;
74 Governors paying an annual subscription of 5*l.* ;
82 Life Governors ;
7,138 Members paying an annual subscription of 1*l.* ;
3,706 Life Members ;
80 Life Members by Examination ;
21 Honorary Members.

11,126 Total number of Governors and Members ;

or a net increase of 76 Members during the year.

5. A List of Governors and Members of the Society on the Register at December 31, 1892, arranged according to the counties in which they reside, has recently been issued, and a copy will be sent to any member on application. Members are particularly invited to interest themselves in obtaining new subscribers to the Society, and in this connection the new County list will doubtless be found of service.

6. The two vacancies upon the Council caused by the deaths of the Duke of Bedford and of Mr. Faunce De Laune have been filled up by the election of the Duke of Devonshire, K.G., and of Mr. F. S. W. Cornwallis, M.P., of Linton Park, Maidstone.

7. The Council have unanimously elected the Hon. Cecil T. Parker as Honorary Director of the Society's Country Meetings for three years, in succession to Sir Jacob Wilson, who has retired from that position ; and they have every reason to believe that under Mr. Parker's management the efficiency of the Society's Meetings will be fully maintained.

8. The accounts for the year 1892 have been examined and certified by the Auditors and Accountants of the Society, and are published in the current number of the Journal. The final results of the working of the year are, that after writing off the customary percentages for depreciation, the Society's assets amounted at December 31, 1892, to 36,858*l.* 18*s.* 3*d.*, as against 34,934*l.* 11*s.* 6*d.* at the end of 1891.

9. Three volumes of the new series of the Society's Journal have now been issued, and the Council have reason to know that its issue in a quarterly form has been much appreciated by the members. The free receipt of the Journal has always been regarded as one of the most valuable privileges which members receive in return for their annual subscriptions, and though the quarterly Journal must

necessarily cost more for editing, printing, postage, &c., than the half-yearly issue which it has succeeded, the Council believe that the advantages to the members of receiving their Journal at fixed and more frequent periods greatly counterbalance the increase of expense. It is satisfactory to note that, notwithstanding the greater size of the annual volume now presented to members, the cost per member of the annual production of the Journal is less than it was five years ago, before the introduction of the new printing and delivery arrangements. Comparing the three years (1890–92) with the last three years of the old printing arrangements (1885–87), it is found that the cost of the Journal per member is now 4*s.* 9*d.*, as against 4*s.* 11*d.* The Society now prints and circulates 12,000 copies of a volume of over 1,050 pages at a nett cost of 2,610*l.* (or 4*s.* 4*d.* per volume) on the average of the last three years, or only 400*l.* more than for 10,000 copies of a volume of less than 900 pages under the old system.

10. In consequence of the inadequacy of No. 12, Hanover Square, for the rapidly increasing operations of the Society, the House Committee have for some time been engaged in making inquiries as to more suitable premises, the necessity for which has become imperative. The Council are glad to be able to announce that the efforts of the Committee have at length resulted in the acquisition on very favourable terms to the Society of a part of the site of the adjoining premises known as Harewood House, through the generous action of the Duke of Westminster and Mr. Walter Gilbey in undertaking the responsibility of purchasing the property, in order to secure such portions of it as may be required for the purposes of the Society.

11. It is proposed to erect upon this site a new building for the accommodation of the Royal Agricultural Society and of such other kindred agricultural associations as may wish to be located therein. The sum required for the purchase of the freehold of the site and for the erection thereon of the new building is estimated at 65,000*l.* After careful consideration, and after consultation with the Society's legal advisers, the Council have resolved to invite subscriptions for stock to be issued for an amount not exceeding 65,000*l.*, to carry interest at the rate of three per cent. per annum, to be denominated Harewood House Debenture Stock, and to be secured upon the portion of the Harewood House premises about to be acquired by the Society, but without recourse to the Society's general funds. The Duke of Westminster, Mr. Walter Gilbey, and Sir Nigel Kingscote have kindly undertaken to act as Trustees under a Trust Deed which is about to be executed for the administration of the Scheme, and the Council trust that those members of the Society who are in a position to do so will accord to it their financial support by taking up the Debenture Stock.[1]

[1] A copy of the Statement as to the Harewood House Debenture Stock will be found on page lxxix.

12. The preparations for the Country Meeting at Chester next month are well advanced. The total amount of space allotted in the Implement Department is 13,018 feet run, exclusive of open ground space, as compared with 12,511 feet at Warwick last year, 12,473 feet at Doncaster in 1891, 9,078 feet at Plymouth in 1890, 15,602 at Windsor in 1889, 10,743 feet at Nottingham in 1888, and 8,217 feet at Newcastle in 1887. Three entries have been received from two competitors for the prizes offered for sheep-shearing machines, and it is proposed that there shall be two exhibitions of sheep-shearing by machinery daily during the Show-week. Twenty-three entries have been made by nine competitors for the prizes offered for Self-Binding Harvesters, and in addition 129 entries of new implements have been made for the Society's Silver Medals.

The total entries of live stock are 2,059, as compared with 1,864 at Warwick, 2,221 at Doncaster, 1,764 at Plymouth, 3,976 at Windsor, 1,886 at Nottingham, and 1,825 at Newcastle. There are 509 entries of horses, 758 of cattle, 631 of sheep, 161 of pigs, besides 836 of poultry, 568 of cheese, 225 of butter, 34 of other produce, and 130 of hives, honey, &c. A feature of exceptional interest at the Meeting will be the competition for the very handsome prizes amounting in all to 540*l.*, offered by the Chester Local Committee for Cheshire cheese. No less than 473 entries have been received for these prizes, and the total amount of Cheshire cheese on exhibition will exceed 35 tons. The names of the Judges in the several departments are published in the current number of the Journal.

13. The Duke of Westminster has kindly consented to allow three of his thoroughbred stallions, viz. Bend Or, Arklow, and Blue Green, to be on exhibition in the Showyard during each day of the Meeting, and the three stallions, Eglamore, Sam Kheen, and Blue Grass, which won the Queen's Premiums this year in District G, will also be on exhibition from the Monday to the Wednesday.

14. Eighty-five candidates have entered for the competitions of Butter-makers for the Society's Prizes and Certificates, to take place in the Showyard, from Tuesday, the 20th, to Friday, the 23rd June. Twenty-seven shoeing-smiths practising in the Society's District G (*i.e.* Cheshire, Lancashire, and North Wales) will compete for the Prizes offered for shoeing Hunters and Agricultural Horses.

15. The Implement Yard and the Dairy will be opened to Members of the Society and the public on Saturday, June 17, when the charge for admission to non-members will be 2*s.* 6*d.* The judging will take place in all classes on Monday, June 19, when the charge for admission will be 5*s.* On Tuesday and Wednesday the charge for admission will be 2*s.* 6*d.* each day ; and on the last two days, Thursday and Friday, it will be 1*s.* each day.

16. The decision of the Railway Companies to discontinue the free conveyance of men travelling to and from agricultural shows in charge of live stock threatened to seriously prejudice the success of agricultural shows. The Council therefore organised a large joint

deputation of the leading agricultural and breed societies, who attended before the Railway Managers on May 11, for the purpose of urging a reconsideration of the matter and the restoration of the arrangement heretofore in force. The Council are glad to announce that the Railway Managers acceded to the request of the deputation, and that therefore men *bonâ fide* in charge of live stock (including horses) travelling to and from agricultural shows will be conveyed free as before.

17. The Council have already reported the receipt of invitations from the authorities of Cambridge and St. Albans for the holding of the Society's Country Meeting of 1894. Both places sent influential deputations in support of their respective claims on February 1, 1893, when the choice of the place of Country Meeting for next year came up for final decision. After duly considering the arguments advanced by both deputations and the Report of the Committee of Inspection appointed to examine the sites and other accommodation offered by each locality, the Council determined in favour of Cambridge, where the Country Meeting of 1894 will accordingly be held.

18. In connection with the Cambridge Meeting of 1894, the Council have resolved to offer for competition prizes for explosive oil engines in two classes as follows :—

	First Prize	Second Prize
Class 1.—Fixed engines of 4 to 8 brake horse-power.	50*l.*	25*l.*
Class 2.—Portable engines of 9 to 16 brake horse-power	50*l.*	25*l.*

The last date for receiving entries for these prizes will be on Saturday, March 31, 1894, which is also the date for the closing of the ordinary Implement entries. Prizes of 5*l.*, 3*l.*, and 2*l.* will also be offered at this Meeting, for butter (in packages not less than 14 lb. and under 40 lb. in weight) to be delivered on or before February 1, 1894.

19. According to the scheme of rotation of districts as revised in 1892, the Country Meeting of 1895 would, under ordinary circumstances, have been held at Birmingham. In view, however, of the fact that the Meeting of 1892 was held at Warwick, it has been considered advisable by the local authorities to postpone an invitation to the Society until a longer interval has elapsed. The Country Meeting of 1895 will therefore be held at some town in the next district in the rotation, viz. District B, comprising the counties of Cumberland, Durham, Northumberland, and Westmoreland.

20. The Council have appointed Mr. Frank W. Garnett, M.R.C.V.S., of Windermere, as Provincial Veterinary Surgeon of the Society for the county of Westmoreland. The Examiners on the Diseases of Animals of the Farm other than the Horse, in the examinations for the diploma of the Royal College of Veterinary

Surgeons held last year, have reported that the following gentlemen attained the greatest distinction :—

1. Mr. F. L. Clunes, Newcastle-under-Lyme.
2. Mr. F. T. G. Hobday, Redhill, Surrey.

The Society's Silver Medal has therefore been awarded to Mr. Clunes, and the Bronze Medal to Mr. Hobday.

21. The following resolution in regard to the importation of foreign live stock has been unanimously passed by the Council and forwarded to the Board of Agriculture :—"That in the interests of the producers and consumers of meat in the United Kingdom, it is essential, as a safeguard against the introduction of foreign contagious diseases with animals, that all cattle, sheep, and swine imported into the United Kingdom from foreign countries, which are not for the time being 'prohibited countries,' be slaughtered at the port of debarkation, except in special cases, when they may be admitted under such conditions as the Board of Agriculture may from time to time consider necessary."

22. The Council have for some time been engaged in considering the steps which should be taken to deal with the disease of epizootic abortion in cattle, which occasions every year great losses amongst stock-owners in this country, and has lately increased to a very serious extent. They consider that the time has arrived when definite measures should be taken to inquire into the nature and causes of the disease, with a view to the application of effectual remedies against it. They have accordingly brought this matter under the notice of the President of the Board of Agriculture, and have urged upon the Government the extreme importance of an exhaustive inquiry into the nature and causes of the disease being undertaken at the earliest possible moment.

23. Two outbreaks of foot and mouth disease, in which thirty cattle were affected, have occurred in the country this year. One of them was discovered on January 1 in a cow-shed in North London. The prompt slaughter of the nine cows in the shed proved successful in stamping out the disease. The other outbreak took place on February 18, at Guestling, near Hastings, where the conditions for complete isolation were favourable, and the disease never spread beyond the farm buildings in which it first appeared. With regard to other contagious diseases of animals, a number of cases of suspected pleuro-pneumonia were reported since the beginning of the year, and the suspected animals slaughtered. In only one of these was the condition of the lungs such as to require the slaughter of more than one animal. In one case, however, the lung lesions were of several months' standing, and of such a character that as a measure of precaution the cattle in contact were slaughtered. Anthrax has very materially increased in the first quarter of the present year, 119 outbreaks having been reported as compared with 65 in the corresponding period of last year. Swine fever has also increased lately, but not to any great extent.

24. Experimental inquiries have been carried on by the Department of Comparative Pathology at the Royal Veterinary College during the last six months, in reference to the treatment of actinomycosis by iodide of potassium, which has proved remarkably successful, and on the action of the modified virus of glanders (Mallein) as a means of detecting the disease in obscure cases. The alleged infectivity of meadows in which sheep suffering from contagious foot-rot had been kept was tested by keeping lambs on a contaminated pasture for several months, without any ill effects resulting.

25. During the five months December to April inclusive, the samples of Feeding-stuffs and Manures sent by members for analysis have somewhat exceeded in number those sent during the corresponding period of last year. The total has been 688. It has been considered desirable to issue in clearer terms the Guide furnished to members as to the purchase of Feeding-stuffs and Manures, and the instructions as to the selecting and sending of samples for analysis. Copies of such instructions may now be obtained by Members upon application to the Secretary or Consulting Chemist.[1]

26. As in former years, the winter months have been utilised at the Woburn Experimental Farm by the carrying out of Feeding Experiments, both on bullocks and on sheep, the reports of which will be duly published in the Journal. In the bullock-feeding experiment the question at issue was the relative values of hay and of oat straw. The usual Field experiments will be continued throughout the year.

27. The Consulting Botanist reports that the quality of the seeds supplied to members, so far as submitted to him, continues to be satisfactory, and the seeds for the most part have been free from impurities. The diseases affecting green crops have been receiving special attention. During the past year experiments were carried on in regard to the action of the Bouillie Bordelaise on the fungus causing potato disease, and these are still being prosecuted. Some obscure diseases affecting the turnip have also been investigated.

28. It has been determined to institute during the coming season an inquiry (both from the chemical and the botanical points of view) into the disease of finger and toe in turnips, and the Consulting Botanist has undertaken to write for the next number of the Journal a paper showing the present state of knowledge on the subject [see page 334]. Any Members of the Society possessing practical information of the disease, or who have fields in which it is always prevalent, are invited to communicate at once with the Secretary.

29. The Department of Zoology, referred to in the last half-yearly report, has now been organised, and the Council have appointed Mr. Cecil Warburton, M.A., of the Zoological Laboratory, Cam-

[1] The Guide and Instructions referred to in paragraph 25 of the Report are reproduced *in extenso* on pages lxxvi. to lxxviii.

bridge, as the Society's Zoologist. They have fixed the charge of 1*s.* for information given to Members by the Zoologist respecting any animal (quadruped, bird, insect, worm, &c.) which, in any stage of its life, affects the farm, or rural economy generally, with suggestions as to methods of prevention and remedy in respect to any such animal which may be injurious.

30. The Council note with satisfaction the increasing interest which is being taken in the subject of agricultural education. On February 1 last they passed a resolution in favour of provision being made in all Universities for the granting of a degree in science for students of Agriculture. Cordially approving the scheme for a course of scientific instruction in subjects bearing upon Agriculture, which has lately been organised at Cambridge, the Council have addressed a letter to the Vice-Chancellor of the University of Cambridge, expressing the hope that the Senate may see fit to sanction an examination in connection with the course, and to grant a diploma to successful candidates; and they are glad to observe that the Council of the Senate have recommended the appointment of a special syndicate "to consider whether it is desirable to establish an examination in agricultural science and to grant a diploma connected therewith under the supervision of a special Managing Syndicate, and if desirable to draw up regulations for the examination and for the constitution of the Syndicate."

31. Schemes prepared by the Charity Commissioners for the administration of the Hanley Castle (Worcestershire) Grammar School, and the Drax (Yorks, W.R.) Schools Foundations having received Her Majesty's approval, the Council have, in accordance with the provisions of each scheme, nominated the Earl of Coventry upon the Hanley Castle Foundation, and Mr. E. W. Stanyforth upon the Drax Foundation, as Governors representing the Society.

32. The unusually large number of thirty-seven candidates entered, and thirty actually competed, in the Society's Senior Examinations, held from the 9th to the 13th of this month. Of these thirty candidates, twenty-two satisfied the Examiners, fourteen gaining first-class certificates, and eight others second-class certificates [see page 367].

33. The Council refer with sincere pleasure to the movement which has been set on foot for the purpose of fitly commemorating the Jubilee of the world-renowned Rothamsted Experiments, which have been continuously carried on since the year 1843 by Sir John Lawes and Dr. Gilbert, with such vast benefits to British and foreign agriculture.

By Order of the Council,

ERNEST CLARKE,
Secretary.

QUARTERLY REPORT OF THE CHEMICAL COMMITTEE.

JUNE, 1893.

1. Referring to a case of linseed cake sold to Mr. C. Lethbridge, of Sherfield Manor, Basingstoke, and reported in the last number of the Society's Journal (Vol. IV., Part I., page 145), the Committee, on further inquiry, regret that the name of Messrs. A. Whittet & Co. was introduced into the case, and, in justice to Messrs. Whittet & Co, the Committee publish the following letter, which has been received from them :—

(Copy.) The Oil Mills, Weybridge: May 15, 1893.

To the Chemical Committee of the Royal Agricultural Society.

GENTLEMEN,—In reference to the analysis of a sample of cake sent up by Mr. Lethbridge and the report thereon in the last Journal of the Society, which cake was alleged to be of our manufacture, we must ask permission to make the following statement, proof of which we have laid before you.

We did not supply Mr. Lethbridge with the cake in question at the price mentioned (8*l.* 10*s.* per ton), and, in fact, have never done any business with him. If the cake analysed was of our manufacture, it could not have been other than part of a four-ton lot consigned by us (nearly three weeks prior to the date when Mr. Lethbridge was supplied) to a firm of local dealers, and which was ordered by them and delivered by us to them as Seconds Linseed Cake, at the price of 7*l.* 12*s.* 6*d.* per ton (nett) free on rail.

Our pure W cake has, we may justly say, a high reputation in the Southern counties, and it is obviously not to our interests that other cake should be supplied in lieu thereof. Moreover, we may add that we, in common with all honest manufacturers, are entirely at one with your Society in your endeavour to prevent the buyer of cake being misled or imposed upon, and are desirous of taking all steps to that end.—We are, Gentlemen, Your obedient servants, (Signed) A. WHITTET & Co.

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2. Mr. Martin Morrison, of Elton Hall, Stockton-on-Tees, sent on March 18, 1893, a sample of manure, of which he had ordered four tons by way of trial.

The manure cost 3*l.* 10*s.* per ton delivered, and was obtained from The North British Manure Co., Central Hall, Church Street, West Hartlepool.

A circular giving the following guaranteed analysis was given to Mr. Morrison by the local agent of the company :—

Guaranteed Analysis.

[1] Organic matter	23·08	
Moisture	15·78	
Oxide of iron and alumina	4·90	
Phosphate of lime	3·26	100·00
Sulphate of lime	14·06	
Carbonate of lime	3·90	
[2] Magnesia and alkalies	13·96	
Silicious matter	21·06	
[1] nitrogen	1·68	
equal to ammonia	2·04	
[2] magnesia	7·22	
alkalies, &c.	6·74	

Dr. Voelcker's report on the sample submitted to him by Mr. Morrison was as follows :—

	March 29, 1893.	
Moisture	19·73	
[1] Organic matter	11·39	100·00
Phosphate of lime	1·39	
Oxide of iron, carbonate of lime, &c.	26·30	
Insoluble siliceous matter	41·19	
[1] containing nitrogen	·78	
equal to ammonia	·94	

An almost worthless material—over 60 per cent. of it is water and sand. In addition, its condition is bad.

After the delivery of the manure, it was refused by the purchaser and removed by the vendors.

As the use of Basic Slag as a manure is now being widely extended, it is desirable that farmers should be careful as to what they purchase under that name. The following is a case in which a purchaser bought a worthless article under the name of "Slag."

3. Mr. George Adams, Faringdon, Berks, sent on April 15 a sample of what he had purchased as "Slag." The price, carriage paid, was 27*s.* 6*d.* per ton for credit, or 25*s.* per ton for cash.

The order was given on April 8 for about five tons. On April 10 Mr. Adams received the following letter :—

April 10, 1893.

DEAR SIR,—I have this day sent you sixty-four bags of slag as promised ; a great portion of it is soot, which I trust you will receive in good condition. Should you like the look of it you may have another lot at the same price, if you let me know early, as the matter is entirely in my hands until the end of this month. You must also kindly oblige me with cheque, less cost of carriage, as I think I told you how matters stood, and at the price I sold to you it will not cover working expenses. I find the rate is 7*s.* 3*d.* per ton.—Yours faithfully,

* * * *

To G. Adams, Esq. : Prize Farm, Faringdon.

After analysing the sample forwarded by Mr. Adams, Dr. Voelcker reported as follows :—

	April 28, 1893.	
Water and loss on heating	9·10	
Oxide of iron, alumina, &c.	8·05	
Lime	none	100·00
Phosphoric acid	none	
Insoluble siliceous matter	82·85	

This is not basic slag at all, but an utterly worthless material as a manure, containing no fertilising ingredient whatever.

On Mr. Adams forwarding the letter of April 10, given above, Dr. Voelcker reported further, on May 3, as follows :—

The statement that the "slag" contains *soot* is not correct. I have made a determination of the nitrogen in the sample, and find that there is

practically *none* whatever, which would not be the case were any soot mixed with it. The exact percentage of nitrogen in the sample is ·08 per cent.

Under threat of legal proceedings Mr. Adams paid the bill.

The following case affords an instance showing that *even when an invoice has been given* in approved terms it is *still necessary* to resort to analysis.

4. Captain R. Boutflour, of Whelly Hill, Castle Eden, co. Durham, sent on April 25 a sample of what had been invoiced to him as Vitriolated Bones.

Two tons of this had been purchased at 6*l.* 15*s.* per ton carriage paid, less 5*s.* per ton net cash, the vendor and manufacturer being Mr. William J. Stephenson, Pipewellgate Chemical Manure Works, Gateshead-upon-Tyne.

A circular sent by the vendor contained the following guarantee of analysis: "Vitriolated Bones, price 7*l.* 5*s.* per ton. 32 to 37 per cent. total phosphates. 15 to 20 per cent. soluble phosphate. Nitrogen=10 to 12 per cent. sulphate ammonia."

Dr. Voelcker gave the following report:—

	May 3, 1893.	
Moisture	15·84	
[1] Organic matter and water of combination	19·48	
Monobasic phosphate of lime	12·47	
equal to tribasic phosphate of lime (bone phosphate) rendered soluble by acid	(19·53)	100·00
Insoluble phosphates	10·00	
Sulphate of lime, alkaline salts, &c.	37·09	
Insoluble siliceous matter	5·12	
[1] containing nitrogen	1·58	
equal to ammonia	1·92	

This is not made, as vitriolated bones should be, of *raw* bone and acid only. The price is distinctly high.

On receiving this report Captain Boutflour wrote:—

Whelly Hill, Castle Eden: May 8, 1893.

Dr. J. Augustus Voelcker.

Dear Sir,—The manufacturer of the Vitriolated Bones called upon me on Saturday last, and in explanation said that the 4½ per cent. soluble phosphates over minimum guarantee would equal 9 per cent. insoluble—making phosphates 15·34 respectively—leaving the deficiency in ammonia the same, and allowing 2 per cent. of total phosphates, as a set-off against the deficiency in ammonia would leave it only ½ per cent. short, and, further, he contended that the ammonia is solely from bones. Would you kindly say what you think the value of this manure should be?—I am, Sir, yours respectfully,

Robert Boutflour.

To this Dr. Voelcker replied :—

R. Boutflour, Esq. May 9, 1893.

Dear Sir,—I am in receipt of your further letter.

The only point which the manufacturers appear to have dealt with is that of the actual deficiency as shown in the figures of analysis.

Taking this point first, I should by no means be prepared to accept the manufacturers' method of calculating. The guarantee was for a minimum of 32 per cent. of total phosphates, and you have only received 29½; you are therefore entitled to claim for the 2½ per cent. of phosphates, as well as for the deficiency of ammonia.

I make it a rule not to fix any money values on manures, and I cannot do so here; I can only tell you in the general terms I have, that I call the manure a dear one.

But there remains the important point, the one which, as I said, I am principally concerned with—viz. that the manure is not, and ought not to be called, "vitriolated bones"; and I want to hear what explanation the manufacturers have to give in respect to this.

As you purchased the manure for "vitriolated bones," and my report tells you that it is *not* of this nature, I consider you would be justified in returning the manure as not being up to the description given.—Yours faithfully, J. Augustus Voelcker.

Mr. Boutflour wrote on May 18 to say that the further explanation given by the manufacturer was that there must have been some mistake on the part of his employés.

Ultimately a reduction of 35*s.* per ton was made.

The two following cases show the necessity of the giving of an invoice, and of having the materials correctly described on the invoice :—

5. Mr. Thomas Trinder, of The Nupend, near Malvern, sent on March 1 a sample of what he said he had purchased as "Linseed Cake."

Two tons had been ordered from a local agent, the price being 8*l.* 10*s.* per ton delivered, with no discount.

Mr. Trinder stated that he had been giving it to sheep, mixed with hay chaff and cut swedes, and that during the time they had been feeding on it he had lost several sheep.

Dr. Voelcker's report on the cake was :—

	March 14, 1893.	
Moisture	13·95	
Oil	8·33	
[1] Albuminous compounds (flesh-forming matters)	24·84	100·00
Mucilage, sugar, and digestible fibre	37·17	
Woody fibre (cellulose)	7·76	
[2] Mineral matter (ash)	7·95	
[1] containing nitrogen	3·97	
[2] including sand	2·70	

A very inferior and much adulterated cake, low in quality, with large admixture of rape-seed, cockle-seed, and some mustard, as well as with excessive sand.

In further correspondence Mr. Trinder said that the local agent, from whom he had ordered the cake, had sent the order direct to the crushers.

When the invoice came to the agent the cake was simply described as "Oilcake." The local agent compensated Mr. Trinder for the inferiority of the cake, though he said the crushers refused on their part to allow him (the agent) anything.

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6. Mr. R. G. Brown, of Good Mayes Farm, Chadwell, Essex, sent on March 7 a sample of what he had purchased as nitrate of soda.

Two and a quarter tons were ordered on March 4, at 9*l.* 5*s.* per ton.

Mr. Brown said that the vendor told him that he had this left over from last season, and showed him a sample, whereupon he bought the above-mentioned quantity.

Thinking, from the somewhat low price, that it was possibly not very good, Mr. Brown submitted a sample to Dr. Voelcker, and received the following report :—

March 14, 1893.

Moisture	6·59	100·00
Chloride of sodium (common salt)	14·46	
Sulphate of soda	11·20	
Nitrate of soda	67·75	

A sample adulterated to the extent of one-quarter (25 per cent.) with common salt and sulphate of soda.

Mr. Brown further said that he had not received any invoice, but had trusted to the vendor's word that the material was genuine, and pure nitrate of soda.

R. A. Warren,
Chairman.

May 31, 1893.

REPORT OF THE EDUCATION COMMITTEE ON THE RESULTS OF THE SENIOR EXAMINATION, 1893.

The Committee have to report that thirty-seven candidates entered, and thirty actually competed, at the Society's Senior Examinations which took place from the 9th to the 13th of May last, and that, of these thirty competitors, twenty-two have satisfied the Examiners.

2. The following fourteen candidates, placed in order of merit, have gained first-class certificates with the Life Membership of the Society, the first four being entitled in addition to the prizes stated below :—

1. James John Forrester, Royal Agricultural College, Cirencester. *First prize of* 25*l.*
2. John Smith Hill, The Beeches, Woodbridge, Suffolk. *Second prize of* 15*l.*
3. Herbert William Raffety, The Agricultural College, Aspatria. *Third prize of* 10*l.*
4. Richard Stedman Cunliffe, Mavisbank, Banchory, Kincardineshire, N.B. *Fourth prize of* 5*l.*
5. Arthur Hilton Greaves, Royal Agricultural College, Cirencester.
6. Cadwaladr Bryner Jones, The Agricultural College, Aspatria.
7. Ernest Goddard, Royal Agricultural College, Cirencester.
8. Robert Heron Rastall, The Priory, Grosmont, R.S.O, Yorkshire.
9. William Wilson, The Agricultural College, Aspatria.
10. John Abbott Chope, 107, Ledbury Road, Bayswater, W.
11. Martin Hammond Ward, The Agricultural College, Aspatria.
12. Septimus Beven, Royal Agricultural College, Cirencester.
13. Frank Virgoe Jones, Bodfeirig Ty Croes, R.S.O., Anglesey.
14. Edward Montague Arnold, Sunningdale, Glynde Road, Bexley Heath, Kent.

3. The following candidates, having passed in Agriculture and in three of the four other compulsory subjects, are entitled to second-class certificates :—

15. Grosvenor Berry, Royal Agricultural College, Cirencester.
16. Frederick Victor Dutton, Royal College of Science, South Kensington.
17. David Lister Smith, The Agricultural College, Aspatria.
18. Edward Carroll, Record and Writ Office, Dublin.
19. William Edwards, Tyddyn Fadog, Llanfair, P.G., Anglesey.
20. Joseph Terrence de La Motiie, The Agricultural College, Aspatria.
21. James Douglas Dunn, The Agricultural College, Aspatria.
22. Richard Elwyn Birch, Maes Elwy, St. Asaph, North Wales.

4. Of the compulsory subjects, there was one failure in Agriculture, and there were ten in Chemistry, seven in Book-keeping, twelve in Land Surveying, and two in Agricultural Engineering. Of the optional subjects, there were four failures in Botany, one in Geology, ten in Anatomy, and two in Agricultural Entomology.

5. The Examiner in Agriculture (Mr. George Street) reports that "many of the papers are good and some of them are excellent. The chief fault is a readiness to spend money too freely, without making due allowance for the cost of living, household furniture, and other outgoings. Instead of working as easily as possible with a farm, and laying the foundation of a future stud, herd, and flock, there seemed to be an idea that a farm should be fully equipped like some imaginary Prize Farm."

6. The Examiner in General Chemistry (Professor Liveing, F.R.S.) reports that the candidates did fairly well, "though there are a few who know nothing of the principles." The Examiner in Agricultural Chemistry (Dr. J. Augustus Voelcker, B.Sc.) reports that "the papers may, on the whole, be described as fair. The number of really good papers was, however, small. In only one case was any exceptional knowledge shown, and only in this one instance was question 5 (on the ferments of milk) adequately answered. Almost all the other candidates merely contented themselves by mentioning the 'lactic' and 'butyric' ferments, and no others. This question, the principal one in the paper, was very unsatisfactorily dealt with. It is remarkable also that in replying to question 6 ('From what countries are bones mostly obtained?') only two out of the thirty candidates mentioned the home supply of bones, while only five named India as a bone-exporting country. The portion of this question which dealt with the difference of composition of bones was only in two instances answered even fairly."

7. The Examiner in Book-keeping (Mr. C. Gay Roberts) reports that "most of the candidates did the journalising and posting fairly; but several failed to bring the year's rent into the account, and others blundered over the 12 per cent. depreciation of implements."

8. The Examiner in Mensuration and Land Surveying (Mr. G. H. Leane, F.S.I.) reports that (1) the candidates have, as a whole, a sufficient amount of knowledge of surveying and levelling, including in some cases a practical acquaintance with land measuring, to enable them to obtain pass marks. (2) There are but few of them that could be entrusted with an estate survey, or who could be relied upon for taking a series of levels for professional purposes. But in awarding the marks I have taken it for granted that it is the object of the Society to pass those gentlemen who may display

a "sufficient" as distinguished from an "exhaustive" knowledge of these subjects.

9. The Examiner in Agricultural Engineering (Dr. W. Anderson, F.R.S.) reports that "the paper work has been above the average, and the oral work has also been satisfactory. There is no improvement in drawing and sketching, which points to the persistent neglect of these accomplishments in secondary and in higher schools. The two questions involving a knowledge of chemistry were attacked by 81 per cent. and 94 per cent. of the students respectively, and were well and fully answered, though not quite in the sense in which I had intended. The practical questions, on the other hand, were indifferently treated. I am afraid that the teaching received by the students in practical engineering is but poor."

10. In the optional subjects, the Examiner in Botany (Mr. Wm. Carruthers, F.R.S.) reports that "the average was higher than on any previous occasion." The Examiner in Geology (Professor Rupert Jones, F.R.S.) reports that "the results are very good. Two candidates have obtained the maximum of marks, and nine are within a very little of that limit—indeed, three of them are nearly equal to it. Ten others have done very well; three others have passed the minimum; and only one out of the twenty-five has failed." The Examiner in Anatomy and Animal Physiology (Professor J. B. Simonds) reports that "a much larger number of candidates presented themselves; but I cannot say that their knowledge of the subjects was proportionately increased. Indeed, I regret to say that the contrary is the fact. This has not arisen from the questions being more difficult than on former occasions. The first question, for example (a very simple one), was only answered by eleven out of the twenty-three candidates, and three of these failed to answer it correctly." The Examiner in Agricultural Entomology (Mr. Cecil Warburton, M.A.) reports that "the papers on this subject are, on the whole, satisfactory. Of the twenty-five candidates, six obtained over 75 per cent. of the maximum marks, while only two failed to obtain 50 per cent. The question relating to the distinction between the larvæ of various orders, though attempted by nearly all the candidates, was the least successfully answered. More attention should be directed to this important part of the subject."

11. The general results of the examination are very gratifying. The number of candidates is larger than on any former occasion (the highest previously being 24 in 1889); and the proportion of successful candidates, viz. 22 out of 30, or 73·3 per cent., is highly satisfactory.

12. The following Table gives the marks assigned by the Examiners to the work done by each candidate in the several subjects :—

Name of Candidate [The names of those winning First Class Certificates are printed in capitals.]	Age of Candidate	Agriculture, *max.* 300	Chemistry, *max.* 200	Book-keeping, *max.* 200	Land Surveying, *max.* 200	Agrl. Engineering, *max.* 200	*a.* Botany, *max.* 100	*a.* Geology, *max.* 100	*a.* Anatomy, *max.* 100	*a.* Agrl. Entomology, *max.* 100	Total Marks	Result.
*ARNOLD, E. M.	21	160	120	160	109	129	55	81	—	71	885	14th
+	21	160	+	+	+	+	—	—	—	—	+	+
†Berry, G.	23	160	149	185	+	139	95	95	85	69	977	15th
*BEVEN, S.	25	160	113	184	118	128	61	83	+	51	898	12th
†Birch, R. E.	23	160	+	184	156	126	—	—	—	—	626	22nd
†Carroll, E.	33	250	+	128	100	170	63	64	+	82	857	18th
*CHOPE, J. A.	26	150	115	189	120	146	56	91	+	62	929	10th
+	19	250	+	+	+	123	52	73	+	53	+	+
+	19	+	+	+	+	+	+	—	—	—	+	+
*CUNLIFFE, R. S.	23	210	153	110	136	185	76	67	50	78	1,065	4th
†De La Mothe, J. T.	19	220	115	+	100	142	70	98	+	66	811	20th
†Dunn, J. D.	25	275	+	160	121	143	+	71	+	+	770	21st
†Dutton, F. V.	28	150	149	155	+	142	82	99	65	85	927	16th
†Edwards, W	28	210	107	105	+	156	56	84	55	55	828	19th
+	22	150	+	166	+	129	+	50	+	+	+	+
*FORRESTER, J. J.	20	300	158	194	100	168	71	97	65	84	1,237	1st
+	26	160	+	120	+	166	50	—	—	—	+	+
*GODDARD, E.	26	260	126	189	100	142	52	77	+	66	1,012	7th
*GREAVES, A. H.	26	150	136	172	145	163	68	100	60	62	1,056	5th
*HILL, J. S.	27	205	133	138	123	146	92	100	95	83	1,115	2nd
*JONES, C. B.	21	220	124	145	100	131	83	93	55	66	1,017	6th
*JONES, F. V.	23	240	100	148	100	179	57	+	+	63	887	13th
*RAFFETY, H. W.	21	225	120	120	185	179	75	94	—	89	1,087	3rd
*RASTALL, R. H.	21	170	140	145	100	177	60	92	60	63	1,007	8th
+	29	215	+	+	+	128	—	—	—	—	+	+
+	18	290	+	+	+	136	52	53	50	58	+	+
†Smith, D. L.	27	235	125	160	+	140	57	79	55	70	921	17th
+	17	280	124	+	+	162	54	55	+	55	+	+
*WARD, M. H.	21	150	106	165	100	145	64	86	50	56	922	11th
*WILSON, WM.	18	220	114	153	100	197	+	90	60	61	995	9th

REMARKS.

* First-class certificate and life membership.
† Second-class certificate.
a Optional subjects.
— Did not attempt.
\+ Failed.

May 29, 1893. JOHN TREMAYNE, *Chairman of the Meeting.*

Adopted by the Council, May 31, 1893.

FEVERSHAM, *Chairman.*

EXAMINATION IN AGRICULTURE.

MAXIMUM NUMBER OF MARKS FOR THIS SUBJECT, INCLUDING THE *VIVÂ VOCE*, 300. PASS NUMBER, 150.

Tuesday, May 9th, from 2 *p.m. till* 5 *p.m.*
(*Vivâ voce, Wednesday afternoon, May* 10.)

1. Assuming that you have a capital of 2,000*l.* to start with, and that you intend getting a living by farming, what sized farm should you be able to manage, supposing it to be one-third grass and two-thirds arable, of light or mixed soil, the greater part being suitable for growing roots and barley, at a rental of about 1*l.* an acre?

2. What would influence you most in the selection of such a farm?

3. Give an estimate of the principal items of expenditure on entering a farm at Michaelmas, such as valuation of articles of husbandry, purchase of implements, cribs, troughs, hurdles, harness, &c.

4. State briefly how you would intend to manage your farm, and give the proposed course of cropping, whether on the four-course system, or, if not, what variations you would introduce, and the probable effect of such variations on the cost of labour.

5. How much seed per acre is ordinarily sown of wheat, barley, oats, beans, peas, tares, mangel, swedes, kohl rabi, and clover respectively?

6. As the value of hay depends to some extent upon its aroma, how would you make it in fairly good weather, so as to secure it in a green state, and how should you act if the weather were showery?

7. Should wheat be cut before or after it is quite ripe? Give your reasons.

What is the effect of cutting barley before it is quite ripe? If you had 20 acres of wheat and 10 acres of barley ready for carting, which should you cart first if the weather were likely to be showery, and why?

Live Stock.

8. State what breed of horses you would intend to keep, and give an approximate estimate of the number, respective ages, and cost per head, and whether you would intend them for breeding as well as for work. Give any information as to the best way of managing farm horses, with especial reference to the mode of feeding them when they come home from work.

9. What kind of cattle would you intend to keep? State the number and probable cost, and whether you would buy in stores and resell them when in good condition, ready for feeding, or when fat to the butcher, or whether you would keep a herd of dairy cows and sell milk or butter, and, if so, how you would propose to keep up the numbers of your herd.

10. As a fourth of the arable land would probably be in roots, what sheep should you buy, and at what do you estimate their cost?

How would you manage a breeding flock during and after lambing?

Would you think it safe previous to lambing to put ewes on swede turnips, and, if so, what means would you take to prevent the mischief which often results when there is a big crop of turnips?

EXAMINATION IN CHEMISTRY.

MAXIMUM NUMBER OF MARKS, 200. PASS NUMBER, 160.

PART A. GENERAL CHEMISTRY.

Thursday, May 11th, from 10 *a.m. till* 1 *p.m.*

1. State the composition of ammonia by weight, and by volume. Given some sulphate of ammonia, describe how you would proceed to prepare a solution of ammonia from it.

2. Give an account of the chief properties of the element carbon, and of the peculiarities of charcoal. What differences are observed in the manner in which charcoal, ordinary house coal, coke, and anthracite, burn; and to what do you attribute these differences?

3. Explain the experimental grounds for the assertion that one gram of magnesia is chemically equivalent to two grams of caustic soda; and that one gram of chlorine and one gram of iodine are together nearly equivalent to two grams of bromine. (Cl: Br: I: Na: Mg = 35·5: 80: 127: 23: 24.)

4. Give an account of the oxides of sulphur, and of those of iron; their composition and chief properties.

5. Explain the chemistry of the burning of lime. Give some account of the differences in chemical composition, and qualities, of lime from different kinds of limestone.

6. Describe, and explain, the effects of exposure to weather on zinc, lead, limestone, iron pyrites, copper.

7. State the composition of the different phosphates of lime. Calculate the number of pounds of sulphuric acid needed to convert one ton of bone earth into soluble superphosphate. (S : P : Ca = 32 : 31 : 40.)

8. Explain the difference in constitution and properties between paraffin oils and fat oils. What are their actions with oxide of lead?

9. What are the conditions required for the fermentation of glucose, and what are the chemical changes thereby effected? By what different methods may the fermentation be stopped?

10. State the chemical elements of albumen. How could you prove the presence of nitrogen in it? In what parts of plants and animals is albumen found? How can you distinguish it from gelatine?

EXAMINATION IN CHEMISTRY.

Part B. Agricultural Chemistry.

Friday, May 12th, from 10 a.m. till 1 p.m.

1. In what respects may Chemical Analysis fail to act as an index of the actual fertility of a soil?

2. Illustrate the differences which exist between soils of various kinds in the manner in which they are severally affected by drought. Explain to what these differences may be due.

3. Explain—from a chemical point of view—the economy of feeding decorticated cotton cake to stock when out on grass.

4. Why is the advice frequently given to farmers to purchase "Pure Dissolved Bones" in preference to manures sold as "Bone Manures" or "Bone Compounds"?

5. Which are the principal ferments that affect Milk, and how do they severally act?

6. From what countries are Bones mostly obtained? What differences of composition may they show according to their origin? In what sense may Bones be called a Landlord's manure, and Nitrate of soda not?

EXAMINATION IN BOOK-KEEPING.

Maximum Number of Marks, 200. Pass Number, 100.

Thursday, May 11th, from 2 p.m. till 5 p.m.

To lessen the number of entries in the ledger, the single heading "Live Stock" may comprise all the animals except horses; single entries may also be used for "Rent, Rates, Taxes, and Insurance," for "Seeds, Manures, and Foods Purchased," for "Tradesmen's Bills and Petty Cash," and for "Corn, Hay, and Straw."

Journalise the following transactions; post them into a ledger; make out a Balance Sheet and a Profit and Loss Account.

H. Jackson rents a farm at 300*l.* a year, and took stock on Sept. 29, 1891. His assets were:

	£	*s.*	*d.*
Cash at Banker's	140	0	0
Petty Cash	15	10	0
Debt due from C. Jones	80	0	0
Horses	185	0	0
Cattle	450	0	0
Sheep	530	0	0
Pigs and Poultry	33	0	0
Corn	540	0	0
Hay	170	0	0
Straw	115	0	0
Growing Crops and Tillages	600	0	0
Food purchased	72	0	0
Seeds and Manures	120	0	0
Implements (taken at cost price less 12 per cent. per annum for depreciation)	214	0	0

His liabilities were:

	£	*s.*	*d.*
To Landlord	75	0	0
,, Manure Merchant	90	0	0
,, Acceptance due Jan. 1, 1892	100	0	0

During the year he draws cheques for:

	£	*s.*	*d.*
Horses	35	0	0
Cattle	140	0	0
Pigs	19	0	0
Implements	27	0	0
Tradesmen's Bills	34	0	0
House Expenses	197	0	0
Wages	433	10	0
Food purchased	95	0	0
Manures (including debt, 90*l.*)	107	0	0
Seeds	24	7	6
Rent	200	0	0
Rates and Taxes	37	0	0
Petty Cash	23	0	0

He pays his acceptance on Jan. 1, 1892.

He buys 130 Sheep at 27*s.* 6*d.* each, and draws cheque, in part payment for them, of 95*l.*

He sells 80 Sheep to his Landlord at 33*s.* each.

From Jones, who compounds with his creditors for 5*s.* in the pound, he receives 20*l.* and pays it into the Bank. He also receives and pays in for:

	£	*s.*	*d.*
Pigs	83	0	0
Cattle	290	0	0
Poultry	14	10	0
Sheep	245	0	0
Dairy Produce	85	0	0
Wool	43	0	0
Wheat	345	7	6
Straw	43	0	0
Hay	54	0	0
Barley	273	5	0

On Sept. 29, his valuations are :

	£	*s.*	*d.*
Horses	204	0	0
Cattle	514	0	0
Sheep	612	10	0
Pigs and Poultry	49	6	0
Corn	490	0	0
Hay and Straw	230	0	0
Growing Crops and Tillages	589	0	0
Seeds and Manures	113	0	0
Food Purchased	94	0	0
Petty Cash in Hand	7	6	0

He values his Implements at cost price, less 12 per cent. per annum for depreciation.

What percentage, approximately, does H. Jackson get for the capital invested in his business ?

EXAMINATION IN MENSURATION AND LAND SURVEYING.

MAXIMUM NUMBER OF MARKS, 200. PASS NUMBER, 100.

Wednesday, May 10th, from 10 *a.m. till* 1 *p.m.*

1. On the plan given on page 4 of this paper [1] draw in pencil the chain lines you would run to enable you to make and plot a complete survey without the aid of angular instruments.

2. Compute the areas of the two inclosures given upon page 2,[1] using the ordinary plotting scale for this purpose, and giving the results in acres, roods, and perches.

3. From the field notes given upon page 3 [1] lay down the survey lines, and plot the details to a scale of 2 chains to an inch.

NOTE.—*The Candidate must not spend more than forty minutes over this question.*

4. Make up the level book on page 2,[1] filling in the rises, falls, and reduced levels.

5. Plot the section in the last question to a scale of 2 chains to an inch horizontal, and 20 feet to an inch vertical.

6. The points A and B are the ends of a base line measured upon the mainland, which is 84·36 chains in length.

C is a point upon an island.

The observed angle CAB is 82° 42′, and the observed angle CBA is 72° 30′ : required the length of AC.

7. In a similar case to the foregoing, where the ascertained distance from A to C was 220 chains, the telescope of a theodolite stood 4·32 feet above the mark at A, having a levelled value of 172·56 feet.

The angle of elevation observed to point C was 2° 16′. Give the reduced level of point C after making due allowance for curvature and refraction.

8. A field scaled from a plan with a scale of 3 chains to an inch gave as a result 10 acres, 3 roods, 20 poles ; it was then found that the plan had been plotted to a scale of $\frac{1}{2500}$, or 25·344 inches to a mile. What is the correct area of the field ?

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[1] Not here reproduced.

EXAMINATION IN AGRICULTURAL ENGINEERING.

MAXIMUM NUMBER OF MARKS, 200. PASS NUMBER, 100.

Tuesday, May 9th, from 10 *a.m. till* 1 *p.m.*

N.B.—*Not more than half the questions should be attempted.*

1. A winch has a rope barrel 6 inches in diameter and a handle with a 15-inch length of arm. The wheel on the rope barrel is four times the diameter of the pinion on the handle shaft. Sketch the winch and calculate the ratio between the stress on the handle and the consequent pull on the rope.

2. A cricket ball thrown vertically into the air is observed to be $1\frac{3}{4}$ seconds in falling from its highest position. Calculate the height to which it was thrown.

3. A 9″ × 3″ deal 12 feet long spans an opening of 11 feet clear width. What load, hung on the centre of the deal, would break it (*a*) if placed on edge and (*b*) if laid on its flat? A piece of the same deal, 1 inch square and 2 feet clear span, breaks under a load of 2 cwt. hung on its centre.

4. Define what is meant by the term "work," and what are the units commonly used for measuring it.

5. A coal truck weighing, when loaded, one ton, is hauled up an incline of 1 vertical to 10 horizontal. Calculate the stress on the rope, and state what will be the work done after the truck has been dragged up the incline 100 feet measured horizontally.

6. Describe the several changes which take place when 1 lb. of ice at 32° F. is melted and wholly evaporated at standard atmospheric pressure. How many units of heat are required to effect the changes?

7. Explain the process of combustion, and state what is the cause of the heat evolved.

8. What are the ordinary components of the atmosphere, and what bearing have they on plant and on animal life?

9. Explain why the barrel of an ordinary suction pump may not be placed more than a certain limited height above the water it has to suck up; and calculate that height on the supposition that mercury is 13·6 times heavier than water.

10. Sketch, to scale, the setting of an ordinary single-flue Cornish boiler 24 feet long by 5′ 6″ diameter, with a 2′ 9″ flue. Write in the leading dimensions.

11. Explain the advantage to be derived from using steam expansively, and show, by a diagram, what theoretical advantage is to be gained in a single-cylinder engine, cutting off at $\frac{1}{4}$ the stroke, as compared with the same engine taking steam the whole length of the stroke.

12. Describe the action of the Otto gas engine.

13. Sketch a field gate 9 feet wide and 5 feet high, giving the scantlings of the timber which you would propose to use.

14. Describe, in a general way, the construction and mode of operation of a reaping machine.

15. Describe the contrivances used in an ordinary threshing machine for cleaning the grain and for separating it into qualities.

16. Describe two or three methods of cooling milk rapidly for dairy purposes.

17. Prepare a specification of a system of subsoil drains to drain a tract of 100 acres of land, having a slight natural slope to a stream which is available to take the drainage water. Make a sketch of your system.

18. Describe the process of forging horse-shoes out of old worn shoes.

EXAMINATION IN BOTANY.

MAXIMUM NUMBER OF MARKS, 100. PASS NUMBER, 50.

Friday, May 12th, from 2 p.m. till 4 p.m.

Seven questions at least must be answered.

1. What constituents in the air and soil are necessary to the life of a plant?
2. What is the composition of starch? In what part of the plant is it formed?
3. Explain the processes by which the stored food in a grain of wheat is made available to the growing embryo.
4. Explain the life history of an annual, a biennial, and a perennial plant, and give examples.
5. Name six British poisonous plants, with the natural order to which each belongs, and give the part of the plant, if any, which is specially injurious.
6. Explain briefly the terms viviparous, hybrid, ascus, plumule, hypogynous, palea, siliqua, and drupe.
7. Give an account of clover sickness, and state how you would treat it.
8. Contrast *Trifolium pratense* and *T. hybridum*, *Poa pratensis* and *P. trivialis*, *Lolium perenne* and *Festuca pratensis*.
9. Of what value in a permanent pasture are the following plants: *Plantago lanceolata*, *Alopecurus pratensis*, *Bromus mollis*, *Centaurea nigra*, *Achillæa Millefolium*, *Phleum pratense*, and *Hyoscyamus niger*?
10. Name and describe in systematic order the plants marked A and B.

EXAMINATION IN GEOLOGY.

MAXIMUM NUMBER OF MARKS, 100. PASS NUMBER, 50.

Saturday, May 13th, from 10 a.m. till 1 p.m.

1. Enumerate twelve of the Elementary Substances that more especially enter into the composition of Minerals; and mention some of the Rocks of which they are severally important constituents.
2. What Natural Agencies tend to change the Earth's Surface? Give particulars as to some of the results in their work—*either* (i.) in *disintegrating* and *degrading*; *or* (ii.) in *accumulating* and *reconstructing*, the materials of the surface.
3. Describe and illustrate by Sections the structure and characters of *either* some Volcanic *or* some Granitic district in the British Islands or elsewhere. Indicate its special physical features, and the character of the soil.
4. Draw up a Table of Rocks that have an *organic* origin—grouping them according to their chief constituents. Indicate any that yield *Mineral Manure*.
5. What evidences are there of (1) *elevation*; (2) *depression*; (3) *successional formation* of strata; and (4) *long lapse of time* in Geology? Give diagrams in illustration.
6. Mention some of the best-known Fossils of either the Silurian (Upper), *or* the Cretaceous Formation; and refer them to their several Natural Orders.
7. Enumerate the great Clay Formations of the geological series in England, in their successional order; mention some of their chief Fossils; and give particulars as to their local physical features and relative agricultural value.

8. Write a short geological account of *either* (1) the North and South Downs; (2) Snowdon; (3) Portland; *or* (4) the Isle of Wight. Give illustrative diagrams.

9. Describe (with diagrams) the geological structure and physical features of one of the large Counties in the British Islands; and give some notes on its economic products.

10. State what you know of the natural history and geological range of any *six* of the following Fossils:—Terebratula, Nummulite, Orthoceras, Trilobite, Palæoniscus, Calamite, Ichthyosaurus, Mastodon, Globigerina, Echinus, Cyathophyllum, Graptolite.

11. Construct a Table of the Tertiary Formations of England; indicate some of their chief Fossils, and their Localities. Add some remarks on their agricultural or other products.

12. Name and describe *four* of the Specimens on the Table.

EXAMINATION IN ANATOMY AND ANIMAL PHYSIOLOGY.

MAXIMUM NUMBER OF MARKS, 100. PASS NUMBER, 50.

Saturday, May 13th, from 2 p.m. till 4 p.m.

1. Given that the Horns of the Ox are attached to bony bases which are cavernous, name the cavities existing in the bones of the head with which this structure has a direct communication.

2. Give an example of a Ball and Socket Joint, and also of a Hinge Joint; say also what covers the ends of bones forming such joints in common with others, and what prevents friction in their several movements.

3. Name the several coats of the Stomach and Intestines—in the Horse as an example—their relative position and their respective functions.

4. Describe the situation and general structure of the Larynx. Name its chief functions. Say also in what structures the several divisions of the Trachea end, and the important functions which such terminations perform.

5. Given that the Heart is the central organ of the circulation, name the vessels by which it receives blood for the maintenance of its own vitality.

6. Suppose a small portion of an Artery and a Vein were lying on a table, how would you recognise the one from the other?

7. In cows two veins, commonly called the Milk Veins, are distinctly visible, one on each side of the abdomen; name the chief vessel by which the blood is conveyed from them and other contiguous veins to the heart.

8. Describe the position and usual number of the Mammary Glands in each animal of the farm, and name the vessels which are distributed to them for the secretion of milk.

9. Given that the Milk of an animal which is secreted at the time of parturition differs both in its colour and consistence from ordinary milk, say on what these conditions depend, and what advantage arises therefrom.

10. In making a section of a Kidney—of the horse or sheep as an example—one part is found to be of a lighter colour than the other; name their relative position and describe the cause of the difference.

EXAMINATION IN AGRICULTURAL ENTOMOLOGY.

MAXIMUM NUMBER OF MARKS, 100. PASS NUMBER, 50.

Friday, May 12th, from 4 p.m. till 5 p.m.

Candidates will not be required to answer more than FIVE *of the questions on this paper. The replies are to be as short as possible, and where the candidate is not acquainted with the scientific name of an insect, the generally received English name will be accepted.*

1. Mention any characteristics by which you would judge a grub to be the larva of

a. a beetle	*c.* a moth
b. a sawfly	*d.* a two-winged fly

2. What peculiarities of structure would make you recognise any insect as a *beetle*? Give an account of any beetle injurious to turnips.

3. What do you know of the so-called "Flax seeds" in wheat?

4. It is intended to break up some pasture land for cultivation. What insect pest may be expected, and what methods of prevention do you recommend?

5. What do you know about the wheat bulb fly (*Hylemyia coarctata*)? Describe the nature and appearance of its attack.

6. Give an account of the life of the Warble-fly (*Hypoderma bovis*). How would you treat warbled cattle?

7. Show, by examples, that the study of the life and habits of insect pests frequently affords a clue to their successful treatment.

8. Give an account of any insect attack to which *beans* are subject, indicating the measures of prevention and remedy.

Notes, Communications, and Reviews.

CO-OPERATIVE DAIRIES IN DENMARK.

In an official report[1] to the French Government, upon the above subject, Dr. Louïse observes at the outset that butter-making has acquired considerable importance in Denmark, and now constitutes one of the principal resources of that country. The farmers, better instructed than formerly, obtain more milk, and that of superior quality; whilst new processes have replaced the old-fashioned procedure in use at the farmhouses. It is true that these processes require complicated means and a special installation, but they are based on scientific principles, and they assure a better and more regular manufacture. Such are, without doubt, the causes of the present prosperity of the industry.

The progress effected in this direction in Denmark is due to the persevering researches of scientific men such as Fjord, Segelke, Storck, and Böggild. Not content with their own important investigations, they have studied with scrupulous care the works of others, notably those of French *savants*. The admirable discoveries of Pasteur are familiar to them, and are appreciated at their full value, as are also the patient and remarkable investigations of Duclaux, not to speak of others. Having thus assimilated all known ideas on the subject, they have carefully worked out their application with the sole object of the methodical manufacture of butter. Their processes serve as models to the French butter factories, and many deputations have been sent by the French Minister of Agriculture to study the Danish processes on the spot, with much advantage to the French dairy industry. A complete report on the modern methods in use for butter and cheese making was given in the *Bulletin du Ministère de l'Agriculture*, 1884, p. 487, from the pen of M. Lézé, Professor at the Government Agricultural School of Grignon.

The report now under notice details more briefly the manufacture of butter only, and gives special prominence to the newly-introduced application of science known as *pasteurising the cream*. It

[1] *Organisation et Fonctionnement des Laiteries coopératives au Danemark.* Par le Dr. E. Louïse, Directeur de la Station Agronomique de Caen. Bulletin du Ministère de l'Agriculture. Douzième Année, No. 1. Paris: Imprimerie Nationale. 1893.

deals as much with the details of organisation, and with the economics of the Danish co-operative dairies, as with the purely scientific side of the processes employed, and hence will be found at least as interesting to practical dairymen as to the scientific reader.

History of Butter-making in Denmark.

The co-operative dairies of the present day are factories intended for the exclusive manufacture of butter, organised and administered by combinations of the dairy farmers of each district. These build and equip the factory by means of a loan redeemable in a certain number of years. At the same time they engage to furnish the milk necessary to the working of the factory. Each farmer receives every month a sum proportional to the quantity and quality of the milk which he brings, but less than the whole value of this milk. He engages, moreover, to take back the separated milk and the buttermilk from his own contribution of milk. The money received for this, added to the profit obtained from the milk, suffices to meet the general expenses, to contribute towards extinguishing the debt, and often to permit of a dividend amongst the members. After some years, the debt being extinguished, the factory belongs to the members of the company, and the dividends are naturally much augmented. These co-operative concerns seem particularly adapted to Denmark, where holdings are much divided and stock is consequently distributed amongst a great number of owners.

It is, however, only after a series of successive trials that this mode of dealing with milk, which seems the most perfect and successful of all, has been arrived at. Before the advent of co-operative dairies, as above constituted, three principal systems were in use having for their object the collection of Danish butter for the export trade. These were known as Smörpakkerier (butter factories), Mœlkerier (creameries), and Fœllesmœlkerier (whole-milk or dairy factories).

The *Smörpakkerier*, or butter factories, were the first which attempted to do a wholesale butter trade. Travellers attended the fairs and markets, buying on account of the factory the butter brought by a multitude of small farmers. These parcels, of very different origin and quality, were more or less assorted, then mixed and freshened by washing with water and fresh buttermilk. Large lots of butter of homogeneous composition were thus obtained, which after being salted were dispatched to the English market. This mode of working was full of defects, which those interested were not slow to perceive. In the first place it was not economical. The farmers lost time and money in bringing their butter to the market. There were numerous intermediate profits between them and the consumer. The factory proprietor had to allow for money sunk in plant, wear and tear, inevitable loss of material, &c. The sum received by the producer was in consequence small, inferior to the value of his merchandise, and always out of proportion to that paid by the consumer.

Besides this the quality and freshness of the products obtained in these establishments necessarily left much to be desired, and in the mixture of so many different butters the mediocre samples were the most numerous. The farmers who furnished them were permeated with ancient errors, and were quite ignorant of the improvements in the dairy industry which have followed scientific ideas as to the composition of milk. And, even if these were known, it would not have been possible for a single producer to erect plant much too expensive for the extent of his production.

Let us add that as most of these farmers possessed only a small number of cows, they were obliged to preserve the cream several days before getting enough for a churning. This product was then exposed to the numerous alterations which are inevitable in small dairies, and as in any case it could not be of recent preparation, the butter made from it was inferior and variable in quality.

The *Mœlkerier*, or creameries, succeeded to the butter factories. The establishment was situated in the centre of the milk-producing district, and two or three times a week the cream was carried there and immediately churned. It will be easily understood that this system, although much superior to the previous one, nevertheless eliminated only a portion of its drawbacks.

It is true that the farmers gained time, not having to make butter and carry it to markets, perhaps at a distance. They found themselves, moreover, in direct communication with the manufacturers, thus doing away with some intermediate profits.

But, as apparatus for testing the quality of the cream was not in existence, it was difficult to control the value of each delivery. The sale of this product gave rise to inevitable errors, and the vendor was often victimised by receiving insufficient payment.

The mixture of cream of different ages, amongst which much was stale and badly made and kept, constituted a material of uncertain quality, which could not yield butter of the first rank.

These creameries were, however, prosperous enough, especially in Sweden, about 1877–78. As the requirements of the English market increased, this system ceased to be workable at a profit ; and as, on the other hand, it was not very beneficial to the farmer, it was sought to create establishments which should deal with the whole milk instead of the cream only.

Thus arose the *Fœllesmœlkerier*, whole-milk or dairy factories, which, like the preceding, belonged to a single proprietor, who took all the risks of the enterprise. They were founded directly the Centrifugal separator became a workable machine, and nearly all of them were furnished with these separators, despite the numerous apprehensions with which they were still regarded by the public.

The milk, bought directly from the farmer, was treated with a view to obtain butter as the principal product. Some factories, however, made skim cheese as well, but most of them utilised the skim-milk and buttermilk for raising calves and for pig-feeding.

The creation of these dairies marked a substantial progress in the butter industry of the northern countries. The manufacture of

this product soon became a rational industrial process, the farmer furnishing only the raw material. The export of butter became more considerable and the sale in foreign markets more certain. Nevertheless, the first hopes were soon falsified, and the new establishments succumbed in great numbers ; but this want of success should be attributed less to the system itself than to the defective conditions under which it was tried. The makers, still without experience, often also with insufficient capital, set up their factories in places ill adapted to the purpose, and many factories were notably lacking in the necessary number of Centrifugal machines to obtain a rapid enough separation. Again, there still being no means of controlling the quality of the milk, farmers strove above all for quantity, and fed their cows with that object, employing without scruple foods which diminished the value of the milk, and also watering or partially skimming it. Not being interested in the profits, on the contrary jealous of those which they supposed were realised by the manufacturer, they took no pains to secure the good keeping of their milk, which often underwent alteration from being kept in unsuitable vessels. The manufacturer dared not risk any criticism for fear of sending the farmer to a rival, and thus driving from his factory the material necessary for its working.

Another difficulty consisted in the necessity of utilising the bye-products—the separated milk and buttermilk. Cheese-making and pig-rearing required costly buildings and plant, and the cheeses and pigs had often to be sold in an unfavourable market ; for the manufacturer, having little security to offer, could obtain little credit, and frequently had to sacrifice to-morrow's profit in order to meet to-day's engagement. It is well to recognise that these diverse causes of failure are nearly all independent of the system itself. A steam dairy belonging to a single owner ought to be quite capable of competing with the co-operative dairies. It would suffice to have plant similar to what the latter possess, and to be furnished with control apparatus allowing of the purchase of milk from the producers according to its quality ; finally to oblige the latter by contract to take back the skim-milk and buttermilk, and thus relieve the proprietor from the exigencies of pig-feeding and cheese-making. A certain number of dairies established on this principle are in existence, and apparently are doing well. Nevertheless, the producer would always distrust the exactitude of the control apparatus, and, as this can only give an approximate result, when it is below the truth he suffers an irreparable loss. Under the co-operative system, on the contrary, the producer recovers in the annual dividends compensation for this temporary loss. Moreover, this loss itself is distributed equally amongst the producers, who are the only shareholders ; for if the apparatus does not indicate exactly the quantity of cream contained in a sample of milk, it does indicate without any error the proportionate richness in cream of the different samples tested at the same time.

Let us add in conclusion that if farmers are indifferent or hostile to the prosperity of an enterprise from which their interests are

excluded, they will attach themselves quickly to one which assures them an immediate, though it may be smaller, profit, and promises them in the long run not only dividends but the rights of proprietorship.

Co-operative Dairies.

The wholesale dairies under single ownership, although not generally successful, yet served the purpose of familiarising people with the use of dairy machinery, and especially of Centrifugal separators. These machines excited much mistrust at the beginning, and, like all new inventions, undoubtedly required the improvements always brought about by time and use. The drawbacks and failures incident to insufficient experience were at first set down to the machines themselves. The alteration undergone by the separated milk, now avoided by the system of *pasteurisation*, were attributed to the system of separation. Some physicians had declared that this milk contained insufficient nourishment, and was even injurious to infants and young animals. This opinion, which rapidly obtained credence, although supported by no precise experiments, was combated by Professors Fjord and Panum, who demonstrated that the slight inferiority in butter fat as compared with ordinary skim-milk was well compensated by the superior freshness and purity of the separated milk. There is, in fact, formed on the walls of the separating vessel in the Centrifugal system a semi-solid layer, which retains not only the accidental impurities accumulated by the milk, but also a great number of injurious organisms. As to the alimentary value of separated milk, it was clearly proved by numerous analyses to afford excellent and economical nourishment. In 1882 the last apprehensions had disappeared, and Centrifugal machines were generally employed in butter-making. Then it was that the first co-operative dairies were founded. Those who organised them profited by the previous experience to avoid the defects of the former systems. The main principle of the new concerns—that of giving satisfaction to all by an equitable division of profits—went far to assure success.

The co-operative dairies sprang up as it were spontaneously, appearing at the outset in the west of Jutland, where the inhabitants, gifted with much business aptitude, were the first to recognise the weak points of the private steam dairies. Founded exclusively by small milk producers, the new dairies soon attracted the large farmers, who saw in them a means of reducing their general expenses, and their example influenced those who still hesitated. The milk being paid for according to quality, each cowkeeper endeavoured to improve the feeding and housing of his cattle.

The prosperity of the first factories had the effect of encouraging the rise of others : they now number 1,500, a large figure, having regard to the small population and extent of Denmark.[1] The number of cows supplying each factory varies from 200 to 1,500, 700 to 1,000 being the most frequent. Some of the shareholders

[1] Area of Denmark, 14,789 square miles; population (in 1890), 2,172,205.

possess many cows, some only two or even one. A few dairies make cheese as well as butter, but this is exceptional. Generally, it is a fundamental rule that the separated milk and buttermilk shall be taken back by the producers. Thus the factory is not encumbered by products for which the sale is at times difficult, whilst the ordinary course of farming is not disturbed, the skim-milk being available for raising stock.

In the following description of the process of manufacture and method of organisation, the Kildewœld Dairy at Pibbe-Möll is taken as a type. It is one of the best, and the differences between the various establishments are slight.

Reception of the Milk.—The factory is situate almost in the centre of the farms of its shareholders, the farthest being three-quarters of a league away. Wells and a stream of good water are close at hand. Milk carts belonging to the factory collect every morning the morning's and the previous evening's milk in tinned iron churns at the different farmhouses, and deliver it at the factory by six o'clock. The milk is discharged and immediately weighed. On a day fixed by the manager samples are taken to determine the cream. Each empty churn is then ticketed with a label on which is entered the shareholder's name, the date, the weight of milk delivered, the weight of separated milk and buttermilk to be taken back, and the weight of butter furnished by the factory for the shareholder's consumption at his own demand. The contents of the tickets are posted in small books kept at the factory, one for each shareholder.

Separation of Cream.—The churns of milk are emptied into a large tank placed high enough for the milk to flow over the refrigerators, where it is cooled to 77–82° F. before entering the Centrifugal machines. These are of the Burmeister and Wain type. The cream is received in special vessels, and the separated milk is delivered by vertical tubes from all the centrifugals into one shute, which conveys it to the *pasteurising* apparatus, situated near the exit of the factory. It is heated in this apparatus to 158–167° F., which sterilises it sufficiently to allow of its being kept for some time without change, and deprives it of microbes which affect its alimentary value. The proper quantity of this "pasteurised" milk is then weighed into each churn and returned to the shareholders by the carts the same evening.

Cream.—The cream, which issues from the separators at a temperature of 77° F., is cooled down to 39–42° by plunging the deep buckets containing it in ice water, or in some cases by placing fragments of ice in it. The latter process is not recommended, especially when the origin of the ice is doubtful.

The churning is delayed for about twenty hours in order that the cream may undergo the "ripening" or slight acidification which has considerable influence on the quality of the butter. This ripening is usually brought about by keeping the cream at a temperature of 60–65° F. (heating or cooling it for this purpose according to the season) and adding a little good buttermilk. In some factories

5 per cent. of this is used, and the ripening takes twenty-four hours; in others double the quantity of buttermilk is employed, when the ripening takes only twelve hours. As soon as this is accomplished the cream must be placed in ice, if it cannot be churned immediately.

Pasteurising the Cream.—The method just described generally gives good results, but there is always in butter-making the risk that either the cream or the buttermilk used in ripening it may have been invaded by some injurious organism. As regards the latter this is guarded against by the partial sterilising it receives on leaving the separators. But the cream, which is produced from the unsterilised milk of many small homesteads, may have contracted from one or other of the lots of which it is composed an inoculation which may easily spoil the entire mass of butter. To avoid this danger certain dairies have adopted the plan of *pasteurising* the cream. This is done in Fjord's apparatus, identical with that used for pasteurising the separated milk, and the same temperature is employed (158–167° F.). The cream is then immediately cooled, and it is found that the butter fat acquires the proper consistence, whilst the peculiar flavour of "melted butter" is avoided. The objection to this process is the extra cost of the necessary plant, and the fact that the flavour and keeping properties of the butter are not any better than when pasteurising is omitted. Makers, therefore, who provide themselves with this apparatus can reserve its use for those occasions when, owing to the inferior flavour or quality of the butter produced, one or more samples of milk are suspected of contamination and cannot be identified.

The buttermilk used to start the ripening process might with advantage be replaced by a pure cultivation of the appropriate ferment. The researches which have been made in Hansen's laboratory with this object are nearly concluded, and soon there will be in the market a *ripening ferment*, equal in the certainty of its effects to the rennet essence prepared in the same laboratory. The acidification of cream appears to be of greater importance in the northern countries than in France, where the taste is for butter as sweet and mild in flavour as possible, and the practice is to churn the cream *very* slightly if at all acid, and to wash the butter repeatedly to get rid of the buttermilk as far as possible. In Denmark, on the contrary, the butter is washed but slightly, and is subject to rapid alteration if the buttermilk with which it is impregnated is not good.

Churning.—This is done every morning, at a temperature of 52–57° F., which is found to be the most suitable for rapid granulation. The butter is then placed on strainers, drained, and worked with the hand or with fluted rollers. It is next placed for one or two hours in cooling vessels, to gain consistence, when it is reworked, resalted, and packed in firkins.

Export Trade.—The co-operative dairies having stimulated the efforts of the producers to obtain milk of better quality and richer in butter fat, the result has been a gradual improvement in both quantity and quality of butter produced. And as the system

permits of the manufacture of butter in large quantity and *of uniform brand or quality*—a great desideratum in the English market—it has resulted in Denmark taking the first place as an exporter of butter to England. From a table giving the imports of butter into England for the six years 1886–91, we gather that Denmark in that time more than doubled her contribution, which in 1891 stood at 397,449 quintals,[1] France coming next with 242,765; Sweden, 106,590; Holland, 66,470; Germany, 52,395; United States, 28,891; Canada, 20,985; and all other countries, 53,164.

Division of Profits.—The payments received by each shareholder are of two kinds: weekly payments, exactly proportioned to the quantity and quality of milk supplied; and yearly payments, resulting from the general profit made by the company during the period. These are made proportional to the quantity of milk furnished by each shareholder without question as to its quality.

Valuing the Cream sent in.—The weight of milk is ascertained daily on arrival. Its richness in cream is determined weekly by Fjord's control apparatus, and the price for the week is fixed by Fjord's tables on this basis. Fjord's apparatus is the one almost always used in Denmark, and although it is not strictly a *butyrometer*, that is, it does not give accurately the percentage of butter fat in the samples of milk, yet it does indicate with sufficient exactness the minimum proportion of cream that should be obtained by the separator: thus a milk marking 8 per cent. should actually yield 8 per cent. of cream at least. As all the samples are tested under identical conditions the control is equally fair to all subscribers, and any deficiency due to it is recovered in the annual distribution of profits. The price paid per pound of milk is fixed by three factors:—

1. The richness in cream as ascertained by Fjord's apparatus.
2. The "official price" of butter fixed weekly by the Copenhagen market.
3. The number of pounds of milk of average quality (say 28) assumed to give 1 lb. of butter. This figure is fixed by the bye-laws of the company, and is always considerably above the truth, in order that the full value of the cream may not be paid for on delivery, a margin being required to meet the working expenses of the coucern.

The tables referred to are furnished with a movable column on the principle of the slide rule. By placing the mean percentage of cream in this column opposite the figure (*e.g.* 28) representing the assumed number of pounds of average milk required to make 1 lb. of butter, the manager reads off at once, in one or other of the columns representing the different official market prices of butter, the price to be paid per 4 lb. of milk opposite to each ascertained percentage of cream in the samples. For example, the factor 28 being used, and the official price of butter being 100 öres[2] per pound

[1] The quintal being so nearly 2 cwt. (only 3·3 lb. short), there is no necessity for converting these into English weights.

[2] 100 Öres Danish = 1*s.* 1¼*d.* English.

Danish, and the mean percentage of cream 6·4, then a sample testing 5 per cent. cream would be paid for at $11\frac{1}{2}$ öres per 4 Danish pounds, and one testing 8 per cent. cream at $17\frac{1}{2}$ öres.

The "official price" of butter is fixed weekly by the Associated Wholesale Butter Dealers of Copenhagen, and serves also to define the annual contracts entered into between the dairies and the butter merchants, the price being specified as the official price *plus* a small addition, say 5 öres per lb. The price of butter shipped to England on quay at Copenhagen will be the "official price" *plus* this 5 öres, and *plus* also a dealer's profit, generally 2 to 3 öres per pound Danish.

The report proceeds to quote at length the articles of association and bye-laws of the Kildewœld Dairy, as adopted in general meeting in May 1888. The most instructive points are the following :—

Under the *Objects of the Company* are recited the already mentioned provisions that the business is to be the buying of milk from members for separation of cream by Centrifugal machines, and the churning of butter to be sold at a profit for the general benefit ; also that the separated milk and skim-milk are to be returned and deducted from the value of the milk supplied at fixed rates.

Membership and Voting.—To become a member a person must (1) possess milch cows ; (2) be elected by a two-thirds vote in general meeting ; (3) pay an entrance fee of five crowns[1] per head of cows (the founders pay one crown per head of cattle). Members possessing one to ten cows have one vote ; eleven to twenty cows, two votes ; twenty-one to forty cows, three votes ; above forty cows, four votes.

Administration.—This is confided to a board of five members, chosen in general meeting, the board electing its chairman, secretary, and treasurer from its own members. These offices cannot be united ; no secretary can refuse to act on the board. One member of the board retires each year, at first by lot, afterwards in rotation ; the retiring members are eligible for re-election.

The members of the board render their services gratuitously, but they may engage a clerk or accountant at a maximum salary reckoned at 40 öres per cow per annum (about 25*l.* per 1,000 cows), payable, like the other administration expenses, out of the company's treasury. The board acts for the company toward its own members and to third parties in all matters. No fresh member can join without the signature of all five directors.

General Meeting.—This takes place in February each year; and has full powers. It decides all questions between the company and its members, and between members themselves on company business. The board presents the accounts for the preceding year made up to January 1, and the programme for the current year. The meeting elects a director in place of the retiring one, and appoints a valuer and an auditor, whose services are gratuitous. The auditors first chosen are two, appointed for two years, and one (first by lot, afterwards by rota) retires each year.

[1] 10 crowns Danish = 11*s.* $0\frac{1}{4}$*d.* English.

Either the board or one-third of the members can convene an extraordinary general meeting.

Notices of meeting and agenda papers must be sent round by the company's carts at least ten days in advance. Votes on questions not on the agenda must be adjourned to the next meeting. Modifications of the statutory laws of the company, or proposals for dissolution, require a majority of two-thirds of the members present, other questions a simple majority.

Joint Capital.—The board may raise, at not over 4 per cent., a loan sufficient to erect and instal the dairy. Each member becomes security for a part of this loan, proportional to the number of cows he possesses. A member giving up or transferring his cow-keeping must withdraw from the company, but may nominate his successor. Except in this way membership cannot be terminated at will until the joint debt is extinguished, and then three months' notice must be given. A member withdrawing for any reason forfeits half his share in the profits, reckoned to the date of withdrawal. A member expelled by general meeting loses all rights.

Staff.—A manager appointed by the board has charge of the factory, its books and keys, excepting the key of the safe and the minute-book. He engages, pays and boards his employés, one of whom must understand butter-making, and another looks after the machinery. The manager gets lodging, fire, lights, and dairy products for his own consumption, and a small fixed salary. In addition, at the end of the year he receives a premium on the butter sold at a profit, made up thus: one-sixth of the net profit and one-fifth of the excess of the sale price of the butter over the "official market price."

Purchase of Milk and Resale of Residuals.—The milk is bought as explained above. The skim-milk and buttermilk are repurchased by the members at 1 öre per lb. Danish (about $1\frac{1}{4}d.$ per gallon) until the joint loan is redeemed, after which a general meeting reconsiders the terms.

Division of Profits.—The annual surplus is applied to the extinction of the debt, and if necessary to the distribution of dividends. When the debt is extinguished the chairman, with the assistance of the valuer and manager, makes an inventory and valuation of the company's property. The capital sum thus found is credited to each member in proportion to the quantity of milk delivered by him since the foundation of the company, and he receives interest at the rate of 5 per cent. on this capital, in addition to any dividends that may be declared on his annual contributions of milk.

Collection of Milk.—The company undertakes the collection of milk and delivery of separated milk, and provides vessels and carts for the purpose. Quantities of over 100 lb. are collected at the homesteads; quantities under this may be carried by the producer to the collecting cart on its rounds. The drivers give notice the day before of the hour at which they will call.

The milk is strained at the homesteads, and the strainers must be kept scrupulously clean. It is prohibited to send milk from

diseased cows, or from cows which have calved within four days. The manager examines each sample on arrival. If the vessels are not clean, or if the milk is sour, he warns the member in writing ; should this happen again he refuses the milk. On a second repetition he fines the member two crowns (about 2*s.* 3*d.*) per cow. Members may not sell milk to other dairies, nor make butter or cheese for sale ; they may keep enough milk for their own use and for the supply of neighbours without cows, provided this is not done to the prejudice of the company. They buy butter for use from the company at the middle price of the day.

Food of Cows.—The members may feed their cows as they please, provided the milk and butter do not contract injurious appearance, flavour, or smell. Cabbages, swedes, and kohl-rabi are forbidden. Members using foods of doubtful effect such as potatoes, rye, vetches, sunflower or arachida cakes, &c., should advise the manager, so that his attention may be called to the milk on arrival ; if he considers the butter injured thereby he warns the member in writing, and if the injury continues he refuses the milk. The chairman and manager may always interdict the use of undesirable fodder. For breaches of these rules of feeding fines from 2 to 10 crowns per cow, without prejudice to reparation of damage, may be inflicted. Foods may be purchased in quantity by the board or its nominees, and distributed to the members. They may also inspect and advise on laying down and improving pastures, and may purchase desirable seeds and seeds of forage plants suitable for cultivation. In order to give the butter an aroma each member is advised to provide himself with enough rape cake to furnish each cow 1 lb. per day during the winter.

A director or the manager may visit the byres and dairies at any time, and must be supplied with all information as to the food and treatment of the cows ; and fines of 2 to 10 crowns per cow may be imposed for concealing or withholding information to the damage of the company.

Contagious Diseases.—The pasteurisation of the separated milk before returning it avoids one cause of these. Any member on whose farm an outbreak occurs must declare it, and must cease sending milk until the farm is free from infection. Should a communicable disease manifest itself at the dairy the manager must remove the sick person and proceed to a thorough disinfection. Contravention of these regulations may entail a fine of 100 crowns.

Surveillance.—The board exercises supervision over the manager and all the arrangements of the dairy. A special inspection is made as summer approaches so as to see that everything is in order and properly kept. The chairman, valuer, and manager take stock yearly for the information of the general meeting. Cash in hand is at the disposal of the board. Members' books are balanced and accounts paid monthly.

The criticisms offered by Dr. Louïse on these statutory laws are that those relating to pastures and cow-feeding would better take the form of bye-laws, modifiable by the board subject to the control

of the general meeting; that in France it would be difficult to appoint officers whose services are at once gratuitous and obligatory; and that it seems unfair, if not illegal, to confiscate profits accruing to a member expelled by vote. Subject to these reservations the organisation is one which may be recommended for general adoption.

An analysis of the accounts of this Kildewœld Dairy for the years 1888–91 is given in the report, from which we select and render into English equivalents[1] the items necessary to show the working of the company for the year ending October 31, 1891. The factory was equipped by a loan of 1,792*l.* at 4 per cent., redeemable in sixteen years. Four Burmeister and Wain centrifugals are used.

Number of shareholders	163
Milk dealt with in the year	621,708 gallons
Average number of cows	1,240
Annual yield of milk per cow	501 gallons
Daily yield of butter	653½ lb.

For each 1,000 lb. of milk treated there was—

	Expended		Received	
			s.	*d.*
From sale of 37·42 lb. of butter			37	4
Receipts from other sources			9	9½
			47	1½
	s.	*d.*		
Carriage	1	5		
Fuel	0	7		
Salaries	0	10		
Barrels	0	7¼		
Interest and accounts	0	7½		
Repairs	0	2½		
	4	3¼	4	3¼
Difference paid to the shareholders			42	10¼
To find the return from the milk to the shareholder we must add to this the sum credited to sinking fund of loan			0	4
And the profit he makes by reselling 920 lb. of separated milk and buttermilk, bought from the dairy at 1¼*d.* per gallon and resold at 2½*d.*			9	3¼
Return from 1,000 lb. milk			52	5½

Each cow produces therefore about 13*l.* 11*s.* 0*d.* annually.

By a comparative table showing the returns of nine whole-milk

[1] The Danish lb. has been taken as $\frac{500}{454}$ English lb., the Danish crown (100 öres) as 1.4 francs, and the franc at 25 to the £.

dairies in private ownership the reporter finds that under this system the return per 1,000 lb. milk varies between 34*s.* 3*d.* and 40*s.* 0*d.*, and is thus notably inferior to that obtained under the co-operative dairy system.

J. M. H. Munro.

SALE AND DELIVERY OF CORN.

As the bulk of the corn that is sold by English farmers is, I suppose, sold at market by sample, a note of the case of Perkins *v.* Bell [1] which relates to barley sold in that way may, I think, be instructive. The case was originally tried before Mr. Justice Lawrance at the Leicester Assizes, but was subsequently decided by the Court of Appeal. The facts were few and simple, and (except perhaps the accidental mixing of the less valuable barley with the more valuable) were such as are not unlikely to happen on a sale of corn by a farmer on any market day.

The plaintiff, Mr. Perkins, was a farmer. The defendant, Mr. Bell, was a corndealer, who had a stand in Leicester Market. At that market the plaintiff, on October 4, 1890, sold by sample thirty-one quarters of barley to the defendant at 34*s.* a quarter, to be delivered in sacks at Theddingworth Station, which is a roadside railway station about two and a half miles from the plaintiff's farm. On the same day the defendant resold the barley by the same sample to some brewers at Sileby at an advance of 2*s.* per quarter. On October 7 the plaintiff sold to the defendant in Market Harborough Market three more quarters of barley, of not such good quality as the first, and it was arranged that the plaintiff should send to the defendant a sample of this barley, that the price of it should be afterwards agreed upon, and that it should be delivered at Theddingworth Station in sacks in the same way as the larger quantity was to be delivered. When the plaintiff reached home from Market Harborough Market on October 7 he found that his men, whilst winnowing the three quarters, had, contrary to his orders, mixed them with the thirty-one quarters, and he at once wrote to the defendant to tell him what had happened, adding that, if the defendant complained that it would make any difference to him in the sample, he (the plaintiff) would make it good, but he hoped it would not. Upon the receipt of this letter on October 8 the defendant wrote to the station master at Theddingworth Station to forward him a sample of about thirty-five quarters of barley delivered by Mr. Perkins. This the station master did, taking the sample out of twenty of the thirty-four quarters which had then arrived at his station. The rest arrived there the next day. The station master, as both parties admitted, took a fair sample. Having inspected this sample, the defendant

[1] Reported in the *Law Reports* for 1893, 1 Queen's Bench, p. 193.

on the next day, October 9, ordered the station master to forward all the barley to the order of the brewers at Sileby, and stated that the cost of the carriage was to be placed to his account. The station master accordingly sent off the barley to the brewers on October 10. On October 16, the barley having arrived at Sileby, the brewers, by telegram to the defendant, rejected it as not being up to sample. In reply to their telegram the defendant wrote acknowledging its receipt and saying, "I can only say we had a bulk sample from sending station before moving on, and consider it a fair delivery." Crossing this letter came one from the brewers to the defendant in which they wrote, "It seems strange that you did not take a bulk sample of the barley yourself before ordering it on to Sileby. We feel sure that if you had done so you would not have sent it, as it is quite unfit for brewing of ale." The brewers having thus rejected the barley from the defendant, the defendant subsequently rejected it from the plaintiff (the farmer), and the latter brought his action against the defendant for the price of the barley. Mr. Justice Lawrance gave judgment for the defendant, being of opinion that the defendant had never accepted the barley, and the plaintiff appealed from that judgment.

The decision of the Court of Appeal was delivered by Lord Justice A. L. Smith, who in the course of the judgment is reported to have said as follows :—

"It will be noticed that by the contract the plaintiff was to deliver the barley at Theddingworth Station. No other destination was known to him, and we cannot doubt that if this had been a sale of specific ascertained barley the property therein would have passed to the defendant upon its delivery to the railway company at the station by the plaintiff. The railway company would thereupon have become the agents of the defendant to receive it, and to carry it to any place or places the defendant might direct. But it was said by counsel for the defendant that, inasmuch as this was a sale by sample, the defendant was entitled to a fair opportunity of comparing the bulk with the sale sample after delivery before the property in the barley passed to him, and that the place for inspection need not necessarily be the place at which delivery is to be made, and in this we agree. The question, however, is if there can be read into this contract an implied term that the inspection was to be had at any place fixed by the vendee without the knowledge of the vendor. This is not a case in which, before a sale by sample, it is agreed that the destination of the goods shall be the vendee's premises or some other named locality, and that the transit thereto shall be performed partly by the vendor and partly by the vendee. In such a case it would be right to imply that the place of destination agreed upon was the place for inspection, and that the joint transit was only an agreed mode of getting the goods there. This is a case in which at the time of sale the only known destination was Theddingworth Station, at which the vendor undertook to deliver the barley at his own risk and expense. Of all that should take place afterwards as regards the barley the vendor knew nothing. It was entirely at the disposal of

the vendee, who might send it where and to whom he pleased, and when he pleased, and over which disposition the seller could exercise no control. We find no evidence in this case to dislodge the presumption which *primâ facie* arises, that the place of delivery is the place for inspection. To hold otherwise would be to expose the vendor to unknown risks, impossible of calculation, when the contract was entered into. It was argued that Theddingworth Station was a mere roadside station, and that there was no opportunity there of comparing the bulk with the sample, and that consequently the station was not the place for inspection, and that some other place was, and that this was the warehouse of the brewers to whom the defendant might have chanced to have sent the barley. The evidence given shows that the bulk could be inspected in the sacks in the trucks at the station. The suggestion that the barley had to be shot before inspection is untenable, and there is no evidence to support it. Moreover, the letters of October 16 show that neither the defendant nor the brewers considered that there was any difficulty whatever in taking a bulk sample at the station—the one saying that he had had one taken, and the other saying that he should have done so. It seems to us that there is nothing in the contract itself, nor any evidence to show that by usage of trade as applied to such a contract or otherwise the *primâ facie* place for inspection had been altered. In our judgment, under the contract the place of delivery named was the place where the inspection was to be had, and consequently Theddingworth Station was the place where rejection should have taken place, and not the premises of the brewers at Sileby. When the defendant took possession of the barley at the station and ordered it to be sent to his sub-vendees the property in the barley passed to him, and his right of rejection was then gone."

Thus the farmer was successful in his appeal, and the corn-dealer had to pay him for the barley.

S. B. L. Druce.

PRICES OF COMMODITIES DURING THE LAST SEVEN YEARS (1886–92).

On April 18, 1893, I had the honour of reading a paper on the above subject before the Royal Statistical Society, and I now beg to offer the following extracts relating to those sections of the subject which are of interest to agriculturists. Readers who may desire further details are referred to the *Journal of the Royal Statistical Society*, where the original paper will be published in full.

In Tables I. and II. will be found average prices of agricultural produce during the last fifteen years, and the index numbers since 1846 of the groups of articles, vegetable food, animal food, and materials, and of the grand total of all commodities, also of silver and of the

TABLE 1.—*Average Prices of Commodities.*[1]

Year	Silver[2]	Wheat		Flour	Barley	Oats	Maize	Potatoes[1]	Rice	Vegetable food.	Beef[3]		Mutton[3]		Pork[3]	Bacon	Butter	Animal food.	Wool			Year
		English Gazette	American	Town made white	English Gazette	English Gazette	American mixed	Good English	Rangoon cargoes to arrive	Total	Prime	Middling	Prime	Middling	Large and small, average	Waterford	Friesland, fine to finest	Total	Merino, Port Phillip average fleece	Merino, Adelaide, average grease	English, Lincoln half hogs	
	per oz.	per qr.	per qr.	per 280 lb.	per qr.	per qr.	per qr.	per ton	per cwt.		per 8 lb.	per 8 lb.	per 8 lb.	per 8 lb.	per 8 lb.	per cwt.	per cwt.		per lb.	per lb.	per lb.	
	d.	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.*	*s.* *d.*		*d.*	*d.*	*d.*	*d.*	*d.*	*s.*	*s.*		*d.*	*d.*	*d.*	
1878	52 9/16	46 5	48 0	38 0	40 2	24 4	25 0	155	10 0	—	61	49	68	55	50	74	122	—	20	9½	15	1878
1879	51¼	43 10	48 0	36 0	34 0	21 9	23 9	130	9 7	—	55	45	64	52	48	72	107	—	18¾	8½	12½	1879
1880	52¼	44 4	51 0	39 0	33 1	23 1	25 9	130	9 1	—	58	49	66	54	55	76	125	—	21½	10⅝	15½	1880
1881	51 11/16	45 4	52 0	40 0	31 11	21 9	27 9	85	8 4	—	56	48	69	57	54	76	123	—	10½	9¼	12⅝	1881
1882	51⅝	45 1	48 6	40 0	31 2	21 10	31 0	95	7 5	—	60	51	72	60	51	74	125	—	19¼	9	11¼	1882
1883	50 9/16	41 7	45 0	36 0	31 10	21 5	27 9	105	8 1	—	61	51	73	61	49	72	123	—	19	8½	10	1883
1884	50 11/16	35 8	36 6	31 0	30 8	20 3	25 3	75	7 8	—	58	49	64	53	48	70	120	—	18½	8⅛	10	1884
1885	48⅝	32 10	35 0	29 0	30 1	20 7	23 0	75	7 0	—	52	44	56	47	45	68	111	—	16½	6¾	9⅝	1885
1886	45⅜	31 0	35 0	28 0	26 7	19 0	21 0	80	6 7	—	49	40	62	50	45	67	100	—	15½	6⅝	10	1886
1887	44⅝	32 6	34 0	28 0	25 4	16 3	21 3	85	6 10	—	43	36	52	42	43	61	103	—	15¾	7	10⅝	1887
1888	42⅞	31 10	37 0	30 0	27 10	16 9	23 6	80	7 1	—	48	39	58	47	40	61	100	—	15¾	7	10⅜	1888
1889	42 11/16	29 9	35 0	29 0	25 10	17 9	20 0	80	7 3	—	47	39	63	50	43	66	102	—	17½	8¼	11	1889
1890	47 11/16	31 11	35 6	29 0	28 8	18 7	20 0	70	7 3	—	47	38	59	45	42	62	100	—	16	7½	11	1890
1891	45 1/16	37 0	40 0	33 0	28 2	20 0	28 0	92	7 11	—	47	40	53	42	39	63	106	—	14¾	6⅞	9¾	1891
1892	39 1/16	30 3	33 0	28 0	26 2	19 10	21 9	70	7 8	—	47	38	53	42	48	68	108	—	13	6	8¾	1892
Average 1883–92	45⅜	33 6	36 6	30 0	28 0	19 0	23 0	81	7 3	—	50	41½	59	48	44	66	107	—	16¼	7¼	10⅛	Average 1883–92
1878–87	50	40 0	43 6	34 6	31 6	21 0	25 0	102	8 0	—	55½	46	64½	53	49	71	116	—	18¾	8⅝	11¾	1878–87
1867–77	58¼	54 6	56 0	46 0	39 0	26 0	32 6	117	10 0	—	59	50	63	55	52	74	125	—	21¼	9⅞	13¾	1867–77
	Index Numbers (or Percentages) of Prices, the Average of 1867–77 being 100.																					
1878	86·4	85	86	83	103	94	77	132	100	760	104	98	108	100	96	100	98	704	93		76	1878
1879	84·2	80	86	78	87	84	73	111	96	695	93	90	102	95	92	97	86	655	88		63	1879
1880	85·9	81	91	85	85	89	79	111	91	712	98	98	105	98	106	103	100	708	103		77	1880
1881	85·0	83	93	87	82	84	85	73	83	670	95	96	109	104	104	103	98	709	92		63	1881
1882	84·9	83	87	87	80	84	95	81	74	671	102	102	114	109	98	100	100	725	92		57	1882
1883	83·1	76	80	78	82	82	85	90	81	654	104	102	116	111	94	97	98	722	89		51	1883
1884	83·3	65	65	65	79	78	78	64	77	571	98	98	102	96	92	95	96	677	85		51	1884
1885	79·9	60	62	63	77	79	71	64	70	546	88	88	89	85	87	92	89	618	73		50	1885
1886	74·6	57	62	61	68	73	65	69	66	521	83	80	98	91	87	91	80	610	70		51	1886
1887	73·3	60	61	61	65	63	65	73	68	516	73	72	83	76	83	82	82	551	72		54	1887
1888	70·4	58	66	65	71	64	72	69	71	536	81	78	92	85	77	82	80	575	72		53	1888
1889	70·2	55	63	63	66	69	61	69	72	518	80	78	100	91	83	89	82	603	82		56	1889
1890	78·4	59	63	63	73	72	61	60	72	523	80	76	94	82	81	84	80	577	76		56	1890
1891	74·1	68	71	72	72	77	86	79	79	604	80	80	84	76	75	85	85	565	70		49	1891
1892	65·4	56	59	61	67	76	67	60	77	523	80	76	84	76	92	92	86	586	61		44	1892

[1] The annual prices are the averages of twelve monthly or fifty-two weekly quotations; potatoes of eight monthly quotations, January to April and September to December.

[2] Index numbers of silver as compared with 60·84*d.* per ounce, being the parity between gold and silver at 1 : 15½.

[3] Meat by the carcass in the London Meat Market.

English wheat harvest. The eleven years 1867–77 have been taken as the standard period for the prices of commodities, and it was found that their average is in the aggregate equivalent to the average of the twenty-five years 1853–77. After 1852 the new gold discoveries appeared to have an effect on prices; the highest year was 1873, when the index number reached 111, and during all these twenty-five years the annual average never sank below 90.

TABLE II.—*Summary of Index Numbers. Groups of Articles* 1867–77 = 100

Year	Vegetable Food (Corn, &c.)	Animal Food (Meat, &c.)	Materials	Grand Total	Silver[1]	Wheat Harvest[1]	Year	Vegetable Food (Corn, &c.)	Animal Food (Meat, &c.)	Materials	Grand Total	Silver[1]	Wheat Harvest[1]
1846	106	81	85	89	97·5	deficient	1869	91	96	100	98	99·6	102
1847	129	88	86	95	98·1	above average	1870	88	98	99	96	99·6	112
1848	92	83	73	78	97·8	very deficient	1871	94	100	101	100	99·7	90
1849	79	71	73	74	98·2	123	1872	101	101	115	109	99·2	92
1850	74	67	78	77	98·7	102	1873	106	109	114	111	97·4	80
1851	73	68	76	75	99·9	110	1874	105	103	100	102	95·8	106
1852	80	69	81	78	99·9	79	1875	93	108	93	96	93·3	78
1853	100	82	97	95	101·2	71	1876	92	108	91	95	86·7	96
1854	120	87	104	102	101·1	127	1877	100	101	89	94	90·2	74
1855	120	87	101	101	100·7	96	1878	95	101	81	87	86·4	108
1856	109	88	102	101	101·0	96	1879	87	94	78	83	84·2	64
1857	105	89	107	105	101·5	124	1880	89	101	84	88	85·9	93
1858	87	83	94	91	101·0	116	1881	84	101	80	85	85·0	97
1859	85	85	98	94	102·0	92	1882	84	104	80	84	84·9	100
1860	99	91	100	99	101·4	78	1883	82	103	77	82	83·1	93
1861	102	91	99	98	99·9	92	1884	71	97	73	76	83·3	103
1862	98	86	107	101	100·9	108	1885	68	88	70	72	79·9	108
1863	87	85	115	103	101·1	141	1886	65	87	67	69	74·6	93
1864	79	89	119	105	100·9	127	1887	64	79	67	68	73·3	110
1865	84	97	108	101	100·3	110	1888	67	82	69	70	70·4	96
1866	95	96	107	102	100·5	90	1889	65	86	70	72	70·2	103
1867	115	89	100	100	99·7	74	1890	65	82	71	72	78·4	106
1868	113	88	99	99	99·6	126	1891	75	81	68	72	74·1	108
							1892	65	84	65	68	65·4	91

[1] Silver 60·84 per oz. = 100; wheat harvest in the United Kingdom, 1849–83, 28 bushels per acre = 100; from 1884, 29 bushels = 100.

For readers not fully acquainted with the construction of *Index Numbers* the following explanation may be useful. The average price of the eleven years 1867–77 was called 100 in the case of each separate article, and all fluctuations of prices were calculated in proportion. For instance, the average price of English wheat during 1867–77 was 54*s.* 6*d.*, whilst in 1892 it was 30*s.* 3*d.*, which is equal to 56 (if 54*s.* 6*d.* be taken as 100), or 44 per cent. below the average point. The index numbers thus obtained represent, therefore, simple percentages of the average point. The inquiry is extended to 45 descriptions of commodities, viz., 19 articles of food and 26 materials, minerals, textiles and sundries.[1] The percentages re-

[1] These include, of foods: wheat, flour, barley, oats, maize, potatoes, rice, beef, mutton, pork, bacon, butter, sugar, coffee, and tea; and of other articles: iron, copper, tin, lead, coal, cotton, wool, silk, flax, hemp, jute, hides, leather, tallow, oil, seeds, petroleum, soda, nitrate of soda, indigo, and timber.

lating to the various articles are added together, and the total is divided by the number of articles. The following is an example for 1892 :—

		Total numbers	Average
Vegetable food, corn, &c. (wheat, flour, barley, oats, maize, potatoes, and rice)	With 8 Index Nos.	523	65
Animal food (beef, mutton, pork, bacon, and butter) . . .	„ 7 „ „	586	84
General average, including materials	„ 45 „ „	3,071	68

The index number 68 indicates, therefore, that the prices of the 45 commodities in 1892 (see Table II.) were on the average 32 per cent. below the standard period from 1867–77.

Prices in 1892.

Seven years have elapsed since my index numbers of the prices of commodities first appeared in the *Journal of the Royal Statistical Society*, seven years of profound moment in the history of trade, comprising times of great activity and of great depression, whilst now complaints are again prevalent, as in 1886, and the battle of the standards is still receiving universal attention. The present time seems, therefore, to be a suitable one to give a retrospect of the movements during this epoch.

Before entering, however, upon a full review of the whole epoch I will make a few remarks as to the course of prices during the past year.

The index number for all commodities was 68, or 4 points lower than in the previous year, though on a very close calculation the difference would have been slightly less (1892=68·2, 1891=71·6, 1890=71·7, 1889=72·3). The fall in the prices of materials during 1891 had not affected the general index number, as it had been balanced by a corresponding rise of corn, but as the latter lost the whole of this rise in 1892, while the fall of materials continued, the index number receded to 68, being on a par with 1887, the lowest on record. The various articles comprised in the group of corn declined almost uninterruptedly during the past year, until at the end of December English wheat had fallen to 25*s.* 8*d.* per quarter (and 24*s.* 8*d.* in March, 1893), the lowest price known for the last 100 or 130 years. The middling and inferior sorts of beef and mutton [1] were depressed, particularly towards the end of the year, but pork, owing to the great decrease in the number of pigs in this country, ruled distinctly higher than in 1891. Textiles, which fell

[1] The index numbers for meat in my tables do not include inferior sorts, for which the decline as compared with 1867–77 is much greater; in 1892 the average price of inferior beef was 27*d.* per 8 lb., and of inferior mutton 30*d.*, against 43*d.* and 46*d.* respectively from 1867–77, showing a decline of 36 per cent., and at these prices large quantities of good imported meat were sold. The prices of live cattle were excessively low in the latter part of the year.

heavily in 1890 and 1891, were on the average again lower. Cotton, middling American, on the spot touched $3\frac{9}{16}d.$ per lb. in March, futures being even cheaper, and was practically on a par with the lowest price in 1848, which was $3\frac{1}{2}d.$ It rose, however, to $5\frac{1}{4}d.$ when it became known that the new crop would be much smaller. The average prices of cotton, as well as of wool and silk, were the lowest on record, and flax and hemp have only been very slightly lower before.

The index number of 68 for all commodities in 1892 was 32 per cent. below the standard period of 1867–77, 14 per cent. below the period 1878–87, and $5\frac{1}{2}$ per cent. below the average of the last ten years (1883–92).

The monthly fluctuations of the average index numbers of all the forty-five descriptions of commodities were thus (1867–77=100) :—

December, 1889.	73·7	April,	1892	68·9	October,	1892	67·4
„ 1890.	71·1	May,	„	68·8	November,	„	68·2
„ 1891.	71·4	June,	„	67·7	December,	„	67·7
January, 1892	70	July,	„	67·8	January,	1893	68·4
February, „	70	August,	„	67·4	February,	„	69·0
March, „	69·1	September,	„	66·8	March,	„	68·1

The figures declined until September, when the index number was only 66·8, the lowest on record ; since then there was a very slight improvement, which made a little further progress at the beginning of 1893.

Silver was on the average 12 per cent. lower than in 1891. It fell to $37\frac{7}{8}d.$ per ounce in August (index number 62·3, or nearly 38 per cent. below the old parity of $15\frac{1}{2}$ silver to 1 gold), which was the lowest price ever known, equal to a proportion of 24·9 to 1 gold. It recovered but slightly from this decline, and was worth $38\frac{5}{16}d.$ at the end of December. On March 22, 1893, it touched a still lower price, viz. $37\frac{9}{16}d.$ per ounce, but rose again to $38\frac{1}{8}d.$ at the end of March.

Average Prices of Whole Periods.

The whole epoch since the crisis of 1847 has been divided into five periods, viz. :—

10	years	from 1848 to the crisis in 1857.
9	„	1858 „ „ 1866.
11	„	1867–77, after which year the index number fell below 90.
10	„	1878–87, when prices touched the lowest point.
5	„	1888–92, and still in progress.

Table III. gives the averages of these periods, and I have added three periods, comprising the time from 1818 to 1847, though I do not attach any great value to them, as prices in England in the first half of the century were so greatly interfered with by legislation—protective duties and prohibitive laws.

The average of the last five years is 29 per cent. below the old standard period and 10 per cent. below the next period from 1878 to 1887. The fall is greatest in the case of textiles and corn.

TABLE III.—*Averages of Index Numbers (Percentages)*, 1867–77 = 100

Periods	Corn, &c.	Meat and butter	Materials	Grand total	Silver[1]
1818–27	109	90	112	**111**	99
1828–37	95	78	91	**93**	98·2
1838–47	102	80	90	**93**	98
1848–57	95	79	89	**89**	100
1858–66	91	89	105	**99**	100·9
1867–77	100	100	100	**100**	96·4
1878–87	79	95	76	**79**	82·1
1888–92	67	83	69	**71**	71·7

[1] Silver compared with 60·84*d.* per oz., being the parity between gold and silver at 1 : 15½.

QUARTERLY MOVEMENTS OF PRICES.

Figures of monthly fluctuations, such as already given, are in many respects accidental, as they render for most articles simply the prices at the end of the month, and not averages, and I therefore thought that quarterly numbers—showing the average of three such monthly quotations—would be more reliable, and by eliminating all minor fluctuations would give a better idea of the gradual changes of all commodities, and of certain classes. I now present in Table IV. a record of the quarterly movements of average prices.

TABLE IV.—*Quarterly Movements of Average Prices.*
Summary of Index Numbers, 1866–77 = 100.

Year	Quarters	Vegetable Food (Corn, &c.)	Animal Food (Meat, &c.)	Materials	Grand Total	Silver	Year	Quarters	Vegetable Food (Corn, &c.)	Animal Food (Meat, &c.)	Materials	Grand Total	Silver
1884	I	74·4	98·7	75·3	**78·4**	83·8	1888	III	67·3	84·4	68·1	**70·3**	69·8
	II	73·6	95·4	73·5	**76·1**	83·4		IV	69·0	84·7	71·4	**72·8**	70·4
	III	70·7	99·1	73·6	**75·9**	83·4	1889	I	66·7	86·2	70·9	**72·7**	70·0
	IV	67·7	94·1	72·5	**73·3**	82·2		II	63·9	84·1	68·4	**71·7**	69·0
1885	I	68·4	89·7	71·2	**72·5**	80·7		III	64·6	86·8	69·9	**72·0**	69·8
	II	69·9	89·5	70·4	**72·8**	81·1		IV	66·3	86·0	73·2	**73·2**	71·4
	III	67·1	89·2	70·0	**71·8**	79·6	1890	I	63·7	86·3	72·0	**72·5**	72·6
	IV	67·2	83·8	69·4	**70·8**	77·7		II	62·8	83·0	70·3	**70·8**	77·2
1886	I	66·5	87·0	68·2	**70·2**	77·0		III	67·2	80·6	71·1	**72·1**	85·1
	II	64·8	90·5	65·9	**69·0**	74·5		IV	67·4	82·0	70·4	**71·7**	79·6
	III	63·8	88·8	66·8	**68·9**	71·2	1891	I	71·0	78·9	69·2	**71·4**	74·4
	IV	65·1	85·3	67·7	**69·4**	75·8		II	77·8	80·1	68·5	**72·3**	73·6
1887	I	66·7	80·2	67·3	**68·5**	75·3		III	75·5	83·0	67·7	**71·7**	74·5
	II	65·4	79·0	65·8	**67·8**	72·2		IV	77·2	80·8	67·1	**71·2**	72·1
	III	63·7	80·2	65·7	**67·8**	73·1	1892	I	70·6	82·7	66·0	**69·7**	67·4
	IV	65·2	77·9	68·9	**69·7**	72·5		II	67·5	83·1	65·2	**68·5**	65·8
1888	I	66·0	78·8	70·7	**70·5**	71·9		III	64·2	85·9	63·2	**67·3**	63·2
	II	66·3	79·9	66·9	**68·5**	69·4		IV	60·7	83·6	64·9	**67·7**	64·0

The grand total column for all commodities gives a clear view of the rapid fall in the years 1884–87 ; of the improvement at the end of 1887 and in 1888 and 1889—which, however, raised prices only very slightly above the 1885 level, of the year of transition, 1890, when the crisis commenced, and of the fall afterwards. Silver, though before 1888 considerably higher than commodities, experienced similar movements till the middle of 1888, when it fell below the line of commodities, still however fluctuating in a similar direction until the new United States silver legislation carried it far beyond the general level of prices. From the second half of 1891 the movements were again in the same direction, but stronger, and more in sympathy with corn and materials only.

A comparison of the figures for vegetable and animal food shows that they frequently move in quite opposite directions. It will be difficult to find a satisfactory explanation for this phenomenon ; the simplest reason that would suggest itself would, of course, be that if vegetable food is cheap people may spend more money upon meat, &c., and the reverse. This may be right in the case of great movements as in 1891, but it would not explain the minor fluctuations, as retail prices do not follow wholesale prices so very closely. Years of prosperity and high wages would, of course, tell on the prices of animal food ; for instance, 1871–74, 1880–83, 1888–89. But even here we have to handle figures carefully ; from 1880–83 prices of animal food kept abnormally high, as the number of live stock in this country had so greatly diminished up to 1882, while the importation of live cattle and fresh meat gained greater importance only from 1883. Since then these large importations have gone hand-in-hand with an increase in live stock. 1892 was exceptional, merely through the influence of high prices for pork. Corn was on a low level from the end of 1884 till the end of 1890, and after the rise in 1891 it declined 21 per cent. within the last year.

If we inquire as to the influence of certain seasons of the year on prices, the averages recorded in Table V. will be of interest. As the year 1884 was a year of transition with falling prices, a better average will be obtained by leaving it out and taking simply the eight years 1885–92, the low price period, in which the average index number fluctuated only between 72 and 68.

TABLE V.—*Average Quarterly Values.*

Average of Eight Years, 1885–92	Actual Average of Index Numbers, 1867–77 = 100				Percentages, 1885–92 = 100			
	I Quarter	II Quarter	III Quarter	IV Quarter	I Quarter	II Quarter	III Quarter	IV Quarter
Vegetable food (corn, &c.)	67·45	67·30	66·68	67·26	100·42	100·19	99·27	100·13
Animal food . . .	83·72	83·65	84·86	83·01	99·89	99·81	101·25	99·04
All 45 commodities including materials	71·00	70·18	70·24	70·81	100·62	99·46	99·55	100·36

We find that for vegetable food the third quarter, when the harvest begins, is on the average the lowest, then follows the fourth quarter ; the first is the highest, while the second shows a tendency to fall. In animal food, on the other hand, the third quarter is the highest, though in summer prices should be influenced by the invariably lower prices of butter ; the last quarter is the lowest. The movements in the third and fourth quarters are, therefore, on the average exactly opposite to those of vegetable food, while in the first and second quarters they are similar.

Materials, however, are distinctly dearer during the winter than in spring and summer, not only minerals (coals are naturally higher in winter), but also textiles and sundry materials. The totals of all commodities show the second quarter to be the lowest, then follow the third and fourth, while the first quarter is the highest. If eight years are sufficient for drawing up such averages, the figures will show to what extent allowance has to be made in judging of movements from month to month or from quarter to quarter.

Review of the Last Seven Years.

Most of the events that have left their impression on the course of commercial and financial affairs during the last seven years will still be fresh in the memory of those more fully acquainted with the subject, but it may nevertheless be interesting and useful, and may contribute to the better understanding of the fluctuations, to give a condensed summary of the more important occurrences.

The index number had been 70 for the first half of 1886, and many people were rather more hopeful towards the end of the year. But the extreme limit had not yet been reached, and prices in 1887 were on the average still two points lower. It was not till the end of the latter year that the first signs of a real improvement became visible, but the average of general prices was only raised by the French copper and tin speculations. The two following years (1888-89) were, however, distinctly better, though prices were not uniformly affected. Wheat, for instance, and indeed corn generally, owing to the large harvests of 1887 and 1888, ruled very low in 1889.

The activity of trade during these years was considerable, manufacturers here and on the Continent were well employed, new factories were called into existence, and the plant and machinery of the old ones were renewed and increased to cope with the requirements of improvements, of new inventions, and the larger production of raw materials. The development in extra-European countries also was very important, and the Stock Exchange did not lag behind.

Large foreign loans were brought out, enormous sums invested in all kinds of undertakings in extra-European countries, and a great number of private firms transformed into limited companies.

The average index number of prices had increased from 68 in 1887 to 70 in 1888, and 72 in 1889, and the highest point (73·7) was reached in November and December 1889, when iron and merino wool were at their best. A reaction followed early in 1890,

and in the first part of the year great fears were entertained as to the effect of the McKinley tariff, which was almost prohibitive to European manufactures.

Towards the middle of the year the difficulties of the Argentine Government became more apparent, and in October and November there was a great fall in American railways. On November 14 the firm of Messrs. Baring applied to the Bank of England for assistance. This is usually called the Baring crisis, and it might have been of the most serious consequences had it not been happily met by the prompt action of the Bank, and the arrangement of a guarantee fund for the enormous liabilities of the firm.

Trade had become worse, not only under the pressure of the financial difficulties, but as a natural reaction from a period of prosperity in which everything had been overdone. In 1891 the European export trade suffered greatly from the effects of the new American tariff, from the shrinkage of the South American demand, the fall of silver, and the unsatisfactory conditions of business in the East. Affairs in Argentina and Uruguay went from bad to worse, and there was in addition the war in Chili, and the crises in Portugal and Brazil. The most important event of the year, however, excepting the great losses of investors, was the failure of the French and Russian crops, and the famine in Russia, simultaneous with a large American harvest. Corn rose considerably, and in Berlin rye ruled even higher than wheat in October. Materials, on the other hand, of which the production had been greatly increased, fell heavily. The general commercial depression continued with unabated force in 1892, and an agricultural depression was added. England was particularly unfortunate, as in conjunction with declining values of corn the harvest was a bad one, and cattle had to be slaughtered and sold at excessively low prices. Of other causes unfavourably affecting trade, we may mention various strikes, the outbreak of cholera on the Continent, the crisis in Australia, and the uncertainty of the future of silver.

The *average* prices of the seven years were distinctly below the average of the preceding decades; but there is one point which on a close comparison of the tables may nevertheless afford some consolation if not satisfaction. The increase in production from 1879 to 1883 was very large indeed, and prices declined heavily from 1880 to 1887, but although in the last five or seven years there was again a very great increase in production, and although some commodities have been even cheaper than in 1886 or 1887, still the average of all commodities has not sunk materially below the 1887 level. It would therefore appear that the effect of quantities on general prices has in the latter period been rather less decisive than in the former.

The Causes of the Fall, and the Monetary Question.

The general causes that have contributed to the fall of prices as compared with the period from 1867–77, and up to 1886, had been stated in my former paper as follows :—

1. Reduction of the cost of production and conveyance of some large articles of consumption by the opening of the Suez Canal, by the increase of steamers, and by the enormous extension of railways and telegraph lines, especially in extra-European countries. The opening of new sources of supply. In consequence of these causes, great increase in production.
2. Alterations in currencies, demonetisation of silver, and insufficient supply of gold.

I ascribed the greater influence to the second cause. The increase in production had indeed been very large, but I showed that in former periods it had been similar—at least proportionately from one period to another. In fact the development from 1850 to 1873 and the growth of wealth were quite phenomenal, as can be easily shown by merely looking at the trade of this country and the returns of the income tax, but while at that period the circulation of money expanded simultaneously with the production of commodities, it was possible to maintain on the whole a certain price level for about twenty-five years. From 1870 or 1873 to 1885, on the other hand, the monetary circulation had scarcely increased owing to the demonetisation of silver and the withdrawal of notes.

During the last seven years, 1886–92, the first cause, extension of the new sources of supply and increase of production, was again at work, and has already been referred to.

The production of gold has of late made satisfactory progress, but there was a considerable extra demand during the last few years from Austria and Russia, who have taken the whole balance available for monetary purposes during the last seven years. There was, however, a large addition of silver, particularly in the United States, and also of notes, and I estimate that the total addition to the currency of Europe, United States, and Australia during the same period amounted to about 123,000,000*l.*, or 17,500,000*l.* per annum, which is very considerable.

This may partly account for the fact already noticed that prices have not gone materially lower than in 1887. The second cause, therefore, alteration of currencies and insufficient supply of gold, has apparently not had any *additional* influence on prices since 1887.

There will, however, arise a fresh demand for gold by various countries, and the supply will again be insufficient for some time to come, if trade continues to expand at the usual rate.

Conclusion.

A comparison of the years 1890–92 with the years 1883–85 shows a great similarity; production was arrested in 1885 and 1886, and business improved somewhat at the end of 1887, and to a greater extent in 1888. Production is now also arrested, but there are no signs yet of any real improvement in the great industries of the world and in general commerce.

After a great deal of overtrading and overfinancing, the losses on investments, in commerce, and agriculture have been enormous,

and some years may still elapse before an important improvement will take place ; but much unsoundness has been cleared, and, with production arrested, a more healthy tone may set in, and some improvement in certain branches may perhaps not be very distant.

A serious curtailment in the use of silver, on the other hand, though it does not seem probable that anything will be done this year, will naturally depress its price, and any sudden change will have a disastrous effect on Eastern trade, and hence on trade generally.

The average prices of the next decade may still keep low, or may even show some further decline as compared with the last seven or ten years, if gold remains the sole measure of value, and if the production of commodities again increases. That this production, generally speaking, should remain stationary for any length of time is of course impossible, as with the increase of population there will be more hands to work and more mouths to be fed. The production may, however, go into different channels. In the first development of new countries the settlers take up principally certain large agricultural products such as wheat, maize, cotton, wool, &c., then comes the mining industry, but with the increase of population and the requirements of the people the production will also become more variform, more of the food will be consumed there, and a time may arrive when the shipments of certain commodities will no longer be so excessive as they are now.

AUGUSTUS SAUERBECK.

PRESERVATIVES FOR CREAM.

THE production and distribution of fresh cream is an important and increasing branch of the dairy industry of the present day. Cream is extensively sold in small earthenware jars, which are often sent long distances and retailed at a price varying from 6*d.* to 1*s.* according to size. It is a great convenience to the public to be able to buy cream in small quantities, and in a portable form, provided that its purity and freshness can be guaranteed, for nothing is more easily tainted or susceptible to its surroundings. In fact, cream seems to have a special power of attracting the odour of anything, whether good or bad, in its vicinity. The composition of the cream, therefore, and the extent to which it has been "doctored" in order to ensure its keeping qualities, are of the greatest importance to consumers. It is, indeed, well known that cream unmanipulated does not travel well, and will not—especially in close weather—keep many hours.

The means used to prevent the rapid souring of cream are sterilisation on the one hand, and the use of preservatives on the other. Both have the same object, namely, to arrest fermentation and the

growth of bacteria; but the character of the cream is altered differently according to the method employed.

Sterilising—which, however, can only partially be accomplished—is done by raising the temperature to 150° or 160° F., and then reducing it below 40° F., thus killing the lactic acid organism. This is a suitable method for factories or for large producers and dealers in cream. The more common practice, however, is the use of preservatives.

Hence the question arises, To what extent is the use of preservatives desirable or permissible?

Many different preservatives are in use, but most of them have a common foundation—boracic acid, or a mixture of borax and boracic acid. Although one may very rightly object to anything of the nature of a drug in food, it has not been shown that boracic acid when used in the quantity necessary to keep cream sweet for a reasonable time has any harmful effect. Salicylic acid was formerly used, and, from answers which have been given to questions asked in the agricultural newspapers lately, it would appear that it is still recommended. Moreover, in the *Imperial Dictionary*, under Salicylic Acid, it is stated: "It has come into very general use as an antiseptic substance, and, being devoid of poisonous properties, it may be used for preserving foods, &c., from decay." Nevertheless, it cannot be too widely known that its use is distinctly dangerous, that it has been condemned by medical authorities and its sale not allowed under the Food and Drugs Act, and that it should on no account be used in connection with food.

Boracic acid, or a mixture of borax and boracic acid, is, therefore, the safer substance to use; but great caution must be exercised, especially in dealing with milk, on account of the greater quantity that is consumed. It may, indeed, be well supposed that, in the case of infants, whose diet is so largely composed of milk, the consumption by them of milk to which preservatives have been added may be harmful.

The amount of preservative necessary for keeping cream or milk for a short time is very small. The following recipe is that of a mixture which will keep cream quite sweet for four or five days, even in hot weather:—1 oz. of boracic acid, or $\frac{1}{4}$ oz. of borax and $\frac{3}{4}$ oz. of boracic acid, dissolved in a quart of hot water. This will suffice for 20 gallons of milk, or a tablespoonful of the solution to a quart (1 to 3,200 parts).

Much stronger solutions are in constant use, as large a quantity as 1 oz. of boracic acid being sometimes put to two gallons. But when strong solutions are used, some other substance must be added; for water will hold but a small quantity of borax and boracic acid in solution, and only a limited quantity can be put in without weakening the cream, besides which the acid would give the latter a bitter taste.

Hence, glycerine and gelatine are sometimes used as preservative mixtures. Both will hold a large amount of borax and boracic acid in solution, and take away, to a certain extent, the bitter taste,

though gelatine does so more effectually than glycerine : 2½ ounces of gelatine steeped in 2 or 3 ounces of water, and dissolved in a solution of 1 ounce of mixed borax and boracic acid in a pint of hot water, will, when cool, form a jelly which will keep any length of time. A teaspoonful of the jelly dissolved will preserve a pint of cream for from seven to nine days. If these mixtures are used they should be added very sparingly, as a large quantity would artificially thicken the cream, and enable a poor thin sample to be palmed off as a rich double cream, though it might keep for a considerable time.

It is doubtful whether it is desirable to keep milk or cream for any length of time. For sterilisation and the use of preservatives only destroy or arrest the lactic acid ferment, and do not affect the numerous other bacteria which go on multiplying with age. It is therefore reasonable to suppose that, after a time, milk and cream may not be wholesome, even though they may not have turned sour.

Milk and cream are essentially perishable articles, and are intended for immediate consumption, though by the careful and limited use of preservatives they may be kept for a short time without any deleterious effect.

J. F. Curtis-Hayward.

RATIONAL POTATO CULTURE.

For some years past M. Aimé Girard has devoted himself to the improvement of potato culture in France, and, according to the reports published by him from time to time, he has achieved remarkable success in this direction. The last report,[1] showing the results of M. Girard's experiments during the season of 1892, is particularly interesting, and has attracted considerable attention ; so that it seems desirable to give a short account of its main points and conclusions for the benefit of potato growers in this country.

M. Girard is a scientific as well as a thoroughly practical agriculturist, who, it will be remembered, was the first to demonstrate the advantage of applications of a mixture of sulphate of copper and lime, *bouillie bordelaise*, to prevent and cure the potato disease. This report, however, does not deal specifically with this treatment of potato plants, nor are the exceptional crops recorded alleged to be principally due to the use of *bouillie bordelaise*. The application of the *bouillie bordelaise* was made in many cases by way of preventing disease. There was so very little potato disease in France in 1892 that there was no occasion for repeated dressings for purposes of cure.

For ten years M. Girard has been writing upon the necessity of increasing the yield of the French potato crop. He has pointed out that

[1] *Amélioration de la Culture de la Pomme de terre industrielle et fourragère en France. Résultats de la campagne*, 1892, par M. Aimé Girard.

this could be done by the adoption of rational methods of thorough cultivation, *procédés rationnels de culture intensive*, which he has duly formulated. During the last few years an increasing band of workers, comprising potato growers upon a large as well as a very small scale, have responded to his appeals to help him by making experiments in various parts of France to demonstrate the value of his system. The results of these were successively published in 1889, 1890, and 1891, and showed clearly and satisfactorily that M. Girard's recommendations are valuable ; but the records of the far more numerous experiments of 1892 prove that by carrying them out thoroughly the potato crop can be largely increased, although the weather may be excessively dry, and not by any means suitable for potato growing, especially upon dry soils.

Of the 600 cultivators who co-operated with M. Girard in 1892 421 cultivators, having among them 1,590 acres of land planted with potatoes, furnished valuable and reliable reports. These M. Girard divides into three groups :—

The first group (*grande culture*) comprised eighty-four growers, who had from 2½ to 140 acres of potatoes, the whole extent cultivated by them being 1,450 acres.

The second group (*moyenne culture*) was composed of 107 growers, having from 80 poles to 2½ acres of land planted with potatoes, the total extent being 103 acres.

The third group (*petite culture*) comprised 230 small cultivators, whose total potato acreage amounted to 40 acres, divided into plots ranging from 4 to 80 poles.

M. Girard gives the results obtained in each of the above groups, fixing a crop of 12 tons per acre as the line of demarcation, in his estimation, between good and inferior crops :—

		No. of cultivators	Acreage of potatoes
1st group (*grande culture*), acreage from 2½ to 140 acres .	12 tons and upwards per acre . .	49	962
	Below 12 tons per acre . . .	35	488
		84	1,450
2nd group (*moyenne culture*), 80 poles to 2½ acres . . .	12 tons and upwards per acre . .	62	60
	Below 12 tons per acre . . .	45	40
		107	100
3rd group (*petite culture*), 4 poles to 80 poles . . .	12 tons and upwards per acre . .	111	20
	Below 12 tons per acre . . .	119	20
		230	40
General Total		421	1,590

It will be seen by analysing this table that the third group, *petite culture*, shows the largest proportion of yields below 12 tons per acre, or 50 per cent. of the acreage cultivated. The proportion of the second group, *moyenne culture*, falling below 12 tons per acre, is 40 per cent. ; while that of the first group, *grande culture*, is not more than 33 per cent. As M. Girard says, "one would expect a different result, as small holdings are generally the object of greater care than the larger holdings ; " but he adds that "small cultivators are apt to continue in the ruts of routine, from which large farmers more quickly extricate themselves." It should be stated that in a few instances the yields of the small cultivators in the third group, *petite culture*, were at the extraordinary rate of 40 tons per acre. These immense crops were produced upon very small patches of a few poles in area, so that it is necessary, as M. Girard remarks, "merely to multiply and to exercise a certain amount of faith."

Among the most striking instances of heavy crops in the first group, *grande culture*, is one in the department Eure-et-Loir, where M. Égasse grew at Archevilliers 18 tons per acre upon 40 acres ; M. Vast at Chanteloup, in Seine-et-Marne, produced a crop of 12 tons on 112 acres ; and M. Godefroy at Grigny, in Seine-et-Oise, obtained 14 tons per acre from 98 acres.

In the region of the north-east the magnificent return of $17\frac{1}{2}$ tons per acre was made on 147 acres by one cultivator. In this region 12 cultivators produced slightly over 16 tons per acre upon 182 acres.

Again, in the *région du centre* 10 cultivators, whose extent of potato land ranged from $2\frac{1}{2}$ to $12\frac{1}{2}$ acres, averaged 14 tons per acre upon 59 acres.

In short, 49 cultivators, having together 962 acres, succeeded in averaging 14 tons per acre.

In some of the potato fields cultivated according to M. Girard's directions, where the soil was sandy with gravelly subsoil, the drought interfered considerably with the results, so that 14 growers in different parts of France, having 112 acres, only obtained crops varying between 4 tons and 11 tons per acre, or an average of 8 tons per acre.

Upon 295 acres of poor and medium soils 16 growers obtained an average yield of 7 tons 10 cwt. per acre.

Eighty-four of the co-operators in this division, however, grew an average of slightly over 12 tons per acre, which must be regarded as a most striking result.

Coming to the second group of medium-sized acreages, *culture moyenne*, 62 cultivators of 61 acres of potatoes, divided among them in plots of from $\frac{3}{4}$ acre to $12\frac{1}{2}$ acres, grew an average crop of 14 tons per acre.

With regard to the other 42 cultivators in this group, their average crop was about the same as that of the 39 cultivators in group 1, or between 7 and 8 tons per acre.

With regard to group 3, *petite culture*, two-thirds of the cultivators planted over 20 poles of land, whose crop averaged 14 tons

per acre. In no case was the crop less than 11 tons per acre, while in some it exceeded a rate of 30 tons per acre. The crop of 119 cultivators in this group fell below 11 tons per acre, but their average yield is not given.

The principal points insisted upon by M. Girard to ensure success in potato culture are,[1] in the first place, deep cultivation and preparation of the soil before the seed is planted. Like the beet root and mangel-wurzel, the potato requires a deep and friable tilth. Its roots run far into the soil in search of available food, if it has been properly and deeply stirred. M. Girard advocates the deep ploughing of potato land in winter with a plough going 8 inches deep, followed by a subsoil plough moving the soil 6 inches deeper. Manure is put on in the early spring and ploughed in. The furrows are then harrowed down and the potatoes planted as soon as the chances of the sets being frozen are past. The date of planting must vary according to the season and the climate of the district. M. Girard thinks that 13,200 plants per acre are sufficient for varieties of full habit of foliage, or a plant every $19\frac{3}{8}$ inches in rows $23\frac{3}{8}$ inches apart, which would give 13,200 plant-centres per acre. For other varieties a distance of $21\frac{5}{8}$ inches in rows set $21\frac{5}{8}$ inches apart is advised, giving 16,000 plant-centres per acre.

Manures.—M. Girard's dressing of farmyard manure is from 8 to 12 tons per acre. He also adds $2\frac{1}{2}$ cwt. of superphosphate of lime and from $1\frac{1}{2}$ to $2\frac{1}{2}$ cwt. of sulphate of potash per acre, put on at the same time as the farmyard manure. From $1\frac{1}{2}$ to 2 cwt. of nitrate of soda per acre are sown broadcast in May, after the plants are up; but M. Girard prefers to apply half of this dressing in May and half in July.

He advises the careful selection of seed from vigorous and fruitful stocks. It should be of even size, weighing from $2\frac{3}{4}$ to $4\frac{1}{2}$ oz. for heavy cropping varieties, and from $1\frac{3}{4}$ to $2\frac{3}{4}$ oz. for ordinary kinds. Seed should be planted whole. The experiments made under M. Girard's supervision would appear to prove that it is wrong to cut seed potatoes.

The most careful and constant hoeing is advocated in order to kill every weed. Moderate earthing is recommended, particularly for those large cropping varieties whose tubers tend to work up to the surface, and become green from the action of light. This, indeed, appears to be the origin of earthing and, as many hold, the sole reason for the practice.

Dressing the plants with sulphate of copper mixture as a preventive measure before disease appears is deemed essential by M. Girard. His receipt for this is—

4 lb. 6 oz. of molasses mixed with 11 gallons of water.
4 lb. 6 oz. of sulphate of copper dissolved in this water.
6 lb. 9 oz. of lime slaked and put in 11 gallons of water.

[1] *Amélioration de la Culture de la Pomme de terre industrielle et fourragère*, par M. Aimé Girard. *Instructions pratiques.* 1893.

These two solutions are mixed and well stirred up together and put on at the rate of from 130 to 160 gallons per acre with the Éclair, or horse machine.

The above are the main features of the system of "intensive" culture propounded by M. Girard.

In a report presented to the Société Nationale d'Agriculture de France in March last M. Girard observes :—

> From the results which I make known to-day I do not hesitate to affirm that the investigation of 1892 is sufficient to demonstrate that the question of regenerating the potato culture of France is already solved. It is another conquest to add to those with which science has enriched agriculture.

It must be admitted that some of the yields recorded by M. Girard are startling. Had they simply been made on fractions of acres in *petite culture*, it might have been suggested that mistakes had been made in multiplication, or that an elaboration of culture had been bestowed on the land which could not be given on a large scale. But it is seen that crops ranging from 14 to 16 tons per acre were grown on large acreages of from 30 to 150 acres.

These large crops are the more remarkable when it is brought to mind that the average return of the potato land of France is only about 3·1 tons per acre, that of the United States about 3 tons per acre, and that of Great Britain 6·11 tons per acre.

From inquiries made of potato growers in England and Scotland as to the largest crops they have grown, I have ascertained that in Kent a grower obtained 16 tons of ware or marketable potatoes and 4 tons of seed per acre on 6 acres of Regents ; and another Kentish grower grew 160 tons of Magnums on 10 acres of land. Another large English grower states that the largest crop he ever grew was 15 tons per acre of Magnums.

A well-known grower in Scotland speaks of 14 tons per acre on 20 acres as the largest crop he has seen. He has also known from 11 to 13 tons grown per acre, and has heard of great crops being grown of 18 tons per acre, but could never get this confirmed. The estimated average annual yield of potatoes in Scotland per acre is 5·79 tons, or rather less than that of England.

It was shown by the experiments carried out by the Wiltshire Technical Education Committee,[1] that the rational or intensive, culture adopted in their experiments, ensured results in some respects as striking as those recorded by M. Girard.

These Wiltshire experiments were made in three different parts of the county, upon 80 small parcels of land a perch in extent. The average yield of these 80 plots, of which 10 plots were unmanured, was 12 tons 6 cwt. 19 lb. per acre. Twenty of the plots yielded at the rate of 17 tons 10 cwt. per acre, and 12 plots at the rate of 16 tons 5 cwt. per acre.

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[1] *Report on Potato Culture and Disease Prevention : Experiments by the Wilts Technical Education Committee in Warminster and District in* 1892. Cassell & Co.

In many ways the treatment of these plots resembled that recommended by M. Girard. Deep cultivation, selection of good seed, planting whole seed of 3 oz. weight, manuring with farmyard manure, or with complete chemical manure, dressing with *bouillie bordelaise*, and other details, were practised upon nearly parallel lines in both cases.

Though the Wiltshire experiments were made upon very small plots, yet, judging from the great care and ability with which they were conceived and carried out, there is every reason to believe that the calculations of the yields of the respective plots were accurately made. Taking also into due consideration the extra amount of attention which small plots would receive, representing a considerable increase of expense per acre, it must be concluded that these experiments prove, not in such a degree as those of M. Girard, but still in an important degree, that the potato crop can be largely increased by rational systems of cultivation.

CHARLES WHITEHEAD.

PUBLICATIONS OF INTEREST TO AGRICULTURISTS.

OF the three publications which are here brought under review, the first is a new edition of a well-known English work, the second is a Government Blue-book, and the third is an official volume issued by the United States Department of Agriculture.

They are noticed in the following order :—

1. The Complete Grazier.
2. The Plague of Field-voles.
3. The Diseases and Feeding of Cattle.

THE COMPLETE GRAZIER.[1]

THIS is a handsome volume of reduced crown quarto, well printed on good paper, and serviceably bound for frequent use. It is divided into twelve books or sections, the first seven treating of the Breeding and Management of Cattle, Horses, Sheep, Swine, and Poultry, and their Diseases ; the last five dealing with Offices and Implements of Husbandry, Management and Cultivation of Grass Lands and Roots, their Manures, the whole concluding with a Calendar of Farm Work for the year, and a useful Index. Such, at a brief glance, are the contents of a volume that is, from its mere size

[1] *The Complete Grazier and Farmers' and Cattle Breeders' Assistant : a Compendium of Husbandry.* Originally written by WILLIAM YOUATT, Esq., Member of Council of the Royal Agricultural Society of England. Thirteenth Edition. By WILLIAM FREAM, LL.D. Pp. xii + 1,086, with 450 illustrations. London : Crosby Lockwood & Son. 1893. 31*s.* 6*d.*

only, likely to be taken up by those who desire to obtain information from its valuable and well-stored pages.

The Complete Grazier, or Gentleman's and Farmer's Directory, was first issued in 1767, and printed by J. Almon, opposite Burlington House in Piccadilly, "written by a country gentleman, and originally designed for private use." It is a small volume of 252 pages, and contains forty-seven chapters. The first twelve relate "to the bull, cow and ox, and kine," with directions as to rearing calves, rules to be observed in buying cattle, feeding oxen, and remedies for distempers and accidents. Chapter XIII gives a particular account of the implements necessary to carry on the business of the dairy farm, with the prices of each ; also the wages of one man and three maids "according to the rule of the north part of Essex, the man 4*l.*, the maids 3*l.* each per annum." Four chapters are given to cream, butter, cheese, and rennet, and six to grass lands and hay. Sheep receive eight chapters, pigs four, and poultry eight ; the last two chapters are of fish ponds, storing them and ordering the fish. The horse is not mentioned. The opening chapter states "that the best oxen and cows are bred in the counties of York, Derby, Lancaster, Stafford, Lincoln, Gloucester, and Somerset, both for largeness and neatness of shape. Those bred in Yorkshire, Derbyshire, Lancashire, and Staffordshire are generally black, with large well spread horns. Those bred in Lincolnshire are, for the most part, pyed, very tall and large, and most fit for labour. Those bred in Somersetshire and Gloucestershire are generally red, and for shape much like those of Lincolnshire. Wiltshire breeds large cattle, but ill-shaped horns and heads. In some parts of Surrey there is a white sort of cow that, it is reported, produces the richest milk, and the flesh more readily receives salt than any other. As the males of all creatures are the principal in the breed and generation, therefore great care ought to be taken in the choice of the bull." This is followed by a quaint description of the bull and cow, "both of which should be chosen of the same country, and as near as you can of the same colour." No breeds of sheep are specified, but "the best sort of sheep for fine wool are those bred in Herefordshire and Worcestershire, but they are small and blackfaced, and bear but a small quantity. Warwick, Leicestershire, Buckingham, and Northamptonshire breed a large-boned sheep of the best shape and deepest wool. The marshes of Lincolnshire breed a very large kind of sheep, but their wool is not good, and Wales bears a small hardy kind of sheep, which has the best tasted flesh but the worst wool of all." Of swine there are three sorts, "the large Hertfordshire or Lincolnshire breed, which is the quickest grower ; another sort called by some the Bantam or Guinea breed, or the African or black French hog ; the most profitable for breeding of pigs and sweetness of flesh are the crosskind bred between the two foregoing sorts. It is recommended to keep in large dairies one hog to each cow." Various remedies for their diseases are given by gentlemen in Surrey, Hertfordshire, Warwickshire, and Northamptonshire.

A third edition, published in 1775, was "written by a country gentleman, and originally designed for private use." An edition unnumbered was printed in 1805, for B. Crosby & Co., Stationers' Court, London, and edited by a Lincolnshire Grazier, assisted by communications from several Yorkshire, Leicester, and Norfolk farmers. This edition is ascribed to the Rev. T. H. Horne, who came to London and was employed by the firm of Crosby & Co. It is a great improvement on the original edition of 1767, and quotations are frequent from the works of Mr. Culley, from the *Farmers' Magazine*, and the *Annals of Agriculture*. A large sheet is given in this volume in tabulated form, "A synopsis of the different breeds of neat cattle, sheep, and swine in Great Britain ; their specific characters, peculiar advantages or disadvantages, and where usually found." The various breeds of cattle are mentioned, but sheep are divided into horned sheep and sheep without horns. Berkshire pigs are described as reddish with brown or black spots ; the Chinese black, and others mostly white.

A fourth edition appeared in 1816 : "owing to the very favourable reception given to the three former impressions of this work, it has undergone a most careful revision." It is illustrated with small woodcuts of the various breeds, evidently after Bewick. Horses for agricultural purposes are mentioned here, viz. Clydesdale horses, Cleveland bays, Suffolk punches, and the old English draught-horse. In 1830 the work had reached a fifth edition, which was dedicated by the Editor "to the noblemen, gentlemen, and farmers composing the Smithfield Cattle Club, to whose exertions the public is so manifestly indebted for many valuable improvements in the live stock of the country." A sixth edition, by a Lincolnshire Grazier, assisted by several eminent agriculturists, came out in 1833, and the seventh was revised in 1839 by a Member of the English Agricultural Society. The eighth edition was enlarged and partly rewritten by William Youatt, who also dedicated it to the Smithfield Club.

The eleventh and twelfth editions are very similar but much thicker volumes ; they appeared in 1864 and 1877, and were edited by Mr. Robert Scott Burn, the author of the *Book of Farm Buildings*, who acknowledges his obligations to various implement firms as well as to the agricultural press.

The thirteenth and latest edition, now rewritten by Dr. Fream, retains the features of the two last volumes and is similarly bound, but is on a much larger scale. Although stated to be originally written by William Youatt, it contains little if anything of his historical research and elaborate histories, as published in his several works. It brings up to date the recent improvements and discoveries in connection with live stock, and the twelve books, in one volume, are divided into many chapters. The first book treats of cattle, their varieties, breeding and management, a long account being given of the wild cattle, and various writers, notably the Rev. John Storer, are quoted. The measurements, girth and length, of the various breeds at recent shows of the Birmingham

and Smithfield Club are reprinted, and the Board of Agriculture of Lower Canada will doubtless feel flattered at their scale of points for Shorthorn cows being printed in this standard work. We could only wish that the happy thought which conceived the idea of illustrating most of the prize-winners at the Jubilee Meeting of the Royal Agricultural Society at Windsor in 1889, as specimens of the different breeds, had been better executed. Photography is excellent in many ways, but it very often distorts animal life, especially by the cheap printing processes. A work of this high character should have been a useful reference half a century hence, but it cannot be said that the illustrations of the cattle convey to the mind an adequate idea of the magnificent specimens of the breeds that were exhibited at Windsor. The second book, on the economy and management of the dairy, is practically new, and introduces the latest developments of separating and the factory systems, the woodcuts being remarkably clear and sharp. The anatomy of the horse is a new chapter in this edition, though Youatt, in another of his works, treated its external structure and its various parts very exhaustively. Mr. (now Sir) Walter Gilbey's work on the Shire Horse, as well as papers by other writers, are quoted, including Mr. Housman's reports upon live stock exhibited at the Windsor Show, as already printed in this Journal. In the sheep section a capital sketch is given of Messrs. Burgon and Ball's sheep-shearing machine. It may be thought that the last five books, relating to husbandry, grass lands, roots and manures, would have made a second volume, as being distinct from the live stock of the farm ; here good and practical authorities are quoted, and Mr. Sutton's experience in laying down land to grass is given at some length. There is an interesting chapter on ensilage, the fashion for which seems now to be somewhat passing away, and there is also an excellent chapter on natural grasses, a subject upon which Dr. Fream is an eminent authority. The volume is very full of information, and will be valuable in any library as a work of reference. Profound knowledge is not, however, sought so much in these days, but students desirous of obtaining exhaustive information on our breeds of domesticated animals will turn with pleasure to the old volumes of Youatt, whose name is associated with *The Complete Grazier*, and who laboured so diligently, more than half a century ago, in imparting knowledge of our domesticated animals and in alleviating their ailments and diseases.

The visitor on entering the Council Room of the Royal Agricultural Society, in Hanover Square, will observe a small picture, immediately on his right, of a tall, upright, middle-aged gentleman, in the broad-brimmer and long frock-coat of the period, with a kind, intelligent face, and his right hand resting in the folds of his buttoned-up coat. W. YOUATT is the simple inscription beneath it, and from June 27, 1838, until May 23, 1842, he was a member of that distinguished body which enrols many of the noblest and most practical men of the time as the Council of the Royal Agricultural Society

of England. To Professor James B. Simonds, his intimate acquaintance, I am indebted for many of the following particulars of his life.

William Youatt, a native of Devonshire, was born in 1777. He received a liberal education, and was intended, it is presumed, to undertake the duties of a Nonconformist minister. When about 35 years of age, he entered into partnership with Mr. Delabere Blaine, who had established, at the beginning of the century, an infirmary for horses and dogs, with a depôt for the sale of veterinary medicines, in Nassau Street, Middlesex Hospital, London.

It cannot be doubted that long prior to taking this step he had given the subject of the diseases of animals deep thought, and with a mind constituted as his was he could not abstain from taking active measures for the alleviation of their sufferings. In his capacity as a partner of Blaine, Youatt threw all his energy, perseverance and talent into the profession he had now adopted, and in which he ultimately obtained so great a celebrity. How long this partnership was maintained is not known, but probably down to 1826. After this for many a year Youatt resided on the premises, the infirmary being kept up, chiefly for the reception of dogs.

The year 1828 must be regarded as memorable in the history of veterinary medicine. Long prior to this date loud complaints had come from the principal members of the profession of the little progress which was made by those in authority at the College. The teaching was too much restricted to one animal, the horse ; chemistry and Materia medica received scarcely any notice ; the educational acquirements of students were never inquired into, and their attendance on the instruction was far too short. To these defects may be added that the examination of students was conducted by physicians and surgeons—doubtless most distinguished—with the practical assistance only of the professor and assistant-professor.

To remedy this state of things meetings of the profession were being held from time to time, and resolutions passed setting forth the reforms which were imperatively needed. Two periodicals also saw the light, the *Veterinarian* and the *Farrier and Naturalist.* The former was conducted by Youatt, who was soon joined by Wm. Percival, V.S. of the First Life Guards ; the latter by Bracy Clarke, a distinguished author, and F. C. Cherry, also an Army veterinary surgeon. Both had the same object in view, the much-needed accomplishment of substantial reform. The *Farrier and Naturalist*, however, only survived three years, but, as is well known, the *Veterinarian* still lives on.

In 1830, Youatt entered into an arrangement to write the *Farmers' Series* for the Society for the Diffusion of Useful Knowledge. This Society, during the several years it was in existence, did enormous good by its publications to the agricultural world. It had a very large committee, of which Lord Brougham and Lord John Russell were respectively chairman and vice-chairman, and local committees in most of the counties of England and Wales, as well as at Calcutta and Canton. One of its last publications was the *Penny Encyclopedia*, but becoming short of funds it became extinct. Mr. Youatt's

scheme for the instruction of the public, set out by him sixty years ago, was in two great divisions; the first was to begin with the animals constituting the most valuable part of the farmer's property, "their origin, their different breeds, their structure, the most economical and profitable and humane method of treating them, and the art of rendering their services more extensive and permanent, and their health and comfort more secure." The first great division comprised those animals which aid the power of man—the horse, the ox, the ass, the mule, the dog; then followed those which supply food and clothing—horned cattle, sheep, swine, goats, poultry, rabbits, bees; and those which were hurtful—the fox, weasel, rat, mole, insects. In dealing with the subject of domestic animals, their history, various kinds, structure and habits, feeding and treatment when young, management when worked, and diseases, were successively considered.

The other great division was "the General Principles of Agriculture." Under this head was to be treated "whatever related to the nature of soils and manures, the rotation of crops, farm buildings and machinery, sheep farming and dairy farming, potatoes and spade husbandry, wood and timber"; and, "in addition, brewing, baking, washing and bleaching, land-measuring, road-making, bridge-building, quarrying, lime-burning, &c.," were to be discussed in the progress of the series. Those who have perused Youatt's original editions on the Horse, Cattle, Sheep, and the Dog will be astonished at the deep research and profound knowledge of the writer. The first of these, *The Horse*, published in 1831, is a closely printed demy octavo volume of 528 pages; it was a work well suited to the times, and contained a good deal of sound practical advice on the treatment of diseases. *Cattle* and *Sheep* are equally large and equally exhaustive and interesting. "The Sacred Volume, besides its higher claims to stand at the head of the Farmer's Library," is referred to for the earliest information of our domestic animals, and quotations are often made from works of history and travel by eminent authorities. Of Mr. Youatt's ability to discourse on the subject of diseases his appointments as lecturer on Veterinary Medicine at University College, London, and as Veterinary Surgeon to the Zoological Society are the best evidence.

The same year, 1828, Youatt established a school at the infirmary for providing a course of lectures on the anatomy and diseases of the dog, illustrated by living examples, a branch of study not supplied at the College; among Professor Simonds's fellow students were the late Mr. W. C. Spooner of Southampton, Mr. E. Stanley of Banbury, and Mr. H. Nash of Dorchester, and a lasting friendship sprang up between master and scholar. These lectures continued till 1830, and were afterwards delivered at the London University under a system which Youatt advocated of a board composed of scientific and practical persons. At the first anniversary dinner of veterinary surgeons, April 22, 1829, he proposed the Royal Veterinary College, and predicted that the time was not far distant when that Institution would fulfil the admirable purposes of its excellent founders, and would

be more identified with the agricultural interests of the country. His researches and communications on rabies were also widely known and appreciated at that period.

The books on *Cattle*, published in 1834, and *Sheep*, in 1837, are standard works to this day, and Simpkin, Marshall & Co. republished them in 1867 and 1869. Youatt's division of cattle was into Middlehorns, Longhorns, and Shorthorns ; the last "originally from East Yorkshire, improved in Durham, mostly cultivated in the northern counties and in Lincolnshire, and many of them found in every part of the kingdom where the farmer attends much to his dairy, or a large supply of milk is wanted." "The *Longhorns*, originally from Lancashire, much improved by Mr. Bakewell in Leicestershire, and established through the greater part of the midland counties ; and the *Middlehorns*, not derived from a mixture of the two preceding, but a distinct and valuable and beautiful breed, inhabiting principally the north of Devon, the east of Sussex, Herefordshire, Gloucestershire, and, of diminished bulk and with somewhat different character, the cattle of the Scottish and the Welsh mountains. The Alderney, with her *crumpled horn*, is found on the southern coast and in smaller numbers in gentlemen's parks and pleasure grounds everywhere ; while the polled or *hornless* cattle prevail in Suffolk and Norfolk and in Galloway, whence they were derived." He considered the Middlehorns to be the native breed of Great Britain, and gave them the first place in his book. The other classification, especially that bestowed by our Continental neighbours on our British cattle of "large and small breeds," or "breeds for milk and breeds for flesh," appears to have been overlooked. About one-half of the 600 pages is apportioned to "the anatomical structure and diseases of cattle," and he states, "veterinary science," as it regards cattle, is "so truly in its infancy that the farmer should take the most prudent course and avoid, as much as he can, the possibility of contagion." Phthisis, or consumption, and the formation of tubercles is lengthily discussed, and he finally concludes by strongly advising the enlargement of cowhouses, and the ventilation of close and hot ones. "Let cruel neglect, exposure, and starvation yield to more judicious and humane treatment ; let those that exhibit decided symptoms of consumption be removed from the dairy, not because the disease is contagious, but because it is undeniably hereditary ; and in fine, where so little can be done in the way of cure, let nothing be omitted in the way of prevention."

The volume on *Sheep* is as large as, and, if anything, more exhaustive than, the work on *Cattle*. The classification is Short Wools, "those used for fine cloths are now all of foreign growth ;" the Middle Wools, headed by the Southdown ; and the Long Wools, headed by the Leicester. A long account is given of the introduction and spread of the Merino sheep in Britain, and there are excellent diagrams showing the serrated structure of the fibre of wool ; the author being the first who had recognised and given ocular demonstration of its existence. In addition to the anatomy,

diseases, and general management of sheep, the volume concludes with the Mountain Shepherd's Manual. *The Dog* was treated in the same exhaustive manner, but in a smaller book ; here the author was at home, and consequently it stands out unrivalled by any subsequent writer. Youatt's masterly description of that terrible malady rabies will ever remain a true guide in recognising its existence under its different forms. The other sections of the work abound with practical knowledge of the diseases and treatment of this noble animal, as he is so frequently designated. The later editions conclude with the new laws of coursing.

This brief sketch of Mr. Youatt's life would be incomplete without reference to the active part he took in associating veterinary practice with the English—afterwards called the Royal—Agricultural Society. One of the clauses in the Society's Charter of Incorporation, 1838, gave power to the Council to take measures "to improve the veterinary art in its application to cattle, sheep, and pigs." This clause is attributed to Mr. William Shaw, proprietor and editor of the *Mark Lane Express—Gazette* as it was then called—who acted as secretary to the new Society. Mr. Shaw and Mr. Youatt were in close communication ; they were old and intimate friends acting together to advance veterinary science, and they missed no opportunity of placing before the public the absolute necessity of extending veterinary knowledge to other animals besides the horse, to which it had been confined from the foundation of the College in 1792–93. No sooner was the Charter obtained and a veterinary committee formed than a sub-committee was selected to advise as to the best means of carrying out the principle of the clause. The sub-committee consisted of Professor Coleman, Assistant-Professor Sewell, Youatt, Simonds and Shaw. It recommended that means be taken to effect the co-operation of the Governors of the Veterinary College with the Council of the Society. This was soon effected, and Assistant-Professor Sewell was instructed to extend his teaching so as to embrace the diseases of other animals of the farm. Arrangements were made with Mr. Flight, who had a large dairy at Islington, to have any of the cows attacked with disease sent to an adjacent building, where they could be seen and receive attention by Mr. Sewell, accompanied by some of the College pupils. Notices were issued that sick cattle and sheep would be received at the College and treated gratuitously. To meet the expenses the Society made a liberal grant of 100*l*. Some sheep and pigs were bought for experiments with regard to the action of medicinal agents on their organism, but no cattle or sheep were sent for treatment. Flight's dairy also afforded little or no advantage. In August of this same year the existence of the disease now known as "foot and mouth" was recognised at many of the London dairies, and also in many parts of the country. It spread so quickly that no part of England could be said to be free. Professor Sewell, chief of the College as he had become by the death of Professor Coleman, issued a circular detailing the symptoms and principles of treatment which in his opinion should be adopted. It is not too much to

assert that the remedies, being of a depletive character, failed to be of much value. Cure rather than prevention of epizootic maladies was then the order of the day. The scheme laid down failing to be of that advantage which it was earnestly hoped it might be, despite all the anxious endeavours of the College authorities to effect its success, was after further trial abandoned. On November 3, 1841, the Council, on the motion of Mr. Shaw, resolved that unless further improvements could be effected, the grant to the College should be discontinued at the end of the current half year.

The problem now to be solved was—What more could be done? Mr. Youatt was urged to take the position of a lecturer, but declined; but he ceased not by word of mouth, and month by month in the pages of the *Veterinarian*, to keep the appointment of a special teacher before the College authorities and the agricultural community. This end was effected in 1842, by the appointment of Professor Simonds.

British Husbandry, exhibiting the farming practice in various parts of the United Kingdom, was issued in 1834 in two volumes. Although published under the superintendence of the Society for Diffusing Useful Knowledge, no author's name is given, but from the general style of writing and occasional references to horses and cattle, it is only natural to infer that Mr. Youatt aided in its publication.

One of his least-known works was *Humanity to Brutes*, published in January, 1839, and dedicated to his friends Professors Dick and Stewart, Messrs. Ainslie, Apperley (Nimrod), Brown, Carlisle, Cartwright, Corbet, Daws, Karkeek, King, May, T. Mayer, junr., Morton, Percivall, Pritchard, Simonds, C. Spooner, W. C. Spooner, St. Clair, Storry, and J. Tombs. It was written on a bed of sickness, and Mrs. Blachford,[1] a great worker in the cause of humanity, is specially alluded to, as having suggested the publication; also his daughter, Mary Ann, who acted as amanuensis. This really was the outcome of an essay "On the Obligations and Extent of Humanity to Brutes," principally considered with reference to the domesticated animals, written in 1839 for and rejected by the Society for the Prevention of Cruelty to Animals, to which he was veterinary surgeon. It contains several chapters on the obligation and duty of humanity to animals, its application, and on the usefulness and good qualities of the inferior animals. There is also a short paper on the dissection of living animals (? vivisection), which he strongly deprecated, and on the study of natural history and the future state

[1] The following anecdote in connection with Mrs. Blachford is related by Professor Simonds. Mr. Green, an aeronaut of past celebrity, had made several ascents on a pony which received some injuries. Mrs. Blachford, hearing of this, took steps to purchase the pony and prevent a repetition of the cruelty. The pony was placed under Professor Simonds for treatment. Although it partially recovered it remained lame and enfeebled, and so much so that it was resolved to kill the animal, and as a memento its skeleton was prepared and presented by Professor Simonds with many anatomical and pathological preparations to the Royal Veterinary College in 1842.

of brutes. The little volume teems with interesting and instructive anecdotes, and the kind, religious spirit of its author, who considered that "the practice of a veterinary surgeon" should be founded on humanity as well as science, pervades the whole book. On the 14th of August, 1839, the members of his profession, recognising his long, unwearied and successful exertions to advance the veterinary art, entertained him to dinner at the Freemasons' Tavern, and there presented him with an elegant dinner service. The tureen bore the following inscription :—"This service of plate was presented by the Veterinary Profession to William Youatt, Esq., A.D. 1839, in testimony of the high esteem they entertain of his literary labours in Veterinary Science." In responding, Mr. Youatt, after having taken a review of veterinary literature, gave an interesting account of the difficulties he had to contend with in establishing the *Veterinarian*. Mr. Simonds proposed "Prosperity to the English Agricultural Society," and Mr. Shaw, the late secretary, in reply, stated that he had had "an opportunity of witnessing the zeal with which Mr. Youatt had laboured to bring about the connection which had recently been formed between the Society and the Veterinary College." Youatt was then a member of the Council of the Royal Agricultural Society of England, and retained his seat until 1842.

His last work after the publication of *The Dog*, which appeared in 1845, was *The Pig*, issued by Messrs. Cradock & Co. in 1847. The author in this work candidly stated that "it has been his task to collect all the various brief and cursory notices which have been accorded to swine by ancient as well as modern agricultural and medical writers, and, by weaving them into the groundwork of his own ideas and experience, to bring the before scattered rays into one focus, so that the eye of science may be attracted towards this hitherto neglected branch." This, like *The Sheep*, is very exhaustive, and treats not only of the hogs of the ancients, and the natural antipathy to pork in many hot countries, but of the race throughout the world generally, and particularly of the English varieties in the different counties. He divided them into the small breed with upright ears and dusky hue; and the large breed, long-bodied and long-eared animals, mostly white or spotted; but he admits that the original breeds are losing all traces of individuality under the varied system of crossing. The Chinese are stated to have two varieties, the white and the black, and, like the Neapolitan, were much used in this country for crossing. The Berkshire has been considered one of the best on account of its small bone, hardihood, early maturity, and aptitude to fatten on little food. The anatomy, breeding, and feeding have each chapters, and piggeries also are described. The preface is signed and dated December, 1846, and an editorial note adds :—"The sudden death of the talented and lamented author having deprived this work of the benefit of his supervision through the press, the Editor has to request the indulgence of the public for any errors which may have accidentally crept in." The illustrations were drawn from life by Mr. W. Martin, and some years later Messrs. Routledge issued a small

shilling edition of this standard work, which was described as by Mr. W. C. L. Martin, entirely revised and edited by Samuel Sidney, of which little work the well-known author of the *Book of the Horse* was uncommonly proud.

Mr. Youatt's death, which was sudden and unexpected, occurred in Osnaburgh Place, Regent's Park, to the dismay and grief of his family and friends, on the 5th of February, 1847, in the seventieth year of his age. JOHN THORNTON.

THE PLAGUE OF FIELD-VOLES.[1]

THOUGH the Departmental Committee appointed by the Board of Agriculture to inquire into the plague of field-voles in Scotland frankly avow their failure to discover any specific means of dealing with this pest, their report is far from being devoid either of interest or of utility. The particular outbreak is attributed to peculiar conditions of weather during the last few years, especially favourable to the breeding of small animals. The winters, though severe in England, have been mild in Scotland; the springs have been exceptionally dry, and the wet autumns, particularly that of 1890, by producing luxuriant grass on the hill pastures, furnished abundant shelter for the voles.

To the destruction of their natural enemies, owls, kestrels, hawks, weasels, &c., by those interested in the preservation of game the plague was in a great measure attributed by the local farmers. The report rightly points out that, as this destruction had been no greater than usual, it could not be reckoned as an active cause of the outbreak; but there can be no possible doubt that but for the war of extermination so long carried on against these "vermin" the plague could never have reached anything like its present dimensions.

In previous outbreaks young trees have suffered great destruction by the voles gnawing at their bark. In the present instance, though some injury has been done in plantations, and though there are not wanting indications of future danger to arable land, the ravages have been committed, for the most part, upon the pastures, and thus indirectly upon the stock. The scarcity of pasture has resulted in low condition among the ewes, which has manifested itself in increased mortality and in a marked deficiency of lambs in a season which, according to the returns from uninfested localities, was of a fully average character.

It is interesting to find that the remedies upon which the Committee report with greatest favour are of the most simple and obvious character. They consist in burning the grass and heather, and thus destroying the runs, and in the direct destruction of the voles by men armed with wooden spades and accompanied by dogs. Indeed,

[1] *Report of the Departmental Committee appointed by the Board of Agriculture to Inquire into a Plague of Field-voles in Scotland.* Pp. xvi + 93, foolscap, with 4 plates and a map. London: Eyre & Spottiswoode, 1893. [C.—6943.] 1*s.* 4*d.*

the Committee are of the opinion that such measures, carried out systematically *at an early stage of the outbreak*, would be most effective, and they express a very natural surprise that, in view of the experience of 1875–6, no concerted attempts were made by the farmers to destroy the voles the moment their numbers appeared to be upon the increase.

Of the remedial measures rejected by the Committee a few words may be said.

The pitfalls, which were used with considerable success in the Forest of Dean in 1813–14, were impracticable in the present case on account of the nature and extent of the land infested. So also were the remedies, sometimes successfully tried on the Continent, of rolling, inundating, or fumigating the runs. Poisoned grain was partially effective, but the area to be dealt with was too large, and the attendant risk to other forms of life too great.

Great interest attaches to that portion of the report which deals with Professor Loeffler's method of destroying voles by endeavouring to communicate to them "mouse typhus," or *Bacillus typhi murium*. The chairman and secretary of the Committee most wisely instituted inquiries on the spot into the results obtained by Dr. Loeffler in Thessaly, and the conclusions they arrived at did not favour the adoption of his method in Scotland. It is open to one fatal objection, namely, that the disease sought to be communicated is not a contagious one, and it is highly unlikely that in the wild state, and surrounded by abundance of vegetable food, any considerable number of the voles would contract the disease by feeding on the dead bodies of their poisoned brethren.

The method, moreover, is a very expensive one, and the virus loses its destructive properties in eight days after its preparation. Still, if mouse typhus were contagious, the trial of the remedy, even in a limited area, might have very far-spreading results. As matters are, however, all that can be said in its favour is that the freshly prepared bacillus is a tolerably certain, though somewhat dilatory, poison, which possesses the one advantage of being innocuous to other forms of life.

Readers of the article on "Vermin of the Farm" in the Journal (Vol. III. 3rd series, Part II. 1892) will remember that, in the Editorial Note on p. 237, no greater success was predicted for Dr. Loeffler's method than had attended a similar endeavour to exterminate rabbits in Australia. In that Note the extreme folly of indiscriminate destruction of the natural enemies of field-voles was strongly insisted on, and this subject has not been overlooked in the report under notice. Such enemies are there divided into two groups, thus :—

Vole-killers, harmless, or nearly so, to sheep, crops, and game	Vole-killers hurtful in other ways.
Owls of all sorts.	Foxes.
Buzzards.	Ravens.
Kestrels and the smaller seagulls.	Carrion and hooded crows.
	Great black-backed gulls, and adders.

The great utility of the owl tribe was strongly urged by Mr. Archibald in the paper, "Wild Birds, Useful and Injurious," which appeared in the Journal, Vol. III. 3rd series, Part IV. 1892, pp. 658–684, and the same writer, after carefully distinguishing the kestrel from the sparrow-hawk, anticipated the verdict of the Departmental Committee in the assertion (p. 663) that "an abundance of kestrels and other mouse-eating birds would act as a most efficient check on the vole plague in Scotland, or in any other locality unfortunate enough to suffer from a similar visitation." We also note with satisfaction that his condemnation (p. 667) of the pole-trap as a barbarous device, more often hurtful to harmless than to mischievous birds, has been embodied in the report of the Committee.

Those who desire more information than is conveyed in the report itself will find much that is of interest in the eight appendices with which it is supplemented. These embrace, among other matters, a full account of the Forest of Dean attack in 1813–14, of the Border outbreak in 1876-77, and of the occurrence of the plague in Thessaly in 1892, together with an exhaustive inquiry into the merits of Dr. Loeffler's remedial method.

As was to be expected from the constitution of the Committee, the compilation of the report leaves nothing to be desired, and, though disappointment will no doubt be felt in some quarters that no sovereign cure for the pest has been discovered, two important lessons have been valuably enforced. The first is the necessity of increased watchfulness, so that the pest may be coped with in its initial stage ; and the second, the importance of a more accurate and widespread knowledge among landowners and their gamekeepers of the habits of such birds as the kestrel and such animals as the weasel.

CECIL WARBURTON.

THE DISEASES AND FEEDING OF CATTLE.[1]

THE various sections of this official publication are written by well-known experts, and are intended for the instruction and use of cattle-owners, especially of those who are located in remote districts of the United States of America, where professional veterinary assistance is difficult, and sometimes impossible, to procure. Whilst advocating the enlistment of veterinary aid whenever it can be obtained, Dr. Salmon nevertheless states that in the many cases where professional examination of the affected animal is out of the question, "the reader may feel assured that the treatment here recommended is safe and the best that can be advised for his use."

[1] *Special Report on Diseases of Cattle and on Cattle Feeding.* Prepared under the direction of Dr. D. E. SALMON, Chief of the Bureau of Animal Industry, by Drs. MURRAY, ATKINSON, HARBAUGH, LOWE, LAW, DICKSON, TRUMBOWER, SMITH, and Professor HENRY. Pages 496, with 44 full-page plates, mostly coloured. Published by authority of the Secretary of Agriculture. Washington: Government Printing Office. 1892.

The pathological section of the work commences with an essay on the administration of medicines, followed by contributions on diseases of the digestive organs, poisons and poisoning, diseases of the heart and blood-vessels, and non-contagious diseases of the organs of respiration. The diseases of the nervous system, of the urinary organs, of the generative organs, the diseases following parturition, and the diseases of young calves come next in order. "Bones, diseases and accidents" form the subject of a separate chapter, succeeded by essays on surgical operations and tumours. Diseases of the skin, of the foot, of the eye, and of the ear are made the subjects of distinct contributions, and a chapter on infectious diseases of cattle completes the major portion of the volume. From this brief enumeration of its contents it will be seen that the work is comprehensive in its scope. It is, moreover, excellently printed, and many of the coloured plates are admirably executed.

Some seventy pages and six plates are devoted to infectious diseases of cattle, and as expressing Transatlantic views on a subject of high international importance this may in some respects be regarded as the most interesting part of the volume. The interest, moreover, is not lessened by the circumstance that Dr. Salmon himself is one of the two joint contributors to this section. If apology were needed for the discussion of this subject, it is amply furnished in the following words :—

> The growing facilities for intercourse between one section of a country and another and between different countries cause a wide distribution of the infectious diseases once restricted to a definite locality. Not only the animals themselves, but the cars, vessels, or other conveyances in which they are carried, may become agents for the dissemination of disease. The growing tendency of specialisation in agriculture, which leads to the maintenance of large herds of cattle, sheep, and swine, makes infectious diseases both more common and more dangerous. Fresh animals are being continually introduced which may be the carriers of disease from other herds, and when this is once introduced into a large herd the losses become very high, because it is difficult, if not impossible, to check a disease after it has once obtained a foothold.

A definition is attempted of the kinds of disorders which may be grouped as infectious :—

> An infectious disease may be defined as any malady caused by the introduction into the body of minute organisms of a vegetable or animal nature which have the power of indefinite multiplication and of setting free certain peculiar poisons which are chiefly responsible for the morbid changes.
>
> This definition might include diseases due to certain animal parasites, such as Trichinæ, for example, which multiply in the digestive tract, but whose progeny is limited to a single generation. By common consent the term "infectious" is restricted to those diseases caused by the invasion and multiplication of certain very minute unicellular organisms included under the general classes of Bacteria and Protozoa. Nearly all the diseases of cattle, for which a definite cause has been traced, are due to Bacteria. Among these are tuberculosis, anthrax, black quarter, and tetanus (or lock-

jaw). Only one, Texas fever, is traceable to Protozoa, and one, actinomycosis, to a fungus. Those diseases of which the cause is unknown, or imperfectly worked out, are pleuro-pneumonia, rinderpest, foot-and-mouth disease, rabies, cowpox, malignant catarrh, and dysentery.

The distinction between *infectious* diseases and *contagious* diseases is made the subject of remarks which are worth reproducing, especially as they close with the caution that to label a given disorder as infectious, or contagious, is a very different matter from really understanding the nature of the particular disease in question.

Much discussion has taken place of late years concerning the precise meaning of the words "infection" and "contagion." But these words are now wholly inadequate to express the complete processes of infection, and it may be said that each species of Bacterium or Protozoön has its own peculiar way of invading the animal body, differing more or less from all the rest. There are, however, a few broad distinctions which may be expressed with the help of these old terms. Infection, as laid down above, refers at present in a comprehensive way to all micro-organisms capable of setting up disease in the body. Some micro-organisms are transmitted directly from one animal to another, and the diseases produced may be called "contagious." Among these are included pleuro-pneumonia, rinderpest, foot-and-mouth disease, rabies, cowpox, and tuberculosis. Again, certain organisms are perhaps never transmitted from one animal to another, but may come from the soil. Among these are tetanus, black quarter, anthrax to a large extent, and perhaps actinomycosis in part. These diseases, according to some authorities, may be called miasmatic. There is a third class of infectious diseases of which the specific bacteria are transmitted from one animal to another, as with the contagious diseases, but the bacteria may, under certain favourable conditions, find enough food in the soil and the surroundings of animals to multiply to some extent after they have left the sick before they gain entrance into a healthy animal.

This general classification is subject to change if we take into consideration other characteristics. Thus tuberculosis would not by many be considered contagious in the sense that foot-and-mouth disease is, because of the insidious beginning and slow course of the disease. Yet the Bacillus must come from pre-existing disease in either case. The disease of rabies or hydrophobia is not contagious in the sense that rinderpest is, because the virus of rabies must be inoculated into a wound before it can take effect. Yet in both cases the virus passes without modification from one animal to another, though in different ways.

Again, all the diseases under the second group, which seem to come from the soil and from pastures, are in one sense contagious, in that the virus may be taken from a sick animal and inoculated directly into a healthy animal with positive result. Other illustrations may be cited which show that these old terms are not in themselves satisfactory. There are so many conditions which enter into the process of infection that no single classification will give a sufficiently correct or comprehensive idea of it. These statements will be easily understood if the different infectious diseases in the following pages be studied with reference to the way or ways in which each disease may be contracted. Enough has been said, therefore, to show that if we wish to make ourselves acquainted with the dangers of any given disease we must study that disease and not rely upon any single word to tell the whole story.

English cattle-breeders have too painful an experience of the ravages of contagious pleuro-pneumonia to render necessary any apology for the quotation of the following paragraphs from the volume. The action taken in connection with this matter by the executive authority in the United States will also be within their recent recollection. The responsibility for the statement that pleuro-pneumonia has been eradicated from the United States, and that it is not probable the disease will ever be seen in that country again, rests of course with those who make it. Nevertheless, it seems pertinent to ask how it can be known that every part of a vast territory like the United States is free from pleuro-pneumonia; also, why it is probable that the disease will never be seen in that country again, although cattle are constantly imported from parts of Europe where pleuro-pneumonia is known to exist.

CONTAGIOUS PLEURO-PNEUMONIA.

This disease has been eradicated from the United States, and it is not probable that it will ever be seen in this country again. As, however, much interest has been manifested in regard to it for a number of years, and as our cattle are still prohibited from some foreign markets on account of its recent existence here, the subject is treated at greater length than would otherwise be necessary.

The contagious pleuro-pneumonia of cattle is a specific epizoötic disease which affects bovine animals, and from which other species are exempt. It is characterised, when the disease results from exposure in the usual manner, by an inflammation of the lungs and pleuræ, which is generally extensive and which has a tendency to invade portions of these organs not primarily affected, and to cause death of the diseased portion of the lung. This disease is frequently called *the lung plague*, which corresponds with its German name of *Lungenseuche*. In French it is spoken of as the *péripneumonie contagieuse*.

The history of the contagious pleuro-pneumonia of cattle cannot be traced with any certainty to a period earlier than the beginning of the eighteenth century. No doubt it existed and ravaged the herds of Europe for many years, and perhaps centuries, before that time, but veterinary knowledge was so limited that the descriptions of the symptoms and post-mortem appearances are too vague and too limited to admit of the identification of the maladies to which they refer. It has been supposed by some writers that certain passages in the writings of Aristotle, Livy, and Virgil show the existence of pleuro-pneumonia at the time that their works were composed, but their references are too indefinite to be seriously accepted as indicating this rather than some other disease.

As early as 1713 and 1714 it seems quite plain that pleuro-pneumonia existed in Suabia and several cantons of Switzerland. Even clearer accounts are in existence of its prevalence in Switzerland in 1732, 1743, and 1765. In 1769 a disease of cattle was investigated in Franche-Comté by Bourgelat which was called *murie*, but which undoubtedly was identical with the pleuro-pneumonia of to-day. From that period we have frequent and well-authenticated accounts of its existence in various parts of Europe. During the period from 1790 to 1812 it was spread throughout a large portion of the Continent of Europe by the cattle driven for the subsistence of the armies which marched and countermarched in all directions. It was generally prevalent in Italy in 1800. It appears to have been unknown,

however, in the department of the Nord, France, until 1826, but during the years from 1820 to 1840 it penetrated into most parts of that country. During the same period it was introduced into and allowed to spread over Belgium and Holland.

This contagion is said to have been carried to Ireland from Holland in 1839, and is reported as existing in England in 1842. The disease was brought to the United States at several different times. Probably the first introduction of the contagion was with a diseased cow sold in Brooklyn, New York, in 1843. It came to New Jersey by importing affected animals in 1847. Massachusetts was infected in the same way in 1859.

South Africa was infected by a bull brought from Holland in 1854, and Australia likewise received the contagion with an English cow in 1858. It is also reported as existing in various parts of the continent of Asia, but the time of its first appearance and the extent of its distribution are very uncertain.

Some countries which had only been infected for a short time—such as Norway, Sweden, and Denmark—have succeeded in eradicating the disease without much difficulty by slaughtering all affected and exposed animals. Other countries long infected, and in which the contagion was thoroughly established—like Australia, South Africa, Italy, France, Belgium, and parts of Germany—have laboured long, in some cases making no progress and in others being only partially successful. Holland was one of the first of the thoroughly infected countries to free itself from the contagion.

In the United States, Massachusetts eradicated pleuro-pneumonia during the period from 1860 to 1866. New York and New Jersey made an attempt to eradicate it in 1879, but were not successful. Late in 1883 the contagion was carried to Ohio, probably by Jersey cattle purchased in the vicinity of Baltimore, Maryland, to which place it had extended previous to 1868. From the herd then infected it was spread by the sale of cattle during 1884 to a limited number of herds in Illinois, to one herd in Missouri, and to two herds in Kentucky. The alarm caused among the stock-owners of the United States by this wide-spread dissemination of a disease so much dreaded led to the adoption of active measures for its control and eradication. By co-operation between the United States Department of Agriculture and the authorities of the affected States, it was found possible to prevent the further spread of the contagion and to eradicate it after a few months' delay.

In 1886 pleuro-pneumonia was discovered in some of the large distillery stables of Chicago, and among cows on neighbouring lots. This led to renewed efforts to secure the complete extirpation of this disease from the country. Congress, in 1887, enlarged the appropriation available for this purpose, and gave more extended authority. During the same year the disease was stamped out of Chicago, and has not since appeared in any district west of the Alleghany Mountains.

The work of eradication was at the same time commenced in all of the infected States. Before the end of the year 1889, Pennsylvania, Delaware, Maryland, the district of Columbia and Virginia, had been freed from the disease. More difficulties, however, were encountered in the States of New York and New Jersey, on account of the larger territory infected and the density of the population. The long struggle was crowned with success, however, and the last animal in which the disease appeared in the State of New York was slaughtered early in 1891, and the last one affected in New Jersey met the same fate early in the spring of 1892.

During these same years a supreme effort has been made to stamp out this lung plague from Great Britain. From the official reports it appears that the number of infected districts and of diseased animals have rapidly

diminished, and there is good reason to believe that if the work is continued for a sufficient time it will meet with success. The chief obstacle appears to be in connection with Ireland, where the contagion is believed to be widely disseminated, and where the activity of the authorities is not so manifest as in England and Scotland. If the contagion is allowed to linger in Ireland, it is very plain that Great Britain can never long remain free from it.

The other infected European countries, though they maintain a veterinary sanitary service, are not making satisfactory progress in eradicating the disease. This is due partly to delays in carrying out the provisions of the laws and partly to mistaken ideas as to the measures which are necessary to accomplish the object. The United States was the last of the countries, having old infected districts, which undertook to stamp out this contagion, and excepting Holland, it is the first to reach success.

Abortion in cattle is a troublesome disorder which well merits the space of ten pages devoted to it, both the contagious and the non-contagious forms of the malady being noticed. With regard to fungus pests, regarded as conducive to abortion, we read :—

Both ergot and smut may be safely fed in moderate quantity, provided it is used with succulent food (silage, roots, &c.), or with free access to water, and salt is an excellent accessory in encouraging the animal to drink. Both ergot and smut are most injurious in winter, when the water supply is frozen up or accessible only at long intervals.

If the foregoing statements may be accepted as correct, they will serve to throw some light upon the conflicting evidence as to the properties of ergot—which, like yew, appears to be consumed sometimes with disastrous results, and at other times with impunity. Exception must be taken to the statement (p. 192) that ergot may be to a large extent prevented by sprinkling the seed with a saturated solution of sulphate of copper before sowing—this is surely based on a misunderstanding of the life-history of the fungus.

The last forty pages are occupied by Professor Henry's essay on the feeding and management of cattle, the inclusion of which in the volume is justified, according to the preface, "on account of the importance of the alimentation as a factor in the maintenance of health and cure of disease, as well as in the profitable management of cattle." The composition of foods and the principles of feeding are first discussed, and then follow practical instructions for the feeding of calves, beef steers, and milch cows. One of the greatest difficulties encountered in calf-rearing is thus referred to :—

Scouring, the bane of calf-rearing, usually indicates indigestion, and is brought on by overfeeding, irregular feeding, giving the feed too cold, or the animal getting chilled or wet. Prevention of disease by rational feeding and systematic good care is far better than poor care and unskilful feeding, followed by attention and solicitude in giving medicines. To check indigestion we have found the use of a tablespoonful of limewater in each feed very satisfactory. Successful management of the calf lies at the very foundation of the stock business, and calls for regularity of attendance, discerning at once all the little wants of the animal, and a generous disposition to supply every need as soon as apparent.

As, owing to climatic considerations, root culture is far less extensively practised in the United States than under the moister climate of Great Britain, Professor Henry advocates the use of silage for steer feeding, and directs special attention to the Indian corn crop as affording excellent material for the silo :—

The British farmer leads the world in the perfection of farm stock, and while this may not be altogether due to his system of feeding, yet that must be a large factor. Under the English system farm animals do not go for any long period on dry food. The cattle go to pasture early and remain late, and when in the stable or yard still have succulent feed in the shape of roots. How different the American system, where our cattle are on pasture a few months in summer, and then return to the stable and yard to subsist on dry food of limited variety for nearly six months! It may not pay in many cases for farmers to grow roots for stock, but we have a means of providing a cheap substitute for turnips and mangel in maize silage. I do not at this time wish to discuss the relative merits of silage and roots, but rather to plead for more general introduction of the silo with those farmers who do not take kindly to root culture. The wonderful development of machinery for planting and cultivating maize enables the farmer to produce a large amount of excellent feed with very little labour. If by some means the juicy, tender stalks can be carried over to winter, we have a very fair substitute in cheap form for the root crop, and this is accomplished by the silo, which gives us at a very small cost a succulent food, palatable to horses, cattle, and sheep.

The use of silage came through dairymen, and to this day the steer feeder seems to hold that silage is only suitable for dairy cows and too sloppy and sour for beef-making. Gradually the prejudice is breaking away, and beef-makers, as well as butter-makers, are beginning to appreciate the silo.

W. Fream.

FURTHER EXPERIMENTS ON CONTAGIOUS FOOT-ROT IN SHEEP.

In a recent number of the Journal[1] the subject of foot-rot among sheep was dealt with, in particular reference to its infectivity when diseased and healthy sheep were pastured together. The last series of experiments was undertaken for the purpose of ascertaining what risk of infection would be incurred when healthy sheep were placed in meadows which had previously been occupied by sheep suffering from the disease in a well-developed stage. Accordingly, six tegs were obtained from a perfectly healthy farm on the Cotswolds where foot-rot had never been known, and were placed in the orchard and meadows at Harrow referred to in the former report.

The following is an exact record of the observations which were made from August 1892 to January 1893 :—

The sheep arrived on August 20, from Andoversford, Gloucestershire ; they were tired and thin after their journey.

[1] Vol. III,, 3rd series, Part II. 1892, pp. 276–291.

Table of Temperatures (in degrees Fahrenheit) of Six Cotswold Wether Lambs.

Mark of identification of sheep	Aug. 24	Aug. 25	Aug. 28	Aug. 31	Sept. 4	Sept. 5	Sept. 6	Sept. 7
1. O.L.	103·6	103·4	106	105·8	107·8	107	107	106·6
2. O.R.	103	103	104·8	106·8	105·4	105·4	105·8	104·6
3. O.L.R.	103·2	103·2	103·2	105·4	103·6	103	103·8	104
4. O.O.R.	103·4	103·4	104·4	104·2	105·2	103·8	103·6	104
5. V.L.	104·6	104·6	105	105·8	105·2	105·2	105·2	105·6
6. No mark	103·4	103·4	104·2	105·4	104·2	105·8	106	107

Mark of identification of sheep	Sept. 9	Sept. 11	Sept. 14	Sept. 16	Sept. 18	Sept. 19	Sept. 21	Sept. 22
1. O.L.	104	103·8	103·4	105·2	104	104	104·8	103·4
2. O.R.	104·4	103·6	104	105	103	103	103·4	104·4
3. O.L.R.	106·2	107	105·4	105·4	103·4	103·4	103·8	103·1
4. O.O.R.	107·2	106·2	106·6	105·2	103	103	103·6	104
5. V.L.	107·4	107·2	106·4	104·4	103·4	103	104·4	104·2
6. No mark	106·4	104·2	103·4	105	102·4	102·4	103·4	103

Mark of identification of sheep	Sept. 24	Sept. 26	Sept. 29	Oct. 2	Oct. 6	Oct. 9	Oct. 11	Oct. 13
1. O.L.	104	104·2	104·4	104·4	103·6	105	104·2	105·4
2. O.R.	104·4	103·4	105	104·4	104·4	103·6	104·8	104
3. O.L.R.	103	103·4	104	105	104·6	105	104·2	104
4. O.O.R.	105	104	104·8	105	104	104·4	105·2	105·2
5. V.L.	104·2	102·4	105	104·6	103·4	105·6	104·2	104·4
6. No mark	102·6	103	105·4	103·6	104	104·2	106	104·2

Mark of identification of sheep	Oct. 16	Oct. 19	Oct. 22	Oct. 25	Oct. 29	Nov. 3	Nov. 6	Nov. 9
1. O.L.	104	105	103	104	103	103·6	103·6	103
2. O.R.	103·6	104·8	103·6	103·4	103·6	102·6	103	103·8
3. O.L.R.	104	101·4	103	102	103·6	103	103·4	102·8
4. O.O.R.	104·6	101·4	103·6	103·4	104	103·2	103·6	103
5. V.L.	103·4	103·8	102·6	102·2	104	103	103·4	103·4
6. No mark	104	101·2	102·4	104·4	103·4	102·2	102·6	103·2

On August 25 they were all penned on a small plot of ground which was occupied by sheep affected by foot-rot in 1891.

Weather.—On August 24 and 25 there were thunderstorms; but the ground previously was hard and dry.

On August 27 and 28 it rained heavily.

On August 31 it was wet, and it rained at night.

From August 31 to September 18 no rain, but frosty on September 16, 17, and 18.

On September 20 and 21, storms.

N.B.—Up to September 21 *the pasturage* was short and *the ground* practically dry.

The sheep were kept—in the same pen which was occupied in 1891 for a long period by sheep suffering from foot-rot—till November 17, on which date they were moved to a pasturage in which diseased sheep had been kept in 1891, and were kept there till January 10 following, when they were sold in perfectly healthy condition, not having shown any characteristic evidence of foot-rot during the above period.

The observations which were made on the temperature of the animals are worth recording, and are given in the table on p. 430. The normal temperature in the animals used for the experiment may be taken as 103·5°.

The sheep were marked thus :—

1. *O.L.* single hole in left ear.
2. *O.R.* „ in right ear.
3. *O.L.R.* one hole in each ear.
4. *O.O.R.* two holes in right ear.
5. *V.L.* a nip at apex of left ear.
6. The sixth sheep was unmarked. *No mark.*

From the rise of temperature in some of the sheep at an earlier part of the experiment it was concluded that some infective matter had been taken into the system. This conclusion was sustained by the further evidence of heat in the feet. But instead of these preliminary symptoms of foot-rot becoming more marked, as they did in the former cases, they gradually subsided altogether. The experiments seem to suggest that a certain quantity of infective matter remained on the grass, and some of the sheep suffered slightly from its effects. But the quantity of active virus was insufficient to cause the full development of the local affection. Time is also an important factor; and there is good reason to believe that an infected pasture becomes comparatively harmless after some months' exposure to climatic influences, especially a winter's frost.

G. T. Brown.

THE PRESENT INCIDENCE OF THE LAND-TAX IN AGRICULTURAL COUNTIES.

THE object of this communication is to demonstrate that the purely agricultural districts are now more unduly taxed than ever, compared with the richer parts of the country, with reference to the "land-tax," and that on this point they clearly have reason for demanding the attention of the Legislature.

The land-tax, originally a payment made in the reign of Henry II. in lieu of military service, was levied on all holders of a certain quantity of land. Various subsequent Acts transferred its incidence to personal property. In 1689 it was levied on "all lands, tenements, hereditaments, annuities, rent-charges, and other rents, parks, warrens, goods, chattels, stock, merchandise, offices (other than military or naval), tolls, profits, and all other estates, both real and personal." But when the whole tax was permanently fixed, in 1798, "the principle of assessment had been widely departed from. Personal estate, which it was evidently intended should contribute the larger share of the annual quota granted, had been gradually relieved from assessment, to such an extent that the proportion of the quota borne by pensions, offices, and personal estate together amounted to only 150,000*l.*, whilst lands, tenements, and other property contributed the remainder." [1] Sir John Sinclair then described it thus: "The land-tax is the most grievous, the most unequal, and the most oppressive tax that was ever raised in this country." It must not be forgotten that this inequality increases daily.

Its present incidence on the counties is shown in Tables I. and II. The first column, giving the amount of the original quota, is taken instead of the present quota payable, because, although it has ceased to be payable by the property, it is still paid by the Government, out of the interest on the capital sums received on redemption. In other words, those persons who have redeemed are in the same position as life members of a charitable institution, as against the now-paying members.

It may be well to remind the reader how this tax is now obtained. The amount of the quota of unredeemed tax for each county is made up of smaller quotas payable by each parish, and this is re-assessed from time to time on the poor-rate valuation. Thus, if the population and the wealth of a parish increase, the land-tax, being fixed, becomes a smaller payment for each individual, till in some of the wealthier towns it has completely disappeared. On the other hand, in those parts of the country which are purely agricultural the tax operates with increased severity. These districts were assessed

[1] Bourdin's *Land Tax*, p. 11.

TABLE I.—*England.*[1]

Counties (including Towns)	Quota of Land-tax imposed on each County by 38 Geo. III., 1798	Amount of Land-tax Redeemed from 1798 to 1891	Rateable Value as assessed to Poor-Rate, 1890	Fraction of Penny in the £ showing the Incidence of the 1798 Quota on the Rateable Value
	£	£	£	*d.*
Bedford	28,555	11,688	810,319	8·46
Berks	40,844	21,684	1,511,654	6·48
Bucks	47,143	24,477	893,916	12·06
Cambridge	32,695	11,486	1,189,938	6·59
Chester	28,599	10,111	3,670,174	1·87
Cornwall	31,943	14,793	1,301,604	5·89
Cumberland	3,714	2,102	1,660,633	·53
Derby	24,094	8,677	1,943,844	2·97
Devon	82,583	37,244	3,047,448	6·45
Dorset	33,080	12,273	1,022,360	7·77
Durham	10,598	7,010	4,055,006	·63
Essex	89,397	50,640	3,222,803	6·66
Gloucester	47,312	22,837	2,808,356	4·04
Hereford	20,409	8,272	848,198	5·77
Hertford	42,283	24,803	1,143,866	8·87
Huntingdon	15,497	5,126	352,458	10·55
Kent	82,553	48,348	4,362,840	4·54
Lancaster	20,990	11,279	18,644,418	·27
Leicester	34,685	14,500	1,938,825	4·29
Lincoln	71,907	23,380	2,906,983	5·94
Middlesex	326,146	222,773	34,586,625	2·26
Monmouth	9,812	3,486	1,176,683	2·00
Norfolk	84,307	24,389	2,230,064	9·07
Northampton	47,670	19,625	1,596,315	7·17
Northumberland	14,549	6,946	2,688,026	1·29
Nottingham	27,277	10,830	2,409,780	2·72
Oxon	38,722	16,329	1,044,522	8·90
Rutland	5,525	1,441	206,562	6·42
Salop	29,057	10,544	1,754,809	3·99
Somerset	72,473	29,781	2,991,785	5·81
Southampton	55,362	30,837	3,129,108	4·25
Stafford	26,700	11,540	4,241,325	1·51
Suffolk	73,506	25,913	1,655,252	10·66
Surrey	66,133	40,271	3,439,372	4·61
Sussex	60,048	32,295	3,244,707	4·44
Warwick	39,790	19,239	3,648,087	2·62
Worcester	35,518	16,714	1,948,106	4·38
Wilts	49,722	21,369	1,388,145	8·60
Westmoreland	3,045	1,830	534,907	1·37
York	91,494	51,436	14,202,829	1·55
ENGLAND	1,945,737	968,318	145,452,652	—

[1] Scotland's quota was 47,954*l.*; Ireland's, of course, nothing.

TABLE II.— *Wales.*

Counties (including Towns)	Quota of Land-tax imposed on each County by 38 Geo. III., 1798	Amount of Land-tax Redeemed from 1798 to 1891	Rateable Value as assessed to Poor-Rate, 1890	Fraction of Penny in the £ showing the Incidence of the 1798 Quota on the Rateable Value
	£	£	£	*d.*
Anglesea . . .	1,633	651	129,584	3·02
Brecon . . .	3,052	1,098	292,525	2·50
Cardigan . . .	1,373	498	308,796	1·07
Carmarthen . .	4,370	1,439	497,547	2·11
Carnarvon . . .	2,337	718	495,517	1·13
Denbigh . . .	6,800	1,937	560,864	2·91
Flint	2,315	895	184,140	3·02
Glamorgan . . .	7,906	2,989	3,018,642	·62
Merioneth . . .	2,433	528	286,878	2·04
Montgomery . .	5,853	1,584	416,055	3·38
Pembroke . . .	3,173	1,587	367,648	2·07
Radnor . . .	2,692	937	105,160	6·14
WALES . . .	43,937	14,161	6,663,356	—
ENGLAND . . .	1,945,737	968,318	145,452,652	—
ENGLAND AND WALES	1,989,674	982,479	152,116,008	—

at the time when wheat was the greatest source of wealth in the country, and now that it is at the lowest price ever known the same quota is exacted, whilst there are no other industries to take their share in the burden.

In Tables I. and II. this is shown very clearly, the incidence on agricultural enterprise being enormous, compared with that on commercial interests.

In Table III. I have taken the hundred of Clackclose, in West Norfolk, as a good example of a purely agricultural district. It has practically no manufactures, the chief products being wheat and barley.

We see (Table I.) that although the incidence in Norfolk is 9·07 pence (just over ninepence in the pound), or thirty-three times as much as Lancashire, it does not represent the difference between, say, the purely corn-growing and the manufacturing industry, because in the parish of Wretton (Table III.), for example, the tax is 15·7 pence in the pound, or fifty-eight times as much as in Lancashire. It may be added that in this parish many cottages are empty and half the land is uncultivated.

It is worthy of note that since the first imposition of this tax it has been made use of for naval and military purposes, and has directly assisted in the conquest and absorption of our various colonies,

TABLE III.—*Present Incidence of the Land-tax in the Hundred of Clackclose, Norfolk.*

Parish	Quota of Land-tax imposed on each Parish by 38 Geo. III., 1798			Amount of Land-tax Redeemed from 1798 to 1891			Rateable Value as assessed to Poor-Rate, 1890	Fractions of One Penny in the £ showing the Incidence of the 1798 Quota on the Rateable Value
	£	s.	d.	£	s.	d.	£	d.
Barton Bendish	149	8	0	10	12	0	3,341	10·7
Bexwell	63	10	0	4	8	0	1,477	9·5
Boughton	74	8	0	13	8	0	1,580	11·2
Crimplesham	89	12	0	34	0	0	2,206	9·7
Denver	148	12	0	72	4	0	4,774	7·4
Dereham, West	207	4	0	113	13	4	3,601	13·7
Downham Market	120	17	3	17	15	7½	10,982	2·6
Fincham	179	6	0	38	2	0	4,147	10·8
Fordham	127	18	0	9	19	7	2,427	12·5
Hilgay	223	16	0	60	18	8	9,002	5·9
Marham	132	12	0	14	8	0	3,198	9·9
Roxham	35	8	0	3	11	0	584	14·3
Runcton Holme (and South Runcton)	84	10	6	38	6	6	1,601 911	8·0
Ryston	36	16	0	3	13	6	799	10·8
Shouldham	120	6	0	20	18	0	3,058	9·4
Shouldham Thorpe	86	12	0	7	3	6	1,566	13·1
Southery	124	9	0	5	16	0	5,179	5·7
Stoke Ferry	138	8	0	60	5	8	3,718	8·9
Stow Bardolph	145	14	0	12	9	0	7,828	4·4
Stradsett	98	16	0	9	8	0	1,621	14·5
Tottenhill	69	10	4	17	12	0	1,925	8·6
Wallington	90	0	0	70	15	8	1,393	15·5
Watlington	132	0	0	10	18	0	3,658	8·6
Welney	41	18	0	13	4	0	4,737	2·1
Wereham	127	5	0	66	4	4	3,295	9·2
Wimbotsham	102	12	0	7	3	0	2,475	9·8
Wormegay	104	14	0	36	3	4	2,535	9·8
Wretton	96	13	0	53	10	2	1,461	15·7

the securing of our naval supremacy, and thus, with cheap freights, has aided in bringing the untaxed lands beyond the seas into fierce competition with our own cornfields.

Mr. F. Stevenson's motion a short time since in the House of Commons, to the effect that there should be no increase of the land-tax on small properties, was based on the presumption that the land-tax was a species of income-tax on the individual, and he proposed, practically, that it should be similarly treated, by granting exemption or abatement on the smaller incomes. Sir William Harcourt, in reply, stated that the land-tax had become a rent-charge on the land of the country, but he thought that although this

was an immutable charge on all purchased or inherited property, it might be taken from the shoulders of the poorer classes, and therefore placed on those of the richer; but he did not seem to realise that in favourably considering this suggestion he was ignoring his statement that the tax was immutable, and that if he favoured the relief of the poorer individual, to be logical he must also favour the relief of the poorer community, which he certainly did not appear to do.

Admitting that the tax falls unduly on the agricultural districts, what remedies can we propose? Although "there is no tax that ever was laid upon the people of this nation that is more unjust or unequal than the land-tax," we cannot expect its repeal, for it cannot be said to be unjust to the individual who inherited or bought his property subject to this rent-charge upon it.

But when we deal with the relative liability of the different counties and parishes, this argument does not hold good, because to them, as communities, the payment is not a rent-charge, but an income-tax for Imperial purposes, and each should contribute to the State in accordance with its means.

It seems, therefore, a reasonable suggestion that the whole of the land-tax should be returned to the counties (or, in strict justice, to the parishes) where it is raised, as a subsidy towards the relief of local taxation, and the county of Norfolk has already petitioned Parliament to this effect.

By this means the greater amounts would be returnable to the poorest agricultural districts—the larger towns receiving but little—and depressed agriculture would be sensibly relieved.

Whether this money should go towards paying for the carrying-out of the Parish Councils Bill and other expenses preparing for us, or for the subsidy of indoor poor-relief, it is not necessary to discuss. Undoubtedly, any discouragement that can be given to the increasing outdoor relief will be to the permanent advantage of the labouring classes.

But the broad fact remains that the profits on agricultural enterprise are now so reduced by foreign competition that the industry cannot thrive, and we have the right to ask that the burden that we bear for the benefit of the State should not, at any rate, be greater than that borne by commerce and manufactures.

E. R. Pratt.

[Note.—With regard to the origin of the land-tax, the following is an extract from Lord Macaulay's account of the financial events of the year 1692, "when the land-tax was first imposed"[1]:—

In the Committee of Ways and Means it was determined that a great part of the charge of the year should be defrayed by means of an impost which, though old in substance, was new in form.

From a very early period to the middle of the seventeenth century our

[1] Quoted in the *Twenty-eighth Report of the Commissioners of Her Majesty's Inland Revenue*, 1885, p. 87.

Parliaments had provided for the extraordinary necessities of the Government chiefly by granting subsidies. A subsidy was raised by an impost on the people of the realm in respect of their reputed estates. Landed property was the chief subject of taxation, and was assessed nominally at four shillings in the pound. But the assessment was made in such a way that it not only did not rise in proportion to the rise in the value of land, or to the fall in the value of the precious metals, but went on constantly sinking, till at length the rate was, in truth, less than twopence in the pound. In the time of Charles the First a real tax of four shillings in the pound on land would probably have yielded near a million and a half, but a subsidy amounted to little more than fifty thousand pounds.

The financiers of the Long Parliament devised a more efficient mode of taxing estates. The sum which was to be raised was fixed. It was then distributed among the counties in proportion to their supposed wealth, and was levied within each county by a rate. The revenue derived from these assessments in the time of the Commonwealth varied from thirty-five thousand pounds to a hundred and twenty thousand pounds a month.

After the Restoration the Legislature seemed for a time inclined to revert in finance, as in other things, to the ancient practice. Subsidies were once or twice granted to Charles the Second. But it soon appeared that the old system was much less convenient than the new system.

The Cavaliers condescended to take a lesson in the art of taxation from the Roundheads; and during the interval between the Restoration and the Revolution extraordinary calls were occasionally met by assessments resembling the assessments of the Commonwealth.

After the Revolution the war with France made it necessary to have recourse annually to this abundant source of revenue. In 1689, in 1690, and in 1691 great sums had been raised on the land. At length, in 1692, it was determined to draw supplies from real property more largely than ever. The Commons resolved that a new and more accurate valuation of estates should be made over the whole realm, and that on the rental thus ascertained a pound rate should be paid to the Government.

Such was the origin of the existing land-tax. The valuation made in 1692 has remained unaltered down to our own time. According to that valuation one shilling in the pound on the rental of the kingdom amounted in round numbers to half a million. During a hundred and six years a Land-tax Bill was annually presented to Parliament, and was annually passed, though not always, without murmurs from the country gentlemen. The rate was, in time of war, four shillings in the pound. In time of peace, before the reign of George the Third, only two or three shillings were usually granted, and during a short part of the prudent and gentle administration of Walpole the Government asked for only one shilling.

But after the disastrous year in which England drew the sword against her American colonies the rate was never less than four shillings. At length, in the year 1798, the Parliament relieved itself from the trouble of passing a new Act every spring. The land-tax at four shillings in the pound was made permanent, and those who were subject to it were permitted to redeem it. A great part has been redeemed, and at present a little more than a fiftieth of the ordinary revenue required in time of peace is raised by that impost which was once regarded as the most productive of all the resources of the State.—Ed.]

SWINE FEVER.

On February 7, 1893, a Departmental Committee of the Board of Agriculture was appointed to inquire into the working of the provisions of the Contagious Diseases (Animals) Acts in so far as they relate to Swine Fever, and—having regard to the nature of that disease, and to the conditions under which swine are infected therewith—to consider whether any more effective measures can be adopted for its prevention and extirpation. The Committee consisted of Lord Edmond Fitzmaurice (Chairman), Sir William S. B. Kaye, C.B., Q.C., Sir Jacob Wilson, Professor G. T. Brown, C.B., Mr. R. G. Wardlaw Ramsay, Mr. Alexander Shaw, Mr. Joseph Smith, junior, Mr. T. Carrington Smith, and Mr. Clement Stephenson. The following are the salient points in the Report, which is dated March 27, 1893.[1]

History of Swine Fever.—In this country swine fever does not appear to have been recognised as a special disease until 1862, when Professor Simonds investigated a virulent outbreak in Berkshire.

A fatal disease of the pig, however, was known to the Bristol dealers under the name of *red disease*, *soldier*, or *purples*, for some time before that date, and there is no doubt it had a prior existence on the American and European continents.

Up to 1878 swine fever was allowed to spread unchecked by any regulations. After the passing of the Act of 1878, several Local Authorities urged upon the Privy Council the importance of including swine fever in the definition of disease under the provisions of that Act.

An Order was accordingly passed, entitled the Typhoid Fever of Swine Order, dated December, 1878, providing for the slaughter of diseased swine by the Local Authority, who had also discretionary power to slaughter swine that had been in contact with diseased animals. The Order further provided that no swine should be moved out of the pigsty, or other place where disease existed or had existed within six days, without a licence, and then only for slaughter.

In 1879 the returns showed that 53 counties had been infected, 2,765 outbreaks occurred, and 17,074 swine had been attacked.

From 1878 to 1892 various measures for the suppression of swine fever were adopted by Local Authorities under the Orders of the Privy Council and the Board of Agriculture.[2] These measures included the slaughter of diseased swine, and of those that had been

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[1] *Report of the Departmental Committee appointed by the Board of Agriculture to inquire into Swine Fever: with Minutes of Evidence, Index, and Appendices.* Part I. Report. [C. 6999.] Price 1*d*. Pp. 8. Part II. Minutes of Evidence, Appendices, and Index. [C. 6999—I.] Price 2*s*. 3*d*. Pp. iv. + 272. London: Eyre & Spottiswoode, 1893.

[2] The Agricultural Department of the Privy Council was in 1889 transferred to the Board of Agriculture.

in contact with them ; the regulation of sales and markets, and the prohibition of movement of swine into certain districts. The regulations adopted failed, however, to produce any marked effect upon the disease.

Though in the year 1892 there was a considerable reduction in the number of cases of disease reported, there is reason to believe that this reduction was more apparent than real, and that it was due in some measure to a reduction in the number of swine in the country, and to a still greater extent to the discontinuance on the part of the Local Authorities of the payment of compensation, which had the effect of making the owners of swine negligent in giving notice of the disease.

The failure of Local Authorities to make any impression on the disease was chiefly due to the absence of uniformity of action in different parts of the country, and it appeared in evidence that many of the Local Authorities had discontinued slaughter and other measures of repression, on account of the discouragement which arose from swine fever being repeatedly introduced into their districts from other districts where the regulations were extremely lax, and slaughter was not adopted.

The extension of swine fever to Ireland was probably due to the importation of infected swine from some part of Great Britain. The disease certainly became prevalent in Ireland soon after it was recognised in England.

Character and Nature of Swine Fever.—Swine fever is a contagious and infectious eruptive fever of the pig, distinguished by characteristic symptoms,[1] which vary to some extent in different stages of the disease.

In the severe form of the malady, there is usually redness of the skin behind the ears and on the inside of the thighs, belly, and under the armpits, with a short, husky cough, loss of appetite, great thirst, elevation of internal temperature to 105°, 106°, and 107° F., constipation, followed by profuse diarrhœa, emaciation, prostration ; and there is frequently loss of power in the hind extremities.

The principal *post-mortem* appearances are congestion of portions of the lung, in some cases with consolidation ; swollen and hyperæmic condition of the bronchial and other lymphatic glands ; inflammation of the pleural and peritoneal membranes, and exudation of fluid into the cavities of the chest and abdomen. The mucous membrane of the intestines is often congested throughout : and the mucous membrane of the large intestine, near the ilio-cæcal valve and throughout the cæcum, is in a state of ulceration in various stages. This ulceration or croupous exudation is a constant and characteristic morbid condition of swine fever.

In the milder form of the disease several of the most marked symptoms may be altogether absent, and in some cases there are no indications of departure from health which would in any way attract the attention of the ordinary observer.

[1] See this volume of the Journal (Part I., 1893), p. 140.

Occasionally the pig may cough, and a careful inspection would show that the glands in the groin are enlarged and tender, but there is nothing in the aspect of the animal to indicate that it is suffering from a highly contagious malady.

On *post-mortem* examination, however, the distinctive lesions, *i.e.* ulceration of the bowels, and especially ulceration of the large intestines, or croupous exudation mentioned above, will be found.

It will therefore be evident that while, in the large proportion of cases, swine fever is indicated by symptoms of such a definite character that an experienced observer has no difficulty in arriving at a correct conclusion, yet there are other instances in which the disease assumes an occult form, and when the diagnosis is a matter of extreme difficulty. In these cases, consequently, it is often necessary to slaughter the animal and make a careful *post-mortem* examination before the existence of the disease can be determined.

The evidence satisfied the Committee that the identification of swine fever is a matter of extreme importance, and that in every case of a reported outbreak means should be adopted to determine the nature of the malady before the provisions of the Contagious Diseases (Animals) Acts are applied.

With regard to the conditions under which the disease is spread, it is quite certain that contact of diseased with healthy swine is among the most certain means of its propagation.

It has further been demonstrated that the introduction of the virus beneath the skin and its ingestion with the food with which it has been mixed, intentionally or by accident, will produce the disease.

Swine fever can also be conveyed through the agency of persons, animals, and substances, which have been in contact with diseased swine or with their excreta, or with their morbid parts. The disease is as virulently infectious and contagious, and as fatal, as cattle plague, and, like that malady, can be conveyed from diseased to healthy animals through channels the existence of which is often unsuspected.

Several witnesses spoke in strong terms of the risk of infection from railway trucks and dealers' carts.

In the course of the inquiry the question was frequently put as to the possible influence of sties and similar places inhabited by diseased pigs, in perpetuating the disease. The Committee had ample evidence before them that the insanitary condition and faulty construction of many of these places often led to a continuance of the disease which otherwise might have been more speedily eradicated.

The opinion was repeatedly expressed that in many cases the destruction of the pigsty would be necessary.

Some of the scientific witnesses were of opinion that the virus remained active for a long period, and some even suggested that pigsties and places where diseased pigs had been kept should be closed for fifty-eight days. It would seem, however, that this long

period would not be necessary where the premises are so constructed as to be capable of thorough cleansing and disinfection.

Further Measures for the Extirpation of Swine Fever.—In answer to the question as to whether any further measures could be taken for the extirpation of swine fever, there was a remarkable uniformity of opinion on the part of the witnesses. The invariable reply was to the effect that the work of exterminating the disease should be placed in the hands of a Central Authority responsible for the efficient execution of the Acts and Orders.

They agreed that this Central Authority should have power to slaughter and pay the costs of the execution of the Acts and Orders, and should regulate movement and sales of swine, but that the existing machinery of the Local Authority should be taken advantage of as far as possible.

It was also agreed on the part of nearly all the witnesses that the slaughter of diseased and in-contact swine would not be sufficient to get rid of the disease, and several witnesses were of opinion that, if the choice were to lie between the system of either slaughter or of restrictions on movement, the latter would prove more efficacious. The evidence was, however, to the effect that slaughter, combined with restrictions on movement and the employment of thorough cleansing and disinfection, constituted the means most likely to result in success.

In reference to the restrictions on movement of swine, some evidence was given that the definition of very large areas was unnecessary and might be objectionable, owing to the interference with trade, and to the inconvenience which would result therefrom, whilst on the other hand evidence was also given showing the unmistakeable advantage of large areas in the case of an outbreak.

Most of the witnesses were asked to give an opinion on the subject of licences, either of pig-keepers or dealers or both, and the evidence given was generally in favour of a system of licensing dealers, but it was considered that, having regard to the enormous numbers of owners of one or two pigs, it would be absolutely impracticable to carry out a system of licensing or the registration of pig-keepers in general.

Overwhelming evidence was given to the effect that by the adoption of proper measures swine fever could be extinguished in a reasonable time. It was also pointed out to the Committee that, although the cost of extinguishing the disease would be very considerable, at all events for the first year, the enormous loss which has resulted from the prevalence of swine fever for the last fourteen years, and the prospect of still further loss in the future, would justify considerable expenditure being incurred.

The Appendix to the Report contains tables which give an estimate of the pig population in Great Britain and Ireland, the losses which have been incurred in consequence of the prevalence of swine fever, and other matters of interest.

RECOMMENDATIONS.

Having stated their conclusions, based upon the foregoing summary of evidence, the Committee finally submit to the President of the Board of Agriculture the following recommendations :—

(*a.*) The administration of the Contagious Diseases (Animals) Acts throughout Great Britain and Ireland, so far as they relate to slaughter, compensation, and regulation of movement of swine in herds or on premises, where an outbreak of swine-fever has occurred, or in the surrounding area, shall be subject to and under the direction of a Central Authority in Great Britain and Ireland respectively.

(*b.*) The power of entry of Inspectors into premises where swine are kept shall be extended.

(*c.*) The scale of compensation for healthy in-contact swine slaughtered by order of the Central Authority shall be the value of the pig immediately before it was slaughtered, but so that the amount does not in any case exceed 8*l.* The compensation for a diseased pig shall not exceed one-half of its value immediately before it became so affected, but so that the compensation does not in any case exceed 4*l.*

(*d.*) Compensation shall be provided out of an Imperial fund.

(*e.*) Steps shall be taken to ensure improved sanitary conditions in all places where swine are kept.

It will be seen in the Appendix (p. lxix) that at the Meeting of Council of the Royal Agricultural Society held on May 31, 1893, a resolution endorsing the foregoing recommendations was carried unanimously.

RECENT AGRICULTURAL INVENTIONS

The subjects of Applications for Patents from March 20 *to June* 10, 1893.

N.B.—Where the Invention is a communication from abroad, the name of the Inventor is shown in italics, between parentheses, after the name of the applicant.

Agricultural Machinery and Implements, &c.

No. of Application. Year 1893.	Name of Applicant.	Title of Invention.
6003	BARTELS, F.	Ploughs.
6145	STAFFORD, W. E.	Ploughs.
6691	RIORDAN, P.	Hay-making machinery.
6745	CASEY, M.	Cultivators.
7099	MAXWELL, G.	Sheaf binding.
7165	SHARPE, A.	Threshing machines.
7338	RUSHBY, C. T.	Hoes.
7814	COOKE, J. E.	Tying string or wire in hop yards.
7856	RUPPE, O. B.	Machine for sowing seeds.

No. of Application. Year 1893.	Name of Applicant.	Title of Invention.
8044	PICK, J. H.	Double-action hoe blade.
8128	PHILLIPSON, B. R.	Propagating seed frame.
8194	ARDAGH, R. Y.	Tool for tying string in hop training.
8307	JONES, T.	Hand-ploughing machine.
8375	FREE, J. W.	Malting grain.
8483	MUNDAY, J.	Reaping machines.
8588	LEGENDRE, T. A.	Drying hay.
8627	RICHMOND, J. G.	Sifters applied to chaff cutters.
8738	BARKER, W. H.	Travelling platforms for self-binding harvesters.
8789	BOULT, A. J. (*Sattler, Germany*)	Lawn mowers.
8858	STEEVENSON, J. E.	Revolving plough.
8879	GOSTLING, W. A. K.	Ventilating hay stacks.
8886	ANDERSON, J.	Combined seed-drill and manure-sower, and plough.
8918	MATHEWSON, A.	Potato digger.
9015	SCHLÜTTER, R. J. M.	Blades for scythes, chaff cutters, &c.
9103	BENTALL, E. E.	Preparing roots for sheep and cattle.
9233	JOHNSON, J. (*McCulloch, U.S.A.*)	Mowing machines.
9393	HORNSBY & INNOCENT	Guards for straw trussers.
9620	BRENTON, W.	Root pulpers.
9645	RANSOME & LEWIS	Potato diggers.
9698	HARRIS, R. & C.	Mowing and reaping machines, &c.
9705	WOODYATT, A. R.	Lawn mowers.
9874	YOUNG, R.	Knives for reaping machines.
10236	KEELING, R.	Threshing machines.
10250	LOVE, G.	Preventing over-heating in hay stacks, &c.
10293	HOFFMANN, E. A.	Potato digger.
10410	MACDONALD, A. & J.	Machinery for distributing manure, &c.
10449	JAENISCH, H.	Revolving harrow.
10697	SLEEP, W. S.	Ploughshares.
11093	CRAGAE, A. M.	Machine for cutting thistles, &c.
11115	OSBORN, F L.	Horse hay rake.
11155	ASHURST, J. L. & L. B.	Agricultural drills.
11188	SUNDERLAND, E.	Horse rakes.
11192	BOWSER, D. J.	Implement for planting seeds.
11423	MCGREGOR,	Reels of harvesting machines.
11424	„ „	Sheaf-binding harvesting machines.

Stable Utensils and Fittings—Horse-shoes, &c.

6010	SCOTT, J.	Safety stirrups.
6042	SEWELL, F. G. & T.	Hameless horse-collar.
6166	DAVIES, E. P.	Horse-collar.
6203	SEWELL, F. G. & T.	Horse-blinker for bridle.
6419	CALLWELL, G. N.	Brushing boot for horses.

No. of Application. Year 1893.	Name of Applicant.	Title of Invention.
6495	GOODMAN (*Wiseman, New Zealand*)	Safety attachment for stirrups.
6650	DADE & DARBY	Pads for horse-shoes.
6793	WELCOME & WALTON	Harness.
6865	McQUILLIN & VERNER	Horse-shoes.
6980	COPE, B. E.	Safety stirrup-iron.
6986	HEATH, R	Preventing and curing tumours, &c., in horses.
7007	ARMSTRONG, J. & W.	Tug suspender for harness.
7193	WAKFER, W. H.	Horse-shoes.
7300	KLÜGEL, F. R.	Controlling runaway horses.
7321	PURDIE, J. J.	Horse-collar pad.
7344	SCHMIDT, R. H.	Folding horse-trough.
7522	STARSMORE, J.	Hoof-pads for horse-shoes.
7531	ROSS, D.	Nailless horse-shoe and pad.
7704	SCOTT, J.	Pull-clip for horse hames.
7815	HEPWORTH, J.	Cart saddle-trees.
7837	MAYHEW, F. W.	Safety buckle for stirrup-leathers.
7956	SELKIRK, J. A.	Horse-collars.
8070	ROBERTSON, F. S.	Yoking and loosing of horses to and from machines.
8170	WADDELL, W.	Horse-shoes.
8209	CLARKE & LAMING	Leg boot for horses.
8327	MARTIN & WYLES	Horse-shoes.
8418	COCHRANE, J. & J. P.	Horse-collars.
8494	PROCTER and others	Horse-shoes.
8515	FRY, J.	Stirrup-leathers.
8549	WILDE, J. T.	Horse-shoes.
8766	JOB, F.	Horse-collars.
8775	DODGE, H.	Horse-shoes.
8891	YETTS, H. M.	Horse kicking-breaker.
8894	WOODS, H. B.	Horse-action improver.
9008	HAYES, M. H.	Ladies' saddles.
9043	HAYES, M. H.	Side saddles.
9187	TAAFE, P.	Horse clothing.
9197	MEYER, X. R.	Actuating horse-clippers.
9298	WITHERS, T. G. & S.	Spurs.
9379	CASILE, F.	Horse-clippers.
9792	AUDOUIN, D.	Stirrup.
9852	TURNER, F.	Horse-shoe grip to prevent slipping.
10010	TOZER, S.	Horse-collar.
10077	REDMOND, L.	Horse-collar.
10112	BOULT, A. J. (*Closa & Soriano, Spain*)	Detaching horses from vehicles.
10308	JENKINS, R.	Securing turrets to harness pads.
10372	PYBOURNE, T., & anr.	Horse-shoes.
10404	WAKFER, W. H.	Horse-shoes.
10443	HAYES and others	Ladies' saddles.
10561	SCOTT, R.	Saddles.

No. of Application Year 1893.	Name of Applicant.	Title of Invention.
10566	FARRER, C.	Horse-shoes.
10572	SCOTT, R.	Horse-collar.
10726	FLETCHER, T.	Horse-shoes.
10805 10806	WATKINS, B.	Frost nails, &c. for horse-shoes.
10959	TIFFANY, W. C.	Horse-shoes.
11031	POUPARD, M. E.	Horse-shoes.
11216	MACKENZIE, C. & L. P.	Stable pillars, &c.
11232	THOMAS, L. P.	Apparatus for curbing horses.
11260	BURNUP, J. M. (*Bourselley, France*)	Saddles.
11269	BARKER, A.	Pads for horses.

Carts and Carriages.

7681	MORTON, J.	Bogie for moving hay.
7793	BRITTAIN, H.	Spring locks or catches for dog-carts, &c.
8193	WOOD, A.	Safety device for carts to prevent horses from bolting.
8645	NIELD, S. W.	Brake mechanism for carts, &c.
10294	BALDWIN, M. C.	Brake-shoes.
10406	STEPHENS, G.	Connection to road vehicles for stopping runaway horses.
10492	STONE, J. S. & W. N.	Self-locking screw tipping apparatus for carts, &c.

Dairy Utensils, &c.

5984	SETTLE, E. W.	Churns.
6076	ADAMS, W. W.	Fastening for milk churns.
7073	DOUGLAS, W. H.	Facilitating delivery of milk.
7079	LISTER, E. A.	Milk testers.
7285	MCMAHON, J.	Butter packages.
7547	TICHBORNE, C. R., & anr.	Determining butter fat in milk.
7552	MCMULLAN, A.	Vertical churn.
7709	SAXON, S. J.	Churn.
7725	HEDGES, C.	Cleaning churns, &c.
8016	SEAL, H., & BAINES, W.	Milk-can protector.
9058	WALLIS, C. G.	Railway milk churns.
9215	SMITH, W.	Hoops for bottom laps of milk churns.
9540	GELDARD, G. R.	Testing for water in butter.
9631	PIJTTERSEN, H. F., and others	Milking machines.
10106	KERNODLE, J. A. C., and others	Churn.
10246	GREENWOOD, W.	Receptacle for milk for attachment to door of dwelling-houses.
11026	WAHLIN, A.	Cream separators.

No. of Application. Year 1893.	Name of Applicant.	Title of Invention.
11066	BOULT, A. J. (*Atwater, U.S.A.*)	Milking machines.
11275	DUNCAN, J. H. H.	Churns,

Poultry and Game, &c., Appliances.

6370	HAZZARD & MARTIN	Egg-testing device.
7177	KEY, W. C.	Setting boxes and nests.
7259	RANDOLPH	Doors for poultry houses.
7520	WALKER, F. T.	Incubator.
7684	STAINES, J. H.	Hen-coop.
8128	PHILLIPSON, B. R.	Hutches for rearing poultry.
9405	GREENWOOD, W. W.	Incubators.
10055	SEYFERTH, F. W.	Packing eggs for shipment.
10735	PARKES, F.	Portable hutch and pen for poultry.
11308	BARNETT, C.	Chicken drinking-trough.

Miscellaneous.

6165	BARWELL, W. and anr.	Device for leading animals.
6522	JOYCE, W. T.	Queen and drone excluders for bee-hives.
6974	URSIN, F.	Cattle food,
7452	MCKEAN, J.	Bee-hives.
7571	ABBOTT, S. W.	Comb foundation for bee-hives.
7973	VEVERS, J. H.	Hurdle for fencing round stacks.
8503	CRAWCOUR, W. H.	Hair and wool clippers.
8566	JACOB, F.	Apparatus for suckling young animals.
8587	CHATTOCK, H. E.	Feeding cakes for cattle.
8647	SHAILER, G. W., and anr.	Ear-marking sheep.
8910	ELLIOTT, S.	Liquid for use as fertiliser and insecticide.
9157	GIBBIE, J. and anr.	Apparatus for scaring vermin.
9342	RICHARDS, E.	Protector for plants, &c.
10109	PARKER, A. H.	Hay-rack.
10495	BURNETT, A. T.	Drinking pail for cattle.
10735	PARKES, F.	Portable kennel.

Numbers of Specifications relating to the above subjects published since March 20, 1893.[1]

Specifications of 1892.

4671, 5549, 6502, 7010, 7317, 7634, 7697, 7823, 7938, 8237, 8325, 8339, 8437, 8844, 9269, 9406, 10040, 10053, 10066, 10395, 10719, 10730, 10826, 11185, 11345, 13695, 16712, 16813, 18033, 20236, 20335, 21402, 23806, 23557, 23667.

Specifications of 1893.

115, 195, 436, 747, 1038, 2067, 2312, 2711, 2729, 3296, 3359, 4088, 4481, 4602, 4782, 5523, 5852, 5854, 6701, 7300.

[1] Copies (price 8*d.* each, post free) may be obtained at the Patent Office (Sale and Store Branch), 38 Cursitor Street, London, E.C.

STATISTICS AFFECTING BRITISH AGRICULTURAL INTERESTS.

AGRICULTURAL PRODUCE STATISTICS, 1892.

THE exceptional nature of the harvest of 1892 confers an additional interest upon the Agricultural Produce Statistics, issued for that year by the Board of Agriculture on April 17, 1893. From them, and from the Agricultural Returns published previously, the Table occupying pp. 450–1 is compiled, whilst the following remarks are extracted from the report of Major Craigie, Director of the Statistical Branch of the Board.

To the particulars for Great Britain have been added similar data for the Irish crops, so as to enable a general estimate to be shown of the aggregate produce and average yield for the *United Kingdom*, exclusive of the Isle of Man and Channel Islands, where no particulars of this nature are collected by the authorities.

Totals for the United Kingdom.—Making, in the first place, a general contrast between the gross out-turn of the crops reported on in each of the past two years for the *United Kingdom* as a whole, the estimated total produce and yield per acre may be thus compared :—

Crops	Estimated total produce		Yield per acre	
	1892	1891	1892	1891
	bushels	bushels	bushels	bushels
Wheat	60,775,245	74,742,700	26·48	31·30
Barley	76,939,135	79,555,089	34·78	34·72
Oats	168,181,197	166,472,428	39·82	40·46
Beans	7,054,275	10,694,376	22·38	29·83
Peas	5,028,494	5,777,445	25·85	28·23
	tons	tons	tons	tons
Potatoes	5,633,954	6,090,047	4·45	4·74
Turnips	31,419,153	29,741,587	14·04	13·40
Mangel	7,427,771	7,558,216	17·99	18·60
	cwts	cwts	cwts	cwts
Hay from clover, sainfoin, &c.	80,305,423	85,566,162	29·10	31·39
Hay from permanent pasture	150,024,198	167,862,776	23·30	28·13
Hops	413,259	436,716	7·35	7·78

The Yield of Wheat.—The largely diminished Wheat crop of 1892, which is 14,000,000 bushels below that of 1891, is due to a double cause—the reduced area remaining under this cereal and the very poor results of the past harvest. The yield of 1892 was nearly five bushels per acre under the yield of 1891. But it is to be noted that, so far as the small areas still grown in Ireland and Scotland affect the figures given for the United Kingdom, their estimates

tend to reduce the serious loss apparent if the figures for England alone, where over 90 per cent of our Wheat is produced, were the subject of observation.

The aggregate Wheat crop in Great Britain is 18·81 per cent. below the estimate of 1891. In England the decline is fully 19·78 per cent. But this also is not equally distributed. If the case of the Eastern or Corn-growing half of England be separated from that of the Western and Northern Counties, the aggregate deficiency of the Eastern Wheat crop must indeed be put at 22 per cent. compared with the immediately preceding year. Narrowing still further the region of special disaster in a yet more closely circumscribed area -consisting of the group of counties formed by Cambs, Hunts, Beds, and Herts—the estimates of the Wheat harvest of 1892 show a deficit of 30 per cent. below 1891, the mean yield of this area receding from 33 to as little as 23 bushels per acre.

The Yield of Barley.—The Barley crop of Great Britain in 1892 was, like that of Wheat, reaped from a reduced area. But unlike Wheat, the yield per acre was 1·73 per cent. over average, so that the aggregate produce of the season was only slightly less than in 1891.

In this case, also, the results vary much in geographical distribution. In the Eastern half of England the crop, if over that of 1891, was by a small percentage below the normal average, while in the group of counties lying to the West the yield was more than 8 per cent. over average, in Wales more than 5 per cent. over average, and in the North and in Scotland more than 3 per cent. over average.

The Yield of Oats.—The average yield per acre of Oats in Great Britain in 1892 scarcely varied from that credited to 1891, or to the standard quoted as the normal average—all three estimates running within a fraction of 39 bushels. As, however, the acreage now used for this cereal has increased even more largely than that of Wheat has diminished in the past season, the aggregate result is to furnish a crop about equal to that of 1886, and not much below the produce of 1890, when on an area nearly a hundred thousand acres less, a crop of over 41 bushels to the acre was estimated to have been secured.

In the case of this cereal, also, the East of England seems to have fared worse than the West or North. Small as the net changes were in either direction from the mean, the average yield per acre in the Eastern half of the country ran from 4 to 5 per cent. below the standard of 1885—while the Western counties show 8 per cent. above their normal yield, and in Wales the crop is more than 5 per cent. above the average. In Scotland the Oat crop is nearly 2 per cent. under average. In Cambridge, the county of estimated highest yield in England, the deficit this year represents about 7½ bushels to the acre, and the case of Huntingdon is about as bad. In Berks and in Oxford there are also relatively bad crops, while Cornwall returns a yield almost as much above average as Cambridge is below it. In several districts, especially the later ones, complaint of low quality is also made as regards the Oat crop of 1892.

The Yield of Beans.—The aggregate reduction in the Bean crop of 1892 amounts to fully 33 per cent. But as this crop was grown on an acreage some 12 per cent. smaller than that of 1891, the result is due in part to this circumstance, although the low yield per acre, which gave an average of only 22 bushels, was a still more potent factor in the reduction. In Essex, where we have over 29,000 acres –the second largest county area—under Beans, the estimate for 1892 only represents a yield of 11·6 bushels per acre against the 32 bushels expected in an ordinary year. In Lincolnshire, where over 25,000 acres are grown, the deficit is 16·6 bushels per acre, and crops of from 10 to 12 bushels short are reported from Suffolk, Berkshire, Buckingham, Oxford and Rutland.

The Yield of Peas.—Less marked deficiency appears to have characterised the Pea crop of the past year. The general yield is about 9 per cent. short in this case, while in Lincolnshire and in the East Riding the crop seems to have been fully 24 per cent. under average. In Essex, where Peas are grown on 23,000 acres, the deficit comes out as $5\frac{1}{2}$ bushels per acre below an ordinary crop, but in the adjoining county of Suffolk the crop is little over one bushel per acre short.

The Yield of Potatoes.—The estimated average yield of 5·80 tons to the acre is a little above that of the crop of 1891, but under the standard average of 1885, which slightly exceeded 6 tons for Great Britain—the English standard being about a third of a ton over, and the Scotch a fifth of a ton under, that figure. In Bedford, Northampton, Hereford, Somerset, and Wilts the cultivators report crops running from 1·2 to 1·8 tons above average, while on the other hand a complaint of deficient crops comes from the East Riding of York, where on 13,000 acres only $5\frac{1}{4}$ in place of $7\frac{1}{4}$ tons have been secured, and the Cheshire, Derbyshire, and some of the Scotch crops are estimated as below average. Reports as to disease have not been numerous, but damage of a special character was complained of from the occurrence of late and severe frosts in several districts.

The Yield of Turnips.—The Turnip crop in Great Britain must be regarded, relatively to the crops recorded since 1883, as a good one, the estimate standing as it does above 14 tons to the acre. Only thrice before, out of eight estimates, has an average of as much as 14 tons been recorded in Great Britain, and, in such years as 1885 and 1887, little more than 10 tons of Turnips to the acre was reported. The Lancashire estimators claim this year the largest English crop, 19·4 tons to the acre, while the smallest crops are reported from Dorset, with 10·7 tons to the acre, and the East Riding of York with 10·5 tons to the acre. In both these cases the results are far below the mean. In Scotland there would appear to be an even wider range of experiences this year than in England, for an estimate of as much as 21·4 tons to the acre is on the one hand hazarded from Caithness and one of little over 9 tons to the acre in Kinross. It must, however, be admitted that a close estimate in the case of this root crop must at all times be attended with especial difficulty.

Estimated Total Produce and Yield per Acre of the Principal Crops, Cattle, Sheep, and Pigs, in the United

[*From the Agricultural Returns and*

Crops	England						Wales					
	Acreage, 'thousands' (000) omitted		Produce of crops, 'thousands' (000) omitted		Average yield per acre		Acreage, 'thousands' (000) omitted		Produce of crops, 'thousands' (000) omitted		Average yield per acre	
	1891	1892	1891	1892	1891	1892	1891	1892	1891	1892	1891	1892
Corn Crops :—	Acres	Acres	Bush.	Bush.	Bush.	Bush.	Acres	Acres	Bush.	Bush.	Bush.	Bush.
Wheat	2,192	2,103	68,694	55,107	31·33	26·20	62	55	1,462	1,319	23·73	23·86
Barley or Bere	1,772	1,710	60,901	59,511	34·36	34·81	117	115	3,439	3,351	29·36	29·26
Oats	1,673	1,765	69,786	73,266	41·72	41·50	234	233	7,699	7,977	32·89	34·18
Rye	38	39	—	—	—	—	1	1	—	—	—	—
Beans	337	295	9,966	6,390	29·54	21·70	2	2	55	44	29·11	28·34
Peas	201	192	5,703	4,966	28·31	25·91	2	1	31	25	19·98	19·73
Total Corn Crops	6,213	6,104	—	—	—	—	417	407	—	—	—	—
Green Crops :—			Tons	Tons	Tons	Tons			Tons	Tons	Tons	Tons
Potatoes	355	350	2,051	2,085	5·78	5·96	38	37	208	207	5·44	5·66
Turnips and Swedes	1,368	1,390	17,704	19,122	12·94	13·76	71	71	1,010	1,138	14·31	16·04
Mangel	345	352	6,598	6,520	19·10	18·52	8	8	130	142	16·55	17·97
Cabbage, Kohl-rabi, and Rape	146	142	—	—	—	—	2	2	—	—	—	—
Vetches or Tares	214	184	—	—	—	—	2	2	—	—	—	—
Other Green Crops	102	92	—	—	—	—	1	1	—	—	—	—
Total Green Crops	2,530	2,510	—	—	—	—	122	121	—	—	—	—
Other Crops, Grass, &c. :—												
Clover and artificial grasses and permanent pasture	10,389	10,348	—	—	—	—	1,683	1,650	—	—	—	—
Ditto for hay	5,458	5,409	Cwt. 140,646	Cwt. 111,178	—	—	654	671	Cwt. 12,902	Cwt. 12,069	—	—
Flax	2	1	—	—	—	—	—	—	—	—	—	—
Hops	56	56	437	413	Cwt. 7·78	Cwt. 7·35	—	—	—	—	—	—
Small Fruit[3]	53	57	—	—	—	—	1	1	—	—	—	—
Total other Crops	15,958	15,871	—	—	—	—	2,338	2,322	—	—	—	—

Live Stock	Year 1891	Year 1892	Year 1891	Year 1892
	Actual No.	Actual No.	Actual No.	Actual No.
Horses	1,143,050	1,169,146	150,186	148,827
Cattle	4,870,215	4,968,590	759,309	754,467
Sheep	17,874,722	17,993,756	3,233,936	3,197,501
Pigs	2,461,185	1,828,512	270,082	197,302

Note.—The produce of Corn Crops for Ireland, originally returned in weight, has been converted into *bushels*, at the rate of 60 *lb.* to the bushel of Wheat; 50 *lb.* to the bushel of Barley; 39 *lb.* to the bushel of Oats; and 60 *lb.* to the bushel of Beans and Peas.

and also the Acreage under other Crops and Grass, and Numbers of Horses, Kingdom in the Years 1891 *and* 1892.
the Agricultural Produce Statistics.]

Scotland						Ireland						United Kingdom					
Acreage, 'thousands' (000) omitted		Produce of crops, 'thousands' (000) omitted		Average yield per acre		Acreage, 'thousands' (000) omitted		Produce of crops, 'thousands' (000) omitted		Average yield per acre		Acreage, 'thousands' (000) omitted		Produce of crops, 'thousands' (000) omitted		Average yield per acre	
1891	**1892**	**1891**	**1892**	**1891**	**1892**	**1891**	**1892**	**1891**	**1892**	**1891**	**1892**	**1891**	**1892**	**1891**	**1892**	**1891**	**1892**
Acres	Acres	Bush.	Bush.	Bush.	Bush.	Acres	Acres	Bush.	Bush.	Bush.	Bush.	Acres	Acres	Bush.	Bush.	Bush.	Bush
53	62	1,971	2,135	36·98	34·66	81	75	2,615	2,214	32·34	29·36	2,388	2,295	74,743	60,775	31·30	26·48
223	213	7,790	7,623	34·89	35·84	178	176	7,426	6,455	41·64	36·76	2,291	2,212	79,555	76,939	34·72	34·78
992	999	34,902	35,052	35·17	35·10	1,215	1,226	54,086	51,886	44·50	42·31	4,115	4,224	166,472	168,181	40·46	39·82
7	8	—	—	—	—	13	13	—	—	—	—	60	61	—	—	—	—
15	15	493	470	32·21	31·23	4	4	181	149	43·58	37·51	359	315	10,694	7,054	29·82	22·38
1	1	26	27	24·48	22·66	1	½	18	11	30·48	24·97	205	195	5,777	5,028	28·23	25·85
1,292	1,298	—	—	—	—	1,492	1,494½	—	—	—	—	9,418	9,302	—	—	—	—
		Tons	Tons	Tons	Tons			Tons	Tons	Tons	Tons	Acres	Acres	Tons	Tous	Ton	Tons
140	139	795	757	5·68	5·44	753	740	3,037	2,585	4·03	3·49	1,286	1,265	6,090	5,634	4·74	4·45
480	476	6,678	7,088	13·91	14·88	300	300	4,349	4,071	14·48	13·55	2,219	2,238	29,742	31,419	13·40	14·04
1	1	23	19	16·74	14·77	[1] 52	[1] 52	[1] 807	[1] 747	[1] 15·60	[1] 14·49	406	413	7,558	7,428	18·60	17·99
9	7	—	—	—	—	[2] 50	[2] 48	—	—	—	—	207	199	—	—	—	—
12	12	—	—	—	—	6	5	—	—	—	—	234	204	—	—	—	—
3	2	—	—	—	—	30	30	—	—	—	—	138	128	—	—	—	—
645	637	—	—	—	—	1,191	1,175	—	—	—	—	4,490	4,447	—	—	—	—
2,445	2,407	—	—	—	—	10,291	10,251	—	—	—	—	24,870	24,716	—	—	—	—
		Cwt.	Cwt.					Cwt.	Cwt.					Cwt.	Cwt.		
521	545	13,023	17,059	—	—	2,058	2,144	86,857	90,025	—	—	8,693	8,768	253,429	230,330	—	—
—	—	—	—	—	—	75	71	—	—	—	—	76	72	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	56	56	437	413	Cwt. 7·78	Cwt. 7·35
5	5	—	—	—	—	—	—	—	—	—	—	[4] 60	[4] 63	—	—	—	—
2,971	2,957	—	—	—	—	12,424	12,466	—	—	—	—	33,755	33,675	—	—	—	—

Year 1891	Year 1892	Year 1891	Year 1892	Year 1891	Year 1892
Actual No. 195,167	Actual No. 200,109	Actual No. 528,576	Actual No. 539,788	Actual No. 2,026,170	Actual No. 2,067,549
1,223,297	1,221,726	4,448,477	4,531,025	11,343,686	11,519,417
7,623,900	7,543,447	4,722,391	4,827,702	33,533,988	33,642,808
157,506	112,015	1,367,776	1,115,888	4,272,764	3,265,898

[1] Including Beetroot. [2] Cabbage and rape only. [3] Gooseberries, strawberries, currants, and other small fruit.
[4] Excluding Ireland.

The Yield of Mangel.—The interest in the Mangel crop centres in the more southerly counties of Great Britain. The average estimated yield in 1892 is 1·3 tons below the standard of 19·8 tons. In Norfolk, which has 49,000 acres under this root, the results are given as 17 tons to the acre, against somewhat more than 18 tons last year, and against an average of over 19 tons in a normal season. In Suffolk, where 34,000 acres are grown, a like deficit of 2 tons below the standard is reported. Devonshire, with nearly 30,000 acres, estimates a yield of 16½ tons in place of 18; but Dorset, where much higher yields have been reckoned on, comes nearly up to its average produce with 25·7 tons to the acre in the past year.

The Yield of Hay.—The remarkable shortness of the Hay crop of 1892 must be noted as one of the most serious features of the year. Hay cut from Clover, Sainfoin, and Rotation Grasses, shows a reduction per acre from the average figures of 3·82 cwt., or 13 per cent., while in the case of the Hay cut from Permanent Grass the decline is 6·45 cwt. below the standard, or nearly twice the above percentage. The north has, on the whole, no ground for complaint, while probably three-fourths of the country has suffered.

In Clover Hay yields have been recorded in 1892 varying from 43 cwt. to the acre in Westmoreland to between 12 and 13 cwt. in Hampshire and Berkshire. A large diminution is reported from Bedfordshire, where the crop is estimated to be 16 cwt. per acre below a standard yield of 38 cwt.; but the largest relative decline is that of Hampshire, where the report gives 15·79 cwt. short out of 28·35, or much less than half a crop. Some estimators state that in the South thousands of acres showed so thin a crop that it was not even cut. Decreases of from 7 to 10 cwt. below the normal yield are reported from many Midland and Southern counties. On the other hand, Northumberland is nearly 7 cwt. over average.

In the Hay cut from Permanent Grass only Northumberland and Westmoreland break the English record of short, and frequently very short, produce. In Hampshire, Berkshire, Wilts, and Somerset, the estimate of the crop secured in 1892 falls to little more than half a ton per acre. In Wales the net yield was nearly average, but with great variety between different districts. In Scotland, where the extent of Permanent Grass cut for hay is relatively small, a crop nearly 48 per cent. over average is reported from Stirling, and one nearly 30 per cent. over average in Perthshire, while, at the other end of the scale, the Hay crop credited to Dumfriesshire, where, with one exception, the largest area of Permanent Grass in Scotland is cut, is reduced by 41 per cent., whilst inclement weather has reduced the Hay crop of the Orkneys, cut from permanent grass, to a quarter of a ton.

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ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

SUGGESTIONS FOR STOCK-FEEDING IN THE WINTER OF 1893–94.

I.

How to meet the winter is a problem which can never have caused stock-feeders more anxious thought than at the present time, after the disastrous spring and early summer drought, which must always render the year 1893 alike memorable and exceptional. In due time it will, no doubt, be desirable to write the history of the approaching winter of 1893–94, and such history, based upon experience, will possess the value of a permanent record, access to which will always be possible. On this occasion, however, and in view of the fodder famine which, in many districts, seems imminent, an attempt has been made to anticipate the trying time that lies ahead, and to place at the disposal of stock-feeders various suggestions, the adoption of one or more of which may, it is hoped, serve to alleviate the distress which the winter cannot fail to bring with it.

A characteristic feature of the recent drought was its unequal distribution, not merely within the island of Great Britain, but even within the limits of England and Wales. In the paper entitled "The Spring Drought of 1893," which Mr. G. J. Symons, F.R.S., has contributed to this volume of the Journal, it is stated (p. 354) that the area over which the drought has been severe is that south-east of a line joining Cardiff to Hull. If there be laid upon the map a rule, the edges of which touch Cardiff and Hull, it will be seen that the

drought-stricken area embraces about twenty counties. It is within this area, which includes the Eastern, Southern, Western, and part of the Midland counties of England, that the pinch of the coming winter will be most severely felt.

Accordingly, it is from practical men dwelling within this south-eastern half of England that the suggestions contained in the following pages have been drawn. There is embodied in these suggestions nothing that is either theoretical on the one hand, or beyond the limits or capacity of the ordinary stock-feeder on the other, and their intrinsic value cannot but be increased by the fact that they all emanate from men each of whom has to face the winter problem himself. For convenience of reference the names of the authors are here given in alphabetical order, whilst the numbers indicate the sequence in which their several communications are presented to the reader :—

II. Mr. J. F. Beddall, Marston Park, Ampthill, Beds.
III. Mr. T. R. Hulbert, North Cerney, Cirencester, Glos.
IV. Mr. Clare Sewell Read, Honingham Thorpe, Norfolk.
V. Professor J. P. Sheldon, Sheen, Ashbourne (Staffs).
VI. Mr. H. Simmons, Bearwood Farm, Wokingham, Berks.
VII. Mr. Alfred J. Smith, Rendlesham, Woodbridge, Suffolk.
VIII. Mr. Tom T. Stacey, Winterbourne Kingston, Blandford, Dorset.
IX. Mr. Thomas Stirton, Stratton, Micheldever, Hants.
X. Mr. Richard Stratton, The Duffryn, Newport, Mon.

In the course of the inquiry I received various letters, from several of which serviceable extracts may be made, and these may appropriately appear at this stage.

An extensive breeder and feeder, and successful exhibitor of stock, dwelling in Kent, but who has also had considerable experience elsewhere, says :—

Last winter I used a great quantity of dried grains with success, and this year I am thinking of steaming mixed hay and straw with different kinds of meal, and thus as far as possible both economising the fodder crops and supplying the moisture which we lose through the deficient root-crops. Molasses may be of use in this direction.

The point, however, which exercises me most is that I should like to feed this steamed mixture *warm*, if not *hot*, to the stock, and I am not clear how such beasts, especially the store cattle, can stand this, unless they are in covered courts—which, again, I do not think very good for them. We might possibly meet the case by feeding them with dry artificial food outside during the day, and giving them a "boiling" at night under cover.

I feel sure of moderate success with fat cattle, but I apprehend some difficulty with regard to store cattle, more especially as it will not be easy to hit the happy medium in the quantity it will pay to give them.

No doubt, while the late grass lasts, it will be necessary to keep every-

thing out of doors as long as we can, and I look forward somewhat hopefully to being able to meet half-way, so to speak, the spring catch crops.

I do not think that the *bulking* value of straw is well understood in some parts of England. If a good flavour is imparted to the straw by the steamed mixture I suggest, a considerable saving may be effected by using as much of it as can be spared for fodder instead of for bedding, while those people who have access to rushes, flags, bracken, heather, bent, &c., are in much better case than those who have not such material to fall back upon, and they should not miss any opportunity which may offer itself of preparing and using such waste products as bedding.

In spite of scarcity, many farmers are apt to use their straw in the ordinary way, though perhaps more sparingly, and then resort to makeshifts when it is finished. This, however, should not be. I would rather say, begin at once, and rigidly enforce entire abstinence from straw, except as a food, and then only *chopped*, and, as I have said, steamed and flavoured. Then, I believe that, with care, and looking forward to early spring crops, we may weather the winter, though undoubtedly it must be one of the most trying the British farmer has ever had to encounter.

The next communication is from a farmer in the Fens, who has to carry a large number of cattle through the winter with only half the usual amount of straw and clover hay, and no roots :—

I would suggest that stock be kept out of doors, weather permitting, as far as possible into the autumn—in the droughty year of 1868 our autumn keep was very abundant. After that, the only advice I could give would be to purchase the cheapest feeding stuffs procurable in each farmer's immediate neighbourhood, taking bulk into consideration—dried grains, for example, where there is not too much carriage to pay. Keep the beasts out on the grass as long as practicable, and then in covered yards or hovels. Cut into chaff all the oat-straw and part of the wheat-straw, steaming the latter to make it more readily digestible. Practise the greatest economy in every direction.

A successful farmer, of nearly half-a-century's experience in stock-breeding, writes as follows from the water-meadows district of Wiltshire :—

The wintering of stock is most important work at all times, and must especially be carried out with anxious care by the feeder who is called upon to face the winter on short commons in such a season as the present.

Those who supplement their failing pastures in good time will effect a great saving of food hereafter, by prolonging the period during which the stock may be kept out, as well as preserving their health. A moderate feed in early morning will help in this direction, and nothing, I think, is better for the purpose than chaff with a mixture of meal, consisting of two parts of thin sweet barley to one of old beans finely ground. The time to begin must be influenced by the condition of the pastures and the state of the weather; but it would be well to be prepared to commence with the usual October rains, or at any rate not after the white frosts of November, or the cattle may be chilled, and sheep lost from water on the chest.

Such feeding will probably carry stock in health till near Christmas, when, if fodder is to be made the most of, they must be put into winter quarters, whilst those who are better acquainted with the chaff-cutter than I

am are more fitted to give advice thereon. Therefore, I pass over the next few weeks in silence, as they embrace a period which has never given me such great anxiety or trouble as is referred to in the old couplet—

March will search, and April try,
But May's the month your cattle die.

If kept on short commons, dry husky fodder must be avoided. As stock crave for dry, warm, stimulating food in early winter, so they pine for moist, nourishing, digestible food in spring. Nothing, in my opinion, meets the requirement like sweet chaff with the best linseed cake. Such food will maintain health through March, and ward off red water and blain on turning out in April and May. But this feeding must not be stopped hastily. "Two flails and the cuckoo going together" have gladdened the heart of many a husbandman,—it means a bit of corn and fodder to finish the winter season.

The last communication I need quote is from a correspondent who has for the last twenty years farmed nearly 1,500 acres on the borders of Somerset and Wiltshire :—

My own plan, when short of keep, is to put in as much rye as possible. My sheep were feeding on rye last winter from November till April, and did well on it with ½ lb. cake. For dry food I have found Mr. Jonas's plan, described in your Journal,[1] a very good one: that is, cutting green oats, grass or clover, with straw, two men putting up the straw and a boy the green stuff. In the droughty year of 1868 I had a lot of stuff put away by the same method for the winter, but was so short of keep that my ewes ate it in July.

With regard to the use of linseed oil as food for stock, I am indebted to General Viscount Bridport, G.C.B., for the details of management on his home farm at Cricket St. Thomas, Somerset, where this material is employed in winter feeding with highly satisfactory results. The method followed is to mix one quart of linseed oil with one gallon of boiling water. This is poured from a watering-pot with rose over a heap of about four bushels of chaff. It is found convenient to make the mixture the day previous to use, and the quantity mentioned is enough for eight beasts. All kinds of stock, however—horses, cattle, and sheep—were fed last winter in this way, and throughout the season the horses were free from colic or gripes. The oil was bought in London at 1*s.* 11*d.* a gallon, free on rail, and was sent out in tins and barrels. Calling the price 2*s.* a gallon, one quart would cost 6*d.*; and as this is sufficient for a meal for eight beasts, the outlay for oil would be ¾*d.* per head. Linseed oil will continue to be used on Lord Bridport's farm throughout the coming winter, as experience proves that a considerable saving in the food bill is thereby effected.

It will be found, in the succeeding pages, that the use of straw as bedding or litter, in such a season as the present, is condemned

[1] *Straw Chaff*, by Samuel Jonas. Journal (2nd Series), Vol. VI., 1870.

by most of the authors. Various substitutes for ordinary litter are suggested, and it may therefore be useful to state that an investigation conducted at the Jönköping Experiment Station, Sweden, in 1891, into the absorptive power of materials used for stable-bedding, gave the following results, the numbers showing how many times its own weight of water the water-free sample of each material absorbed :—

Heath litter . .	3·2	Wheat straw . .	3·9	Oak leaves . .	3·7
Oak shavings . .	3·9	Oat straw . . .	4·1	Birch leaves . .	4·5
Pine shavings . .	4·0	Barley straw . .	4·3	Moor earth . .	15·1
Birch shavings .	5·3	Rye straw . . .	4·9	Peat	16·9

The papers which follow have not been written upon any set or uniform plan, nor have they arisen in response to a stereotyped schedule of questions. Rather are they the spontaneous utterances of the practical men who have been good enough to write them, and they thus possess a freshness and an originality which could hardly otherwise have been attained. Though in the main anticipatory, they are necessarily at the outset somewhat retrospective in character. Moreover, as a local flavour to the opinions expressed, and to the practices advocated, is by no means inconsistent with the object in view, it will be useful to associate each author with the district from which he writes. The critical reader will be prepared, then, to look for differences of opinion, such as are bound to find expression when localities as far apart as Monmouth and Suffolk, or as Dorset and Norfolk, are brought under notice. Furthermore, it is well to remember that the papers were written at the beginning of September, as several references are made to the date current at the time.

It is in the hope that stock-feeders may find suggested, amongst the following communications, methods which might be usefully incorporated with their own winter practice, that these papers are laid before them. I am tempted to summarise, if ever so briefly, the salient points which are set forth by the several writers. I feel, however, that I should be doing the reader but an ill-service were I to stand longer between him and those who have kindly enunciated a series of practicable proposals, based upon actual experience, for carrying live stock through what is bound to be, even at the best, an unusually difficult and trying winter.

W. Fream.

II.

The majority of farmers in the Eastern and Midland counties enter upon the winter with comparatively nothing at command

in the shape of either hay, straw, or roots. Many will undoubtedly be compelled to sell stock at half their average value. Others more fortunately placed will probably make desperate efforts to retain animals which in numberless instances could hardly be replaced; being the result of many years' judicious selection and breeding, to suit the requirements of the soil and locality. Very little can be done at the end of September, by way of making provision for late or early keeping; our seedsmen, however, testify to the fact that the advice given on all sides to shorten the winter in this way has been generally followed.

In offering a few suggestions as to how an ordinary cultivator, of perhaps limited means, may cast about to his advantage, I am primarily impressed with the idea that, should the winter be ever so favourable, there is not on hundreds of occupations sufficient bulky feeding material to combine with such alimentary constituents as it may be within the farmer's means to supply, or purchase, for his cattle. This being the case, there will be next to nothing to spare for bedding or litter, even inside the buildings. Probably every known substitute available, locally or otherwise, will be requisitioned, and peat moss litter will be largely bought. In nine cases out of ten, as the cost of haulage will put this out of the range of ordinary farmers, experience indicates that dry earth may be stored for use with advantage. In proof of this,—our circumstances on 800 acres being those indicated above,—a large number of sows and pigs and weaning calves (the only stock under cover) have for the past three months had nothing else, thereby saving a considerable bulk of straw.

The use of burnt earth or clay, the efficacy of which as a mechanical and manurial improvement to stiff clay land is universally acknowledged, was advocated in the Journal forty years ago by the late Dr. Voelcher, and since then by many able writers, including Lawes, Mechi and others, as one of the best absorbents and deodorisers, when used as bedding for stock. It appears to commend itself in this time of scarcity as the cheapest and healthiest layer for any kind of stock, and when its subsequent value as a manure is considered, it will be seen that a moderate outlay made in burning some handy hillock, or headland, with the aid of useless old pollards or other waste wood, or fine coal (if cheap and easily available), would furnish a valuable addition to the supply of manure in a season which will find it woefully deficient.

The cost of burning will vary from 8*d*. to 1*s*. per yard, and care should be taken not to get the heap too big or too hot, when

clays run together. Even these brick-like lumps may be turned to account in road-mending and in other ways. The burning of a headland may be continuous, leaving a heap the size and shape of a mangel clamp, which should be lightly thatched from day to day when sufficiently cool. Useful bedding is available on some farms from patches of low-lying moorland, and where sandpits are handy, or spent bark or other waste is available, they will probably be turned to account. Sparred floors are successfully used, and if the brick floors of pigsties, &c., be cheaply lined over with old sleepers or boards, it will save half the otherwise necessary bedding.

Having thus proposed to conserve the straw by the use of a substitute, the manufacture of which may probably be worked in the ordinary farm labour account, it will be necessary to consider the most economical and profitable method of utilising the straw, both in the replacement of hay and as the accompaniment of more concentrated foods. The necessity of a proper distension of the stomach in the case of cattle and sheep is an elementary fact known from experience to every practical man. A case occurred within the writer's recollection, some years ago, in which a London trader (having constituted himself a "farmer") was prosecuted, convicted, and fined for cruelty to his cattle (although it was in evidence that a good stock of cake and corn was warehoused on the farm, and that the cattle had plenty of it), simply because, in spite of neighbourly advice, he ignored the fact that a coefficient was required in the shape of bulk.

This department has been well handled by able writers in these pages, and in different publications, for many years, so that it is unnecessary in these days to occupy space with any attempt to prove the value of straw as food. Many feeders, having foreseen the necessity for its increased use long before harvest, will have cut such crops as are better suited to supply it at the earliest possible moment, thereby ensuring the largest proportion of nutritive properties in the straw. Being thus prepared, experience indicates that it is best to reduce the straw to chaff as soon after harvest as possible, in order that it may be properly ripened for use. The cheapest method, and one which has practically superseded all others, is to cut all up at one operation by attaching the cutter to the threshing machine, and mixing the corn and straw chaff together. Our practice for many years has been to cut up the largest possible quantity of all kinds of straw, and store it in a convenient position in the homestead, and, if possible, in the "bay" of a large old-fashioned barn, capable of holding from one to six days' work, according to requirements. The chief point to be aimed at is *consolidation*,

which is attained by treading by men or boys, but better still by horse labour in the same way as barley is frequently treated. If the chaff is carried up an incline (which can subsequently be thrown up or removed), extending along the barn floor or "midstry," the horses can walk off and on, and be kept at it till the work is completed, or as long as they can walk under the roof. The admixture of a pint of salt per bag, and a limited quantity of green fodder cut with the straw the first two or three hours, or in winter some pulped roots, will quicken and increase fermentation, which will render the chaff when cooled down and ripe (in, say, a month) more digestible and acceptable all round, also a safer and better accompaniment to the food of all stock. It may, when so treated, be given to horses with impunity, care being taken to avoid gripes by selecting for them the interior of the heap, and by making any change gradually. A proportion of bran, a few roots, or, where neither are available, an ounce per day each of linseed oil poured over the feed, is advisable where it is found absolutely necessary to use fresh straw chaff for horses without hay.

When preparing the "mixing," should (as will undoubtedly often be the case) the supply of roots fall short, soups may be made with *boiling* water, treacle, sugar, linseed, or meal, and poured over the chaff. If the different feeding-stuffs are in this way well mixed, *the day before* the heap is required for use, the food will have an appetising aroma and digestibility, which will render the expense and tronble of steaming, cooking, or condiments unnecessary.

The present low price of wheat—26*s*. per quarter—will undoubtedly lead to its increased use as food for stock. The old prejudice against its consumption on the farm—founded, probably, on the unsatisfactory results of injudicious administration—is fast disappearing, and it cannot be too widely known that a proportion of one-third mixed and ground with cake, maize, oats, and other corn has been continuously and successfully used for two years past on many large farms, the meal so produced proving a cheaper and more nutritious food than either used alone. For horses or colts the proportion should not exceed one-fourth of the whole, and is best "grittled." Good results have been obtained on small occupations by boiling wheat, and many affirm that it is best thus prepared, especially for pigs.

Probably there will be a run on all such bulky foods as dried grains, malt combs, rice meal, bran, &c. Dried or desiccated grains seem to be steadily increasing in favour. Several good practical men have already laid in a store, and when damped

down with boiling water or steamed the day before being incorporated with the "mixing" above described, we have by different practical comparisons found them a cheap, palatable, and nutritious auxiliary. When fed in a dry state, they did not appear to be worth much more than our properly-prepared chaff.

As a matter rather out of the reach of farmers, on account of the expensive machinery required, I may say that in the course of an endeavour to get information as to continental systems of winter feeding, I have received a letter from M. Grimaldi, of Milan, who has probably given as much attention to food-preparing machinery as any man in the world. He informs me that the machine for reducing straw to pulp (first made under his patent by Messrs. Garrett in 1884) is largely used in Italy and other southern countries, that cattle are chiefly fed on this pulp either alone or mixed with hay, and that they thrive well on it. He has kindly sent me a sample of the pulp, the enclosure of which herewith may elicit editorial opinion.[1] It seems that, notwithstanding the prices at which some continental products are exported to England, the British farmer is in advance of his neighbours generally in the matter of stock feeding; and that the apparent cheapness of some of our importations (butter, to wit) is due (1) to adulteration—which we take no steps to prevent—and (2) to the cheaper labour available.

Possibly many will follow the advice given by M. Viger, the French Minister of Agriculture, who says, "It is an error to think that animals are condemned to perish if the hay crop fails." He recommends the storage and use of the shoots and leaves of trees, and shrubs, and says that "in France, Italy, and Spain cattle are always fed on the dried leaves of poplar, ash, elm, lime, and oak trees . . . that these constitute a forage as rich in feeding material as the best meadow hay . . . By neglecting to use these, much resource is lost to the country." The leaves and twigs should be gathered and stacked like hay. Leaves after falling in the autumn have no value as food. As a matter of fact, a herd of twenty bullocks here, in Bedfordshire, did well the greater part of June on pickings cut from elm trees. The labour of one man half the day was sufficient, the range of the cattle being on a poor hill where there was a good supply of water, but not a vestige of other food. They have now (the beginning of September) returned to this diet, to save the grass for use later on, and are doing well.

All store cattle will naturally be kept on the grass lands as

[1] This material has neither the softness nor the succulence usually associated with the term "pulp." If some fragments of ordinary straw chaff be torn *lengthwise*, the shreds thus produced will give a good idea of the "straw pulp."—Ed.

long as possible, the oldest probably all the winter, in which case a dressing on the back of some greasy waterproof mixture, which may be bought, or more cheaply prepared at home, is often used with considerable advantage. The scanty grass feeding at this time must be supplemented with cotton, or rape cake, or corn, *before the animals begin to sink in condition.*

The foregoing remarks apply generally also to sheep, with regard to which some useful hints will be found applicable to the present time in the prize essay of Mr. John Coleman, "Management of Sheep Stock on Heavy and Light Land" (Journal, Vol. I. 2nd series, 1865). In any case, in the matter of both cattle and sheep, it will probably be the aim of feeders, as an exceptional practice this winter, to supply the maximum of nourishment with the minimum of bulk; beginning this system of economy gradually, so as to allow the animal time to more or less accommodate itself to the change. It is of importance to look well in advance, and to so arrange that an uniform and regular supply may extend over the anxious months ahead.

Many hints have been given, applicable to an ordinary year, in aid of economical wintering of stock, which in this year of famine would be altogether out of place, tending as they do to the increased consumption of the very product which it is our imperative duty now to conserve.

One encouraging fact must not be lost sight of, which is that the present unusual slaughter of calves, lambs, and all animals carrying any quantity of flesh can have but one result, and that the same as followed similar proceedings in the matter of pigs two years ago, viz., improved prices as soon as the grass grows in 1894. This should be some little encouragement to the English farmer, who is now face to face with a crisis originated by unfair foreign competition, bad seasons, and rampant and unchecked adulteration, accentuated at this particular time by the most disastrous season of the century—a crisis which will be ruinous or otherwise in proportion to the ability and willingness of all classes interested to stand shoulder to shoulder in mutuality of interest for the common weal.

JOHN FRANCIS BEDDALL.

III.

All kinds of fodder—hay, straw, silage, and roots—are more scarce, and will continue to be during the ensuing winter, than the present generation of farmers has ever experienced. This follows, moreover, upon the exceptionally bad year of 1892, when all such stocks were exhausted. Thus the farmer is now at his wits' end to know how to keep his live stock, not only in

condition, but from starvation. The rains that fell at the end of July and beginning of August served in most places to relieve current anxieties, and in some way helped to prepare a more hopeful outlook for winter, as many hayricks were afterwards made, and some amount of material was grown for silage.

Catch crops, which have recently been again widely advocated, are all very well on good easy-working land, but they are not always profitable then, and in many districts are a positive loss, as the regular crop is often delayed and even lost, through land not working, and other causes. I refer to swedes or turnips, after vetches, or Italian rye grass and trifolium. We know from experience that a lot of work has to be done to prepare and clean land after such crops, and this takes time. If bad weather intervenes, the main crop is lost. Moreover, there is the general work of the farm going on, and labour means money.

However, to limit myself strictly to the text, the problem is, How to winter my stock of nearly 40 horses, 1,000 sheep, and 100 head of cattle, with little or no hay. To make the best use of the small available supply of fodder, the chaff-cutter must, I think, follow the threshing machine. Here we have a great improvement on the appliances of our forefathers, as, by attaching the chaff-cutter to the thresher, the labour of moving straw and stacking is dispensed with, all being done more easily, far better, and the chaff safely secured, at one operation. The chopped material is also much better if well trodden into a big heap—say, a good mow, as sweating softens the straw. If it further has an addition of a small quantity of fenugreek, malt dust, or dried grains—and some would add a little pulped mangel—a really valuable mass of stuff may be made from sweet straw of any kind.

The cake or corn that is intended to be given I should mix as required for use, that is, into the bags when taken to the field.

Sheep.—On the Cotswolds, sheep take the precedence of all stock, as they consume the roots where they are grown, and so prepare and improve the land for corn or other crops.

The late Mr. E. Playne, of the Downs, Chalford, many years ago showed the Cotswold farmers how lambs could be wintered and well brought out with a daily allowance of 1 lb. per head of cotton cake and plenty of roots, but no hay.

I would, however, suggest that the wether or fatting sheep should receive, say, for one hundred, 50 lb. linseed cake or crushed linseed, 25 lb. maize meal, and 25 lb. wheat meal per head per day. Every kind of stock on the farm ought to receive a portion of wheat to help get rid of this product, and so improve the price. For the ewe tegs I would use cotton

cake, instead of linseed, at the present price of 5*l.* 5*s.* per ton. To the 100 lb. of cake and meal I would add, say, 8 bushels of chaff, to be given night and morning. Such rations, with a fairly good supply of roots, will winter the tegs well. If very wet weather or very severe frost set in, an increase of dry food must be given.

The theaves, or two-teeth ewes, are generally put on roots about November. They will do with a few less roots than the tegs have, clearing up behind the lambs as well. They will receive, for one hundred, 50 lb. cake and meal, to be mixed with, say, 1 quarter bag of chaff morning and night, the corn tc be increased according to the weather and the supply of roots.

The old ewes generally run the old leys and scour out stubbles, &c., until nearly Christmas, when they come in and lay behind the ewe tegs or fatting sheep, receiving a few fresh roots and a little hay, as a rule. This time it will be the general chaff with an addition of cake and meal, as required.

The greatest difficulty will be at lambing time, if no hay at all is to be had, as too much chaff always seems to tuck the ewes up, and it is more trouble to the shepherd. Consequently, if there is a load or two of hay on the farm, I expect it will find its way to the lambing pen.

It is customary to give the doubles some corn, but I think every ewe after lambing will be obliged to have something in the shape of corn or cake. I do not believe there is a better feed—as compared with hay at the present price—than dried grains, at anything under 5*l.* per ton; all my lambs are now eating them. Giving the ewes corn quickly teaches the lambs to eat, and, the sooner they get a little help, the sooner they become strong enough to stand against the many ailments sheep are liable to suffer from, especially at weaning,—the most critical period for lambs,—though if they have learnt to eat corn and cake, the process is much easier and safer.

The many lamb foods that are now supplied are most useful for young lambs, though the large farmer can buy his ingredients and mix his own, and thus save from 10*s.* to 20*s.* per ton. Whilst, however, many are thinking about it, they are very likely losing a lot of lambs, though from what cause they do not know, but it is often due to drinking too much water, and to the want of a little stimulant in the shape of corn or cake. The mortality was very great in my neighbourhood this season, when a few tons of lamb food or dried grains would, I feel sure, have saved hundreds.

Our system of fatting out the lambs, at from eight to ten months, on roots through the winter, does not necessitate the

forcing that is required to bring them out fat, such as is the practice in the neighbouring counties of Wiltshire and Hampshire, at the fairs of Stockbridge (July 10), Overton (July 18), and Britford (August 12).

The Horned Stock.—The dairy cows and calves have the best of what there is, but without hay they must all go to the chaff house. There is now a prospect of some clover silage to mix with the chaff, and some hope of a few swedes to pulp. Corn and cake of all sorts must be mixed as required.

Backward calving cows and two-year-old heifers will lay out in sheltered fields, with, I hope, nearly enough grass left for them to get a bite whilst the weather remains open. They will get a few pounds of cake or corn, and a little straw or chaff as convenient. The calves will run in yards supplied with straw, chaff, roots, meal, &c.

Horses.—Worked horses will receive 10 lb. of crushed corn per head per day, with what chaff the carters like, a few pulped swedes when these can be spared, or a little chaffed silage, racked up with cavings. Colts and brood mares not in work must lay out, and get a few tail oats with chaff. Yearlings generally have a yard, and get rather better chaff, and a bushel of oats per head per week.

All this means expense. Corn is cheap, but mutton and beef are too cheap to leave any margin for profit. The stock must be wintered, and I think if all the straw on mixed farms is converted, as I have suggested, there will be enough, but strict economy must be the rule. The prospect is better than it was a month ago, but the farmer who has least stock, and is able to sell straw and what little hay he has, will be the best off, as no feeder can make a profit with hay at 7*l.* per ton, or with straw at from 3*l.* to 4*l.* Therefore, the good farmer must look to his landlord for help, as he will, I think, be not only doing him good, but himself in the long run, by sticking to his stock, and only parting with it when fat.

T. R. Hulbert.

IV.

The great and terrible drought of the present year has been compared to that of 1868. But it differed from that drought in many particulars. This year the dry weather set in earlier, whilst in 1868 the drought extended far into July. So the spring corn crops in 1868 were a much better plant, whilst the early roots in that dry season were a complete failure. We must go back to 1844 to find a direct parallel to the past season. Then, as now, the late-sown spring corn did not come

up until after Midsummer, whilst harvest was not ended until long after Michaelmas.

This has, indeed, been a trying season for the English farmer. The fall of 1892 was very wet, and it was with great difficulty that the autumn wheat could be sown. A month's exceedingly severe frost, with very little snow, set in on Christmas Eve, and the stiffest land at the end of January seemed likely to work beautifully. But a drenching February counteracted all the pulverising and beneficial effects of the long dry frost, and from the early days of March there was scarcely any rain for three months. The soaked and sodden land was soon converted into adamantine clods, and the consequence was that upon all retentive and unkind soils, spring grain was planted in a rough and rubbly seed-bed.

The result of the drought was most serious upon the cereal crops. Wheat stood the trial best, but, being a thin plant which had no opportunity of tillering in the spring, the crop is not equal to the yield of most dry seasons. The straw is unusually short, but of good quality, and is generally well harvested. The straw of the spring grain is still shorter, but, having so many green stems in it, should make good fodder. The first haysel was almost a total failure, and certainly not one-fourth of the usual weight of hay was cut on the arable lands. Second cuts of clover, and some late cow grasses and pastures which had been fed late, produced satisfactory August hay, and upon many low-lying meadows there was a good and heavy swathe. Where this latter hay has been well secured it will prove much better than the usual second crops, for the fine grasses and clovers hardly grew at all before Midsummer.

The dry spring was fatal to a full plant of mangel. Where a fair braird was secured, the mangel stood the early drought bravely, and revelled in the rains and heat of July and August. It should prove a good crop where the ground is covered, but taking East Anglia through there is not half a crop. Swedes are better, but still there are many districts that have a poor plant, and as the majority of the swedes did not come up until some weeks after they were drilled, the weight per acre must be small. Moreover, the glorious harvest weather of August told against the early swedes, and a dry autumn will certainly produce mildew and curtail the growth of all root-crops. Turnips are a much more regular plant, and generally promise to be a fair crop. The acreage of white turnips will be much larger than usual, for, besides the numerous fields which were intended for early roots, and could not be sown until after the midsummer rains, many fields of mangel and swedes which failed have

been resown with white turnips. There is also a great breadth of stubble turnips planted in order to make spring feed. So, upon the whole, it would appear that there is a fair prospect of sheep feed, but very few roots will be available for cattle in our stalls and yards.

A further and far-reaching loss to the arable farmer is the failure of this year's grass seeds. As a rule all sorts of clovers and most rye-grasses are a complete failure; sainfoin and kindred plants are somewhat better, but are very weak. There is, therefore, the certainty of the loss of all feed upon the new seeds this autumn and next spring, the certainty of a short crop of arable hay next year, and of a faulty ley furrow for wheat in the autumn of 1895.

Having now stated the condition of the root and fodder supply for the coming winter, it may be well to consider how the farmer can best meet these deficiencies.

In making any suggestions I am well aware that I shall be repeating much which has been better said before by many more experienced writers, and I should like my remarks to be considered as limited mainly to East Anglia, for agricultural customs are so different in other parts of England, that what may suit Norfolk would be inapplicable to Devon and even to our southern counties.

It seems right to begin with the failure of the small seeds, or new layers as we call them in Norfolk, as any attempt to remedy that evil must be done at once. But perhaps the wisest plan may be to let the stubbles alone for awhile. It is just possible that all the seed has not germinated, especially in the late barleys. But in most instances this must be a forlorn hope, as no doubt the greater proportion of the small seeds have perished. Moreover, they are such a complete failure that patching them up would do no good, and most of them must be entirely resown. Before this paper is published the proper season for sowing trifolium, rye-grass, and clovers will be passed, but it may not be too late to drill vetches, and even rye in some localities. After all there is nothing so reliable as vetches to produce plenty of feed early in the year. The seed is very dear, but vetches answer so many purposes, for soiling, hay, or folding, that they may yet prove the best and cheapest substitute for our lost clovers, and they can be followed by turnips, and then barley instead of wheat, without altering the antiquated four-course rotation which, on some estates, is still regarded with superstitious reverence.

The soundest advice, however, is to keep the best of the old seeds down for another year, applying at once the manure that

was intended for wheat, and taking a second crop of barley where the young seeds have failed. For 1 cwt. of nitrate of soda and 2 cwt. of mineral superphosphate per acre (which should not cost more than 14*s*.) are almost certain to produce a better crop of barley than many which have been grown this year. One great advantage of keeping the old leys down will be the valuable feed they will throw up in the autumn, especially if well dressed with farm manure, and they may be also fed in the spring much more closely than would be safe with the younger seeds. Having a smaller acreage of wheat next year may be no great loss, and then next season the two-year-old leys may come in for wheat to be followed by barley, so as to have the desired two corn crops in four years, and to restore the field to the sacred "four-course shift."

Most of the late and second crops of hay will have been secured during the fine hot weather of August, but we have reason to expect, should the autumn remain open, and continue mild and damp, a great growth of all kinds of grass and weeds until late in the year, as the ground must be thoroughly heated by the tropical warmth of the brilliant summer. Every blade of coarse grass, not only that which grows under trees in pastures, but even in plantations, and the very rushes and other weeds off banks, ditches, borders, and dykes, should be cut and made into silage. An amusing lot of tall talk was indulged in by some early and sanguine supporters of the process of ensilage, and we were told that the veriest rubbish put into a silo would be converted into most nutritious food. Only last month the Board of Agriculture informed us that "fern and bracken may be put into a silo," but it was wisely silent as to the value of the silage they would produce. On the other hand, many good farmers who have never tried ensilage are terribly prejudiced against it, mainly on account of the unpleasant smell, and one rural sanitary authority last year gave notice that a silo must be closed in consequence of its "offensive effluvia," although it was a quarter of a mile away from the nearest cottage. But it is a curious fact that, notwithstanding the sickening scent of sour silage and its exceedingly nasty look, all stock come to eat it readily, and, even when the mouldy outside portion is thrown into the yard for manure, a good part of it is eagerly devoured by pigs. But to suppose that the curing process which the forage undergoes in the silo or clamp greatly augments its nutritive value is a mistake, though it certainly does this—it renders sour grass and rank herbage, that stock would not look at in a green state, so palatable that they will eat it with relish in the winter. When good clover and the

best grasses can be successfully made into hay, they should never be ensilaged, but in wet weather even the best grasses may be thus treated, and certainly late in the year, and especially in a season like this, every effort should be made to ensilage any green herbage, and I see no reason why the leaves of our root crops should not be so secured. When mangel is stored, the crown should never be cut, and all the leaves should fall singly; hence it may be difficult to collect them in a cleanly state, and probably the ewes may this autumn be glad of them fresh in the fold. But when swedes are pitted or stored in November, thousands of acres of these turnip-tops are allowed to wither and decay, whereas in a season of scarcity, they might be preserved in silage pits or clamps for winter and spring use.

Notwithstanding the plain practical directions so opportunely issued by the Board of Agriculture upon making silo stacks and heaps, I shall venture to give my own brief experiences.

I could not afford to build a silo myself, nor did I feel so certain of its necessity that I could ask my liberal landlord to build one for me. Nor could I see the value of screws, and pulleys, and presses, as I thought I could press down and cover up the grass more cheaply. So I put down a layer of the coarsest rubbish or trimmings, and then carted the green stuff to the heap, the carts passing over it as a manure mixen is made, or, as we call it, a "drawn muck-up." Then a horse is kept continually trampling and consolidating the mass, while a man firmly treads the outsides. The heap may occupy a month in making, and when it becomes too high for a cart and three horses to haul up the loads, the ends and sides are cut down and thrown on the top, beaten down and covered with a thin layer of straw, and the whole mass is cased with 6 or 8 inches of mould or road scrapings. A garden roll may be kept on the top to close up any cracks which may result from uneven settlement. It is better on a dry subsoil to excavate the earth, the length and breadth of the intended clamp, 2 or 3 feet deep, using the mould thus thrown out to cover up the sides and top. In the wet summer of 1888 I made some clover into a silage clamp, and, instead of covering it with earth, placed a big stack of hay on the top of it. This saved the trouble of carting the mould, and the heat from the silage seemed to improve the washed hay which was placed upon it.

Then as to the best mode of using the silage. As I never give any stock long hay, and I chaff up a vast amount of straw, I find the silage is best passed through the chaff-cutter with the straw, and, if allowed to remain some hours before using, both are improved. I need hardly add that an addition of

shredded roots, with cake or meal, will be necessary for all grazing stock, but cart-horses, when hay is scarce, will do well upon the mixture if some oats or a few pulped roots are added. By far the greatest advantage the flockmaster can derive from silage is in the spring. When roots are scarce the dry provender, upon which the ewes have often to subsist, is a poor milk-producing diet. It is then that the moisture of the silage affords the greatest benefits, for its addition to the dry chaff stimulates the flow of milk, without any drawback or danger whatever to dam or offspring.

It has been a beautiful season in the Eastern Counties for harvesting our scanty corn crops. Most of the spring cereals have a large quantity of green ears, and consequently the straw should prove unusually nutritious. In fact, some oat straw is so green that it ought to be quite as good as ordinary hay, and every pound of it should be carefully preserved for fodder. Where cattle are grazed this winter in large open yards, they must be content with a somewhat dirty bed in the sheds, for only the roughest litter can be spared for the yards, and even in stalls, boxes, and covered yards the bedding must be used most sparingly.

The threatened famine of winter provender will surely revive the old controversy as to the best mode of giving roots to stock. In my young days all sheep had to break their own turnips, and the cattle had their roots thickly sliced or chopped in rough pieces with a hook. Since then roots have been cut into fingers, shredded, or pulped, and yet one of the best Norfolk graziers, at the end of his successful farming days, threw aside all his machines and gave the roots *whole* to his bullocks. His idea was that by breaking and gnawing whole roots a larger quantity of saliva was produced and digestion was thus assisted; whereas cattle are too apt to bolt a pulped mass without giving it the necessary mastication. In many districts this winter there will be hardly any roots for the horned stock, and even where they are plentiful it will be necessary to make the very most of them. So the wasteful plan of allowing grazing bullocks to eat as many turnips as they please will hardly find an advocate, even in that fruitful Goshen of our root-crops—North-East Norfolk.

There was a rage a few years ago for giving all stock cooked food. But it never became general, for although it is quite true that giving frozen turnips one day and sloppy dirty roots the next is not the way to make grazing pay, it is equally certain that to give hot food at noon and cool at night is no great improvement upon the ordinary modes of feeding. The

difficulty is to regulate the temperature with certainty, and, unless this is done, cooking or steaming roots has few advantages to cover the extra expense. But it is no great trouble to prepare and mix a great bulk of common food with more nutritious feeding stuffs, so as to produce a gentle fermentation which will "take the chill off," and render the whole mass more eatable and digestible. The best possible "seasoning" for straw or corn chaff is malt, and if that is not to be had, malt-combs or sproutings, steeped in hot water and thrown over the dry provender, make a very good substitute. Hot water entirely removes the bitter principles which are sometimes found in malt germs, and as the combs contain a considerable percentage of protein bodies, and are certainly richer in albuminoids than malt itself, they must be a very valuable cattle food. Crushed linseed treated in a similar manner is more fattening, but does not impart so much fragrance to the mass, and there is no doubt that malt possesses the great advantage of rendering palatable and digestible a large amount of coarse, unsavoury food.

In 1868 a large quantity of treacle was used for cattle food, but it has not been heard much of lately. It is considerably cheaper now than it was then, and can be purchased in London at the present time at the exceedingly reasonable price of 6*l.* 10*s.* a ton. Dissolved in hot water and poured over a heap of chaff, our lean cattle thrived fairly well upon it, but it was a nasty sticky mixture, and the treacle appeared more popular with the farm boys at breakfast time than it was with the cattle which had to eat it regularly. But if sound feeding treacle can now be bought at 10*d.* per stone, 4 lb. per day to a store bullock, eating chaff or straw *ad libitum*, would keep it in good thriving condition at 1*s.* 8*d.* per week; so no cattle need starve. Common sugar is to be had at a little over 12*l.* a ton. This may be a useful addition to our artificial cattle foods; it is certainly not so cheap as treacle, though probably much more nutritious. Englishmen have of late years had to drink a large quantity of this self-same sugar in their beer; perhaps as good and possibly a better use might be made of it by giving it to lean and hungry cattle this winter. May the enterprising stockowner who tries the experiment be enabled to extract as much profit from the use of it as the brewer has done! Probably, if his stock return him the cost of the sugar, he will be content, for there is always a vast difference between trade profits and those made by the farmer.

The coming winter must be dreaded by most stockowners. As already stated, sheep stand the best chance of being fairly

well-fed, as there are so many small turnips and so few large ones. But the farm-horses, which have been accustomed to an abundance of long hay, will find their rations terribly contracted in that particular. There will be very little hay to spare for them on many farms, and they will have to be content with small baits of oats, meal, or cut hay, and large allowances of chopped straw and corn chaff. Many of the mixtures which have been suggested for cattle may be given with advantage to farm-horses, but there must be a large expenditure for all kinds of horse corn.

The breeders of both cattle and sheep who made great sacrifices to keep their stock during this trying summer, in the hope of realising better prices in the autumn, may, we fear, be disappointed. The East Anglian farmers have little or no money wherewith to buy store stock, and, unless they are very cheap, will not purchase half their usual quantity for stall feeding. The few winter graziers who are blessed with plenty of roots are apprehensive that, in consequence of the abundant crops of all farm produce in Scotland, in the north of England and in Ireland, and the exclusion of Canadian cattle, lean stock will be too dear for them to feed at a profit. Very fresh bullocks that are nearly beef have already risen considerably in value, but young and poor cattle and store sheep are still very cheap, and likely to remain so. There is such a large area of the kingdom that has not half its usual store of hay and roots for the winter that every holder of stock will be anxious to sell, and comparatively few will be in a position to buy. Norfolk, with short straw, patchy roots, and half a hay crop, would be mad to be overstocked, even if she had the means to purchase. Suffolk is rather worse off than Norfolk, and Essex is in a still more deplorable condition. And yet every reasonable effort should be made to winter as much stock as possible, for there can be no doubt that, if we are blessed with a mild winter and early spring, both cattle and sheep are certain to command much better prices than those now current.

It is hardly possible that the last half of this cruel year can be as disastrous to the farmer as were its first six months. Already the "fore part of the back end," as our Midland brethren appropriately designate the early autumn, has greatly improved our prospects, and if the weather should remain open and moist till Christmas there is likely to be a considerable and continuous growth of grass, which may enable neat stock and breeding sheep to be kept at a comparatively trifling cost. But while hoping for the best, we must prepare for the worst, and to enforce these views this paper is written, though I feel sorry to

have given so few novel ideas as to the best mode of meeting the trials of the coming winter. But in a year like this, I know that my brother farmers tolerate any advice, however homely it may be, so I hope that among so much dust and chaff they may extract at least one grain of information or comfort. If any stockfeeder can find that one useful grain, I shall be well pleased and amply rewarded.

CLARE SEWELL READ.

V.

How to winter their cow stock is the problem which is now causing thousands of dairy farmers to metaphorically scratch their heads day after day. In my part of the county of Stafford this anxiety is neither so keen nor so general as it is a few miles to the south of us, where forage is scarce, and, indeed, in other counties which are south of the degree of latitude in which this district is situated. This section of the country is admitted by those who have travelled about to have taken less harm from the drought, and to have had better crops of hay, than perhaps any other locality to the south of it. But even here there are men whose hay crop is not more than half an average, and these it is who are now "cudgelling their brains" as to what is the best thing to do with their cattle from November to May. Others there are, not a few, who have from 70 to 80 per cent. of an average crop, and yet others—not many of these —who have one that is a fair average. And so it is throughout the district—the effects of the drought have been most variable, and, as a rule, worst of all in meadows that were eaten up late in the spring, and in such as were nipped by the late spring frosts in the valleys. Crops, generally speaking, were much better in meadows that lie away from the rivers, away up the slopes, and even on the tops of the hills.

There were little "cobs" of hay left on many farms when last winter came to an end—the drought had enabled us to save them. But as a rule they are rather diminutive, and will not count for much in the time that is coming. Yet, however, as "every little helps," they will be made the most of, and are now regarded as bits of old gold! Old hay, old straw, indeed, old anything that will serve as food for stock, possesses a higher value now than it ever did before, so far as I can recall the past. We who are now at the helm of affairs on the farms have not known a time when, so far as we can see at present, such close economy has been practised as will be the case in the coming fall and winter. It sometimes occurs that a famine foreseen is averted; there never was one more clearly foreseen than the

famine in forage which now hangs like a cloud on the horizon, and we shall do our best to avert it.

Fortunately, however, grass has grown apace in the early autumn, and while the aftermath has thriven well in the meadows, many pastures have filled up nicely with food for the fall of the year. Nevertheless, it must be remembered that grass seldom makes much headway after September sets in. Very much depends on the "grassiness" of the autumn, and on the "openness" of the weather till Christmas. These two conditions, indeed, may yet turn out to be of the highest value to livestock farmers, for, although corn and cake are cheap, it is not exactly pleasant to be compelled to buy twice or thrice as much of them as one ought to do. Our men are aware that the demand for surplus milch cattle that are going dry, and for lean cattle of any kind, whether barren or in-calf, will be even less than it was in 1887, for the simple but all-sufficient reason that the usual customers for those classes of stock have no straw or hay to spare for the purpose of wintering them. Roots, no doubt, will be pretty good, and perhaps fairly plentiful, but cattle cannot be wintered on roots alone. The fact consequently looms out that dairy farmers will either have to winter their own surplus stock as best they can, or sell them during the fall of the year at a deplorable and ruinous sacrifice.

The question therefore arises: What is the best course to pursue? In the fall of 1887, after the hot drought of the summer, cattle were abnormally low in price; and, happening to have in a barn a bit of old hay that really wanted eating, the bottom part of it being five years old or more, I thought I would try an experiment of wintering cattle on a minimum quantity of hay, and I did so because I had a fair amount of grass on the land to serve in the stead of hay. It is seldom that summer graziers winter many cattle, or indeed any, save a few cows in milk for household requirements; they prefer, as a rule, that other men, whose purpose it suits, should do the wintering. But in the fall of the year named I decided to depart from the usual custom and to try the aforesaid experiment. I bought, therefore, half a score of young barren cattle, chiefly heifers, and had them running out on the land every day, and all day, throughout the winter, unless the weather was altogether abominable. I really bought fourteen, but four of them were sold early; these, however, were replaced soon afterwards by seven or eight others, and do not interfere with the principle of the experiment. In the daytime these half-score cattle—and most of the others too—were picking up the greater part of their living on the land; in the night time they were housed and tied by the

neck, each one receiving, according to her size, from 3 to 5 lb. of decorticated cotton-cake, and a wisp of hay when it was deemed expedient, with a wisp again in the morning. Being turned out with an appetite, these cattle were not in the habit of standing about with arched backs under the fences, but were at once engaged in browsing on the grass. My farm, I may say, situated though it is in a valley, is 700 feet above sea level, and is not at all an uncommonly well-sheltered farm. If, then, cattle will do well out of doors every day in the winter on a farm like this, they will do equally well on at least half the farms in the country at large.

The cost of these cattle in cake was just about 2*s.* per head per week, and the cost in hay about 1*s.*—say, 3*s.* per head per week for twenty weeks, or 3*l.* each for the winter. Now, these cattle cost on the average, in November and December, exactly 5*l.* 8*s.* per head, and at the end of April they were worth, I considered, 11*l.* per head, showing a profit of 2*l.* 12*s.* per head as a reward for the trouble of looking after them during five months, and there was the additional profit of a quantity of manure. The ten heifers kept through the whole of the winter went on with the rest at "grass day," and were sold out fat, most of them before Midsummer, and the rest in July—save one only, which was sold in August—and the average price realised was 14*l.* 8*s.* 6*d.* per head, or 9*l.* 0*s.* 6*d.* per head more than they cost in the fall of the previous year. It will be obvious to anyone practically acquainted with summer grazing that these cattle came out in good condition in the spring—as indeed they did—or they could not have been sold out fat as early as they actually were.

Now, I would ask, Why not winter barren cattle this way in the coming dead time of the year? Calves, yearlings, "twinters" —barren cattle of any age, in fact—may well be wintered in this manner, now that forage is so abnormally deficient in quantity. Lean stock must be wintered somehow, and they will all be wanted in the spring; but thousands of "half-meated" things will be hurried off to the butcher out of dread of the winter. If only the land gets fairly well covered with grass there will be something for the cattle to pull at through the winter, so long as the ground is bare of snow. As a matter of fact, easily susceptible of demonstration by anybody, barren cattle of all ages, if only the land is tolerably dry and fairly well sheltered, will go through the winter entirely out of doors if need be, provided also that they get a few pounds of cake per day, and a handful or two of hay when there is snow on the ground. If it were really cruel so to treat them, why is it con-

sidered, and rightly considered, a good thing to give a horse a winter's run? To a horse, indeed—a horse jaded by a long spell of work, satiated with corn, heated in the legs, and more or less shaky—a good winter's run is a restorative of marked value in many cases.

Straw will not be much used for bedding in the coming winter; it will all be wanted for food. Moss litter may with advantage be used instead of straw for bedding, even where straw is worth less than 4*l.* a ton. All sorts of rough grass under the trees, by the road-sides, in the plantations, and on the pastures where the land is sour, is being made into silage or into hay. Nothing of this kind should indeed be passed over as worthless; for, even if it make but sorry forage as it is, the possibility of improving it by the addition of bean, pea, maize, wheat, oat, or any other sort of meal is within the experience of most feeders. Bran, rice meal, cakes of various kinds, are all less money per ton than hay is likely to be, and indeed already is, and they must consequently be used as extensively as may be required, with the object of making hay last till "grass day"; wheat, indeed, and flour, and even loaves of bread, are being sold now at something less per cwt. than prime hay commands. Here, then, we have both choice and scope.

If any man has more hay than he will want, or can make it more by following the course suggested, let him sell it to those who are anxious to buy it. It will, in fact, be to the interest of many farmers to sell all the hay they dare to part with,—sell it in good time, and buy corn with the money. If only this sort of thing be done generally, and no gambling syndicate be formed to rush up the price of corn, there is no very great reason to dread the coming winter. As a matter of fact, our cattle must be and can be wintered, and although the shoe will keenly pinch a large number of farmers, particularly in the southern half of the country, ways and means may be found to prevent starvation, or any very near approach to it. Horses and sheep come, of course, within the scope of the remarks already made, but one naturally feels less anxiety about them than about cattle. The present crisis will have the effect of teaching farmers to be as careful of hay when it is plentiful as when it is scarce; and we may all sincerely hope that the lesson will not soon be forgotten, for these periods of scarcity are certain to occur now and again.

Town readers of the Journal, who are also horse-keepers, will perhaps be interested in the details of the following case. A relative of mine, Mr. Johnson, of Casson Street, E., keeps four horses for the purposes of his business. During some

thirty to forty years, he and his father before him have been horse-keepers in London, and, like many others similarly situated, have aimed at securing efficiency with economy in the feeding of hay and corn, which are serious items of working expenses in the metropolis. One leading result of accumulated experience is this: Mr. Johnson's horses eat no hay whatever, as such—that is, they receive no hay at all, save in the form of chaff that is mixed with the corn. To some men this will be a revelation, for hay in racks has been commonly considered a *sine quâ non* for horses that are stable-kept. Mr. Johnson, however, assures me that the system of feeding his horses which he has now arrived at is better than any other he has tried, that his horses work well and are always in good condition, and that virtually no need is found for medicines. The only litter is sawdust, at 4*d.* a sack.

The corn used is Russian oats, the average cost of which for a year past was 17*s.* 1*d.* per quarter of 304 lb. These oats are lighter than ours, with a larger proportion of fibrous husk, and weigh 38 lb. per bushel. No fixed quantity per horse is laid down as a regulation for the grooms, but the average consumption has been 15⅔ lb. per horse per day. Bran is used as well, but not to any great extent; the quantity so far, though used for the most part all the year round, has been only about one-third of a lb. per horse per day. The current price of it is a trifle under 5*l.* per ton, and as hay is at least fifty per cent. higher in price per ton, more of the bran and less of the hay will now be used. Formerly the oats were macerated in water for a day or so before feeding them, but this practice has been discontinued, and they are fed in a dry and also in an uncrushed state, mixed with hay-chaff and a modicum of bran. The amount of hay used—all of it in the form of chaff—averages about 3¼ lb. per horse per day, or half a ton per horse per annum—a remarkably small quantity, as will be readily admitted—and the mixture of chaff, oats, and bran is not even damped when fed. That the oats should be crushed in a mill would seem to be a reform required in the *modus operandi* of this simple and economical dietary. No other kind of corn but oats and bran is used: in summer, however, the dietary includes a liberal supply of green food, and in winter of kohl rabi and carrots. The roots and greenstuff are, of course, an addition of very considerable importance, in reference not only to economy, but to the health and comfort of the horses.

The chief lesson taught by this instance of horse-feeding is the broad fact that hay, as such, is not indispensable by any means to the extent we have been in the habit of thinking, and that

we may safely aim to greatly reduce the consumption of it now that it is scarce and dear, whilst corn of various kinds is comparatively cheap, bran being a little under, and maize a little above, 5*l.*, per ton.

J. P. Sheldon.

VI.

Before entering upon the more practical part of the discussion of the all-important question as to how best, and most economically, to keep our stock during the approaching winter months, it may be well briefly to first consider the immediate cause of our present difficulty. This, of course, is mainly attributable to the long drought experienced throughout the greater part of England during the last five or six months, thereby checking vegetation, and reducing our straw and fodder crops to one-half, and our hay crop to one-fourth, of an average yearly yield. It is true that very dry seasons have been experienced in years gone by, but associated with circumstances different from those now existing, for the facilities for the transport, by land and sea, of food of all kinds, from the more favoured districts and countries to those parts most seriously affected, did not then exist. Scotland, Ireland, Canada, and many other parts of the world, are already sending fodder of various kinds to the rescue, and thus, what otherwise must have resulted in nothing short of famine, at least to our stock, will be in a great measure averted.

Looking back fifty years, farmers, throughout the length and breadth of the land, save in the immediate neighbourhood of London and other large towns, were, at that time, very strictly forbidden by covenant to sell hay or straw. Then, as the value of the commodity increased, liberty was given to sell, on condition of bringing back equivalents on the land, in artificial and other manures, and farmers began to realise that with the increasing supplies of oil cakes, and feeding stuffs of all kinds, on our markets, this could be carried out, leaving a good margin for profit. Thus gradually, instead of the former waste, more care was taken to secure the straw and fodder from damage by weather, by carefully stacking at the time of threshing, till within late years a considerable proportion is chaffed, mixed with other foods, and so rendered an important element in stock-feeding.

When a boy at home some forty-eight years since, on my father's farm (about 1000 acres), I well remember seeing most valuable hay given to the cows from the truss, in open yards and cribs, much of it being wasted, whilst all the time the

animals were treading in with their feet sweet barley straw and oat straw, given out daily by the men who were hand-threshing in the adjacent barns,—material which, if chaffed as now, and mixed with roots or other feeding stuffs, would have made excellent fodder, whilst a large portion of the hay could have been sold. Then, again, we thought it good business to supply hotel yards and other stables with straw, merely taking back the dung, without any money payment. I often in those days heard it said that a pig was the best animal to eat straw, meaning, of course, that he would not eat any, the whole going for manure. All this is very much a thing of the past; reduced prices and vanishing profits have made men wiser in their generation.

Turning now to the more important question of how best to deal with our very short output of hay and straw, it is evident that a mild open winter, with an abundance of grass in the meadows and pastures, such as I hope we may get, would prove a very great blessing, and carry us with our stock well into the New Year. Then the difficulty would be how to hold our own till May-day.

In speaking first on the question of hay as an article of consumption, the very price it is now worth in my neighbourhood, say, from 8*l.* to 10*l.* per ton, appears to me to almost render it impossible for a farmer to consume his hay to a profit, when by selling it at this high price, and spending the money in corn and other feeding stuffs, he can carry a greater number of stock, and with better results. Then comes the danger lest farmers, pressed as they necessarily must be for money, and with corn making so little, will turn the hay into cash and forget to bring back the equivalent, to the detriment alike of the cattle and of the land. Straw, again, at its present market price, and very short quantity, cannot, so far as I can see, be used for litter in the ordinary way. Much of the wheat straw will be sold, like the hay, and the barley, oat, and other straw and haulm will be chaffed for the stock. In many cases where the barley and oat crops were backward and light, it might be economy, instead of threshing, to pass the entire produce, grain and straw, through the chaff-cutter for the stock. A large area of the pea crop has been cut green and stacked, to be used as fodder in the same way.

All this must cause a very short make of farmyard dung, which will be sorely felt next spring and autumn. In districts like my own, where fern or bracken grows in large quantities, by cutting this when green and stacking it in ricks, it will help very much to keep the horses off the bare bricks

and cattle out of the mud, although possessing little or no manurial value in itself.

Another article of food, and one in ordinary seasons overlooked, is gorse, furze, or whin. I have a neighbour who for many years now has kept down a few acres of gorse. This he cuts every year in the dead of winter, putting it daily through the chaff-cutter, with a proportion of straw, and giving it to his milking cows with, to my own knowledge, good results. The top shoots of gorse, even in old coverts, might in a hard winter serve a turn.

Every opportunity is being taken for putting in, during this autumn, crops of trifolium, mustard, cabbage, rape, kale, rye, vetches, and other green crops, in addition to our very moderate crops of mangel, swedes, and turnips, to keep the sheep and cattle in the spring. The dry summer has helped us to do this with less labour than usual, the land being clean and very healthy. I think it has been noted by many farmers this season what a very useful, but somewhat neglected, fodder plant lucerne has proved itself, cutting three and even four times in spite of the dry weather, and I am confident a large acreage will be sown with it next spring; it has come up thickly in some of our newly laid-down pastures, producing feed when the finer grasses had stopped growing. What must prove disastrous next year, and tend to keep up the price of hay, is the almost total failure of the young grass seeds sown with the spring corn; in some fields they have improved a little, and everything is being done to mend them with trifolium, rye grass, and other seeds, but so far the weather is unfavourable to promote growth before cold sets in.

I have been favoured with a few hints, from one or two leading agriculturists, as to the system they intend carrying out in feeding their own stock through the winter, and think it well to give some of the proposed rations in detail.

Horses.—Wheat chaff with some oat or barley straw, cut fine, mixed with 3 bushels of the following mixture for each horse per week, adding a little salt:—1 bushel brewers' grains and 2 bushels of maize, Egyptian beans, and oats, in equal proportions. Estimated cost, 8*s.* per week. (In feeding horses I have found malt dust, well soaked in water, a valuable material; a proportion of roots or potatoes may be added, and less corn given.)

Milking Cows.—A small allowance of hay with oat or barley straw chaffed. Add 1 bushel bran, ½ bushel toppings (or sharps), 1 bushel oatmeal, with a small quantity of grains and salt. Estimated cost per week, about 7*s.* 6*d.* Decorticated cotton cake may

be preferred by some to toppings. (In feeding cows the rations will be altered according as the object is to produce milk or butter. I may say the above is for butter; a greater proportion of grains would be used, with roots, and less corn, if for milk.)

Store Cattle.—These we hope to keep in the fields as long as possible, after which cut straw and roots must carry them through. Where no roots are available a little maize, pea, or bean meal can be added, or many would prefer linseed cake with straw only, having regard to the weekly cost per head. One farmer has fed largely both store and fat cattle and sheep on pure linseed oil mixed with straw chaff, varying the quantity from half a pint upwards per meal per beast; the price now quoted is 1*s.* 11*d.* per gallon on rail.

Fat Cattle.—Stall feeding will be almost impracticable, there being nothing with which to make dung, which is often the chief end to be attained. Instead of our usual fat Christmas beasts, we must carry the animals on through the winter as best we can, rather as stores, and make beef when the early green crops and grasses come in, leaving other districts—where the meadows are good enough to feed beasts fat, with the aid of artificial foods—to supply our Christmas requirements.

Sheep.—If only we get rain enough [1] to carry on the present growth of green crops, and late-sown turnips, to perfection, less difficulty may be experienced in wintering the flock than would at first sight appear. A dry flock with plenty of roots, a little cotton cake, or an equivalent in corn or malt dust, will store well, and even fatten with a little extra time given, and additional corn, which, at the present low value, and in view of the favourable terms upon which sheep at the early fairs were purchased, will leave a margin for profit.

Last year I lambed 500 ewes, producing over 600 lambs. The ewes had a very few roots drawn to them on the pastures daily, and some straw chaff in their troughs each morning till they had lambed. We had a few lambs at Christmas, the rest falling in January. I then added a little hay to the straw chaff, giving the ewes their fill of turnips, and 1 lb. linseed cake daily, and the lambs—as soon as old enough to eat it—white peas, and cake broken very fine indeed, in their troughs in front of the ewes. The hay was discontinued as the hard weather we experienced broke, and I had no difficulty in fattening the whole of the lambs, and selling them at an average price of 36*s.*,

[1] Everything must depend upon rain, as, unless we get it in abundance, the grass and roots will dry up, and what Berkshire, Hampshire, and other similarly situated counties will then do with sheep it is most difficult to say; it must lead to disastrous consequences.

and afterwards the ewes, these making a few shillings per head beyond the price I paid for them as stores, in addition to the clip of wool. This would seem to leave a fair living profit, but the drought, by diminishing our corn crops (grown where the sheep had fed the roots with corn and cake) one-half, leaves the balance on the wrong side. My system is to buy in a fresh full-mouthed ewe flock each year, saving my own ram lambs from the previous year's flock, thus getting fresh blood, and fattening ewes and lambs together. I have this season 640 ewes bought in at an average of 30*s*. per head; these were all, I hope, safely in lamb by the end of August, and ought, with ordinary luck, to pay for wintering.

I would like here to mention that, when the frost last spring broke up, our turnips had nearly all rotted, and a large proportion of our swedes also, consequently during the last month they were on them our ewes and lambs made no progress, looking sticky in their coats, and losing their bloom entirely. Fortunately we had 30 acres of common rape sown very late; this had withstood the frost bravely, and, when our ewes and lambs went on to this after the old rotten roots, the change was quite marvellous. They soon regained a thriving appearance, and we were enabled to keep them going till the end. Our shepherd, a man of long experience with a breeding flock, said he had never seen anything so marked, and was most anxious we should always have 30 to 50 acres each spring. We are now sowing in every available field common rape, and thousand-headed kale, for spring feeding. Our early-sown rape and turnips will be ready to feed off with the dry flock by the second week in September, and this, with 1 lb. linseed cake and a few split beans per head daily, will make the sheep fit for the butcher by the time the warm weather goes, and Down mutton is inquired for.

With a herd of about twenty milking cows, Shorthorns and Channel Islands mixed, the yield of butter, of rare colour and quality, from our poor pastures, all through the long dry time, has been very remarkable, the separator giving off a large percentage of cream. We calve our cows at all times in the year, in order to keep up a supply of rich milk. The cows when brought in to be milked in the morning have 4 lb. each of linseed cake in the stalls, in addition to the grass they get in the pastures. The best milker in the herd is a little cross-bred cow, got, I should think, by a common Shorthorn bull out of a very ordinary Channel Islands cow. She calved on April 15 last, rather fresh in condition, and weighed 8½ cwt., worth at that time on the market about 14*l*. She has given

5 gallons of rich milk every day since calving till the heat of mid-August, and now it is cooler again she is coming back to her quantity. Up to the first week of September, she has yielded 12 lb. of butter weekly.

Pigs for several years past have been the most profitable animals on the farm, and while all the food they eat is of so little value when sold as grain, they will continue a good investment; at the same time it does not answer to be led away to take up any particular hobby too extensively. A farmer near me, seeing that bacon must be dear, purchased on the market a considerable number of large store hogs to fatten, with the result that swine fever broke out in the herd, entailing a very heavy loss, instead of the anticipated profit. Of course this was an unforeseen misfortune that might not occur again.

I trust that the foregoing remarks and suggestions may possibly be of some little service to those who may give the time to read them. I do not for one moment put them before the reader as anything new—nothing is new—but rather as old truths revived, and with a view to induce my brother farmers to think out the matter, each for himself, and probably thereby arrive at some system, or plan, much more suitable to the requirements of his own case than anything here set forth.

H. Simmons.

VII.

The question is "How best to provide for the wintering of our usual quantity of stock?" I say "usual quantity," as to me it appears ruinous to sell at the present low values, if farmers can anyhow see their way to holding on till the dread of a severe winter has passed, and prices have hardened. Some may think that, after so dry a summer, we may have before us a mild open time, through which stock may pull with not much difficulty. But it is only reasonable to ask what will take place if we have to face a medium, or, worse still, a severe and lengthened winter.

As a matter of prudence we must provide not only for winter, but also for the possibility of a sharp winter. If roots should be injured by frost, there is no haystack and very little straw to fall back upon. After all provision has been made as to catch crops, silage, &c., and the greatest possible amount of stuff fit for consumption has been grown, the next point for consideration is, how to economise in the direction of bedding or litter. Fortunately, the straw from our corn crops, although exceedingly short, is good and sweet. On this, indeed, we place our reliance. We cannot do much without roots, but we are still worse off with neither hay nor clean straw. Possessed of the latter,

however, we can make many a good mixture, not only palatable, but life-sustaining and meat-producing. Not one straw fit for consumption, more than is absolutely necessary, ought to be wasted or used for bedding. Not that I advocate a neglected or scanty bed for the animals that we are compelled to house during the winter. This would, indeed, be false economy. When once cattle and young horses are taken from the pastures to sheltered yards a dry comfortable bed is a necessity. Every bit of rush, sedge, bracken, border grass, sprigs of young furze and heather, must be secured and reserved for litter; while even the fallen leaves from trees will be a welcome addition to the stock of bedding stuff.

Covered yards will, this winter, be more valuable than ever, but where tenants are not fortunate enough to possess them, a thick layer of sand, crag, or burnt clay, forming a dry bottom to the yard or box, will greatly economise the straw thrown down for bedding. I have found fresh-ploughed turf carted in the cattle-yard every three or four days a good substitute for straw; but this is more difficult to obtain on any but light land farms, and on these sand or crag is about as good, and is always available. As a last resource, both cattle and colts will winter well on a *dry* pasture, provided it is sheltered somewhat, and the fact recognised that there is no food on the pasture, and that therefore *a sufficiency must* be carried to them. A dry bottom is a great point.

At Orford Ness, about as bleak a place as any on our Eastern coast, colts have wintered (in severe weather, too) on the marshes, simply divided from the sea by some quarter of a mile of bare shingle, with no shelter beyond what a score of animals could obtain from a small haystack, which they were allowed to pull at as they chose, and which, as winter wore on, gradually disappeared altogether. They received the same amount of additional food as they would have had in a covered yard at the homestead. Bedding, however, they neither had nor required, and this was the only saving. Yet, in the approaching winter of 1893–94, a saving such as this will prove of considerable importance.

Young cattle on a sheltered pasture I have found to go through the winter equally well, and our young Red Polls have thus gained quite a rough Highland-looking coat; but it should be remembered, and never forgotten, that *they must be fed.* The great mistake in this matter arises from the fact that the farmer is prone to think there is something to be got from the pasture, and therefore does not carry the animals a sufficiency of food, or an amount equal to what he would allow them at the homestead.

The Board of Agriculture and Mr. Martin J. Sutton did good service in publishing suggestions as to autumn crops, ensilage, &c. Having taken advantage of them, and thus made every available addition to his supply of food, and also having got together the greatest amount of bedding stuff within his reach, the farmer will be in a position to calculate how much straw he can spare for feeding purposes, and in fact to take stock of his resources; remembering that he cannot insure a growth of green stuff much before May, and also that—as spring advances—days get longer, animals grow bigger, and, with cold March winds blowing, more food will be required. At this stage how often does the stockfeeder wish that more economy had been exercised with the roots during the early winter! A condition of plenty often produces carelessness, and his constant care at this season of scarcity will be to see that his stockman does not exceed his orders. If his roots will only run to one root per day for each animal, there can be no doubt about his position later on if his stockman allows two to be consumed. These roots may prove a valuable investment, to be realised in the spring of 1894.

Once a man has accurately estimated his resources, and made choice of the many different off-the-farm foods offered by our merchants in these times of cheap corn, there ought to be no difficulty in working out the problems before us. Cattle will thrive without roots, although with many farmers these are the mainstay during winter. Sheep are more difficult to manage after a dry summer, and with little or nothing left on the pastures.

I have found treacle very useful for cows, &c., where no roots are to be had, and where straw chaff has to be used in any great quantity. This, I think, answers all the purpose of steaming the chaff, besides giving additional flavour and substance. My plan, and that of others in my district, is to mix 1 lb. per head in hot water, adding as much cold water as required to fairly saturate the heap of chaff intended for the day's consumption. To this I add from 7 to 14 lb. per head of meal, and linseed or cotton cake—mostly a mixture of all three. The choice of meal—wheat, maize, peas, or any other kind—will be determined as the market value of each varies. The treacle and water can be easily poured on with a watering-pot, and the whole should be well mixed together and left a few hours before use. If it is only intended to winter cattle for grass next spring, 7 lb. of meal will be sufficient; but, of course, this will depend upon the size of animal, &c. Treacle is of more market value now than it has been; but it will be found that growing

stock can be kept at about 3*s.* per head per week, if not at less cost, exclusive of straw and attendance.

ALFRED J. SMITH.

VIII.

How farmers can best carry their sheep and cattle through the coming winter months is a problem rendered the more difficult from the fact that nobody can remember a time when the country was so badly off for all kinds of fodder as at present.

In addition to this, owing to the last winter and spring being so severe and backward, farmers not only exhausted all their old stock of hay, but made a considerable outlay in the purchase of artificial food, which, unfortunately, has not proved remunerative, either in the price of stock sold during the summer or in the value of the crops just gathered. Therefore, it seems to me that many will feel indisposed—even where circumstances might permit—to be so liberal during the coming winter, whilst all will try to utilise their small amount of home-grown produce to the best possible advantage.

On the borders of North and East Dorset, where I live, there is, on some farms, not a single haystack to be seen, and on others there is only about one-fourth of the average quantity of hay which should be found at this time of the year. The roots, although an even plant, which made good progress during the month of August, cannot be expected to produce large "bulbs," or to attain the weight per acre of ordinary years, unless there should be a continuance of showery weather throughout September. Therefore, especially in this locality, where good-sized flocks are kept, and with a small outlet for sheep, I would suggest that the old ley lands in course for wheat be left unploughed till the early spring, when oats, or even barley, may be sown. These lands should be laid up at once, and, with the hope of five or six weeks of mild and growing weather, we may expect to have sufficient grass to fold off with the early in-lamb ewes at night. I prefer the evening, as the grass would not then be frosty, and no hay would be required, but in the early morning a good supply of dry food and water should be given.

This dry food might comprise wheat straw or oat straw, and, if possible, a little hay, cut into chaff, with a mixture of bruised oats or barley, or wheat, with malt dust, dried grains, pollards or bran, a little cotton-cake, or any such cheap feeding-stuffs as may be bought at from 4*l.* 10*s.* to 5*l.* 10*s.* per ton; this should be sufficient if given at the rate of about 1½ or 2 bushels per 100 head of ewes. Then a few roots—common turnips—should

be folded off during the day, or a run might be provided on some dry pasture. This practice may be continued till the ewes are brought to the lambing-pen and have lambed, when an extra supply of cake should be added, and given twice daily, with a run out, as soon as the lambs are strong enough, on dry pasture, or ley, or stubble. The ewes should have a few roots (swedes or turnips) for a short time, and when the weather permits they should be got on the turnip land, with chaff, &c., given twice daily; whilst if the weather continued favourable, and we should be blessed with an early spring, some rye and other green food would soon afterwards be available.

Tegs or shorn hogs can be wintered—provided they have been kept well during the summer months—almost without hay, if a good supply of roots be given twice daily, with 2 bushels of cotton-cake to each 100, or about 1 lb. per head. Or, where only a few roots can be spared, some barley-straw in cribs, or cut into chaff, with a few oat-sheaves, or a mixture of malt dust, will keep them healthy. If there are no roots, and a run can be given, they should have a liberal supply of cotton-cake, and be folded on dry land, with troughs containing chaff, or some good straw in cribs.

The feeding of cattle, although perhaps not looked upon by many in this district as so serious a matter as the feeding of sheep, is nevertheless a subject of anxious concern where dairies are kept, whether on mixed farms or on grass alone.

How are the animals to be fed and sheltered, with only a small supply of straw, and much less, if any, of hay—with mangel, too, in most places, a failure?

Cows to calve early, and in full milk for the winter supply, must be housed, and well fed, at whatever cost. Cabbage, mangel, and silage are excellent for producing milk, but unfortunately there is very little of any of these this season. We must therefore hope to have a few common turnips (without the green tops) to mix with straw and what hay can be procured, cut into chaff, with an addition of meal and cake at about 6 to 8 lb. per cow. Maize meal is good, and brewers' wet grains are excellent, to give with chaff, if they can be obtained at a reasonable price and short carriage. Where there is no hay, some loose barley or oat straw, such as this year's unripened produce, will have to be given instead of hay at night, taking care at the same time that the cows get a good supply of water.

I hope that most farmers took the precaution to sow early in August on well-manured lands an extra breadth of rye or Italian rye-grass, as, if top-dressed at once, it will be found

an excellent substitute for silage and hay for early-calved cows. I think many farmers will agree with me that the price given for the winter milk, by the large milk and dairy companies, is not nearly enough to pay the producer a fair margin for the extra expense and trouble to which he will be put.

Young cattle and late in-calf cows will in many places have to be wintered in the open, and, if kept on dry sheltered pastures, will be much more healthy than if put in draughty yards with a scanty supply of bedding; such practice as the latter often leads to serious consequences. Dry, sheltered yards, and a good supply of sweet straw, with about 3 lb. of cake per head, furnish our usual means of wintering dry cattle, but this season we shall not have sufficient straw. Therefore, I suggest, where there is sheltered and enclosed pasture land, to give in troughs some straw chaff, with a little inferior corn ground, and, if conveniently obtainable, some furze or gorse (young shoots) chopped fine or bruised, which would be a great help. A less expensive way, perhaps, would be to employ some green straw of this year's growth, served out twice daily with a little cotton-cake; a few roots are good, but I do not think there will be any to spare for young cattle.

In conclusion, I am afraid that, however careful and economical farmers may be in the utilising of their feeding-stuffs, and however fortunate in the keeping and rearing of their stock, the winter of 1893–94 will prove one of considerable loss, and without the liberal aid of landlords, and better prices for stock and corn, many stock-feeders will have hard work to pull through.

Tom T. Stacey.

IX.

If the experience in Hampshire may be taken as a reliable index, our fodder and forage crops as a whole have suffered terribly through the recent severe and prolonged drought. Throughout Hampshire only about one-half the usual quantity of straw has been secured, whilst hay has suffered still more grievously, the year's supply having fallen short by quite three-fourths of the ordinary crop. But it is to be feared that the record of bad crops is not yet complete. Roots are decidedly unpromising. Mangel—probably the most valuable for spring consumption—has practically failed; and swedes and turnips are so very backward that it is hopeless to expect a fair supply of either.

The prospect is more especially discouraging to the farmers in Hampshire because they have already suffered very severely from the expensive winters of the two previous years. They

are now unable to profitably realise upon their stock, since scarcity of supply has so greatly advanced the price of the ordinary fodders that buyers of cattle refuse to purchase at anything like the usual figures, fearing that the cost of keep will make it impossible to hold stock profitably through the winter.

Farmers are therefore reduced to this position: they must either sell their cattle at a loss, or carry them through the winter with the usual but at present expensive fodders. Failing either of these alternatives, they must employ every means that experience can dictate and information can furnish to keep stock with such fodders as may afford efficient and cheap substitutes for those now so costly, and in some cases altogether unavailable.

In face of the present ruinous prices, and notwithstanding the fodder difficulty, there should be no hesitation in declaring that stock should undoubtedly be held, more especially as it may be reasonably anticipated that with the spring of 1894 prices of all kinds of stock are almost certain to advance, the reason being that, according to the official returns,[1] there has been an appreciable reduction upon last year's numbers of cattle and sheep in Great Britain.

Sheep form the most important branch of Hampshire stock-farming, and the rule of the county has been to make extensive use of clover-hay for food, the straw being converted into manure, or more usually sold. But it is apparent, that in the present exceptional circumstances, this practice must be varied to a very considerable extent. The straw, reduced to chaff, must now take its proper and rational place in the feeding of both sheep and cattle. Indeed, the scarcity of hay, and the consequent higher prices that may be obtained for it, must constrain all practical farmers to admit that it is better to sell the greater part of that which has been secured, rather than to use it altogether for feed at home; and this with stronger reason because experience has proved that for cattle the straw chaff with pulped roots makes an efficient and nutritious substitute. Certainly there need be no doubt of the nutritive character of this season's straw, as the bulk of it failed to reach the usual uniformity of ripeness. In addition, it is fortunate that all kinds of straw, as well as seed, pea, and vetch haulm, have been harvested under a scorching sun, and are consequently sweet and good for food. For their sheep Hampshire farmers will have neither silage nor roots, worth mentioning, to supply to any extent the place of the clover-hay, which it is advised that they should sell. It is therefore imperative upon

[1] See p. 655.

them to decide what fodders are best adapted to constitute the cheap and efficient substitutes suggested above. The writer's general practice, and such practice as he has observed in successful operation in Hampshire, together with the present prices of the materials now to be dealt with, point to the following:—

(1) An efficient food for sheep will be obtained by the mixture of 1 part hay, 3 parts straw chaff, and about $1\frac{1}{4}$ lb. of malt dust with $\frac{1}{2}$ lb. of cotton-cake per head.

(2) For the provision of sheep food, the present low price of barley brings it within range. Sound barley may be purchased at Southampton for from 15*s*. to 16*s*. per quarter. This will produce most food if steeped in water for about twenty-four hours. Care must be taken, however, not to use more water than the corn will absorb. After saturation, the barley should be laid upon a covered floor until it sprouts, which will occur after about three days, unless the weather be very cold. In this event it is desirable to obtain warmth by covering the corn with old bags. Barley thus prepared is a wholesome diet for cattle also, and one on which they thrive. With reasonable care as to quantity, it has likewise been used with advantage for working horses. Of course, in all the above cases, the barley must be given mixed with straw chaff.

(3) Wheat, cheap as it is, with a due proportion of straw chaff, may also be used, grittled, but sparingly at first, and increasing to nearly $\frac{1}{2}$ lb. per head. Some of the principal Hampshire farmers have already fed their sheep upon it, and with a success that will justify its employment in future years, provided that it remain as low in price as at present.

Of the foregoing foods, it may be remarked that the best, if not the cheapest, is that first mentioned. A good method of preparing the straw chaff is as follows: Cut all straw, haulm, &c., into chaff directly it is threshed, and have it well trodden into the store with a slight sprinkling of salt—about a bushel of salt to a ton of straw—and the addition of a little fenugreek or spice; though the salt must be used sparingly where breeding ewes are to be fed. Chaff so treated mellows wonderfully, and improves by being kept for a few months. It will be found that both sheep and cattle will eat it with zest.

The moderate supply of roots that may be available should be used to supplement each of the foregoing foods.

Maize would be serviceable during the coming winter if it should be as cheap as now appears probable. Cotton-cake, again, if price permit, with plenty of turnips, will make a feed upon which dry sheep will thrive. 1 lb. of cake per head daily is a fair allowance. This is a cheap way of wintering tegs, and

has the great advantage that it does not foul the land so much as hay.

Cattle in Hampshire are not nearly so important a consideration as are sheep, therefore the question of cattle food does not cause so much anxiety in this part of Great Britain as, unfortunately, it does elsewhere in the island. Certain mixtures of cattle fodder have been already indicated, but, in addition to these, Hampshire stock-holders may find the following of service. Setting aside the hay, which it is advised should be disposed of by sale, and remembering the entire lack of silage and the scarcity of roots, a good food may be obtained by a mixture of 40 lb. to 50 lb. of straw chaff, nearly 2 lb. of boiled linseed, and about 3 lb. of such home-grown ground-up wheat or barley as may be found unfitted for the market. The mass should be allowed to remain about twelve to sixteen hours before being used, as, in that time, fermentation will arise, making the whole more agreeable and more easily digested. It may here be noted that, where straw has been carted in bad condition, steaming will rob it of all flavour of mustiness, and convert it into a palatable food.

Where the farmer has been fortunate enough to secure a fair supply of roots, he will, as usual, pulp these, using about 20 lb. per head, and will mix the pulped mass with about 30 lb. of straw chaff, in addition to 2 lb. or 3 lb. of unsaleable home-grown wheat or barley, reduced to meal.

For all kinds of stock, however, required to be fattened, straw chaff and hay, in equal proportions, are generally used; but it is possible to fatten cattle by the use of a mixture of about 12 lb. of hay, 36 lb. of straw, and artificial food—consisting of crushed oats, bean meal, and linseed cake in equal proportions—increased from 7 lb. to 14 lb. per head daily.

Horses have not been so much affected by the drought as other live-stock, as some of the variety of fodders of service to them have escaped its effects; but, as oats are now somewhat expensive, it might be found advisable to substitute in great part ground maize for these, using, perhaps, about ½ bushel of oats to 1 bushel of maize and ½ bushel of beans per head weekly.

Since so liberal a use of straw for feeding purposes has been advised, it becomes necessary to indicate a material which may be found equally as useful as the straw for litter. Undoubtedly, peat moss, a product of the Yorkshire moors, is the best of these litters at present known. It lasts longer than the straw itself, retains more manurial properties, and, important also to notice, it requires less labour in carting and spreading on the fields. Dried fern also, though not so capable an absorbent, will be

found to be extremely useful; but, where fields afford shelter, cattle might be left out in them to a later period of the year than is usually permitted, and the store of litter, consequently, appreciably economised.

The possibility of a large extent of failure in the root crops has been already alluded to; but it is also to be feared that if the practice, too common in the South of England, be followed this year of allowing the crops to remain in the fields without protection from the frost, this failure will be accentuated. Farmers might take warning from the experience of the last two winters, during which roots were extensively rotted by the frost. It may not be out of place to urge that swedes should be taken up, and pitted in the field in quantities of about two loads each, while the turnips should be moulded up between the drills by the plough. This last is a beneficial practice common both to Scotland and the North of England.

It is to be hoped that farmers generally have taken advantage of the early harvest to sow a series of catch crops. Those who have done so will, if the winter be at all moderate, be relieved from the fear of scarcity and the necessity to purchase in the critical months of March and April, when the rye will have become fit for food. Italian rye-grass (which, in March, should have 1 cwt. of nitrate of soda sown per acre), winter barley, trifolium, thousand-headed kale, and tares will come in due succession to carry stock in safety, and with economy, to the end of July.

THOS. STIRTON.

X.

This is a subject on which I am afraid there is nothing new to be said, for every known system of feeding has been practised, and is pretty well known. But though there may be nothing new, it may be well to point out that there is a wasteful process of feeding, and also an economical process. Some people certainly get more stock kept on a given quantity of food—and get them done better—than others do, and though I do not profess to be one of them, I mean to have a good try at economy in stock-feeding this winter. The necessity for so doing is too obvious to discuss; the mere fact of hay being worth from 7*l.* to 8*l.* per ton is quite sufficient reason, without going any farther. Having in my own case commenced by selling 200 tons of hay, the problem to be solved, viz., How to winter our stock, is extremely interesting to me, as I have to winter about 400 head of cattle, 2,000 sheep, and 50 horses, with something like half the usual crop of straw, barely an average crop of roots, and with three-fourths of the hay sold.

I am hoping for a repetition of the season of 1826, respecting which I have heard my father say, "There was no hay made, and none wanted."

Without indulging in theoretical ideas about this matter, I propose as nearly as I can to sketch the plan I intend to adopt in feeding my own stock through the coming winter, which I need hardly say I look forward to with some anxiety.

It is too late to talk about what we can produce this season to help us through. Hence we have only to deal with what we have already got, or what we must buy. Many of us have a grand growth of grass, which will no doubt greatly increase yet, before the growing season is over, and which in ordinary times would be consumed on the land, but in a season like this should undoubtedly be cut, and made into silage if the weather is unsuitable for haymaking. Though grass is useful to feed on the land for store cattle and sheep through the autumn and winter, still it must not be forgotten that, so soon as the ground gets soft, at least 75 per cent. of such grass is trodden into the dirt, and utterly wasted. Again, in frosty weather, every bullock and sheep has five mouths, for they destroy as much with each hoof as they consume with their mouths. Of course, everyone would be careful to feed the grass on his wet ground first, before the land becomes sodden, and to keep his dry land for the wet weather,—in fact, if possible to clear his wet land altogether as soon as it begins to "tread." Even if there should be some grass left, this may come in most usefully in the dry months of February and March, when a good bite of old grass will often do cattle and sheep admirably, with the aid of only a small amount of dry food.

Whatever the character of the winter may be, it must be more economical to cut anything that is enough of a crop to cut, and make it into silage or hay, rather than feed it on the land. The simple process of making stack silage, by hauling the loaded carts over the heap and tipping thereon, is too well known to need description. Then there is another system which I think might be carried out conveniently this year, certainly up to Christmas, namely, to keep a piece of latter-math, or a grazing-ground recently shut up, and cut and haul the grass daily to stock in neighbouring fields. Possibly, if heavy snow fell, the grass would become rotten, but more likely—as the ground is so dry—it would this year keep good for a considerable time, and I shall certainly set apart some with the object of carrying out this plan. I have at present (first week of September) over 100 acres that have been shut up for a month or more; these will cut silage equivalent to fully 15 cwt. of hay per acre, another

50 or 60 acres will produce somewhat less, but if this growing weather continues the grass produced by this land will very much simplify my stock-keeping through the coming winter. Of course this growth of late grass is quite unusual, but almost invariably follows a hot dry summer; the tropical heat, combined with the moisture of the past month, has made grass grow as I have only known it once or twice before in my life,—1868 was the nearest approach to it.

I have not been long in making up my mind that hay at present prices is the dearest article a farmer can consume, and that unless he has a milk contract, or for some reason or other he feels bound to retain his stock, he had better dispose of it at almost any sacrifice rather than feed on hay. For this reason I sold the whole of my hay on two farms, reserving only a moderate quantity where I have a milk contract to carry out, and a few show Shorthorns, which will no doubt require a little, though the bulk of the Shorthorns will fare as "ordinary" stock.

Another conclusion I have also come to, though not without reluctance, is that the chaffcutter will have to be used extensively this year. Generally speaking, I am not a believer in the system of chopping straw and pulping roots for cattle. I think the extra cost in labour and the inferior doing of the cattle, to say nothing of the extra actual dead losses caused by indigestion, &c., far exceed the advantages derived in the greater economy of food. I think (again speaking generally) that it is better to allow cattle to eat their straw in its natural state (and the roots separately), when they will consume what is good and wholesome, and the refuse will go for litter, rather than compel them to eat a lot of indigestible stuff (positively injurious to health), and buy peat moss or sawdust for litter, or, as I have often seen, litter with straw as good as that laboriously cut into chaff to feed them. It would, in my opinion, be better to chaff the litter and feed with the long straw.

But in this season, owing to absolute necessity, everything grown on the farm must be consumed, and a deal more besides. In my own case, oats were cut green for hay, perhaps a ton per acre, and the ground planted, some of it with mustard, some with thousand-headed cabbage, which will at all events keep the sheep off the pastures at a critical time, and allow my grass to go for silage. Wheat, cut very green, was about half a crop. Winter barley, also cut very green, was a light crop. The straw of all this must be mixed with the hay, and cut into chaff, and none of the stock allowed to eat long hay. In addition to this, cows in-milk will get 10 lb. or more of artificial food, probably a mixture of bran, maize meal, and cotton cake in about equal

quantities; also a bushel of roots per day, or the equivalent in grass or silage. Cattle with any flesh upon them will be pushed forward as fast as possible for the butcher on cake and meal *ad libitum*, roots, and straw. These, for the most part, will be fed in the open fields to save litter, where, if the ground is sound, and there is a fair amount of shelter, they will do better than they would do tied up, or in yards; of this I have had sufficient experience to speak confidently. A large number of young cattle, down to yearlings, will have barley straw and cake, either in open fields or yards. We generally give 4 lb. of cake and any amount of straw; this time it will be 5 lb. of cake, and they must eat practically all the straw. Yards must be bedded with stubble cleanings, which, as worked out, will be stacked when dry, and kept dry for this purpose and for covering potatoes, &c. But open yards are an extravagant invention for the consumption of litter, and, where possible, I shall enclose the shed and confine the animals to this, only allowing them to go out in the open yards twice a day for water. Peat moss will also be used in boxes to some extent,—no straw for litter this time. Cattle under a year old will get a little hay and straw chaff, with roots, bran, and cake or beans.

In this way I hope to get through the winter without much loss or inconvenience, anticipating a sharp rise in prices next spring. I reckon that 6 cwt. of cotton cake and 1 ton of good straw, with a fair picking of grass, ought to winter a two-year-old bullock. Of course much depends on the character of the winter, but with 5 lb. of cake per day, assuming there is a fair amount of grass, he ought to require very little straw before Christmas,—6 cwt. of cake at 5*s.* is 1*l.* 10*s.*, and 1 ton of straw, say at 2*l.* spending price, makes the total 3*l.* 10*s.* Then there is the value of the manure from the cotton cake, say 10*s.*, which will cover cost of attendance. I think there is a very fair prospect of cattle paying well for wintering in this way.

Now comes the question of sheep keep. My ewes rarely have hay excepting in very bad snowy weather. My Shropshire flock of 230 ewes did not consume 5 tons of hay last winter, and 300 Radnors consumed even less. My practice has been for some years to keep them chiefly on grass until within a month of lambing, when they get a few roots, and about Christmas time 1 lb. of cake or corn per head, which is continued through the spring, until the lambs are old enough to eat, when they have the corn instead of the ewes. Of course, all feeders may not have suitable dry pastures in which to run their ewes, and my system would not apply to all; but I am confident that hay, even at 3*l.* or 4*l.* per ton, is extravagant feed for sheep, and that

it would be far more economical to sell even at that price, and spend half the money in cake or corn instead. My flock of Shropshires has invariably done well under this system, and I see no reason why hay should be a necessity for any other breed of sheep, if it is not so for Shropshires or Radnors.

Ewe lambs, 150, will have grass, a few roots, and ½ lb. of cotton cake until mid-winter, when the cake will be supplemented by ½ lb. of bran or malt dust; no hay, straw, or chaff.

My fattening sheep comprise 250 tegs. I have found 1 lb. of cake and corn per day with about 16 lb. of roots to be a fair daily ration for a fattening Shropshire teg. I never give hay, though sometimes a little chaff with the corn, but it is quite unnecessary: 1 cwt. of roots and 1¼ cwt. of cake and corn will feed out a teg in twenty weeks, during which time he should put on 32 lb. of mutton. It is pretty easy to calculate the feeding capacity of one's roots on this basis, but I know of no reason why the corn and cake should not be doubled. Certain it is that some *show lambs* are made to eat 4 lb. of cake and beans per day *before Christmas*. This, I should say, would not be economical feeding, but in a season of scarcity of roots, I am very much inclined to think that a ration of 2 lb. of cake and corn per day would be economical feeding. I cannot say what saving in roots the extra 1 lb. of cake would cause, but my impression is that fully one-third less would be required per day, and the animals would be as fat in sixteen weeks on this treatment as they would in twenty weeks on the lighter feeding. In the first case the sum would work out, say, 1 ton roots 7*s*. 6*d*., 1¼ cwt. cake and corn 7*s*. 6*d*.=15*s*. In the second case, say, 11¼ cwt. roots at 4½*d*.=4*s*. 2*d*., 2 cwt. cake and corn at 6*s*.=12*s*., total 16*s*. 2*d*. Thus we have a fat sheep costing 1*s*. 2*d*. more, but against that there is the saving in roots, 8¾ cwt., worth over 3*s*., and the extra manure from the cake. It appears, therefore, that the higher feeding is the more economical, especially when we take into account the value of the manure from the extra cake feeding. This seems to me to be the line for those who are short of roots. Another 250 cross-bred tegs (Radnor and Shropshire) will "run round," having a few roots, grass, and ½ lb. of cotton cake and malt dust—in fact, kept as the Shropshire ewe lambs are kept. So much for my Monmouthshire stock.

I have now to deal with a considerable stock of 100 young cattle and 1,000 sheep on the Cotswold Hills, about 700 ft. above sea level. In this district hay is universally considered essential for ewes in lamb, and for fattening sheep on turnips. The latter I have proved to be a fallacy, having successfully

fattened a considerable number last winter without any hay worth mentioning, and with only the smallest amount of chaff (hay and straw in equal parts), just enough to prevent their swallowing their corn too rapidly. Hitherto I have not succeeded in quite overcoming the prejudice of the shepherd (one of the best on the Cotswold Hills) in favour of hay for ewes, but it will have to be settled this winter, for, having sold all the hay, there can be no use in arguing the point. However, I shall keep a somewhat smaller proportion of breeding ewes than I at one time intended, and feed a larger number of tegs,—400 of the former, 600 of the latter. Being well off for grass, the ewes will require little else, I hope, before Christmas, when they begin roots; the young ewes may be on roots earlier, and have 1 lb. of artificial food per day, probably malt dust and cotton-cake, or whatever equivalent may be cheapest in the market. In fact, they will be kept much in the same way as my Shropshires are kept in Monmouthshire, and I expect with the same satisfactory result. Possibly I may have to give the Cotswolds in their colder country a little extra dry food; if I have to give them $1\frac{1}{2}$ lb. per day I shall not object. This will work out at a cost of 8*s.* per head,—say 10 lb. per week for 20 weeks, or 200 lb. at about 4*s.* 6*d.* to 5*s.* per cwt. Under the ordinary haying system about 4 lb. per head per day would be the ration = 1 cwt. per month = 5 cwt. for 5 months, at 7*s.* = 1*l.* 15*s.* I think $1\frac{1}{2}$ lb. of cake and malt dust will be fully equal to the 4 lb. of hay. Straw being very short,—about 150 tons of oat straw to winter the 100 young cattle and 15 horses,—chaffing will have to be resorted to, and a considerable expense incurred for cake; but the roots, 105 acres, promise to be good, and with grass abundant, and dry-lying for the stock, I enter upon the winter there with a light heart.

Cart-horses will, of course, have no long hay, only a little cut in the chaff. Colts and brood mares will winter out and require nothing but grass until Christmas (this applies to Monmouthshire, not to the Cotswold Hills), when most of them will no doubt require a couple of feeds of corn and chaff per day.

Such, roughly told, is my plan for wintering my stock. There is nothing new in it that I am aware of, but the main point in economy is the prevention of waste, of which there is a great amount going on constantly on most farms. I do not think farmers are sufficiently alive to the advantage of high feeding; they do not consider that it is perfectly absurd to give an animal intended for the butcher only sufficient artificial food to keep him stationary. It is next to useless to keep them *slowly* moving, for the true economy is to feed as rapidly as is com-

patible with safety. I know some farmers will say, "I don't want to hurry my sheep out, or get them over fat, because I want to shear them and sell them out of the wool;" and so they keep them about stationary for three months. I think it would be more economical to feed out the first lot quickly, and buy others to take their places. More cake and corn would be consumed, and land would be improved to an extent only understood by those who have adopted the plan. No doubt, this may appear opposed to the policy I pursue in keeping 250 tegs "round." I have, however, special reasons for doing this in the case of my cross-breds (Radnor and Shropshire), but it is beyond the scope of this paper to enter into detail on this point.

R. Stratton.

THE CHESTER MEETING, 1893.

Fifty-four Country Meetings have now been held by the Royal Agricultural Society, but only once before the present year has the annual gathering taken place in Cheshire. During the long period 1839–1893, however, as many as six Country Meetings have been held within a radius of less than fifty miles from the historic city of Chester. These were at Liverpool in 1841, when Mr. Philip Pusey was President; at Shrewsbury in 1845, when the Duke of Richmond was President; at Manchester in 1869, on which occasion His Royal Highness the Prince of Wales was for the first time President of the Society; at Liverpool again in 1877, under the presidency of Lord Skelmersdale (now the Earl of Lathom); at Shrewsbury a second time, in 1884, when Sir Brandreth Gibbs was President; and at Preston in 1885, under the presidency of Sir Massey Lopes, Bart., M.P. Eight years subsequent to the last-named Meeting the Society has for the second time pitched its camp at Chester; but an interval of thirty-five years has separated the two Chester Meetings, a few details concerning which are presented in the subjoined table:—

Year	Place of Meeting	President	Entries of live stock	Number of implements entered	Number of persons admitted
1858	The Roodee, Chester	Earl Berners	1,026	3,648	62,539
1893	Hoole Road, Chester	The Duke of Westminster, K.G.	2,061	5,527	115,908

The Show-ground.

The site selected for the Show, on the Hoole Road, was conveniently situated and easy of access, being less than a mile from the General Railway Station at Chester. The character of the ground and the appearance of its surroundings were somewhat prosaic, especially when contrasted with the beautiful scenery amid which the Meeting of the previous year had been held in Warwick Castle Park. If, also, a comparison in this respect be made with the former Show at Chester, it must be decided in favour of the Meeting of 1858, which was held on the famous Roodee. But, though there were lacking many of the natural adjuncts such as have at various times contributed to the picturesqueness of the Society's Shows, it must be admitted that the site chosen for this year's Meeting was one eminently suitable from a practical point of view, and this is a consideration which cannot be ignored.

The disposition of the various sections of the Exhibition has necessarily to be controlled by the shape and size of the ground; but it will be seen from the plan given on p. 501 that, though certain modifications were inevitable in matters of detail, the Society's Surveyor was, nevertheless, able to adhere to the general scheme with which visitors to the Country Meetings are familiar. The area occupied by this year's Show was 70 acres; at the former Chester Show 25 acres were found sufficient.

Some Statistics of the Showyards.

It is quite possible that the casual visitor to the Shows of the Royal Agricultural Society may carry away a very inadequate idea of the labour involved, the material consumed, the time bestowed, and the money expended in preparing year after year the temporary premises for the great national agricultural display. The grubbing-up of hedges, the levelling of ground, the laying of water-pipes, the making of roads, are usually amongst the indispensable preliminaries. Beyond these, however, there is a vast amount of work to be done, respecting which various details have been kindly furnished by the Society's Surveyor.

Area.—As a general rule the Showyard occupies an area of about 70 acres, as was the case this year. At Warwick, in 1892, although the entries were fewer, an area of 90 acres was required, on account of the large number of trees with which the ground was so agreeably diversified. On the other hand,

in 1890, at distant Plymouth, and with reduced entries, about 50 acres were found sufficient.

Timber.—This year 86,000 cubic feet of new timber, weighing 1,300 tons, and costing over 5,500*l.*, were purchased and used in the construction of the Show.

Shedding.—To accommodate all the entries in the Implement Department 13,018 feet of shedding were built, in widths varying from 16 to 25 feet. In addition, 4,422 feet of shedding were required for the horse-boxes and stalls, 5,638 feet for cattle-sheds, and 3,381 feet for sheep- and pig-pens. The Poultry Department necessitated a building 100 feet by 120 feet. The large horse-ring is usually 500 feet long by 150 feet wide, and has a Grand Stand extending the full length, with covered seats and platform, capable of accommodating 4,000 persons.

The Farm Produce Department was especially large at Chester, Cheshire cheese alone requiring a building of 120 feet by 150 feet. The remaining exhibits of cheese, butter, jam, cider, &c., took up little more than half this space.

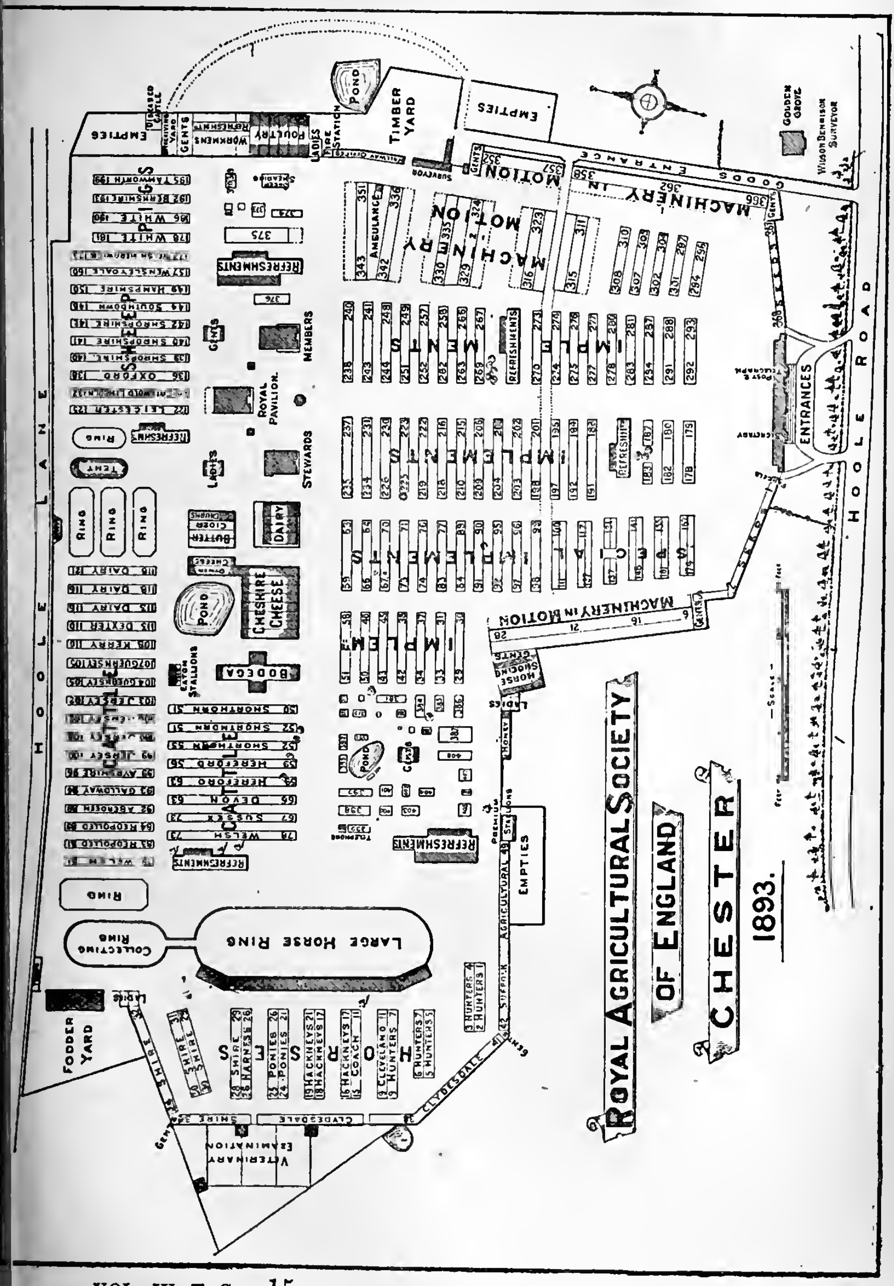
For the Refreshment Department, one of considerable importance, nine separate buildings are usually erected. Two large ones are 170 feet by 50 feet, with two dining-rooms, each 50 feet by 40 feet, and long open bar. There are two others of 160 feet by 25 feet, and also two of 120 feet by 25 feet for temperance firms, and a special pavilion for workmen. All are fitted with kitchens, stores, tables, shelves, &c., and are delivered up to the refreshment contractors ready for use. The Bodega Pavilion is formed with permanent plant, which is taken down and re-erected each year.

Besides the more important structures, shedding and offices have to be provided for the forage, which at Chester consisted of hay, 38 tons; straw, 103 tons; and green fodder, 98 tons. This is all provided by the Society.

Specially constructed buildings are also required for the horse-shoeing competition, hives and honey, diseased cattle, implement competitions, and lavatories.

The Dairy Department is one of growing importance in the Showyard, requiring a building which at Chester measured 96 feet by 96 feet, completely fitted with stone floors and offices, seating accommodation, and tiled roofs. It was arranged as two distinct buildings, back to back, the one being used for lectures, demonstrations, and butter-making competitions, and the other fitted with machinery, separators, and new implements for dairy purposes, besides being also used for demonstrations.

The whole of the buildings, if put end to end, would measure over six miles.


Royal Agricultural Society
of England
Chester
1893.
Large Horse Ring
Collecting Ring
Fodder Yard
Veterinary Examination
Machinery in Motion
Implements
Goods Entrance
Entrances
Hoole Road
Hoole Lane
Timber Yard
Pond
Empties
Royal Pavilion
Members
Stewards
Dairy
Cheshire Cheese
Bodega
Refreshments

In addition to the construction of the Showyard the Society undertakes to do any fittings required by exhibitors on their stands. Works of this character were carried out at Chester for 254 firms, the cost amounting to over 1,100*l.*

Canvas.—Of canvas 86,500 superficial yards were used at Chester.

Permanent Plant.—The entrances and pavilions are constructed with the Society's permanent plant, which is sent from show to show, and weighs 270 tons.

Time occupied.—The Society takes possession of part of the site in July, when the entrances are erected in their proper position, and sheds are built to cover the remainder of the permanent plant. The Local Committee level and drain the site during the autumn and winter months, whilst the Society commences the erection of the Showyard in the month of February. The Showyard Works, building and clearing away, occupy about x months.

Cost.—The gross cost of the erection of the Showyard Works is some 11,000*l.*, but about half of this amount is returned by sales of materials and payments for work done for exhibitors and purveyors, leaving the nett cost of these works about 5,500*l.*

With the exception of the employment of a few leading men, the whole of the works are carried out by local workmen under the direction of the Society's Surveyor, and without the intervention of a contractor.

Entries.

An examination of the table of entries on the opposite page will show that, in the live stock classes, sheep to some extent, and cattle very considerably, were this year above the average. Pigs, on the other hand, were less numerous than usual, and would seem in this respect to reflect the diminution which has taken place in the pig population of the country. Horses were only slightly below the average number of the last ten years. In the Cattle section, the Jersey, Shorthorn, and Welsh breeds were particularly well represented in numbers; in the Horse section, the Hunters and the Shires were specially prominent; whilst in the Sheep section considerably more than one-fourth of the pens were occupied by Shropshires. The aggregate entry of horses, cattle, sheep, and pigs was up to the average of the last ten years, and above that average if Windsor be excluded.

1858 and 1893—A Comparison.

Many facts of instructive interest are revealed in comparing the arrangement of the live stock classes at this year's Meeting

with that which sufficed at the Chester Meeting of 35 years ago.

Cattle.—As was usual in the earlier years of the Society's Shows, cattle then occupied the place of honour in the Catalogue, but whereas at this year's Meeting sections were provided for 13 distinct breeds, in 1858 only 3 breeds—Shorthorn, Hereford and Devon—were specifically recognised. It is true that the Chester Local Committee of that day provided a section for "Welsh breeds"

Number of Entries at the last ten Country Meetings (1884–1893).

Number of animals entered	Chester, 1893	Warwick, 1892	Doncaster, 1891	Plymouth, 1890	Windsor, 1889	Nottingham, 1888	Newcastle, 1887	Norwich, 1886	Preston, 1885	Shrewsbury, 1884
Horses . .	509	449	717	333	996	546	500	493	438	407
Cattle . .	759	607	669	642	1,644	644	626	681	539	579
Sheep . .	631	600	649	571	1,109	537	513	446	433	490
Pigs . . .	162	202	205	223	265	148	194	203	203	211
Total . .	2,061	1,858	2,240	1,769	4,014	1,875	1,833	1,823	1,613	1,687
Poultry . .	836	835	789	695	861	343	405	191	325	—
Produce . .	957	433	425	456	1,202	441	347	274	385	150

Shedding in Implement Yard (in feet) [exclusive of open-ground space]	Chester. 1893	Warwick, 1892	Doncaster, 1891	Plymouth, 1890	Windsor, 1889	Nottingham, 1888	Newcastle, 1887	Norwich, 1886	Preston, 1885	Shrewsbury, 1884
	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.
Ordinary . .	8,610	8,241	8,343	6,117	10,378	7,253	5,508	7,155	8,417	9,315
Machinery in motion .	2,211	2,151	2,106	1,291	2,496	1,607	1,125	2,017	2,063	2,035
Special shedding (including seeds, models, &c.)	2,197	2,119	2,024	1,670	2,728	1,883	1,584	1,640	1,520	1,554
Total . .	13,018	12,511	12,473	9,078	15,602	10,743	8,217	10,812	12,000	12,904

of cattle, 11 out of the 13 prizes offered for which were taken by the Hon. Colonel Pennant, of Penrhyn Castle, who thus won 160*l.* In 1858, also, as again (Classes 117–121, p. 524) in 1893, the Local Committee offered prizes for "Dairy Cattle," irrespective of breed, the sum of 170*l.* having been thus assigned in 1858, as against 195*l.* this year. Cattle, other than those already referred to, had to compete in 1858 in a section for "Other established Breeds," wherein the prizes were won by animals variously de-

scribed as "black-polled Angus," "dun West Highland," and "red Norfolk (polled)."

In connection with the award of the Shorthorn Champion Prizes at this year's Show, there are two coincidences worthy of notice. The male Shorthorn Championship is, on this occasion, won by the Earl of Feversham, with *New Year's Gift*, the bull which his Lordship purchased for 1,000 guineas, at the sale of a portion of the herd of Her Majesty the Queen at Windsor in 1892. At the Chester Meeting of 1858 the award of the premier prize in the Shorthorn section is thus recorded in the Journal (vol. xix., 1858, p. xxi.):—

> Lord Feversham, of Duncombe Park, Helmsley, Yorkshire: the Prize of thirty sovereigns, for his 5 years 3 months 3 weeks and 3 days-old red and white Short-horned Bull "5th Duke of Oxford"; bred by the late Earl of Ducie, of Tortworth Court, Wootton-under-edge, Gloucestershire.

Again, the female Shorthorn Championship has this year been won by Mr. Richard Stratton, with *Timbrel 23rd*; in 1858 this gentleman's father figured in the prize-list as follows:—

> Richard Stratton, of Broad Hinton, Swindon, Wilts: the Prize of ten sovereigns, for his 3 years and 3 months-old roan Short-horned Cow, In-milk and In-calf, "Matchless the 4th"; bred by himself.

Horses.—In 1858 "Horses" formed a section which was not subjected to any differentiation into breeds. The competitors were, however, arranged in three groups—Agricultural Horses, Dray Horses, and other horses. The prize-winning animals were then variously described as—"Agricultural Stallion," "Suffolk Agricultural Stallion," "Dishley Agricultural Stallion," "Agricultural Cart Filly," "Clydesdale Dray Stallion," "Buckinghamshire Dray Stallion," "Thoroughbred Stallion," "Mountain Pony," "Welsh Talacre Stallion Pony," "Half-bred Filly," "Thoroughbred Colt," "Hunter Mare," and "Mare for breeding Hackneys."

Sheep.—Turning to sheep, the only breeds for which separate sections were provided in 1858 were Leicesters and Southdowns, half the prizes for the latter of which went to the Goodwood flock. All other fleece-bearers had to find a place in one of two other sections—"Longwools (not Leicesters)," and "Shortwools (not Southdowns)." The whole of the prizes for "Longwools" went to the Cotswold breed, amongst the winners being Mr. Robert Garne, a name which is again conspicuous in the Cotswold classes of 1893. In the "Shortwool" section, the prizes went to animals variously described as "West Country Down," "Shropshire," and "Improved Hampshire Down." In addition, sheep specified as "Welsh," "Welsh Mountain," and

"Cheviot," were amongst the prize-winners. The prize record of 1858 is silent, however, as to such sheep as the Lincolns, the Oxford Downs (these are mentioned, by the way, amongst the commendations in 1858), the Suffolks, the Wensleydales, the Border Leicesters, the Dorset Horns, and other breeds which received class recognition at Chester in the present year. It is interesting to recall the circumstance that Mr. Robert Smith, in his Report on the Live Stock at Chester in 1858, took occasion to remark (Journal, vol. xix., 1858, p. 388) :—

> This competition of "other short-woolled sheep, not being Southdowns," requires the consideration of the Council as to whether they can be separated into distinct classes of established breeds.

Pigs.—Like the horses, their thick-skinned allies, the pigs, appear to have been exhibited in one section free from differentiation, saving such as was expressed by the terms "large breed" and "small breed" respectively. The prize-winning animals were, in 1858, entered under such designations as "large white-and-spotted boar," "large white boar," "small-breed boar," "small-breed Cumberland white boar," "large-breed white, with one blue spot, sow," "large white-and-spotted sow," "small-breed white sow," "black (with a little white) improved Berkshire sow-pigs, of large breed," "small-breed Yorkshire sow-pigs," and "blue-and-white large-breed sow."

Implements.—The date of the former Chester Meeting marked the close of a period of almost unprecedented activity in the development of machinery adapted to agricultural purposes. The circumstances attending that period are tersely set forth in the following paragraph, taken from the Report on Implements at Chester in 1858 (Journal, vol. xix., 1858, p. 313), written by Sir Archibald K. Macdonald, Bart , who was Senior Steward of Implements for the occasion, and who happily still occupies a seat on the Council in his capacity as a Trustee of the Society :—

> The Prizes offered by the Society at Chester—with the exception of the 500*l.* Prize for Steam Cultivation—were confined exclusively to those implements and machines applicable to "the conversion of farm produce," forming the third division of agricultural machinery admitted to competition at the Society's Meetings within the last three years, the Prize List at Chelmsford in 1856 having been devoted to implements for "the preparation of the soil," and that at Salisbury in 1857 to those for "the treatment of the crop from sowing to gathering."

The prize of 500*l.* just referred to was won by Mr. John Fowler, jun., for his Steam Plough. In addition, prizes varying

from 25*l.* to 3*l.*, and amounting in the aggregate to 267*l.*, were awarded in 1858 for steam engines, threshing machines, chaff-cutters, root-cutters, root-pulpers, linseed- or corn-crushers, oil-cake breakers, winnowing machines, corn-dressing machines, screens for corn and seed, mills, and churns, all of which were submitted to trial by the Judges. This year special prizes were offered and awarded for sheep shearing machines, the trials of which are reported at p. 547, and for self-binding harvesters.[1]

In 1858 the awards of Silver Medals for "new" implements were six in number, and were given for a paring plough, a cheese-making apparatus, a blast drill, a draining-pipe and tile machine, a chronometrical thermometer, and a whisk for eggs. This year five Silver Medals (see p. 552) have been awarded for devices variously described as a lift-out gulley-trap, a revolving seed-sower for clover and rye-grass, a straw-trusser, a "disc" churn, and a potato-planter.

Produce.—The handsome Champion Prize of 100*l.* for Cheshire cheese, won by Mr. Thomas Houlbrooke, of Calveley Farm, Tarporley, Cheshire, serves to recall the fact that a similar champion prize was won in 1858 by Mr. George Willis, of Ridley Hall, Tarporley. This year Mr. Henry Willis, of the same address, wins 60*l.* for two first prizes and a second in the Cheshire cheese classes. In 1858 there were 194 entries of Cheshire cheese, with a total weight of 20 tons; this year 473 entries were made, and the weight of the cheese staged was 35 tons. The prize-money distributed in 1858 for Cheshire cheese was 419*l.*; this year it amounted to 540*l.* With the exception of 15*l.* offered for butter, the produce classes in 1858 were restricted to Cheshire cheese.

The Show of 1858 comprised cattle, horses, sheep, pigs, poultry, cheese, butter, and implements. It was emphatically a good Show, "unequalled by that of any former year," and though it was the twentieth of the Society's Country Meetings, there is something of happy omen in the fact that it was the first of the series to result in a financial success. It is too early to speak definitely of the outcome of this year's Meeting, but there is every reason to believe that the balance will again be on the right side.

The total number of Judges who officiated at the Show of 1858 was 47. This year the corresponding number was 108. Subjoined are the details:—

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[1] The full report of the trials of harvesters was not completed in time to be included in this number of the Journal. The results, however, are stated in the Appendix, p. xcvii.

	Chester, 1893.	Chester, 1858.
Implements	7	11
Horses	16	4
Cattle	21	9
Sheep	34	12
Pigs	6	3
Poultry	4	2
Produce	16	6
Competitions	4	0
	108	47

The Show.

At 9 o'clock on Saturday morning (June 17) the entrance gates were opened to the public, the Implement Yard alone being accessible on that day. On the following Monday the entire Showyard was thrown open, and the public were admitted daily till Friday (June 23), the gates being finally closed at 6 o'clock on Midsummer Eve.

Intense heat prevailed on the Saturday and Sunday, the thermometer registering very high readings, even in the shade. Monday, "the Judging Day," was equally hot, but the brilliant sunshine was accompanied by a delightful breeze which kept the profuse display of bunting in a continual flutter, whereas the flags had been hanging listlessly during the two previous days. On Tuesday and Wednesday there was not much sunshine, but, as an effect of the persistent drought, the ground became extremely dusty. On Thursday, the "popular" day, close upon 60,000 visitors passed the turnstiles, and the presence of so large a concourse of people rendered the dust well-nigh intolerable. About 4 P.M. on the day named, however, rain—the first in the district for many weeks—began to fall, and continued for some hours. The result was that the Showyard rapidly cleared of people, and the music of the turnstiles suddenly ceased. Had the rain come a few hours later, several thousand more visitors would probably have arrived; nevertheless, the number of people who paid for admission on Thursday has only been twice exceeded during the last ten years, and it was the largest day's entry recorded since the Nottingham Meeting in 1888. Rain fell almost continuously on Friday, the result being the smallest aggregate of visitors on the closing day for the last ten years.

The custom of holding Divine Service on the Show-ground on Sunday morning was duly observed, and the grooms, herdsmen, shepherds, and others who assembled, filled to overflowing the large tent that was subsequently used for the General

Meeting of Members on the following Tuesday. The service was choral, and the Rev. Canon Morris, chaplain to the Duke of Westminster, officiated. An eloquent sermon was preached by the Bishop of Chester (the Right Rev. F. J. Jayne, D.D.) from the text (Ruth ii. 4), "And, behold, Boaz came from Bethlehem, and said unto the reapers, The Lord be with you. And they answered him, The Lord bless thee."

In the afternoon, by invitation of the Duke and Duchess of Westminster, a large number of Members of Council and officials of the Society went by special steamer up the Dee to Eaton Hall, and remained till the evening. The stables and their renowned stud were inspected, as well as the beautiful gardens, the extensive grounds, and the Hall itself, whilst the pleasure of the occasion was enhanced by the kindness and hospitality with which the Duke and Duchess received their guests.

At 8.30 A.M. on Monday there was another assembly in the large tent, consisting on this occasion of the Stewards and Judges of live-stock. The Hon. Cecil T. Parker, who met with a cordial reception on this his first appearance as Honorary Director, explained in a brief, business-like speech the nature of the duties which the Society desired at the hands of these gentlemen. Punctually at 9 o'clock the important work in the numerous judging rings was commenced, and soon afterwards the telegraph wires began to be busy carrying the Judges' decisions to all parts of the kingdom.

On Tuesday, not only was the attendance of paying visitors considerably above the average on the first half-crown day, but the number of Members present at the General Meeting was far greater than the large tent could accommodate. The Duke of Westminster, K.G., President of the Society, occupied the chair, and was supported by His Royal Highness the Prince of Wales, His Royal Highness Prince Christian, the Duke of Devonshire (President-elect), and numerous other Members of Council. A report of this Meeting is given in the Appendix, p. xcviii. On this and the remaining days of the Meeting the band of the 14th (the King's) Hussars played selections of music, the programme of which was printed in the Catalogue.

Tuesday night will be remembered for the magnificent illumination of the River Dee. In offering to the Prince of Wales a thoroughly loyal and enthusiastic welcome, it was but natural that the citizens of Chester should take pride in the fact that they were also greeting in His Royal Highness the holder of the ancient title of the Earl of Chester. Accordingly, in the splendid display to which the sloping bank of the river so effect-

ively lent itself, the emblem "Long live our Earl" picked out in coloured lights, was a conspicuous feature. The river *fête* was witnessed by the Prince of Wales from the illuminated barge in which the Duke of Westminster conveyed His Royal Highness and other members of the house party at Eaton Hall.

On Wednesday evening the Mayor and Mayoress of Chester held a reception at the Town Hall, which was largely attended. The visitors had an opportunity of examining many objects of historical interest belonging to the ancient city.

With regard to the weather, conflicting emotions must have been experienced by many who had the Society's interests at heart. Whilst rain was most urgently needed by farmers generally, it was obvious that a wet week would impair the success of the Meeting. Had the weather changed only 24 hours later than it did the receipts at the gates would undoubtedly have been considerably larger. Even as it was, however, the rain came too late to have any disastrous effect upon the attendance, and it is legitimate to regard the Chester Show as a fine weather meeting. It is true that the shillings were few on the Friday, but against this may be placed the 40,000 half-crowns received on the Tuesday and Wednesday.

From the subjoined table it will be seen that the Chester Meeting of 1893 occupies a very good position, so far as the number of paying visitors is concerned, amongst the Shows of the last ten years. It is necessary to mention that at Plymouth there were three one-shilling days and only one half-crown day; whilst at Windsor, Thursday was a half-crown day.

Number of Paying Visitors at the last ten Country Meetings (1884–1893).

Day of Show	Chester, 1893	Warwick, 1892	Doncaster, 1891	Plymouth, 1890	Windsor, 1889	Nottingham, 1888	Newcastle, 1887	Norwich, 1886	Preston, 1885	Shrewsbury, 1884
Implement day (2*s.* 6*d.*)	299	266	314	194	493	1,826	1,209	148	394	194
1st day (Mon. 5*s.*) . .	2,397	3,570	2,681	1,234	6,223	1,671	1,097	625	3,557	2,183
2nd day (Tues. 2*s.* 6*d.*)	20 959	16,598	12,331	10,008	18,809	11,103	11,331	8,074	21,713	11,211
3rd day (Wed. 2*s.* 6*d.*)	19,034	15,779	18,530	39,308	24,690	9,057	12,020	10,894	19,318	13,474
4th day (Thurs. 1*s.*) .	59,555	36,448	57,580	32,371	32,965	88,832	77,410	42,774	34,302	49,374
5th day (Fri. 1*s.*) . .	13,664	23,801	20,034	14,026	44,493	35,438	24,305	42,394	14,908	17,690
Total . .	115,908	96,462	111,500	97,141	155,707 [1]	147,927	127,372	104,909	94,192	94,126

[1] Including 28,034 on the sixth day (Saturday).

The persistent drought which characterised the spring and early summer of 1893 rendered the duties of the Steward of Forage unusually arduous. Mr. Alfred Ashworth, who undertook this important office, says:—

The difficulty in procuring (at any cost) *good* hay and straw has been quite exceptional. The hay, however, has been of excellent quality, and great praise is due to the contractor, Mr. White, who supplied it.

At one time it seemed unlikely that any green fodder would be found in the neighbourhood, and I had in view the sewage farms of Birmingham and elsewhere. Thanks, however, to Mr. J. Jones Roberts, who dressed his crops in the middle of the night, and resorted to other exceptional methods, an ample quantity was supplied.

In proceeding to notice, in the order of the Catalogue, the various sections of the Exhibition, it should be mentioned that the views of the Judges of the several classes are embodied in the statements made, and that, where necessary, quotations are given from the Judges' reports. The names of the Stewards and of the Judges, together with the List of Awards, are given in the Appendix, p. ciii. *et seq.* As this list furnishes full details concerning the ownership, breeding, and pedigree of the prize-winning animals, these particulars are not, save in special cases, repeated in the text.

Light Horses.

Thoroughbred Stallions.—Through the kindness of the President of the Society, a very unusual interest was imparted to this section by the presence of the renowned Derby winner *Bend Or*, and his son *Arklow*, and also of the thoroughbred sire *Blue Green*. The Duke of Westminster sent these three horses on several days from the stables at Eaton Hall to the Showyard. They were housed in special shedding in a convenient part of the ground, between the Bodega and the cattle stalls, and whether there or on parade in the Large Horse Ring, they constituted a never-failing source of interest and attraction to visitors throughout the week. Details concerning these horses will be found in the Appendix, p. cvii.

Three other thoroughbred stallions, *Blue Grass*, *Eglamore*, and *Sam Kheen*, were also exhibited. They were those three of the winners of Queen's Premiums at the Spring Horse Show of 1893, which took the Gold Medals offered by the Chester Local Committee in District Class G, comprising Cheshire, Lancashire, and North Wales. See p. cvii. of the Appendix.

Hunters.—For the ten classes, comprising 131 entries, two sets of Judges were engaged, the one set adjudicating upon Classes 1, 3, 5, 6, and 7, and the other set upon Classes 2, 4, 8, 9, and 10.

Class 1, hunter mare (with foal at foot), capable of carrying 15 stones and upwards, with 7 entries, was good in quality, the first and second prize mares being "exceptionally good-looking and well worthy of the prizes."

Class 2, hunter mare (with foal at foot), capable of carrying weights between 12 and 15 stones, had 13 entries, and was also of high quality, "some of the mares being exceptionally good."

Class 3, hunter mare or gelding, up to 15 stones, foaled in 1887 or 1888, attracted 14 entries, and was "a very good class," headed by "a bay full of quality, well up to 15 stones."

Class 4, hunter mare or gelding, up to 15 stones, foaled in 1887 or 1888, also had 14 entries. The Judges found it, however, "a very poor class indeed, no animal of merit being exhibited."

Class 5, hunter mare or gelding, foaled in 1889, with 19 entries, proved "a long way the best class" of Classes 1, 3, 5, 6, and 7. The animals placed first and second were "both up to great weight, full of quality, and good movers."

Class 6, hunter gelding, foaled in 1890, had 11 entries, of which the three prize-winners were "very good-looking, and all like growing into good weight-carrying hunters."

Class 7, hunter gelding, foaled in 1891, with 16 entries, was "one of the best classes," and the three winners promise to grow into valuable animals.

Class 8, hunter filly, foaled in 1890, presented 11 entries, but like Class 4 this "was also unsatisfactory."

Class 9, hunter filly, foaled in 1891, with 13 entries, was generally better, the first and second prize-winners being valuable animals, and the contest between them very close.

Class 10, hunter filly, foaled in 1892, had also 13 entries. "Again the first two animals were fair, but the class on the whole was disappointing."

The Judges of Classes 2, 4, 8, 9, and 10 report:—

> On the whole we are of opinion that the classes of light-weight hunters, with the exception of the brood mares (Class 2), which were a good lot, were unsatisfactory.

Cleveland Bays.—There were two classes, but only the stallion class filled, there being 9 entries, all from Yorkshire. Whilst the first prize stallion (Class 11) was decidedly good and quite the type of the old Cleveland Bays, the Judges "thought all the others but moderate."

Class 12, Cleveland bay mare and foal, attracted no entries —"a fact to be deplored."

Coach Horses.—Class 13, coaching stallion, had 6 entries, and the first prize went to "a very promising young horse, especially good in his action." Excepting the three prize-winners, "the rest were unworthy of notice."

Class 14, coaching mare and foal, contained but 5 entries,

amongst which the first prize went to "a particularly good short-legged brood mare, the best animal that came before us, but her foal was hardly worthy of her."

The Judges of Cleveland Bays and Coach Horses say:—

We regret the classes were so small of animals now in such general request at home, and demand for exportation, and especially deplore the absence of Cleveland brood mares.

We wish to place on record the fact that every animal we sent to the Veterinary Inspectors was passed sound, a matter as satisfactory to ourselves as to the breeders of Yorkshire horses.

Hackneys.—Sixty entries at Chester compared with 47 at Warwick last year, and 128 at Doncaster in 1891. The Chester entries came from 14 English and 3 Welsh counties. Of exhibits from England, Yorkshire entered 11, Lancashire 9, Chester 8, Norfolk 8, Kent 4, Essex 3, Salop 3, Lincoln 2, Suffolk 2, Sussex 2, Berks 1, Derby 1, Hereford 1, and Warwick 1. The 4 entries from Wales were made—2 from Montgomery, 1 from Carmarthen, and 1 from Denbigh. Of the 19 prizes awarded, Yorkshire secured 7, Lancashire 4, Norfolk 4, Kent 2, Montgomery 1, and Warwick 1; in addition to which Lancashire and Montgomery each won a Champion rosette. The prizes went to the produce of as many as 16 hackney sires. In only three cases, however, did more than one prize go to the produce of the same sire, *Lord Derby 2nd*, 417, being thus represented by a first, a second, and a Champion prize; *Danegelt*, 174, by a first, a third, and a Champion prize; and *Cadet*, 1251, by a first and a third.

Class 15, hackney stallion, foaled in 1890, above 15 hands, though containing only 3 entries, "formed a most choice lot, and it would have been hard to beat them in excellence though the class had been ten times as large." The first prize horse, the Halewood Stud Co.'s *Astonishment 2nd*, 3422, "showed beautiful quality in shoulders, neck, and head, while his action was perhaps the most wonderful we ever saw in a three-year-old. We thought him well worthy of the Champion Gold Medal, which ultimately fell to his lot."

Class 16, hackney stallion, foaled in 1890, from 14 to 15 hands, with 5 entries, "contained nothing that seemed very remarkable." The first prize horse was of good stamp, but inclined to be "fleshy."

Class 17, hackney stallion, foaled in 1891, contained 18 entries, and was "a magnificent collection of youngsters, which showed in a most marked degree the improvement in the Hackney breed within recent years." The first prize horse, "a

most promising young stallion," was placed in reserve to the Champion stallion.

Class 18, hackney mare and foal, above 15 hands, with 8 entries, was "remarkably good." The first prize mare, Mr. Edward Green's *Modesty*, 1731, "which ultimately carried off the Champion Gold Medal as the best hackney mare in the Show, was as fine an animal as one can wish to see walk a show-ring. With a little more action she would seem to almost meet our ideal of a hackney brood mare."

Class 19, hackney mare and foal, from 14 to 15 hands, with 11 entries, "was a collection of particularly good mares of the finer type. The first prize mare was a "beauty," though a little small of bone.

Class 20, hackney mare or gelding, above 14 hands, up to 12 stones, foaled in 1887, 1888, or 1889, had but 2 entries, of which only one was present, "a handsome mare" worthy of a prize.

Class 21, hackney mare or gelding, above 14 hands, up to 12 stones, foaled in 1887, 1888, or 1889, with 13 entries, included "several first-class animals," the first prize mare being "specially worthy of her place."

The Judges of Hackneys state :—

We are pleased to report what we consider a great advance in the quality and general excellence of the exhibits.

As lovers of the breed it has been our pleasure to watch from year to year the movements of the Society in connection with the Hackney, and we say without hesitation that not only were the exhibits far ahead in merit of those of any former year, but the interest displayed by the general public far exceeded anything ever experienced at the Royal Shows hitherto.

Ponies.—There were 20 entries arranged in two classes. Pony stallions (Class 22), with 7 entries, were only "moderate." The first prize pony "was a good mover, and showed fair quality, with plenty of substance, and good all-round action." Class 23, pony mare and foal, not exceeding 14 hands, with 13 entries, "was a most excellent class, with scarcely a moderate animal amongst them. We doubt whether there was ever a better lot than this shown together before."

Welsh Mountain Ponies.—Class 24, for stallions, had but 2 entries—"a most disappointing class, but we suppose this is to be attributed to the pony stallions being otherwise engaged." The first prize animal "was quite the true type of a Welsh mountain pony." Class 25, Welsh mountain pony mare or gelding, contained 19 entries, which, though fairly representative, showed no extraordinary merit.

Harness Horses and Ponies.—Class 26, harness mare or geld-

ing, of any age, above 14 hands, mustered 14 entries. The Judges regarded them as "a very excellent class—one of the best we have ever seen in any showyard." Class 27, harness mare or gelding, of any age, not exceeding 14 hands, with 13 entries, "was also good, containing several cobs that ran the first prize mare very close."

Heavy Horses.

Shires.—The modern representatives of the "Old English" horse were entered to the number of 122 in the Catalogue, no less than 21 counties contributing to this total, these counties being 16 in England, 4 in Wales, and 1 in Scotland. Of the English counties Lancaster sent 18 entries, Warwick 16, Chester 12, Derby 10, Stafford 10, Leicester 9, Salop 9, Middlesex 5, Herts 4, York 3, Essex 2, Gloucester 2, Beds 1, Cambs 1, Notts 1, and Norfolk 1. From Wales, Carnarvon contributed 6 entries, Flint 5, Montgomery 2, and Carmarthen 1. From Scotland the county of Berwick sent 4 entries. Of the 21 class prizes awarded Warwick secured 5, Chester 3, Leicester 3, Stafford 3, Derby 2, Beds 1, Gloucester 1, Lancaster 1, Notts 1, and York 1. In addition, Derby and Warwick each won a Champion prize.

Class 28, Shire stallion, foaled in 1890, had 15 entries, "half of which were of great merit," the first prize horse combining "great size and substance with action."

Class 29, Shire stallion, foaled in 1891, attracted 17 entries, four of which "were especially good," the first prize horse being "of excellent quality, fair substance, and commanding appearance."

Class 30, Shire stallion, foaled in 1892, with 17 entries, was not so good on the whole as the two preceding classes, "but the first prize colt was so much ahead of all the others that perhaps in other company they might be more valued." In awarding the Shire Horse Society's Champion Gold Medal to Lord Belper's *Kingston Harold*, which under the name of *Rokeby Harold* obtained the Championship at the Shire Horse Society's Show in the spring of 1893, the Judges remark:—

> The first prize colt, also the champion horse, is in our opinion quite the best horse that has been seen since the Shires have been acknowledged as an established breed. Many people think it wrong to give a Champion Cup to a yearling. We think we are bound to give to the best, consequently we had no hesitation as to which was the best animal in the yard. We think this colt has a great future before him, and it will be long ere we see another at the age to rival him.

Class 31, Shire mare and foal, had 11 entries, and the first and second prize mares "were of extra merit."

Class 32, Shire filly, foaled in 1890, sent out "15 of the most extraordinary fillies ever seen in one ring, 4 of them being simply superb." The first prize filly, Mr. P. Albert Muntz's *Dunsmore Gloaming*, the Judges regard as "a typical Shire," and add:—

> She has substance, size, quality and action, and in awarding her the Champion prize as the best mare we felt we were awarding to one of the best animals that we ever saw at the age.

Class 33, Shire filly, foaled in 1891, with 14 entries, was "also an extraordinary class;" the three winners being "such as we have seldom seen in one ring together."

Class 34, Shire filly, foaled in 1892, had 32 entries, "but they were not as a whole good. One or two of the best were quite spoiled by over-feeding—such a mistake in young animals."

It is noteworthy that, of the prize-winning animals in the Shire classes, the produce of the sire *Harold*, 3073, took three first prizes, three seconds, and two thirds, beside the two Champion prizes. The only other sire whose produce took more than one prize was *Hitchin Duke*, 9586; he has a first and a second to his credit.

Viewing the display collectively, the Judges are of opinion that a better show of Shires was never seen in the Royal Show-yard, and that since the time when the Society first granted separate prizes for Shires the improvement in the breed has been immense. Their only misgiving as to the future is lest breeders should be "tempted to sacrifice too much substance for quality." The greatest value of the Shire "is in being able to produce a heavier and more serviceable, and consequently more valued animal for the commercial interest of this country than any other breed under the sun." The Judges add that "a good 5-year-old Shire gelding, standing 17 hands, is worth from 90*l.* to 100*l.*, whereas a good, small, active 16-hands gelding is worth from 50*l.* to 65*l.*,—this must mean a wide difference in the margin of profit to the breeder."

Clydesdales.—The 51 entries of the Scottish breed compared favourably with the 29 entries farther south at Warwick in 1892. England contributed 30 entries, comprising 11 from the county of Chester, 8 from Cumberland, 7 from Kent, 3 from Durham, and 1 from Northumberland. Scotland entered 18, namely, from Dumfries 7, Berwick 4, Inverness 3, Wigton 2, Kirkcudbright 1, and Midlothian 1. From the Principality, 2 were entered from Glamorgan and 1 from

Carmarthen. Of the 21 prizes awarded England secured 12, of which 5 went to Chester, 4 to Cumberland, and 3 to Kent. The remaining 9 prizes were well distributed amongst the six Scottish counties represented, for Dumfries obtained 3, Berwick 2, Inverness 1, Kirkcudbright 1, Midlothian 1, and Wigton 1.

Class 35, Clydesdale stallion, foaled in 1890, with 6 entries, was "a fairly good class," and the premier award went to "a compact, active horse, full of Clydesdale character." The third prize horse "might have stood higher, but for lightness in thigh and hock."

Class 36, Clydesdale stallion, foaled in 1891, had but 3 entries, at the head of which was placed "a very handsome colt of great size and weight of bone, with broad knees and hocks and fine action; might be deeper in back rib."

Class 37, Clydesdale stallion, foaled in 1892, with 6 entries, was, both in numbers and quality, a marked improvement on the previous class. The first prize went to "a colt of fine size, with good bone, fine pasterns, and solid useful feet; also a good mover." The second "was only surpassed by the winner in fore-foot and size."

Class 38, Clydesdale mare and foal with 8 entries, was "a good class of brood mares, in which there was little to choose between the first four."

Class 39, Clydesdale filly, foaled in 1890, "contained some notable specimens," amongst its 9 entries. The premier award went to "a grand filly, with perfect feet and legs, and grand action. When age brings greater depth of rib, she will be even more difficult to approach, in competition, than now."

Class 40, Clydesdale filly, foaled in 1891, had 8 entries, forming "a very excellent class," the first prize filly being "of fine quality and good size, with grand pasterns."

Class 41, Clydesdale filly, foaled in 1892, with 11 entries, "was probably the best class in the section." "There was hardly one moderate animal in the lot, and the first three or four were fillies of conspicuous merit."

The Judges report:—

> The show of Clydesdales at Chester, as a whole, was a very creditable one, and compares favourably with any of those of the Society since Windsor (1889). There was an excellent representation of many of the best specimens of the breed.

Suffolks.—There were 32 entries, this number being practically identical with that at Warwick last year. Excepting one entry each from Cambridge and Essex, the entries were all

made from the county whence the breed derives its name. Of the 14 prizes awarded, 13 went to Suffolk, and 1 to Essex.

The Judges consider that breeders have no reason to be dissatisfied with the quality of the exhibits (Classes 42–46), and they add:—

> The males (Classes 42–43) we did not consider so good as the mares (Classes 44–46). We found it very difficult to decide when the combined merits of the foals and their mothers (Class 44) had to be taken into consideration. The fillies (Classes 45–46) we thought very good, alike in symmetry, size, and constitution.

Agricultural Horses.—The entries (Classes 47–49) numbered 13, of which 8 were from the county of Chester.

The Judges found them "fair, but not as good as we hope in the future to see—the first prize-winner in each class only showing real merit."

Cattle.

Shorthorns.—The names of 108 Shorthorn cattle were in the Catalogue, England contributing 90, Scotland 9, Wales 8, and Ireland 1. These entries were drawn from 21 counties in England, 5 in Wales, 2 in Scotland, and 1 in Ireland. English counties were represented by the following entries: Cumberland 11, Wilts 10, York 10, Hereford 8, Berks 6, Salop 6, Notts 5, Chester 4, Lancaster 4, Northumberland 4, Westmoreland 4, Cornwall 3, Lincoln 2, Monmouth 2, Norfolk 2, Northampton 2, Stafford 2, Worcester 2, Rutland 1, Somerset 1, Warwick 1. In the Principality the contributory counties were: Glamorgan 3 entries, Anglesey 2, Carmarthen 1, Denbigh 1, and Montgomery 1. From Scotland, Berwick made 8 entries, and Inverness 1, whilst Ireland was represented by 1 entry from Queen's County. The 20 class prizes were thus distributed: Cumberland 4, Wilts 4, York 3, Hereford 2, Westmoreland 2, Berks 1, Berwick 1, Glamorgan 1, Monmouth 1, and Salop 1. In addition, York and Monmouth each secured a Champion prize.

Class 50, Shorthorn bull, calved in 1888, 1889, or 1890, with 13 entries, was "a large, good class, containing several animals of exceptional merit." Here was found the best male Shorthorn, the Earl of Feversham's *New Year's Gift*, 57796, to which was awarded the Shorthorn Society's Champion prize. Class 51, Shorthorn bull, calved in 1891, with 21 entries, was "a very meritorious class." Class 52, Shorthorn bull, calved in 1892, had 16 entries, but the Judges found it "deficient in merit,—the weakest lot in our department."

Class 53, Shorthorn cow, in-milk or in-calf, calved previously

to 1890, had 8 entries—"few in numbers, but quality fair." Class 54, Shorthorn cow, in-milk or in-calf, calved in 1890, comprised 10 entries, and was "very good, several animals being of outstanding merit." Class 55, Shorthorn heifer, calved in 1891, attracted 18 entries—"a large, good class, one of the best." It contained the best female Shorthorn, Mr. Richard Stratton's *Timbrel* 23*rd*, to which was awarded the Shorthorn Society's Champion prize. Class 56, Shorthorn heifer, calved in 1892, with 22 entries, "was well filled, but much behind the last in point of quality."

Of the display as a whole the Judges report:—

> Shorthorns, in point of numbers, were quite up to the average of preceding years, all the classes with the exception of the cow class (53) being well filled. In point of merit, two-thirds of the whole were really good animals, but the remainder, or most of them, would have been better at home.
>
> The yearlings in both classes (52 and 56) were numerically strong, yet broadly speaking they were lacking in quality, and showed a want of the character of high-class Shorthorns.

Herefords.—In this section 58 entries showed a slight increase upon the entry at Warwick last year. Ten counties, two of them in Wales, were represented by the following entries: Hereford 23, Salop 11, Worcester 9, Berks 3, Essex 3, Brecon 2, Monmouth 2, Notts 2, Warwick 2, and Cardigan 1. The 18 prizes awarded went: to Hereford 10, Salop 3, Berks 1, Brecon 1, Cardigan 1, Monmouth 1, and Worcester 1.

Class 57, Hereford bull, calved in 1888, 1889, or 1890, had but 2 entries—"two grand bulls." Class 58, Hereford bull, calved in 1891, with 7 entries, was "a remarkably good class." Class 59, Hereford bull, calved in 1892, had 11 entries, which call for no comment.

Class 60, Hereford cow, in-milk or in-calf, calved previously to 1890, with 6 entries, was "an exceptionally good class, and the animals were all noticed." Class 61, Hereford heifer, in-milk or in-calf, calved in 1890, though it contained but 2 entries, "brought out the best animal of the breed exhibited," the second heifer being also very good. Class 62, Hereford heifer, calved in 1891, had 8 entries, and formed "an attractive show of heifers," the Judges considering them all worthy of notice. Class 63, Hereford heifer, calved in 1892, made with its 22 entries "a large and meritorious display."

The Judges say:—

> The Herefords as a whole are equal in quality to those exhibited at previous Meetings of the Society, but some of the classes are not well filled numerically.

Devons.—These were much better represented than last year, there being 35 entries at Chester as against 22 at Warwick. Moreover, 7 counties figured in the entries, of which Devon contributed 15, Somerset 10, Berks 3, Cornwall 3, Gloucester 2, Stafford 1, and Warwick 1. Of the 13 prizes awarded, 6 went to Somerset, 4 to Devon, 2 to Gloucester, and 1 to Berks.

Class 64, Devon bull, calved in 1888, 1889, or 1890, had 4 entries. The prize-winners were "each of especial merit," and some hesitation was felt in deciding between the second and third prize bulls. Class 65, Devon bull, calved in 1891, had 7 entries. "The quality was not above the average of merit, and it appeared that special attention had been paid by breeders to size rather than symmetry." Class 66, Devon bull, calved in 1892, with 9 entries, included some good animals. "Owing to the great differences in their ages, the Judges found considerable difficulty in giving their awards. One young bull 9 months old obtained great admiration, and will probably be heard of in the prize ring on a future day."

Class 67, Devon cow or heifer, in-milk or in-calf, calved previously to or in 1890, had 5 entries, which were "a good lot of stock." The Judges felt it their duty, however, "to withhold a prize from a heifer of remarkable merit with the exception of a very defective udder." Class 68, Devon heifer, calved in 1891, had but 3 entries, but the quality of the exhibits made up in some degree for the deficiency in numbers. "There was a close contest for the first and second prizes, the merit of the first prize heifer being somewhat marred by a white patch appearing too far forward on her underline." Class 69, Devon heifer, calved in 1892, contained 7 entries. "The distance which these young heifers had travelled made its mark and somewhat diminished their bloom. They were, however, a good class."

Sussex.—The number of entries, 29, was identical with the Warwick entry of 1892. Surrey contributed 14, Sussex 9, and Kent 6. Of the 12 prizes 8 went to Surrey and 4 to Kent.

Class 70, Sussex bull, calved in 1888, 1889, or 1890, having 5 entries, "was represented by 3 huge beasts." The first prize went to "a fine representative of the breed, combining good quality with great size." Class 71, Sussex bull, calved in 1891, had 6 entries, but with the exception of the first prize animal they "were not quite up to Royal Show merit." Class 72, Sussex bull, calved in 1892, with 4 entries, proved "also below the average, both in numbers and quality."

Class 73, Sussex cow or heifer, in-milk or in-calf, calved previously to or in 1890, had 5 entries, which included "some good animals." The Judges direct attention "to the defective

udders of some otherwise good animals, and add "good milking qualities ought to take a very high place in determining the value of breeding stock." Class 74, Sussex heifer, calved in 1891, mustered 4 entries, of which the prize-takers "were nice promising young beasts." Class 75, Sussex heifer, calved in 1892, with 5 entries, contained "nothing very special," though 3 of the heifers "were pretty and promising animals."

The Judges of Sussex cattle "would have been glad to have seen this useful breed—which is not much known in the North—better represented."

Welsh.—The breeders of Welsh cattle responded readily to the efforts that were made to secure a representative display, the 70 entries which were made at Chester comparing with only 28 at Warwick in 1892. The entries were from 8 distinct counties, namely, Carnarvon 37 entries, Merioneth 16, Anglesey 5, Carnarvon 3, Denbigh 3, Pembroke 3, Warwick 2, and Cardigan 1. Of the 19 class prizes awarded, Carnarvon took 9, Merioneth 8, Anglesey 1, and Carmarthen 1, in addition to which Carnarvon and Merioneth each secured a Champion prize.

Class 76, Welsh bull, calved in 1888, 1889, or 1890, with 8 entries, could not be too highly praised. "Headed by Lord Harlech's *Master Tom*, which also took the Champion prize as best male, there was not a bad bull in the lot." Class 77, Welsh bull, calved in 1891, mustered 10 entries, which were "also a creditable lot." The first prize bull was reserved for the Championship, and "was closely followed by the other prize-takers." Class 78, Welsh bull, calved in 1892, had 8 entries, but beyond the prize-winners "there was nothing to call for special notice. As a whole they were not so good as the older bulls."

Class 79, Welsh cow, in-milk or in-calf, calved previously to 1890, contained 8 entries. "The prize-takers were grand specimens, combining size and quality, and some of the other cows were of great merit." Class 80, Welsh heifer, in-milk or in-calf, calved in 1890, with 7 entries, included the Champion female, Colonel Henry Platt's *Bechan 2nd*, whilst "there were other particularly good deep heifers in this class." Class 81, Welsh heifer, calved in 1891, had 13 entries, most of which were considered worthy of notice. Class 82, Welsh heifer, calved in 1892, mustered 16 entries—"a very strong entry both in number and quality, which augured well for the future of the breed."

Of the Welsh cattle generally the Judges say:—

> We wish to express our gratification at the large number of entries, and the almost uniform good quality of the stock brought before us. Excepting a few animals of a colour and type that would debar them from entry in

the Welsh Black Cattle Society's Herd Book, the whole of the exhibits may be pronounced excellent, and far in advance of any previous Show.

Red Polled.—Of this breed 31 specimens were entered, all from the East of England, Norfolk contributing 26 entries, Suffolk 3, and Herts 2. All the prizes went to Norfolk herds.

Class 83, Red Polled bull, calved in 1888, 1889, or 1890, with 5 entries, contained last year's male Champion at Warwick; and "had he not shown signs of frequent forcing for exhibition" he would probably have repeated this performance, whereas he only got the reserve card. Class 84, Red Polled bull, calved in 1891, had but 3 entries, but included the male Champion, Mr. J. J. Colman's *Red Prince*, which possesses both size and quality. Class 85, Red Polled bull, calved in 1892, had 4 entries, of which "a well-grown young bull" was placed first.

Class 86, Red Polled cow or heifer, in-milk or in-calf, calved previously to or in 1890, with 9 entries, "was a good class and contained two animals of exceptional merit," of which one, Mr. Colman's *Dorena*, was declared Champion female, and the other, Lord Amherst's *Saltarella*, was reserved for the championship. Class 87, Red Polled heifer, calved in 1891, was a small lot of 3 entries, calling for no special remark. Class 88, Red Polled heifer, calved in 1892, had 7 entries, "fairly good animals," the first prize heifer being "big for her age."

Aberdeen Angus.—The tendency in this black polled breed to become ubiquitous is shown by the fact that the 36 entries at Chester were made from as many as 14 counties, of which 8 are in England, 5 in Scotland, and 1 in Ireland. Aberdeen contributed 5 entries, Banff 4, Beds 4, Bucks 3, Fife 3, Middlesex 3, Northumberland 3, Essex 2, Gloucester 2, Inverness 2, York 2, Forfar 1, Sussex 1, and Waterford 1. Of the 12 prizes awarded, Aberdeen, Banff, and Northumberland took 3 each, and Bucks, Middlesex, and York secured 1 each.

Class 89, Aberdeen Angus bull, calved in 1888, 1889, or 1890, had 8 entries, of which the first and second prize bulls were "exceptionally good, and the others an average." Class 90, Aberdeen Angus bull, calved in 1891 or 1892, with 10 entries, furnished in the first prize bull "an outstanding winner," whilst the others placed "were good animals."

Class 91, Aberdeen Angus cow or heifer, in-milk or in-calf, calved previously to or in 1890, contained 7 entries, the first and second prize cows being "really fine specimens of the breed." Class 92, Aberdeen Angus heifer, calved in 1891 or 1892, with 11 entries, caused some difficulty in adjudication—as did Class 90—on account of disparity of age amongst the exhibits.

Galloways.—There were 24 entries, to which the counties of Cumberland, Dumfries, and Kirkcudbright each contributed 7, and the counties of Lincoln, Salop, and Wigton each contributed 1. Of the 11 prizes awarded 6 went to Dumfries, 4 to Kirkcudbright, and 1 to Lincoln.

Class 93, Galloway bull, calved in 1888, 1889, or 1890, had but 2 entries, and the premier award went to "a magnificent animal combining substance and quality in a remarkable degree." Class 94, Galloway bull, calved in 1891 or 1892, had 5 entries, of which 3 "showed high merit." The first prize bull possessed "very superior quality and level outline." The second and third animals were "rough" or "faulty" at the tail-root.

Class 95, Galloway cow or heifer, in-milk or in-calf, calved previously to or in 1890, attracted 8 entries, and contained "several beautiful specimens of the breed." The first prize cow possessed "genuine Galloway character and grand symmetry." Class 96, Galloway heifer, calved in 1891 or 1892, secured 9 entries. The premier place was assigned to a symmetrical and attractive heifer, almost her only fault being a slight falling away in the hind quarters. "Altogether the breed was very creditably represented."

Ayrshires.—There were only 7 entries altogether, "but the quality and merit were very high indeed, and better specimens could not be seen at any exhibition close to the headquarters of the breed."

Class 97, Ayrshire bulls, contained 3 "splendid representatives of the breed." The first prize went to a two-year-old, and "seldom has a better of the age been seen."

Class 98, was for cow or heifer, and the two-year-old heifers which received the prizes "were great beauties."

Jerseys.—There were 137 entries of this widely-distributed breed. The following entries were made from 20 English counties:—Essex 18, Herts 18, Chester 16, Bucks 10, Kent 10, Hants 8, Worcester 8, Surrey 7, Dorset 6, Sussex 5, York 5, Berks 3, Lincoln 3, Salop 3, Warwick 3, Norfolk 2, Suffolk 2, Somerset 2, Cambridge 1, and Lancaster 1. In addition there were 2 entries from Denbigh, and 4 from Jersey. Of the 16 prizes awarded, Essex secured 5, Herts 4, Chester 3, Sussex 2, Hants 1, and Surrey 1. Of the prize-winning cattle, 11 were bred in the island of Jersey, and the remainder in England.

Class 99, Jersey bull, calved in 1889, 1890, or 1891, with 23 entries, "was a better class of old bulls than is usually seen, and included no heavy animals past service." The premier position was assigned to "a long level bull with good shoulders." Class 100, Jersey bull, calved in 1892, had 32 entries, so that

it was well filled, and altogether 17 of the animals were noticed by the Judges. The first prize was bestowed upon a bull which, "for richness of handling and general character," well deserved the honour.

Class 101, Jersey cow, in-milk, calved previously to or in 1889, was "a good class" of 21 entries. The animals selected for first and second places, "though built on different lines, were two very fine specimens of Jersey cows." The first "had the most perfect fore-bag and best-placed rump-bones," but the second "was her superior in head, neck, and general outline." Class 102, Jersey cow, in-milk, calved in 1890, contained 13 entries, and the first prize went to "a fine, straight, rich heifer with good markings." Class 103, Jersey heifer, in-milk or in-calf, calved in 1891, with 25 entries, "was a better class than the preceding." For the principal award the Judges selected "a promising heifer, straight and rich, udder emptying well, and good milk-veins." Class 104, Jersey heifer, calved in 1892, had 23 entries, and "was a good class." The first prize went to a heifer "level, long, and handsome."

"The classes of Jersey cattle," say the Judges, "were, on the whole, of a level and good average in point of merit, and well-filled."

Guernseys.—This breed, with 53 entries, was better represented than at Warwick last year. Sussex contributed 14 entries, Middlesex 11, Chester 6, Isle of Wight 5, Herts 4, Wilts 4, York 4, Hants 3, and Salop 2. Of the 13 prizes Middlesex obtained 5, Sussex 4, Herts 2, and Isle of Wight 2. The prize-winning cattle were bred, 8 in England and 5 in Guernsey.

Class 105, Guernsey bull, calved in 1889, 1890, or 1891, had 9 entries, and the leading award went to "an island bull, with good top-line, fairly rich in quality, and good skin; this bull had well-placed teats." Class 106, Guernsey bull, calved in 1892, with 7 entries, "was a disappointing class, and below average merit."

Class 107, Guernsey cow or heifer, in-milk, calved previously to or in 1890, had 10 entries, and "was an exceptionally good class, and of more than average merit." The leading place was assigned to "a beautiful cow, first at Warwick last year, very straight top-line and beautifully fine in the withers; her milk-vessel is not so good as it was, but in spite of that she somewhat easily retained premier position." Class 108, Guernsey heifer, calved in 1891, with 15 entries, "was the largest class presented, and contained many promising animals." The first prize went to "a very straight, good heifer, rich in quality, and giving promise of an excellent vessel, but rather inclined to coarseness

in the shoulder, and failing in the throat." The Umpire being called in, decided in her favour. The second prize heifer was "very straight, possessing a smaller vessel than the first prize heifer; she had, however, a straighter top-line, and was a fair type of a Guernsey." Class 109, Guernsey heifer, calved in 1892, had twelve entries, and the premier place was given to "a very good, straight heifer, perhaps failing a little in touch of skin, but of fairly rich quality."

"The Guernsey classes," add the Judges, "were well filled, considering the northern position of the Show, and the small number of breeders residing in the district. We are glad to report favourably on the number and quality of the Guernsey cattle exhibited."

Kerry and Dexter Kerry.—There were 29 Kerry cattle in the Catalogue, entered from 8 English counties, and 2 Irish counties. Warwick contributed 6, Wilts 6, Cambridge 2, Lancashire 2, Suffolk 2, Surrey 2, Chester 1, and Notts 1. From Ireland 4 were entered from Clare, and 3 from Dublin. The class prizes went, 3 to Wilts, 2 to Warwick, and 1 to Cambridge, whilst Wilts also secured the Champion award.

The 19 entries of Dexter cattle comprised—from Berks 4, Bucks 3, Surrey 3, Hants 2, Sussex 2, and Warwick 2, besides 3 from Dublin. Six prizes were awarded, of which 2 were secured by Hants, 2 by Warwick, 1 by Berks, and 1 by Sussex.

"Each section," reports the Judge, "was well represented—fully up to the average." In Class 110, Kerry bull, "some good animals had to be put aside, owing to the rule as to no white in bulls, as arranged by the Royal Dublin Society."

Dairy Cattle.—There were 55 entries comprised in five classes. They were catalogued, 40 as Shorthorns, 2 as Ayrshires, 1 as Dutch, 8 as cross-bred Shorthorns, and the remaining 4 as "cross-bred," and they were judged in the ordinary way, according to their physical appearances.

In Class 117, dairy cow, in-milk, whose last calf was born more than three months before the first day of the Show, out of 11 entries "the prize cows were very useful." In Class 118, dairy cow, in-milk, whose last calf was born within three months of the first day of the Show, there were 13 entries. The first and second prize cows "were remarkably good—not much between them, and both showing great milking, breeding, and feeding properties." The third prize cow was of "very nice Shorthorn character, with large but unshapely bag." In Class 119, dairy cow, in-milk, calved in 1890, out of 6 entries the first prize went to "a useful dairy heifer," but "the rest were very indifferent." Class 120, dairy heifer, in-calf, calved in

1891, with 9 entries, proved "a very difficult class to judge, none being forward enough in-calf to show their milking properties, which should appear in a dairy class." Class 121, dairy heifer, calved in 1892, had 16 entries, but the best heifer in the class the Judges "felt unable to place higher than reserve, not being of a milking type."

In this section was also included the class for cows entered for the butter test, as described in the subjoined

REPORT BY THE ASSISTANT STEWARD OF THE DAIRY, ON THE BUTTER TEST CARRIED OUT AT THE CHESTER MEETING OF 1893,

For the prizes offered by the Society in Class 116, for cows yielding the largest quantity of Butter by practical test of the churn.

There were originally 33 cows entered, catalogued from No. 1179 to 1211. Eight animals (Nos. 1185, 1187, 1188, 1193, 1194, 1196, 1203, 1210) were, however, absent, thus leaving 25 competitors.

At 5 o'clock on the evening of Sunday, June 18, 1893, the cows were milked dry and afterwards stripped in turn by an independent man, in my presence. The cows were then weighed, and were classed 116A or 116B according to whether their live weight exceeded 1,100 lb. or not, as laid down in the Society's conditions. The result of this was, that 6 cows were grouped in Class 116A and 19 in Class 116B.

At 5 o'clock on the morning of Monday, June 19, the cows were milked in the presence of assistant stewards, each assistant steward having charge of three cows. Buckets for each cow were provided by the Society, one for the morning's and one for the evening's milk. Attached to each bucket were two metal labels, one with the tare of the bucket clearly stamped on it, and on the other the number of the cow. It was therefore quite impossible for the buckets to get mixed.

The milking being finished, the several lots of milk were taken to the milk-receiving room, where each lot was weighed. A sample was then taken by Dr. Voelcker for analysis, after which it was again weighed. The buckets containing the milk were then carried by the Society's men to the Steward's office in the Dairy, and locked up.

At 5 o'clock in the evening of the same day (Monday) the cows were milked as in the morning, in the presence of assistant stewards, and the milk weighed as before. In the case of one man having charge of more than one cow I was careful to see that such cows were milked in the same order at each milking, so that one should not have an advantage over another as regards time between the milkings.

After the milk had been weighed it was taken to the Dairy, and as soon as possible the 25 lots were passed through the "Alpha Windsor" separator, which never stopped working until the 25 lots were separated. The buckets were first of all brought on to the Dairy and placed in order. The milk was then heated to 88° and put into the separator. Twenty-five small cream cans, with metal labels attached on which the numbers 1 to 25 were stamped (one for each cow), were supplied by the Society. A little warm water was passed through the separator after each lot, so that it was impossible for any cream to be left in the drum of the separator. As each lot was separated, the cream was immediately taken away and locked up with sufficient ice near it to prevent it turning sour. The last lot was separated at 11 P.M.

At 8.30 o'clock on the morning of Tuesday, June 20, seven churns of

the same make were got ready for the churning of the 25 lots of cream, each lot being churned by a skilled churner (in the same order in which it had been separated) at a temperature of 52°, the temperature of the Dairy being 63°.

The churning was carried out under the superintendence of Miss Maidment and myself. As soon as the butter had been washed in the churn it was put into the Normandy Delaiteuse and thoroughly dried before being put on the butter-worker to be made up by Miss M. Maidment; when made up, it was carefully weighed and the weight booked.

Every necessary appliance, &c., was provided for the satisfactory carrying out of the test, and there was no hitch of any kind.

Particulars of weights, quantities, &c., are annexed hereto in the form of a Table (p. 527), the figures of which explain themselves.

(Signed) ALEX. E. PARKER.

SHEEP.

Leicesters.—Of this breed there were three dozen pens, representing 8 flocks, and the 10 prizes were divided amongst four Yorkshire flocks. Two-shear rams (Class 122) were "very good." Ram lambs (Class 124) were "not good as a whole." On the other hand the shearling ewes (Class 125) were "of unusual excellence, the first and second prize pens being very well matched, and of good Leicester type."

Cotswolds.—This breed was better represented numerically than has been the case for several years. There were 39 pens, representing 6 flocks in the counties of Gloucester, Oxon, and Hereford. Ram lambs (Class 128) were "somewhat backward in condition, owing to the dryness of the season; otherwise promising." The Judges were specially pleased with the shearling ewes (Class 129), and noticed every pen; this class was "certainly the special feature of the breed, and the prize pens were well grown, and showed judicious breeding."

Lincolns.—Thirty-five pens were entered from 8 flocks—6 in Lincolnshire, 1 in Cambs, and 1 in Notts. Two-shear rams (Class 130) were "all of high merit, but the wool in some cases was not quite so good as could be desired." The shearling rams (Class 131), when brought out for inspection, "looked a fine lot of grand, massive sheep, but some might have been better in their wool, and others were wanting in muscle." Ram lambs (Class 132), though well-grown, full of wool, and with good symmetry, were "some of them rather backward in condition. The pick of the Lincolns was found in the shearling ewes (Class 133); "they were as near perfection as it is possible to produce them at such an early age."

Oxford Downs.—Here again, as with the Cotswolds, there was an entry of 39 pens. These came from 10 flocks—3 in Oxon, and the remainder in Beds, Berks, Bucks, Herts.,

List of Entries in Class 116 *for the Prizes offered to Cows yielding the largest quantity of Butter by practical test of the Churn.*

No. in Catalogue	No in Test	Name of Exhibitor	Name of Cow	Breed of Cow	Live weight on June 18, 1893	Age	Date of calving in 1893	Weight of milk		Total yield	Butter yield	Ratio, viz., lb. live weight to lb. butter	Ratio, viz., lb. milk to lb butter	Awards
								1st meal	2nd meal					
		CLASS 116A (*Cows of* 1,100 *lb. and over, live weight*)			lb.	yrs. mon.		lb. oz.	lb. oz.	lb. oz.	lb. oz.			
1190	9	G. Church	*Fancy*	Shorthorn and Red Polled	1141	4 11	March 30	19 10	27 5	46 15	1 3½	936·21	38·51	3rd
1191	10	do.	*Number One*	Shorthorn	1284	8 0 abt.	January 11	15 3	17 11	32 14	0 15¾	1304·38	33·40	R.N.
1192	11	Geo. Cooke	—	Cross bred do.	1280	7 0 abt.	March 14	11 7	30 7	41 14	0 15½	1342·95	43·93	
1197	13	Lord Egerton of Tatton	—	Shorthorn	1197	5 0 abt.	April 5	16 12	19 3	35 15	0 15½	1255·87	37·70	
1200	16	C. A. Pratt	*Dairymaid*	do.	1263	8 1	January 23	16 15	14 15	31 14	1 5¾	529·10	23·45	2nd
1201	17	do.	*Dowager III*	do.	1440	6 4	April 19	22 10	21 15	44 9	1 10½	869·43	26·91	1st
		CLASS 116B (*Cows under* 1,100 *lb. live weight*)												
1179	1	C. Adeane	*Babraham Belle*	Kerry	945	6 0 abt.	April 13	21 6	19 15	41 5	1 11½	554·86	24·26	
1180	2	do.	*Blackberry II*	do.	784	8 0 abt.	April 26	18 5	18 1	36 6	1 7½	533·79	24·77	
1181	3	S. Baxendale	*Bella*	Jersey	756	4 1	April 11	19 12	16 10	36 6	1 15	390·19	18·71	
1182	4	do.	*Chestnut II*	do.	896	6 3	June 1	16 2	16 15	33 1	2 2	421·65	15·56	R.N.
1183	5	do.	*Dairyman's Pride*	Shorthorn	1098	7 0 abt.	February 26	19 13	20 14	40 11	2 0	549·00	20·34	
1184	6	J. Blyth	*Graceful Maid*	Jersey	834	6 3	May 15	19 2	19 9	38 11	2 3	381·26	17·69	3rd [1]
1186	7	W. E. Budgett	*Beauty V*	do.	793	6 7	May 15	14 3	15 13	30 0	1 10½	483·35	18·29	
1189	8	G. Church	*Bolnhurst*	Shorthorn	1018	4 0 abt.	April 29	25 2	24 11	49 13	1 11	603·26	29·52	
1195	12	Lord Egerton of Tatton	—	Kerry	800	8 0 abt.	May 19	18 12	17 14	36 10	1 5½	602·35	27·58	
1198	14	G. Greenall	*Trial Ruby*	Jersey	660	2 7	May 17	13 1	12 13	25 14	1 11	391·11	15·33	
1199	15	Sir A. Montefiore	*Lucilla*	Guernsey	1052	7 4	March 20	15 4	15 2	30 6	1 3	885·89	25·58	
1202	18	J. Robertson	*Beauty*	Jersey and Kerry	658	4 0 abt.	May 9	7 15	absent	7 15	(Disqualified)			
1204	19	Sir M. J. Stewart	*Bertie*	Ayrshire	966	6 4	April 26	25 10	16 10	42 4	1 10	594·46	26·00	
1205	20	E. Swan	*May Blossom*	Jersey	1000	5 1	April 24	12 13	16 10	29 7	2 4¾	435·37	12·82	1st
1206	21	Rev. W. S. Walford	*Doll Biddy*	Dexter	644	4 1	May 29	8 2	8 7	16 9	13½	763·26	19·63	
1207	22	Dr. H. Watney	*Barbara*	Jersey	980	7 4	January 14	12 7	12 13	25 4	1 6½	704·72	18·16	
1208	23	do.	*Lady Mansell II*	do.	838	5 1	April 5	15 8	17 2	32 10	1 4¾	646·17	25·16	
1209	24	do.	*Vesta II*	do.	814	8 0	February 18	12 6	13 14	26 4	1 6½	578·84	18·67	
1211	25	Rev. W. S. H. Williams	*Tiny III*	do.	957	7 3	May 21	19 2	21 10	40 12	2 3½	431·32	18·37	2nd

[1] To this cow (1184) was also awarded the Champion Prize offered by the English Jersey Cattle Society "for the cow in Classes 116A and 116B yielding the largest quantity of butter in proportion to her live weight."

(Signed) ALEX. E. PARKER.

Hunts, and Northampton. Two-shear rams (Class 134) were "on the whole not a good class," though the first prize ram was of good quality. Of shearling rams (Class 135), the first prize animal was by far the best, "the remainder not being up to the standard usually seen at the Royal Show." Shearling ewes (Class 137) "formed the chief feature of the Oxford Down section, there being several pens of excellent type and character."

Shropshires.—Though falling 50 pens short of the wonderful display which the Shropshire breeders made in the midst of their own country at Warwick last year, the breed of the West Midlands was nevertheless represented at Chester by the altogether creditable entry of 184 pens. These came from 41 distinct flocks, of which 34 are in England, 3 in Wales, 3 in Ireland, and 1 in Scotland. The English flocks belong to five contiguous counties, namely, Salop 15, Warwick 7, Stafford 6, Hereford 4, and Worcester 2. The Welsh flocks are located 1 each in Cardigan, Denbigh and Flint; and the Irish flocks 1 each in Meath, Queen's County, and Westmeath. The 13 prizes were thus distributed amongst the counties: Warwick 5, Salop 4, Hereford 1, Westmeath 1, Stafford 1, and Worcester 1, whilst Warwick must also be credited with the Champion prize for single ram. Two sets of Judges were engaged, the one set dealing with the rams (Classes 138–140), and the other set with the ram lambs and ewes (Classes 141–142).

Two-shear rams (Class 138) formed "an excellent class," wherein was found the Champion ram which won for Mr. A. S. Berry the Gold Medal offered by the Shropshire Sheep Breeders' Association for the best ram in the two-shear and shearling classes. "This sheep has excellent character and style, good back, heavy flesh, fine wool and skin, and walks remarkably well; he won the Champion prize very easily." Many animals in this class were noticed by the Judges, "and some of them might have been placed higher if they could have walked better."

Shearling rams (Class 139) were not quite so numerous as usual, "owing, no doubt, to the extra class of pens of five shearling rams." "There were many very good animals in it, but nothing of exceptional merit." The Judges had little hesitation in awarding the first prize to a ram which proved to be "very wide, heavily fleshed, with great scale, good back and fleece, with nice skin, strong head and neck, and well sprung everywhere."

Pens of five shearling rams of the same flock (Class 140) formed a special class for which prizes were offered by the Local

Committee. These were considered by the Judges the best class they had to deal with, and they noticed nearly all the pens. No difficulty was experienced, however, in awarding the first prize, which went to "a pen of very well matched rams, with excellent heads, character, and colour, and with good wool and heavy flesh combined with plenty of size and bone."

Pens of three ram lambs (Class 141) showed, on the whole, good character, the first prize going to "a matchy pen with beautiful coats and skin."

Pens of three shearling ewes (Class 142) likewise possessed, as a class, good Shropshire character, the first prize pen being "great good ewes with capital wool, and legs well placed, but wanting just a little finish about their heads."

Southdowns.—Numerically this breed came next to the Shropshires, though present to the extent of 20 pens less than Southdown breeders put forward at Warwick last year. The 84 pens in the Chester Catalogue represented 16 flocks, namely, 4 in Sussex, 2 each in Gloucester, Norfolk, Suffolk, and Surrey; and 1 each in Berks, Essex, Kent and Notts. Of the 10 prizes, Norfolk secured 5, Suffolk 2, Sussex 2, and Berks 1. Two-shear rams (Class 143) were the weakest part of the display, "with great diversity of character and wool." Shearling rams (Class 144) were exceedingly good, the first prize ram "being a specially good representative of the breed, his style, character, and quality being all that could be desired." Amongst ram lambs (Class 145) "competition was very severe," and there was but little to choose between the first two lambs. Of ewes (Class 146) the first prize pen is described as "very massive," the second prize pen as "matching and of good style," and the third prize pen as "very level."

Hampshire Downs.—Thirty-three pens were entered, representing 11 flocks in six counties,—Hants 4, Cambs 2, Wilts 2, Beds 1, Berks 1, Herts 1. Nine prizes were awarded, namely, 3 to Berks, 3 to Hants, 2 to Cambs, and 1 to Wilts. Shearling rams (Class 148), excepting the first prize animal, "were not a very strong class." On the other hand, ram lambs (Class 149) were, excepting one or two pens, "a very good class," the first prize pen being of great merit. Shearling ewes (Class 150) were likewise "a very good class indeed, and would show well in any company." The Judges "sum up the show of Hampshire Down Sheep on the whole as reflecting great credit on the exhibitors."

Suffolks.—Of this breed 18 pens were entered, this number being identical with the entry at Warwick last year. Four flocks were represented, 3 in Suffolk and 1 in Cambs. The

exhibits at Chester "fully maintained the character of the breed." Both classes (151 and 152) for single rams were good. Ram lambs (Class 153) were "headed by a pen of good strong lambs of the type that breeders of Suffolk sheep aim at producing," and were followed by "several pens of useful lambs." For shearling ewes (Class 154) the first prize went to "a pen of good character, with great size and quality." The second prize pen "had good backs and were an even lot," and in addition there were one or two other pens of useful sheep.

Wensleydales.—There were 32 entries from 10 flocks—8 in Yorkshire, 1 in Lancashire, and 1 in Westmoreland. Shearling rams (Class 155) were "a very good class as regards both quantity and quality, and entailed considerable difficulty in coming to decisions." Ram lambs (Class 156) were a fair class "considering the high situation in which they are bred." Shearling ewes (Class 157) "were a very good class, and the first and second pens especially good."

Border Leicesters.—Thirty-four pens were catalogued from 9 flocks, 3 of the latter being in York, 2 in Northumberland, and 1 each in Cumberland, Durham, Haddington, and Queen's County. The entries comprised 24 pens from England, 6 pens from Scotland, and 4 pens from Ireland. The six prizes awarded all went to the Haddington flock, belonging to the Right Hon. A. J. Balfour, M.P. Aged rams (Class 158) "were fairly representative;" shearling rams (Class 159) "moderate but numerous;" gimmers (Class 160) "good all round."

Somerset and Dorset Horned.—The representatives of this breed had a long way to travel, but they mustered 12 entries from 3 flocks—2 in Somerset and 1 in Dorset. The prizes were equally divided, each exhibitor taking a first and a second. Of shearling rams (Class 161) "the quality was not an average." Of ram lambs (Class 162) the first and second prize pens "were of exceptional quality, having all the character and type of the Dorset breed." Ewes (Class 163) were good, "possessing size and quality, particularly the first prize pen."

Kentish or Romney Marsh.—There were only three entries, all from one flock. The Judges report:—

> We very much regret this useful breed of sheep is badly represented at this Show. This may no doubt be attributed to the great distance from the county of Kent. In Class 164, for shearling rams, there were but two entries, neither good specimens of the breed. No. 1826 we considered worthy of a prize. In Class 165, for pen of three shearling ewes, we withheld the prize, the class not being of sufficient merit.

Cheviot.—Five entries represented 2 flocks, 1 in Northumberland and 1 in Roxburghshire. Shearling rams (Class

166) "were about an average," and "the first prize ram, though not possessing the fine fleece of the second prize animal, had a majority of good points." The prize pen of shearling ewes (Class 167) was "rather above the average in point of merit."

Black-faced Mountain.—Eleven entries were made from 4 flocks—2 in Westmoreland, 1 in Cumberland, and 1 in Northumberland. They were found to be "sheep of a fairly good class, especially the first prize pens in each section."

Lonk.—Seven entries were made from 5 flocks—4 in Lancashire and 1 in Yorkshire. Shearling rams (Class 170) were "a small entry but a very good class—the first and second prize rams were extra good sheep." The first prize shearling ewes (Class 171) were "good in wool and quality."

Herdwick.—There were 17 entries from 6 flocks—2 in Denbigh, and 1 each in Cumberland, Lancashire, Northumberland, and Westmoreland. Shearling rams (Class 172) were "a large entry and an excellent class taking them all through."

Welsh Mountain.—The 28 entries of this breed came from 6 flocks—2 in Merioneth, and 1 each in Brecknock, Carnarvon, Montgomery, and Oxon. Of Class 174, aged rams, the Judges say, "the first prize ram is the most perfect sheep of its breed we have seen, the wool being exceptionally good." The second prize sheep "has very high merit, and the whole of the class is a credit to the judgment of the breeders." With regard to ewes (Classes 176 and 177), notice is taken of "the great improvement that has taken place of late years in the breeding of Welsh ewes."

Pigs.

Swine were entered in the Catalogue in the following numbers, from which it will be seen that 40 per cent. of the pens contained Berkshires:—

Large White	19	Berkshires	61
Middle White	14	Any other Black Breed	13
Small White	14	Tamworths	32

Large White Breed.—The 19 entries compared with 32 pens at Warwick and 33 at Doncaster. In Class 180, for breeding sow, the first and second prize animals are reported as "good in head, heavy flesh, nice quality of hair, and stand well on their hind legs; two of the best pigs in the Show."

Middle White Breed.—Here again the first and second prize sows (Class 184) were "two fresh good young animals, shown in fair breeding condition." But the class, as a whole, "does not come up to former Shows."

Small White Breed.—Boars (Class 186) were "very uneven." The best boar in the class the Judges "were obliged to throw out, as he was heavily spotted with black."

Regarding White Pigs as a whole, the Judges say:—

> Altogether a poor show of White Pigs as regards numbers, but in quality many of the classes compare favourably with the last two years, although several are sadly deficient.

Berkshires.—The 61 pens of this breed were entered from 11 counties, of which Berkshire contributed 16 pens, Chester 9, Gloucester 9, Norfolk 8, Salop 5, Herts 3, Northampton 3, Warwick 3, Essex 2, Wilts 2, and Hants 1. Of the 12 prizes awarded, Berks took 4, Gloucester 2, Norfolk 2, Salop 2, Essex 1, and Hants 1, the last-named county also securing the Champion prize.

Boars (Class 190) were represented by a number of very useful animals. The three prize-winners "were all excellent representatives of their breed." In Class 191, pen of three boar pigs, "many of the pens were spoiled by not being evenly matched."

Breeding sows (Class 192) made the largest of the Berkshire classes, with 25 entries. It proved to be "a very meritorious class, and a number of excellent animals had to be out of the money." Mr. Edney Hayter's first prize sow, which also took the Champion prize offered by the British Berkshire Society, "was a very deep-sided, large pig of good quality, and of the type now sought by bacon curers." The second and third prize sows "were also admirable specimens of the breed." In a well-filled class of sow pigs (Class 193) all the prize-winners were good specimens.

The Judges state:—

> The show of Berkshire pigs on the whole was a very good one, every class having a good number of entries. The sow class had a large entry, and we think Berkshire breeders are to be congratulated on making so good a display in comparison with other breeds.

Any other Black Breed.—This section was very sparsely filled, "though amongst the few animals exhibited were several of considerable merit."

Tamworths.—The entries possessed great merit, and, with few exceptions, were found to be of true type and colour. The prize boars in Class 198 were of a high order of excellence, but comparing the general exhibit of boars with that of sows, the advantage rested with the latter.

Poultry.

Of Poultry there were 685 entries in the Catalogue, made up of the following numbers:—

Dorking	93	Cochin	32	Andalusian	30
Game	95	Langshan	62	Leghorn	44
Houdan	21	Wyandotte	65	Hamburg	32
Other French Breeds	14	Plymouth Rock	47	Any other recognised Breed	31
Brahma	30	Minorca	47	Table Poultry	42

Dorkings fully maintained their high character; the dark chickens were decidedly good, and the pullets were promising, "except only in leg, which in many was a little coloury." Notwithstanding the unprecedented sunny weather, the Silver Greys preserved the silvery whiteness of their plumage. The winners "showed a distinct advance on former years, inasmuch as they were fine, strapping, well-grown, straight-breasted birds, early matured, and of conspicuous excellence." In Whites the entries were good, but few in numbers, "nor can we expect an increased entry unless others take up this purest of strains, and raise it again into popularity." *Old English Game* made a fine display, which in its happy combination of usefulness and beauty was most encouraging, whilst in uniformity of the right type it afforded evidence of a distinct advance upon former Shows. *Indian Game* were an even and presentable lot, which handled well; the chickens showed an advance in maturity whilst maintaining quality, and altogether the variety came prominently to the front as one that can always be utilised in effecting a profitable cross for table purposes. *Houdans* and *Other French Breeds* were fairly good, but many of them out of condition. *Brahmas*, on the other hand, were mostly in fine condition. *Cochins* were very good in all classes, and mostly in good plumage.

Langshans were a remarkably good lot; the chickens were well forward in size, feather, and condition. *Wyandottes* brought forward some fairly well-grown chickens, but beyond the prize birds there was a lack of merit throughout. In the *Plymouth Rocks* the cocks were tarnished in feather by the sun, whilst some of the finest hens were very pale in legs and bill; the cockerels were well forward and promising, and compared favourably with the pullets. Viewing the Langshans, Wyandottes, and Plymouth Rocks as a whole, "it is evident these three varieties are as popular as ever, and that this June exhibition is encouraging a much earlier production of youngsters, most of the chickens having been hatched last January."

Minorcas made a praiseworthy display both of adults and

chickens, the prize birds excelling in uniformity of character associated with a combination of all-round good qualities. *Andalusians* appear to remain *in statu quo*, though some of the chickens were fine forward birds. *Leghorns* were mostly above the average, and were in good show form. In the *Hamburg* classes the adults were truly grand, particularly the blacks, and were in the most perfect condition. *Any Other Recognised Breed* was remarkable for the high merit of Polish and Spanish.

Ducks comprised 26 Aylesbury, 24 Rouen, 19 Pekin, 10 any other useful breed, and 16 table ducks. With few exceptions they were not meritorious, the deficiency in quality being attributable to the hot dry season.

Geese (16 entries) were of fair size and quality, and up to the usual standard of the Royal Show.

Turkeys (21 entries) were an exceptionally fine show throughout.

Table Poultry.—The Judge has supplied the following detailed report:—

Again an increase in the number of entries of Table Poultry has to be recorded, as is apparent from the following statement of entries in this and the three previous years:—

	Chester 1893	Warwick 1892	Doncaster 1891	Plymouth 1890
Pure-bred Cockerels . .	6	8	6	6
Pure-bred Pullets . . .	7	8	7	7
Cross-bred Cockerels . .	16	10	6	1
Cross-bred Pullets . . .	13	10	8	2
Pure-bred Ducklings . .	8	7	5	8
Cross-bred Ducklings . .	8	4	6	5
	58	47	38	29

It will be seen from the above that the increase is chiefly in cross-bred cockerels and pullets, though there is also a slight increase in both classes of ducklings, whilst the pure-bred chickens have fallen to the figures of 1890 and 1891. This is to be regretted, and the competition is largely confined to Dorkings and Indian Game. There are other breeds which might be represented, but probably until some further division is made of the pure-bred classes we shall not see any increase. The cross-bred classes show a very marked advance, and their value is evidenced by the birds displayed.

As was the case last year, all the birds were weighed separately alive, on the first day, and during the Monday evening were killed and plucked, this work being again excellently performed by Mr. Thos. Newby, of Leeds. They were weighed dead on the Tuesday morning, when the prizes were awarded. Below are the notes made under both conditions:—

Class 270. Pair of Cockerels of 1893, of any pure breed. Six entries; four pairs exhibited.

No.	Alive	Dead	Prize
662.	Indian Game. (1) 5 lb. 4 oz.; fair shape, except breast; (2) 5 lb. 2 oz.; much the better, nice colour, handling well.	(1) 4 lb. 15 oz.; plump, but dark flesh, and badly bent breast-bone; (2) 4 lb. 15 oz.; a beauty all through; very straight in keel, and good colour.	2nd

No.	Alive	Dead	Prize
665.	Dark Dorkings. (1) 4 lb. 12 oz.; (2) 4 lb. 14 oz.; small and not in good condition.	(1) 4 lb. 7 oz.; darkish flesh, fair skin, excellent legs; (2) 4 lb. 9 oz.; better in quality of flesh, but dented breast-bone.	Res.
666.	Dark Dorkings. (1) 5 lb. 1 oz.; (2) 4 lb. 13 oz.; ragged and not in good condition, breast-bones not quite straight.	(1) 4 lb. 12 oz.; (2) 4 lb. 9 oz.; fair in legs, but full of pin feathers, and rough.	
667.	Silver Grey Dorkings. (1) 4 lb. 14 oz.; good shape and legs, slightly bent breast-bone; (2) 5 lb. 13 oz.; decidedly the best bird in class, large, nice shape.	(1) 4 lb. 9 oz.; good colour of flesh and nice skin, but much smaller than (2), 5 lb. 6 oz., which, however, was hardly so good in colour, and had a slightly bent breast-bone.	1st

This Class was not a very good one, and the weakness shown by bent breast-bones was seen in every pair.

Class 271. Pair of pullets of 1893, of any pure breed. Seven entries, all exhibited.

No.	Alive	Dead	Prize
668.	Black Plymouth Rocks. (1) 3 lb. 11 oz.; (2) 3 lb. 13 oz.; good birds, in nice condition, but very small.	(1) 3 lb. 7 oz.; very plump, good shape, and wonderfully nice colour for breed; (2) 3 lb. 9 oz.; not equal in quality, rough skin, and slightly bent breast-bone.	Res.
669.	Indian Game (1) 4 lb. 6 oz.; (2) 4 lb.; small, but handled well; latter long in body.	(1) 4 lb. 3 oz.; plump, though small, nice colour, but spoiled by tumour on breast; (2) 3 lb. 12 oz.; coarse and full of pin feathers; both dented in breast-bone.	
670.	Dark Dorkings. (1) 3 lb. 13 oz.; (2) 3 lb. 6 oz.; small and wanting in flesh; legs rather coarse on No. 1, better on No. 2.	(1) 3 lb. 8 oz.; long in keel, good colour, but lacking in flesh; (2) 3 lb. 2 oz.; coarse in skin; nice legs.	
671.	Indian Game. (1) 4 lb. 13 oz.; compact, nice shape, but not well fed; (2) 5 lb. 4 oz.; heavy and a much better bird in every way.	(1) 4 lb. 8 oz.; good flesh, but skin wrinkled; (2) 5 lb. 3 oz.; very plump, large, well fleshed, and excellent throughout.	2nd
672.	Silver Grey Dorkings. (1) 5 lb. 5 oz.; well grown, nice colour of legs; (2) 4 lb. 11 oz.; smaller but better in bone; very shapely.	(1) 5 lb.; very long, good flesh, nice skin, but slightly bent breast-bone; (2) 4 lb. 4 oz.; darker in flesh and not nearly so plump, also bent in breast-bone.	3rd
673.	Dark Dorkings. (1) 3 lb. 12 oz.; (2) 4 lb.; very small, lacking size and flesh, out of form, and latter coarse in legs.	(1) 3 lb. 8 oz.; (2) 3 lb. 12 oz.; both dark in flesh, and full of pin feathers.	
674.	Silver Grey Dorkings. (1) 4 lb. 8 oz.; a lovely bird, best colour, fair in legs, but small; (2) 4 lb. 12 oz.; rather better in legs, and a good match.	(1) 4 lb. 4 oz.; very plump, well fleshed, fair colour, but a bit coarse in skin; (2) 4 lb. 8 oz.; better in colour, good skin and legs, and an excellent pair, well matched.	1st

On the whole a nice class, but here again bent breast-bones were the chief weakness.

Class 272. Pair of Cockerels of 1893, of a first cross from any pure breed. Sixteen entries; eleven pairs exhibited.

No.	Alive	Dead	Prize
675.	Indian Game and Dorking. (1) 3 lb. 13 oz.; (2) 4 lb. 3 oz.; showing the Dorking type, both with white legs and five toes; small and leggy.	(1) 3 lb. 10 oz.; fair colour and moderately plump; (2) 3 lb. 13 oz.; a little plumper, but both full of pin feathers.	Res.
676.	Indian Game and Langshan. (1) 5 lb. 12 oz.; (2) 6 lb.; a plump, well-developed pair, handling excellently; plumage following Indian Game, but almost white legs.	(1) 5 lb. 8 oz.; plump, and fleshy, rather coarse in bone, good colour; (2) 5 lb. 12 oz.; longer and bigger, coarsish in skin.	2nd
677.	Game and Dorking. (1) 4 lb. 6 oz.; (2) 4 lb. 9 oz.; of the Dorking type, black and white plumage, both five toes, No. 1 pure in legs; No. 2 darker.	(1) 4 lb.; moderate size, dark in flesh; (2) 4 lb. 7 oz.; but also dark, and very uneven.	
679.	Dorking and Langshan. (1) 5 lb. 8 oz.; (2) 5 lb. 5 oz.; white plumage, white legs, and good size, having the fifth toe; No. 2 had white feathers down side of legs.	(1) 5 lb. 3 oz.; (2) 5 lb.; both long in body, former especially so, but narrow, and coarse in skin.	
680.	Dorking and Indian Game. (1) 3 lb.; (2) 3 lb. 3 oz.; of white Dorking type, but with single comb; both white in leg, and with fifth toe, but very small.	(1) 2 lb. 13 oz.; fairly plump, but coarse; (2) 3 lb.; larger, yet also fails in skin.	h.c.
681.	Plymouth Rock and Game. (1) 3 lb. 9 oz.; (2) 4 lb.; of the Plymouth Rock type and plumage; small and not good in breast.	(1) 3 lb. 5 oz.; very yellow in flesh, but badly bent breast-bone; (2) 3 lb. 12 oz.; whiter and plumper, but with same fault.	
684.	Dorking and Indian Game. (1) 4 lb. 9 oz.; good shape, handled well; (2) 4 lb. 8 oz.; nice body, square. Both with white legs and fifth toe.	(1) 4 lb. 7 oz.; bad colour of flesh, but fairly long; (2) 4 lb. 6 oz.; better colour, good shape, a little coarse in skin.	h.c.
685.	Pile and Indian Game. (1) 3 lb. 9 oz.; (2) 3 lb. 12 oz.; one following the Pile, and the other the Indian Game, both fairly plump; yellow legs.	(1) 3 lb. 4 oz.; plump and fleshy, but yellow, and full of pin feathers; (2) 3 lb. 9 oz.; much better, excellent shape and colour.	
686.	Dorking and Indian Game. (1) 2 lb. 15 oz.; (2) 3 lb. 1 oz.; small, but good frames, and with more time could have been improved, both with four toes.	(1) 2 lb. 13 oz.; (2) 2 lb. 15 oz; a very good pair, wonderfully even and neat, but so very small.	h.c.
689.	Indian Game and Dorking. (1) 4 lb. 14 oz.; following the Indian Game, except in legs, only four toes, well developed; (2) 5 lb. 5 oz.; very plump, nice shape, five toes.	(1) 4 lb. 8 oz.; long, fairly plump, moderate colour, spoiled by pin feathers; (2) 4 lb. 14 oz.; better colour and fleshy, but a little coarse.	3rd

No.	Alive	Dead	Prize
690.	Indian Game and Dorking. (1) 5 lb. 3 oz.; in excellent condition, nice legs and shape, five toes; (2) 5 lb. 5 oz.; very even and a good match, only four toes.	(1) 4 lb. 14 oz.; a little dark in flesh, but plump and shapely; (2) 5 lb. 1 oz.; best colour, and good throughout, nice legs, though just a little coarse in skin.	1st

In this Class the Indian Game and Dorking proved the best, and would have been even more successful had the feeding been equal. The Indian Game and Langshan cross is also shown to be good. Dorking and Indian Game do not come out so well as the reverse cross.

Class 273: Pair of pullets of 1893, of a first cross from any pure breeds. Thirteen entries; twelve pairs exhibited.

No.	Alive	Dead	Prize
691.	Plymouth Rock and Langshan. (1) 3 lb. 3 oz.; (2) 3 lb. 9 oz.; black plumage and legs, small, and rather lanky.	(1) 2 lb. 15 oz.; fair colour and plump, light bone; (2) 3 lb. 5 oz.; not so good in colour of flesh, but better meat qualities.	3rd
692.	Indian Game and Dorking. (1) 3 lb. 3 oz.; very young, but fairly plump, white legs but only four toes; (2) 3 lb. 3 oz.; very equal. This bird had dark legs, and *five* toes.	(1) 2 lb. 14 oz.; did not kill so well as expected, full of pin feathers; (2) 2 lb. 15 oz.; better colour, but narrow and not meaty.	h.c.
693.	Indian Game and Langshan. (1) 4 lb. 10 oz.; of the Indian Game type, dark legs slightly feathered, plump and well made; (2) 4 lb. 2 oz.; very similar though lighter in body, much whiter in legs.	(1) 4 lb. 5 oz.; very plump, good colour, but a bit coarse in skin; (2) 3 lb. 14 oz.; better in skin, but too many pin feathers.	Res.
694.	Game and Dorking. (1) 3 lb. 4 oz.; (2) 3 lb. 8 oz.; a nice pair, but small, four toes on No. 1, 5 toes on No. 2; good white legs.	(1) 3 lb.; small and neat, rather heavy in bone; (2) 3 lb. 2 oz.; better shape, fair skin, again small, and lacking colour.	h.c.
695.	Dorking and Redcaps. (1) 4 lb. 2 oz.; fairly long, five toes, but slightly feathered on legs, which were white; (2) 3 lb. 9 oz.; less fleshy; only four toes.	(1) 3 lb. 13 oz.; large frame but narrow and wanted filling out; (2) 3 lb. 5 oz.; not quite straight in keel, also narrow.	
696.	Dorking and Game. (1) 3 lb. 10 oz.; (2) 3 lb. 8 oz.; following Dorking type, both with white legs and fifth toes, but small.	(1) 3 lb. 7 oz.; fair colour and plumpness, but bad breast-bone; (2) 3 lb. 5 oz.; small and coarsish in skin.	
697.	Plymouth Rock and Game. (1) 2 lb. 6 oz.; (2) 2 lb. 12 oz.; following the Game type, both yellow legs, No. 1 with five toes and No. 2 with four toes; very small.	(1) 2 lb. 4 oz.; good colour, neat and fairly fleshed: (2) 2 lb. 9 oz.; plumper, but very yellow and coarse in skin.	
698.	Game and Dorking. (1) 3 lb. 8 oz.; (2) 3 lb. 1 oz.; of the Dorking type, good white legs, and five toes.	(1) 3 lb. 5 oz.; plump and well made, nice colour and skin; (2) 2 lb. 14 oz.; coarse in skin and failing in colour.	h.c.
699.	Dorking and Wyandotte. (1) 4 lb.; (2) 3 lb. 12 oz.; of Dorking type, handled well, had good white legs and five toes.	(1) 3 lb. 13 oz.; (2) 3 lb. 11 oz.; a lovely pair, in the pink of condition, No. 2 not quite so fleshy, but for skin and flesh best in the Show.	1st

No.	Alive	Dead	Prize
700.	Dorking and Indian Game. (1) 2 lb. 14 oz.; (2) 3 lb.; small, but good shape, nice legs and feet, four toes.	(1) 2 lb. 13 oz.; neat and good colour, full of pin feathers; (2) 2 lb. 15 oz.; same fault, plumper but coarse in skin.	h.c.
701.	Indian Game and Dorking. (1) 3 lb. 4 oz.; (2) 3 lb. 3 oz.; white legs, but bad breasts.	(1) 3 lb. 2 oz.; (2) 2 lb. 13 oz.; both soft, and with badly bent breast-bones.	
703.	Indian Game and Dorking. (1) 3 lb. 13 oz.; plump, well made; (2) 3 lb. 12 oz.; both good in shape and legs.	(1) 3 lb. 10 oz.; coarse in skin, but plump, and a nice fowl; (2) 3 lb. 5 oz.; better colour, but not so fleshy.	2nd

The feature of this Class was found in the first prize pair, showing that the Dorking and Wyandotte cross is a good one, but the ripe condition of these birds helped them materially.

Class 290. Pair of ducklings of 1893, of any pure breeds. Eight entries all exhibited.

No.	Alive	Dead	Prize
783.	Aylesbury. (1) 5 lb. 12 oz.; good length, nice in bill; (2) 5 lb. 12 oz.; do., a very equal pair, with 1893 rings.	(1) 5 lb. 7 oz.; (2) 5 lb 7 oz. nice colour, but No. 1 spoiled by pin feathers.	Res.
784.	Aylesbury. (1) 5 lb. 2 oz; good quality, in nice condition; (2) 5 lb. 11 oz.; bigger, but did not look well, plumage all wet.	(1) 4 lb. 11 oz.; (2) 4 lb. 15 oz.; a lovely pair, grand colour, very even, in the pink of ripeness.	1st
785.	Aylesbury. (1) 5 lb. 13 oz.; big bodied and well developed, promising well; (2) 5 lb. 6 oz.; not quite so large or so fit, nice head and bill.	(1) 5 lb. 6 oz.; uneven in flesh and full of pin feathers; (2) 5 lb. 1 oz.; better quality, but not so fleshy.	
786.	Indian Runner. (1) 3 lb. 5 oz.; (2) 3 lb. 8 oz.; very small, but fair specimens of race. Better as layers than on the table.	(1) 3 lb. 3 oz.; (2) 3 lb. 6 oz.; showing dark frontal flesh of this breed.	
787.	Aylesbury. (1) 4 lb. 12 oz.; very young, capital shape and plump; (2) 5 lb. 1 oz.; equally good and a nice pair.	(1) 4 lb. 6 oz.; (2) 4 lb. 10 oz.; a neat, even pair, a little soft, but nice colour; might have been more fleshy.	2nd
788.	Aylesbury. (1) 5 lb.; shapely, good colour; (2) 4 lb. 10 oz.; good plumage, but not so plump.	(1) 4 lb. 12 oz.: (2) 4 lb. 7 oz.; good length, fair colour, but not even, and wanting in flesh.	
789.	Aylesbury. (1) 6 lb. 8 oz.; (2) 6 lb. 5 oz.; largest pair in class, but looking rather sick. Probably been kept too long.	(1) 6 lb. 3 oz.; (2) 5 lb. 15 oz.; a large pair, very full of pin feathers and very pale in flesh.	h.c.
790.	Aylesbury. (1) 6 lb. 1 oz.; (2) 5 lb. 15 oz.; a well-developed pair, better shown, but still very pale.	(1) 5 lb. 11 oz.; (2) 5 lb. 10 oz.; even, and well grown, better in body, but still with deadness in colour of flesh.	3rd

Class 291. Pair of ducklings of 1893, of a first cross from any pure breeds. Eight entries; seven pairs exhibited.

No.	Alive	Dead	Prize
791.	Aylesbury and Pekin. (1) 4 lb. 4 oz.; (2) 5 lb. 8 oz.; an uneven pair, No. 2 partaking of Pekin type.	(1) 4 lb. 1 oz.; (2) 5 lb. 3 oz.; full of pin feathers, and coarse.	

No.	Alive	Dead	Prize
792.	Aylesbury and Pekin. (1) 4 lb. 8 oz.; (2) 4 lb. 6 oz.; following the Pekin, rough in plumage.	(1) 4 lb. 5 oz.: (2) 4 lb. 3 oz.; killed better than expected, yellow in flesh, but plump.	Res.
793.	Aylesbury and Pekin. (1) 4 lb. 7 oz.; (2) 4 lb. 7 oz.; of the Aylesbury type, broad and in fair condition, but short.	(1) 4 lb. 5 oz.; (2) 4 lb. 5 oz.: a nice pair, plump, but full of down feathers, lacking a little in colour.	3rd
794.	Aylesbury and Pekin. (1) 5 lb. 6 oz.; (2) 5 lb. 2 oz.; big, well-grown birds, in perfect condition, long in bodies.	(1) 5 lb. 1 oz.; (2) 4 lb. 12 oz.; a lovely pair, grand colour, shape, and skin, and just at perfection.	1st
796.	Aylesbury and Pekin. (1) 5 lb.; (2) 4 lb. 10 oz.; of Aylesbury type, well shown.	(1) 4 lb. 9 oz.; (2) 4 lb. 6 oz.; very even, but yellowish in colour, and not pleasing.	
797.	Aylesbury and Pekin. (1) 5 lb. 8 oz.; (2) 6 lb. 2 oz.; biggest pair in class, but old-looking and out of form.	(1) 5 lb. 3 oz.; (2) 5 lb. 13 oz.; dead white skin, very fleshy, but one full of pin feathers, and too old.	
798.	Aylesbury and Pekin. (1) 5 lb. (2) 5 lb. 6 oz.; good shape, and in better form, well grown.	(1) 4 lb. 11 oz.; lacking in flesh, (2) 5 lb. 2 oz.; a much better bird, very even, but full of pin feathers.	2nd

It is satisfactory to note that exhibitors are commencing to learn the importance of sending the fowls when in the best condition, and not too old, as was formerly the case. Of course, advantageous though the plan of exhibiting alive first and killing at the Show is, the really highest quality will seldom be obtained in this way, for birds fattened should be killed when ripe and never sent away alive. In future, also, I would suggest that the birds when killed should not be trussed as for market, but simply plucked and laid out straight.

As will be seen from the comparative weights, the loss when killed varies considerably, in some instances being as low as two ounces, and in others as high as eight ounces in chickens, and in ducklings ranging from three ounces to seven ounces. But it will be noted that the birds which lost the least in weight were, as a rule, those in the most perfect condition.

Cheese.

Cheshire.—The large number of 470 entries of Cheshire cheese came forward, the total weight of this exhibit being about 35 tons. It is noteworthy that the competitors came not from the Home county alone, but that eight other counties—Denbigh, Dorset, Flint, Lancaster, Montgomery, Salop, Somerset, and Stafford—were represented in the display. Of the 32 class prizes awarded, however, only 5 passed beyond the Cheshire border, the county of Salop securing a first, a second, and a third, Denbigh a second, and Montgomery a second. Three sets of Judges were engaged in deciding the awards, whilst one Judge from each set made a fresh group for the awarding of the Champion prize of 100*l.*

Two classes were allotted to cheese made in 1892, Class 296 for 3 cheeses of not less than 60 lb. each, and Class 297 for

3 cheeses of 30 lb. to 60 lb. each. Of Class 296, the Judges report that "the show was very fair, the larger proportion unfortunately being of bad colour and off flavour; this of course was quite expected owing to the length of time the cheese had been kept since 1892, and also to the extreme heat. The quality of the prize cheese stood out well from the bulk." The Champion cheese was found in this class. The smaller cheeses in Class 297 "were, as a lot, only a poor show, and not nearly up to the standard of Class 296, many of the cheeses being very poor and soft, also ill-flavoured."

Three classes were set apart for coloured cheese, made in 1893—Class 298 for cheeses not less than 60 lb. each, Class 299 for cheeses of 40 lb. to 60 lb. each, and Class 300 for cheeses of under 40 lb. each. The subjoined extracts are taken from the Judges' report:—

In reporting on these three classes of coloured cheese, all of this year's make, we find 90 exhibits of the large size above 60 lb. each (Class 298), 66 exhibits of 40 lb. each and less than 60 lb. (Class 299), and 36 exhibits of cheese under 40 lb. each (Class 300). We find in each of the classes great diversity of quality, arising from the fact that the season of the year has not yet arrived when the best quality is made. Many lots evidently from good dairies were unripe, while not a few were tender in condition and short in texture, occasioned by the introduction of too much acidity. This may have been due to a desire on the part of the maker to insure early ripening. This also may account for the presence in many dairies of discoloration. Yet with all these deductions there remained a good percentage of rich forward cheese ready for consumption, and we do not think the percentage of best cheese differed much in the three classes in its proportion to the bulk exhibited.

The great heat of Saturday and Sunday (June 17 and 18) had an unfavourable effect on the cheese, and the reputation of the maker suffered through this tropical heat. This feature should not be overlooked by those who viewed the cheese, especially the critical observers.

We sympathise with our makers in their efforts to make early ripening cheese of uniform fine quality, from the fact that it appears to us more difficult and uncertain of attainment than was the production of really good cheese by a slower process in former days, but we must not forget that the standard of fine cheese has been raised.

A significant incident has occurred at this Show. We refer to the fact that the same maker takes the highest prizes in the old and also in the new cheese. It is of the greatest importance that careful investigation should be made as to the process by which such a consummation has been attained, viz., the production of cheese which ripens early and yet has good keeping qualities. It should be noted as significant that Mr. Thomas Houlbrooke's cheese took the four leading prizes in the old and new cheese classes, and this success was verified by the fact that different Judges, without any knowledge of the owner of any exhibits, all fixed on cheese from the same dairy as the finest in the Show, the Judges being drawn from London, Newcastle-on-Tyne, and Cheshire.

It has been generally assumed that the maker of cheese of fine keeping qualities could only excel in that style of cheese, but it is now proved that a fine cheese can be made to be early ripe, and yet has good keeping qualities;

this fact will make the Royal Show at Chester in 1893 memorable to all interested in dairying, and especially to the Cheshire cheese makers.

The section for uncoloured Cheshire cheese made in 1893 (Classes 301–303) was "as a whole very fair; but the early date of the season and the extreme heat were prejudicial to the cheese showing as it otherwise would do." These remarks apply to all three classes, but the Judges considered Class 303 (for cheeses under 40 lb. each) "superior to the other two classes."

The contest for the Champion prize was, in effect, a competition of old against new, with the victory to the former. The successful dairy, Mr. Thomas Houlbrooke's No. 31, "stands out well, condition, flavour, and colour being very good, quality not to be surpassed."

Other Cheese.—There was not a large display of cheese other than Cheshire. The Catalogue contained 20 entries of Cheddar, 19 of Stilton, 7 of Double Gloucester, 4 of Leicester, 4 of North Wilts Loaf, 4 of Lancashire Toasting, and 19 entries not eligible for any of the foregoing classes. *Cheddar* of 1892 make was "a very good class, being of a rich prime quality, very well made." Cheddar of 1893 was "also well made, and had every promise of proving good quality when matured." Of *Stilton* made in 1892 "the entries were small, but contained some very choice specimens." Stilton made in 1893 was "difficult to judge in June," but the Judges "were pleased to find that the first and second prizes were awarded to the prize-winners for old Stiltons." For *Double Gloucester* "all the prizes went to makers non-resident in Gloucestershire." *Leicester* was "a small entry of only medium quality." For *North Wilts Loaf* "all the prizes were given to cheese not made in Wilts." *Lancashire Toasting* cheese was "of a prime rich quality." In Class 312 several of the entries were eligible for other classes "and were thus disqualified. The Loaf Cheddars in it were good and took the chief awards." In Class 313, cheese under 2 lb. weight, there was only one entry "worthy of notice."

Of *Cream cheese* "the quality on the whole was disappointing."

Butter.

The entries numbered 225, showing a marked increase on the 164 at Warwick last year. Of fresh butter, slightly salted (Class 315), "whilst there was a large number of good samples presented in excellent condition, there was room for improvement in the method of making up and packing." For similar butter, but the produce of cows other than Channel Islands,

pure or cross-bred (Class 316), the competition "was exceedingly close in regard to the majority of the samples shown, the flavours in many cases being very fine. They were presented in a manner reflecting great credit on the makers, though in some instances there was considerable room for improvement in this respect. The Judges cannot express too high an opinion of the arrangements made for staging the butter in these classes, and for the keeping of it in condition by means of the clever device of the ice-trough."

Of salt butter "there was considerable difference not only in the flavours, but also in the texture and colour of the butter shown in Class 316." The first prize exhibit in Class 317 "was decidedly the best of all the potted butters, and showed evidence of careful manipulation and skill, the natural flavour of the butter being well preserved." The general character of the butter shown in these two classes "suggests the desirability of greater attention being bestowed on the proper making and preservation of this kind of butter."

Cider and Perry.

The two dozen entries in this section were rather below the average number. The counties represented were Devon, Gloucester, Hereford, Norfolk, and Somerset, but there was no exhibit from Worcester on this occasion. The Judges, having reported the exhibits to be "generally a good lot, and most of them of a genuine character," proceed:—

They hope, however, that at future Shows there may be a larger competition, as cider and perry are daily becoming more favourite drinks, and farmers would do well to turn their attention to the production of samples of a quality that would suit the public taste. This must be done, first by better attention to orchards, both in planting good sorts of fruit and in pruning and manuring, and also in giving greater care to the making of the cider, both in sampling and storing the fruit, and to cleanliness in making, for this point is of the greatest importance, as it is in brewing, or cheese-making, or indeed in any process which has to deal with fermentation.

Jams and Preserved Fruits.

Three of the six classes in this section were vacant, and the remaining three had but 10 entries amongst them. The Judge reports:—

The entries in Class 322 (whole fruit jams) and Class 323 (bottled fruits) are of exceptional merit, and I regret that there are not more exhibitors, as I am sure that this industry has done more to encourage the growth of high-class fruit than anything else, which is proved by the greatly increased acreage of fruit that immediately follows the establishment of a

jam factory in any neighbourhood. In judging these classes I have looked to quality and flavour more than mere showiness of get-up, although this latter is a matter not to be neglected. In Class 327, for air-tight receptacle, there is no entry, although the exhibit in Class 324 is in a receptacle to which I should have awarded a prize had it been entered, for that purpose, in Class 327.

Hives and Honey.

In this department there were 130 entries in eighteen classes, as compared with 154 entries in sixteen classes at Warwick in 1892. The Judges have presented the subjoined report :—

The Bee and Honey Department was fairly representative in character, but, as usual, the early date on which the Show is held had a somewhat adverse effect on the *Produce Section*. This was particularly unfortunate this year, because at the time the exhibition was on view honey was being rapidly gathered everywhere for miles around, and a week or ten days' longer time would have enabled local beekeepers to have made a fine display of produce. As it was, the bulk of the honey shown came from the south, the whole being put up in good marketable form and well staged.

The *Appliance Section* of the department was very creditable indeed, no old-fashioned or out-of-date articles being staged in any of the classes. Of hives, though not a large display, some excellent specimens of workmanship were shown, especially those taking prizes. The general tendency of manufacturers is to make hives much lighter in weight than formerly, cumbersome ones, of heavy material, being never seen of late years at Shows. We quite approve of the change, and it seems to be generally admitted that a light outer-case, to protect the hive proper from the extremes of weather, with all portable parts, roof, body-box, and surplus-chambers made of thin, light wood, are best for all purposes. They are easier to handle, and certainly advantageous, bearing in mind the great weight hives and surplus-chambers frequently attain and the amount of "handling" required during the busy season. These remarks have reference mainly to Class 330 (best and most complete hive for general use), in which class several "Wells Hives" were staged in competition; but however excellent these particular hives may be for illustrating what is known as the "Wells" or double-queen system of working bees, they were obviously out of place among hives for general use, consequently we had no option but to pass them by unnoticed. This was matter for regret, because had they been staged in Class 344 (any practically useful invention connected with beekeeping) their merits could have been adjudicated on.

In Class 331 (most complete inexpensive hive for cottagers' use) we consider the makers who competed did not attach quite sufficient importance to cost, and we think it would be better if a maximum price of, say, 10*s.* 6*d.* were fixed by schedule in future. Hives costing so much as 14*s.* or 15*s.* cannot be called "cottagers' hives," the price being quite too high for a cottager. Otherwise some very good hives were shown in this class. In Class 344 some interesting things were shown; notably a "device for preventing swarming." This was shown by an American exhibitor, Mr. J. P. Langdon, of East Constable, N.Y. It consisted of a simple but ingenious arrangement for working hives in pairs, by means of which the population of both could be combined, or turned into either hive at the will of the beekeeper, and thus prevent the bees from swarming. The exhibit was awarded a silver medal as a meritorious attempt to overcome a difficulty which has long troubled beekeepers. Whether or not it will succeed time alone can

show; though the inventor claims to have made it succeed in America after trial with a large number of colonies of bees.

The only other class requiring mention at our hands is Class 345 (the most interesting and instructive exhibit not mentioned in the foregoing classes). The most notable exhibit in the class was the admirable set of *Lantern Slides on bees and bee culture* staged by Messrs. Newton of London, and prepared by them for the use of lecturers engaged in imparting instruction under the "Technical Education Act."

These slides are arranged in two sections, the *Scientific* and the *Practical*, the former including some beautiful microscopic slides of the *Bacillus Alvei*, or bee-pest, known as *foul brood*, together with many other fine ones illustrative of the anatomy and physiology of the honey bee. The *practical section* embraces photographs of various operations connected with bee-management, all of which are from direct negatives from nature, and form a valuable and interesting series of educational pictures admirably suited for the purpose for which they are intended. In this class was also exhibited *the Rietsche hand-press* for preparing home-made comb-foundation, a useful appliance for beekeepers desiring to work up beeswax, the produce of their own apiaries, into comb-foundation for home use.

The above embraces such features of the bee department as we consider worthy of special reference, and we cannot close without expressing our gratification at the progress which is being made in *the art of beekeeping*, a progress in a large measure attributable, as we think, to the far-reaching influence of well-managed Bee and Honey Shows.

Competitions of Butter-Makers.

These contests were, as usual, conducted at the Dairy, a commodious building occupying a central position in the Show-yard. Here, also, Miss Maidment delivered a series of instructive addresses, and, with the aid of her assistants, gave daily demonstrations in butter-making, and cream cheese-making.

Regarding the butter-making contests generally, the Judges report :—

The work done was very creditable in all classes, and with few exceptions was executed without undue delay, but too little attention was given in the first instance to the condition of the cream.

The judgment and skill shown in churning were on the whole very satisfactory, and equal.

The appearance of the butter when finished left a good deal to be desired in some cases, the merit of the previous good work in churning, working, &c., being rendered of much less value unless this essential point is carefully carried out. Too much attention cannot be given to the appearance of the butter as it is presented to the purchaser.

The butter on being cut showed that the compactness had been too little attended to, and the quantity of water left in the butter was, as a whole, excessive.

In point of firmness the butter was in most cases satisfactory, although its softness in some instances was evidence of inattention to the proper temperatures, or of overworking. 12 lb. of cream was allowed to all the competitors.

The subjoined details are furnished respecting the competitions in the several classes :—

Class I.—Open to the United Kingdom. 17 competitors.—The washing of the butter in this class was excellent on the whole, and the weights of the butter obtained by the competitors were very equal, although less than they should have been owing to thinness of the cream. The compactness of the butter was fairly good, but the quantity of water was excessive on the whole.

Class II.—Open to female members of a farmer's family not in service or working for wages. 34 competitors.—The washing of the butter in the churn was only fair, and not so good as in Class I. The compactness of the butter was disappointing, evidently showing signs of hurry in manipulation, and the water in the butter must again be described as excessive. The weight of butter obtained by this class, though greater owing to thickness of cream, was less uniform than that by the previous class.

Class III.—Open to dairymaids and others residing in the Society's District G. 11 competitors.—The judgment and skill shown in churning were very equal, and deserving of special notice, the washing of the butter being also fairly good. The compactness was better than in the previous class, but the same remarks must be repeated in regard to the excess of water in the butter. A weakness in this class was shown in the want of knowledge of the temperature of the butter when it first came, though some were careful in this respect. The weight of the butter was again uniform, and a fair quantity was obtained from the cream.

Class IV.—Dairymaids and others resident in Cheshire or North Wales, who had received instruction in Dairy schools. 20 competitors.—Again the judgment and skill in churning were on the whole excellent, and the washing of the butter in the churn was good. Compactness fairly good, but the quantity of water was again excessive. The weight of butter was uniform. The careful attention to temperatures in this class was very noticeable, the effect showing itself in the firmness of the butter.

Champion Class.—Limited to prize-winners in previous classes.—This competition took place on the rainy Friday of the Meeting, when the conditions as regards temperature of the dairy were considerably altered; with few exceptions the competitors did not sufficiently consider this point, but altogether the work was most creditable both as regards skill in churning, washing the butter, and making it up, the appearance of the butter being in most cases admirable. There was a great improvement in the compactness and freedom from moisture, though two failed greatly in this latter point.

Horse-Shoeing Competitions.

These competitions were limited to shoeing smiths in the Society's District G, comprising Cheshire, Lancashire, and North Wales. In Class I., Hunters, there were 14 competitors, and in Class II., Agricultural Horses, there were 12 competitors. Amongst the regulations it was stated that :—

Each competitor will be required to make a fore and hind shoe out of the new iron provided by the Society, to take off the fore shoe and put the new one on. The hind shoe will be retained by the Steward.

In awarding the prizes, the time taken in the forging and fitting of the shoe will be considered by the Judges.

Each candidate will also be required to undergo an examination by the Judges, satisfying them that he possesses an adequate knowledge of the construction of the horse's foot.

A competitor must bring his own tools and provide his own striker if he requires one; but the Society will provide forge, anvil, iron, nails, and fuel.

The Judges report as follows:—

In taking off the fore shoe and preparing the foot, a marked improvement was observed, the work was well done, and with four exceptions every competitor received the full number of marks allotted for this section of the work.

In making and getting up the shoes, and in the time test, the work varied considerably, but it is only fair to say that in many cases this was the first competition of the kind that the men had taken part in, and also that some of the competitors were quite young men.

The setting on was upon the whole good. The time test varied from 22 to 45 minutes.

Both the first prize winners were registered shoeing smiths.

We examined thirteen men as to their knowledge of the anatomy of the foot, one passed "very good," four "good," and five "moderate."

The horses selected to be shod proved to be admirably adapted for the purpose.

At noon, on the Wednesday, Mr. Clement Stephenson, F.R.C.V.S., delivered at the Shoeing Forge a lecture on the subject of horse-shoeing, which was copiously illustrated by means of anatomical and other specimens. The address proved so attractive, and was so generally appreciated, that Mr. Stephenson acceded to a request to repeat it on the following day, whereby others interested in the subject were afforded an opportunity of listening to the discourse.

Conclusion.

A farewell glance at the Chester Meeting of 1893 must necessarily rest upon those features which possessed special merit. In what was universally admitted to have been a capital Show, fully up to the standard always aimed at in the "Royal," the points of special excellence in the Horse section were afforded by the Hackneys, the Shires, and the Clydesdales, whilst the class of Pony mares also deserves recognition here. In the Cattle section the display of the Welsh breed was one to be remembered, and the special classes allotted to Dairy Cows and Heifers were eminently in place in a county which occupies a leading position in the dairying industry of England. In the Sheep section the ewe classes, especially of the Leicester, Cotswold, Lincoln, Oxford Down, and Welsh breeds, called forth the unqualified admiration of the Judges. The display of Shrop-

shires was highly creditable, and the breeders of the West Midland Sheep proved themselves well qualified to undergo the severe test of filling a new class for pen of five shearling rams of the same flock. In the Pig section the Berkshires constituted the leading feature. Lastly, the Produce section will long be remembered for the spirited competition amongst the makers of Cheshire cheese. But, whereas in the similar competition in 1858, out of 17 prizes awarded, only 1 went outside the Home county; this year out of 32 class prizes 5 went beyond the limits of the Cheshire border—another illustration, perhaps, of the saying that "cheese is made in the dairy."

It is hardly possible to conclude this Report without a reference to the fact that, in the interval between the two Chester Meetings, the farmers of Cheshire passed through a dark period of disaster which spread ruin far and wide. In no part of England were the dire ravages of the dreaded Cattle Plague more severely felt than in the county of Chester, where by the end of April, 1866, more than one-third of the cattle population had been swept away. The horrors of that terrible time—separated from us by more than a quarter of a century—are still vividly remembered in many a Cheshire homestead, nor were there lacking amongst the visitors to this year's Show some who could relate their painful personal experiences of the visitation of a scourge the recurrence of which it may fervently be hoped has, by a course of prudent legislation, been rendered for ever impossible.

W. Fream.

THE TRIALS OF SHEEP SHEARING MACHINES AT CHESTER.

The machines exhibited by the only two firms who accepted the Society's invitation to compete are identical in principle, and almost identical in the manner in which that principle has been carried out. The trials took place in the Chester Show-yard on Saturday, June 17, 1893. The machines which were tested are thus entered in the Implement Catalogue:—

Class II.—*Sheep Shearing Machines, worked by power.*

No. of Stand.	No. in Catalogue.	Names and Addresses of Exhibitors.
369	5250	Newall-Cuningham Sheep Shearing Machine Syndicate, Ltd., 73, Cheapside, London, E C. Price 10*l.*
370	5253	Burgon & Ball, La Plata Works, Malin Bridge, Sheffield, Yorkshire. Price 10*l.*

CLASS III.—*Sheep Shearing Machine (other than ordinary Shears), worked by hand or foot.*

369 5251 Newall-Cuningham Sheep Shearing Machine Syndicate, Ltd., 73, Cheapside, London, E.C. Price 15*l.*

The shearing arrangement in each case is a reproduction, on a small scale, of the cutting apparatus in the mowing and reaping machines; the fingers, however, look like a coarse comb, and occupy a length of some three inches only, and the cutters or shears travel in the arc of a circle instead of in a straight line.

In both exhibits there are contrivances for pressing the cutters against the fingers with readily adjustable tension, and the reciprocating lever, which gives the to-and-fro motion, is pivoted on counter cone ball bearings, and has adjustments whereby the pressure is brought evenly over the whole surface of the cutters. Motion is given by a crank, worked on the end of the internal flexible shaft, hereafter described, the crank pin of which moves in a slot formed at right angles to the plane of the fingers in the rear end of the reciprocating lever.

The whole of the cutting apparatus is enclosed in a light metal box fitted with a handle which the operator grasps, and by means of which he guides the implement over the body of the sheep.

The flexible shafts in the two exhibits are of identical construction. They are external and internal. The former are composed of tubes about $\frac{13}{16}$-inch external diameter, and are in three lengths. The first piece, about four feet long, hangs vertically from the driving gear; the second, two feet long, is more or less horizontal; and the third forms the actual shearing apparatus.

The driving power is transmitted through $\frac{3}{8}$-inch diameter steel spindles, which pass down and revolve inside the tubular shafts above mentioned: these, at the two lower joints, are hinged together, so as to be capable of bending from a straight line to an angle of about 60°, and at the same time one of the hinges is made to revolve round the shaft it is attached to, and by that means gives additional mobility. The internal shafts are coupled and connected by peculiarly formed bevel wheels, the teeth of which lock into each other when the shafts are in a straight line, but act as bevel wheels when they are at an angle to each other.

The second length of shaft is connected to the shears by means of a bayonet joint protected by a brass sheath which slides over the outer shaft: the articulations here also are

guarded by means of leather covers. By this means the shears are detached with the greatest ease, and without any loss of time, when they have to be cleaned or when the cutters require to be changed.

Messrs. Newall's driving gear consists of a light spur wheel sliding on a countershaft, and gearing into a vulcanised fibre pinion, which is secured to a light shaft, the opposite end of which is connected to the flexible shaft in the manner already described. The motion of the shaft is stopped or started by sliding the spur wheel out of, or into, gear by means of an ordinary forked lever engaging into a collar groove on the base of the wheel, and retained in its place by an automatic catch, which, however, did not work in a satisfactory manner.

Messrs. Burgon's gear, on the other hand, has a bevel pulley keyed on the countershaft, and drives a conical friction pinion, covered with a special elastic composition, fixed on a vertical spindle which works at the extremity of an upright rocking frame some six inches long, by means of which it can be moved to, and from, contact with the cone pulley by the agency of a starting lever furnished with two hand lines, on the boss of which is formed an inclined plane, which, through a short sliding connecting rod, communicates the rocking motion to the frame, and so presses the pinion against the bevel pulley, and by that means starts or stops the shaft.

The lower and upper horizontal members of the rocking frame carry, in line with the vertical member of the flexible shaft, fixed sockets, the lower one of which is bored taper and is fitted with a taper mandril, on to which the friction cone pulley is secured between the upper and lower members of the frame. The upper end of the internal flexible shaft is connected to this mandril by a bayonet joint, followed a little lower down by a Boyle universal joint. The outer portion of the flexible shaft is connected to the outside of the fixed socket of the frame by means of a brass shield, which is partially split and is clamped on by means of a binding screw, while in the same plane, horizontally with the internal universal joint, is a ball-and-socket joint which enables the vertical shaft to have a considerable lateral movement in all directions, but provision is made to limit this motion and to tend to bring the shaft to the vertical state by means of a $\frac{1}{4}$-inch steel wire spring, the upper end of which is secured to the fixed brass sheath above, while the lower end is twisted round the middle of the vertical shaft.

The speeds of the two machines, i.e. of the internal driving shafts, are as follows:—

Messrs. Newall . . . . . 1,800 revolutions per minute
Messrs. Burgon . . . . . 2,000 „ „

The weights of the shearing apparatus, held two feet above the floor and two feet from the vertical shaft, were—

Messrs. Newall . . . . . 3 lb. 10 oz.
Messrs. Burgon . . . . . 4 lb. 2 oz.

The essential difference—that on which, to all appearances, the success of Messrs. Burgon's and the failure of Messrs. Newall's machine are to be attributed—is that the fingers of the former are ten in number, having four teeth and three spaces to the inch, and the cutter three teeth, $\frac{3}{4}$-inch pitch; while in the latter there were only nine teeth spaced wider apart, namely, only three teeth to the inch in the comb, while there were four teeth in the cutter. This greater coarseness of pitch in the comb made it, naturally, more difficult to avoid cutting the folds of the skin as they appeared on the body of the sheep.

An attempt was made to measure the power absorbed by the shears by means of the dynamometer, but the amount was so small, when driving only one pair of shears, as to be completely masked by the friction of the shafting.

RESULTS OF TRIALS OF SHEEP SHEARING MACHINES.

TIME SHEARING. SHROPSHIRE HOGGETS.

Messrs. Newall's Hand Machine. No. 5251.

Sheep	Min.	sec.	
1st	8	40	
2nd	8	20	
3rd	12	18	inclusive of 1 min. 20 sec. in changing cutter.
4th	11	58	

Average time between sheep 46 seconds. Total time shearing four sheep, up to the commencement of the fifth, 45 minutes 39 seconds. The porter-wheel was driven by a moderately-powerful labourer: he was evidently distressed at the end of the run, and could not have kept up the rate of work much longer.

Messrs. Newall's Power Machine. No. 5250.

Sheep	Min.	sec.	Sheep	Min.	sec.
1st	5	22	6th	8	22
2nd	6	30	7th	7	16
3rd	7	6	8th	7	32
4th	6	48	9th	10	4
5th	6	25	10th	8	22

Average time between sheep 38 seconds, including about a minute lost in securing the clutch handle. Total time shearing ten sheep, up to the commencement of the eleventh, 1 hour 20 minutes 8 seconds.

About the eighth sheep the clutch handle kept coming out of gear, causing

some delay and embarrassment to the shearer; before the tenth sheep was begun the lever had to be secured by means of string. Other portions of the gear worked very well. The operator seemed a good deal distressed at the end of the run.

Messrs. Burgon and Ball's Machine. No. 5253.

Sheep	Min.	sec.	Sheep	Min.	sec.
1st	7	54	6th	5	32
2nd	5	40	7th	5	41
3rd	5	15	8th	6	1
4th	5	8	9th	6	7
5th	5	16	10th	6	17

Average time between sheep 46 seconds. Total time shearing ten sheep, up to the normal commencement of the eleventh, 1 hour 7 minutes 14 seconds.

One finger of the comb broke off about the middle of its length, and was changed after the tenth sheep; the eleventh sheep was commenced, however, 2 minutes 15 seconds after the tenth. No hitch whatever occurred in the working of the machinery, and the operator—quite a young man—did not seem in the least distressed. He worked with either hand. The shears were detached from the shaft after each sheep and washed with a brush, with soft soap and water, and then oiled.

Second Run, with Lincolns.

Messrs. Newall's. No. 5250.

Sheep	Min.	sec.
1st	7	58
2nd	8	7

Before commencing this trial the speed of the cutters was greatly increased, with the view of improving the quality of the work.

Trial stopped on account of the severe cutting of the sheep. Time between first and second sheep, 27 seconds.

Messrs. Burgon and Ball's. No. 5253.

Sheep	Min.	sec.
1st	7	46
2nd	5	30

Time between first and second sheep, 1 minute. During the run with the first sheep some screws in the shears got loose; half a minute was spent in securing them, so that the actual run totals 8 minutes 16 seconds.

The result of the trials was officially announced as follows:—

Class II.—Prize of 20*l.* to Messrs. Burgon and Ball, for their Sheep Shearing Machine, worked by power.

Class III.—Prize not awarded.

The quality of the work done by Messrs. Burgon's implement was all that could be desired; there was but little wounding of the sheep, the cutting was uniformly close, and there was little waste of wool.

With reference to the cost of shearing by machinery it is evident that it can only be economical where large numbers of

sheep have to be dealt with, so that the cost of the power (when not water power) may be spread over several machines working simultaneously. It is also probable that the art of shearing will be more readily acquired with the mechanical shears than in hand work, and the fatigue to the shearer in the former case is less than in the latter.

The apparatus, driven by a small petroleum engine or by a horseworks, would seem to be well adapted for working on hire about the country.

W. Anderson.
Alfred J. Smith.

MISCELLANEOUS IMPLEMENTS EXHIBITED AT CHESTER.

Attention has been drawn to the apparent anomaly of a magnificent Agricultural Exhibition coexistent with agricultural gloom of a most serious character. So far as this report is concerned, however, there is no anomaly to explain. The farmer's necessity is the inventor's opportunity; cause and effect are both in evidence. And yet it is to be feared that, without underrating this year's great display of skilful invention, favourably as it may compare with the advance of any former year, the "New Implement" is still unforged that can convert adversity into prosperity. Collectively, however, modern labour-saving appliances do go some distance in this direction.

This year the "New Implement" exhibits were exceptionally numerous, 127 being entered in the Catalogue as against 114 at Windsor in 1889, and less than 100 at the intervening shows. Several oil engines of good design were entered as "new implements," but, in view of the prizes offered by the Society next year for this class of machinery, it is not thought desirable to specially allude to them on this occasion.

Before considering individual exhibits, it may be well to state that there were several potato-raising implements with great claim to both novelty and merit, and it was with some regret that the Judges recognised the impossibility of carrying out the trials that would have been necessary to do justice to each, within the time at their disposal. It is much to be hoped that an opportunity for such trials may occur at no distant date.

Within the limits of this Report, it will only be possible to

briefly draw attention to those articles that have the chief claim to novelty. Accordingly, the "Silver Medal" awards will be first considered, and afterwards other novelties, following in each case the order of the Catalogue.

Silver Medals.

The Judges (Mr. Mason Cooke and myself), after careful consideration of the claims of the numerous articles entered as New Implements, decided to recommend the award of Silver Medals to the following five exhibits :—

No. in Catalogue.	Exhibitor.	Nature of Implement.
600	Turner & Croker, 38, St. James's Road, Liverpool . .	Improved lift-out gully trap.
1045	George Cotton & Co., Ltd., Willaston, Crewe . . .	Revolving seed sower for clover and rye-grass.
3096	J. H. Duncan, 39, Coleman Street, London, E.C.	Churn manufactured by the Disc Churn Co.
5069	Ransomes, Sims & Jefferies, Ltd., Orwell Works, Ipswich .	Potato planter, new double row, Miles & Arter's patent.
5113	James & Frederick Howard, Britannia Iron Works, Bedford	Straw trusser for working in combination with a threshing machine, with patent automatic straw conveyor.

Article 600. *Messrs. Turner & Croker*, Liverpool. Lift-out Gulley Trap. Price 7*s*., 8*s*., 9*s*. 6*d*., and 10*s*. each.—The sectional drawing (fig. 1) renders very little further description

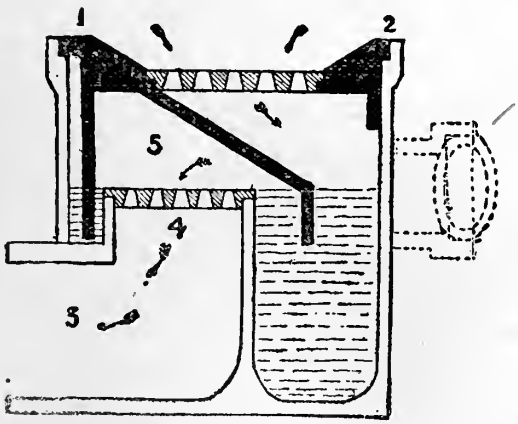


Fig. 1.—Turner & Croker's Lift-out Gulley Trap.

necessary. The upper grating and trap lift out, giving full access to the container and the mouth of pipe, without breaking

either the surface of the ground or the drain. A second smaller grating covers the mouth of the drain and effectually intercepts any floating matter or grease that might otherwise enter. When this is removed the drain can be thoroughly flushed. The container, as compared with most traps, is large and easily cleaned. The depth of seal is from 2 to 3 inches, and the traps are made in four stock sizes, for sinks, stables, &c., square and round, both in earthenware and iron.

Article 1045. *George Cotton & Co., Ltd.*, Willaston, Crewe. Revolving Seed Sower, for clover and rye-grass. Price 7*l.* 7*s.* This sower (fig. 2) is simply a cylinder of tinned sheet steel,

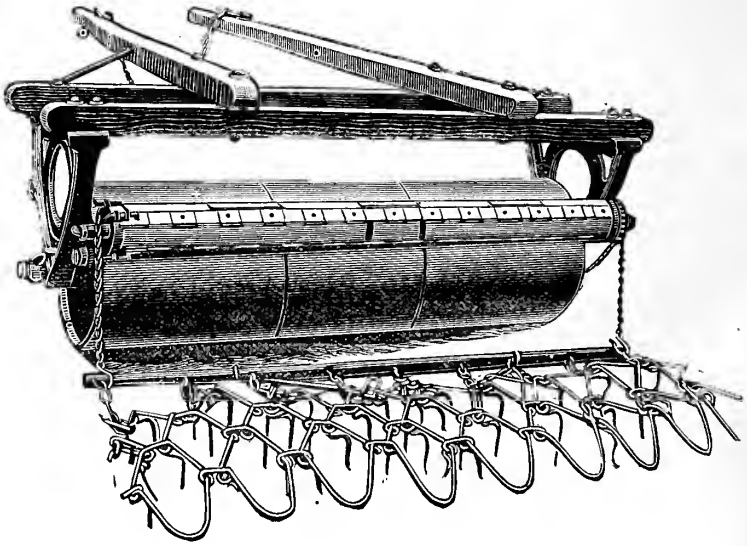


Fig. 2.—Cotton's Revolving Seed Sower.

about 9 inches in diameter, perforated in lines parallel to its length, over which slides—with corresponding perforations—work, opening or closing the holes, to sow more or less seed as required. The regulation is effected by screws on the end of the slides. The cylinder is divided into compartments to prevent the seed working to one end on hilly ground. It is mounted on travelling wheels, and these transmit a slow revolving motion to the cylinder by means of a gear chain. It is also mounted, as shown in the figure, on a Cambridge roller, to which it can be attached either in front or rear.

The sower was tried with rye-grass seed alone, and the distribution was excellent, being very uniform both with a small

and also with a large delivery of seed. This machine is very adaptable, and is capable of broadcasting any kind of corn or of dry material such as basic slag. Its use is further intended for spreading sand or gravel on the wood pavements in towns. Brushes, cups, and the like are entirely dispensed with, and clogging thereby avoided.

Article 3096. *J. H. Duncan*, 39 Coleman Street, London, E.C. New Era "Disc" Churn, price in pine 35*s*., in oak 45*s*.—This churn was certainly one of the chief features of the implement yard. It may fairly be described, in slang phraseology, as an "eye opener." Like the cream-separator, it is very improbable that its purpose would be guessed by anyone who saw it for the first time. In common with many other good machines, its construction and principle of working are alike extremely simple. It consists (fig. 3) of an oblong wooden box, with a circular bottom, in the centre of which a plain wooden disc is mounted on a shaft and revolves vertically. The gearing at the outer end of this shaft is such that 40 revolutions of the handle give about 600 to the disc. The disc belonging to the 8-quart size churn is about 15 inches in diameter, $1\frac{1}{8}$ inch in thickness at the shaft, and bevelled to a knife edge at the circumference, any point upon which thus travels at the rate of 2,350 ft. per minute. The top of the box is open, with the exception of one very important part, viz., the hood or dasher. This is fixed over the disc, and forms, with its hanging sides, what might be described as an inverted trough, about 3 inches wide, in which the circumference of the disc runs. In the construction of this churn it is evident there has been a thorough knowledge beforehand of the material to be dealt with. The disc and the hood are partners who understand their business, and (with the assistance of a man at the handle) they do their work in an incredibly short space of time—in fact "while you wait." The churn is filled with cream to half the depth of the disc, and owing to the natural viscosity of the cream it is picked up by the rapidly revolving disc and discharged with considerable force against the hood. This process continues until the whole volume of

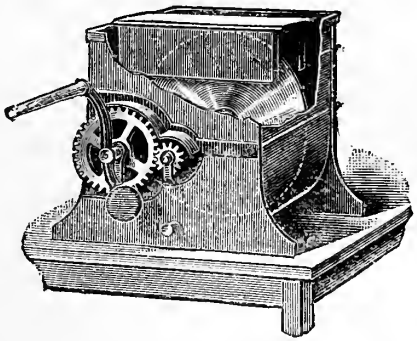


FIG. 3.—The "Disc" Churn.

cream has in turn been sufficiently under treatment to cause the butter granules to form, or "come," but not a moment longer, because the contents of the churn have then lost viscosity, the disc ceases to pick up, and there is very little danger of over-churning, and only sufficient agitation to secure a thorough subsequent washing of the granules, with water added in the usual manner.

The crank handle is holed to give a longer or shorter leverage as required, with a counter-weight to balance the handle.

This churn was tried by the Judges with 15 lb. of rather thick cream at 60° F., the handle being frequently reversed in working. The cream was very thick in $3\frac{1}{2}$ minutes, and butter came in about 4 minutes. Washing was finished and the butter lifted in 17 minutes at a temperature of 58°. Seven and a half lb. of butter with good grain, and free from buttermilk, were made up. The simplicity of construction—especially the circular bottom—makes cleaning an easy process. It is cheap, quick in operation, and washes effectually without beating the butter. Over-churning is almost impossible, as the open top allows observation of the exact stage at which churning has arrived, and for the same reason perfect ventilation throughout the whole process is assured. It is claimed for this churn, that the temperature of the cream may vary between 50° and 80° without seriously affecting either the time of churning or the quality of butter produced.

Article 5069. *Ransome, Sims & Jefferies, Ltd.*, Orwell Works, Ipswich. Double Row Potato Planter (Miles & Arter's Patent), price 20*l.*, pair of ridging bodies 1*l.* 5*s.* extra.—This machine (fig. 4) has already received notice in this Journal both at Doncaster and at Warwick.[1] It is not necessary, therefore, to give a detailed description, but merely to state the improvements that, in the opinion of the Judges, justified the award of a medal within the meaning of their instructions, that "the principle of the improvements must be new." First, then, as formerly constructed, the empaling needle was withdrawn at a point some 28 inches from the ground, and the potato dropped into a spout or guide, the lower end of which was some 9 inches from the ground and 12 inches in front of the dead point of the wheel, and thence to the furrow. It was found that under these conditions the potato had a tendency to roll in the row and cause irregular distribution. This evil has been almost entirely overcome by carrying the potato on the needle to a point some 5 inches from the ground, and 6 inches in front of

[1] See Journal (3rd Series), Vol. II., 1891, p. 531; Vol. III., 1892, p. 547.

the dead point, when the needle is withdrawn and the seed is delivered with no travel on it and without the use of any spout or guide. Secondly, at Warwick, one of the chief objections was the heavy draught, due in a great measure to the continuous friction of the cam which actuated the feed spikes. This also has been greatly reduced by dispensing with the cam, and giving the alternate thrust and pull back to the needles by projecting levers coming in contact with fixed arms at the points of empalement and delivery respectively. The machine is further improved by substituting travelling wheels with solid concave

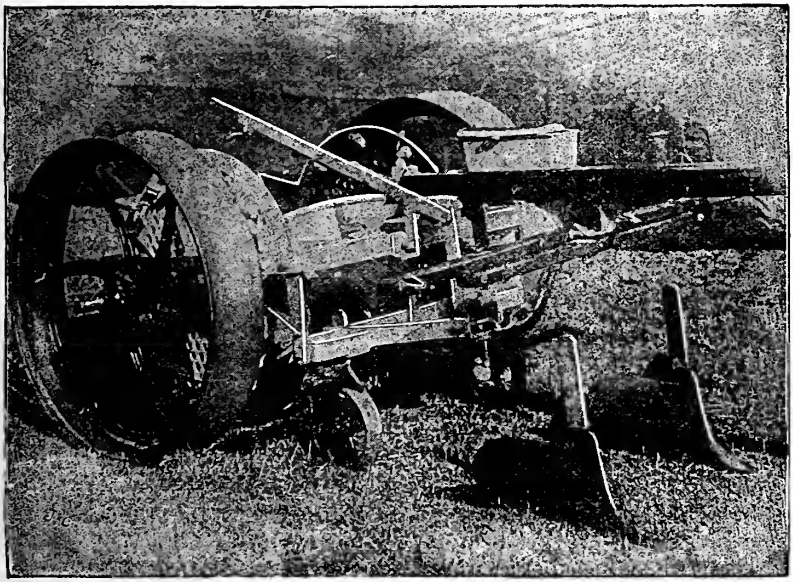


FIG. 4.—Ransome's Double Row Potato Planter.

tyres for the skeleton wheels of last year, as these were found to pick up, and disturb the ridges. Greater width between the discs gives a better and steadier delivery of seed. It will sow either on the ridge or flat, any width from 24 to 30 inches between the rows, and 12, 14 or 16 inches apart in the rows—as ordered—each distance requiring separate discs.

This implement was tried by the Judges at Hoole Farm, sowing 26 inches apart, on the flat, making its own furrows without steerage. With fairly even, seed-size potatoes, the work was very good and misses were very few. With mixed cut and uncut sets it also made fairly regular work, but with

large uneven seed the misses were more frequent. The draught did not appear excessive for a pair of horses.

Article 5113. *James & Frederick Howard*, Britannia Iron Works, Bedford. Straw Trusser, for working in combination with a threshing machine, with patent automatic straw conveyor,

Fig. 5.—Howard's Straw Trusser.

price 52*l.* 10*s.*—In this exhibit (fig. 5) the objectionable travelling canvas to carry the straw is done away with, and four conveyor prongs take its place. To prevent crowding straw on to the back of the needles, during the binding process, these prongs are given an intermittent action. When binding commences, a small cam, fixed on the end of the knotter shaft, revolves with

it, and in doing so lifts one end of a long lever—pivoted near its centre to the frame of the machine. This depresses the opposite end and throws the conveyor prong shaft out of gear till the truss is tied, and the cam has completed a revolution. This brings the depression on its circumference to the position which enables a projection on the above lever to drop into it and so resume its original position, when the conveyors are again free to work. The feature mentioned is important, as it goes far to ensure separation, and without it no binding mechanism is satisfactory. The hanging knotter bracket, instead of sliding on the knotter shaft as formerly, is made in two parts, which together embrace the shaft, and so give less trouble to mount and dismount. A gear lever with one motion puts all the parts out of gear, viz., the conveyor prongs, the packers, and the binding mechanism, and at the same time leaves the chain running. A loose hanging arm takes up the slack string by its own gravity.

This completes the list of awards of Silver Medals.

Other Exhibits.

Article 534. *Joseph G. Rowe*, Denbigh House, Aylesbury. Self Closing Gate, price 1*l.* 5*s.*—This attracted considerable attention, and the novelty was chiefly in the construction of the hanging irons. The upper hook is made of flat iron, about $1 \times \frac{1}{4}$ inch, twisted to a screw on which the eye fits and revolves, rising up the screw in opening, and falling by its own weight in closing, guided by the screw to its original position. It was exhibited at Chester as a bridle gate, and indeed it is a question whether a hook so formed would stand the strain of a field gate and remain in truth for a length of time, as the sectional area would be very small even when new, and rust would be apt to destroy flat iron of this thickness very quickly, whilst an ordinary blacksmith could scarcely renew or repair it. It should be remembered that any gate can be made to close automatically with certainty, and with any degree of force required, by a proper adjustment of *ordinary* hooks and bands, and these should last out two gates, say forty or fifty years. It is unfortunate that very few carpenters understand the simple rules which bring about this result.

Article 678. *Alexander Wood & Sons*, Stockwell Street, Glasgow. "Smithfield" Weighing Machine, for carts, cattle, &c. Weighs up to 3 tons, price 37*l.* 10*s.*—The great convenience of this weighing machine lies in the fact that it is not necessary to remove the cattle pen to enable carts to be weighed. It is only

necessary to fold back the sides against the end gates, when any ordinary loaded cart can pass on to the bridge. If more room is needed, 2 feet can be gained by inclining the end gates outwards, as these are on patent hinges with levers and counterpoise weights under the bridge.

Article 917. *William Hucks & Co.*, 22 Oval Road, James Street, Camden Town, London, N.W. Butter Pat Machine, price 15*l.* 15*s.*—This was a most attractive machine, both in appearance and also in its smooth, rapid working, and fascinated everybody who saw it. All its parts were in perfect proportion and highly finished throughout.

It is an adaptation of the principle of brick-making machinery, but the work it performs with such beautiful precision consists in turning out small pats of butter, not much bigger than a crown piece—such as are usually seen in restaurants and hotels—at the rate of 2,500 pats an hour, the stated capacity of the machine.

Article 1056. *John Perkins & Sons*, Sandford Street Iron

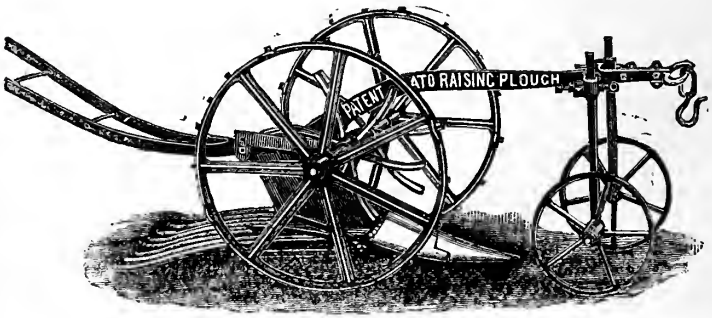


Fig. 6.—Perkins's Potato Raising Plough.

Works, Lichfield, Staffs. Potato Raising Plough, price 6*l.* 10*s.*—This is a simple, serviceable-looking implement, which greatly commended itself to the Judges; the remarks at the beginning of this report may well apply here. The novelty consists (fig. 6) in a row of loose tail-shakers or straight iron rods, hinged in rear of the body of the plough. These trail on the ground, the unevenness of which gives the motion that shakes the soil from the tubers without cutting or bruising them.

Article 1325. *Samuel William Blyth*, Ingatestone, Essex. Hay and Straw Press, "The Giant," price 25*l.*, with weighing machine attached 5*l.* extra, travelling carriage and shafts 4*l.* extra. Total 34*l.*—This is a very powerful and convenient press, fitted with differential chain gear, to give the extra power required when pressing hay or straw for shipment.

Article 1425. *Messer & Thorpe*, 8 Quality Court, Chancery Lane, London, W.C. Fire Extinguishing Apparatus, price 7*l.* 7*s.*—This is a very simple, practical contrivance, founded on the oft-stated fact, that more fires are put out with a bucket of water, year in year out, than by any other means. It is merely an iron tank which can stand anywhere, full of water. In the centre of this tank, immersed in the water, are some 20 buckets, telescoped one inside the other and so occupying very little space. These slide easily into grooves which keep them in place. In case of fire the lid is raised, the top bucket is full, and as fast as this is handed out the next fills, and so on to the last. Probably there have been moments when this appliance would have commanded a good deal of money.

Article 1642. *The Bifurcated Rivet Co., Ltd.*, Warrington. Slotted Clinch Rivet, price 1*s.* to 1*s.* 8*d.* per gross.—These rivets (fig. 7) are made of steel, coppered, and in all sizes

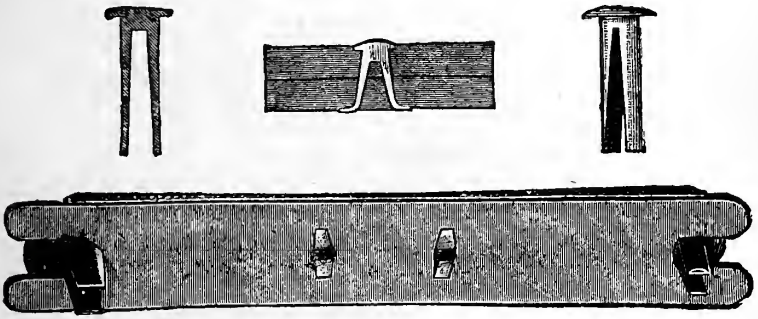


Fig. 7.—Slotted Clinch Rivet.

from $\frac{1}{4}$ inch to $\frac{3}{4}$ inch. They require no punch, no washers, no spreading, and no more skill than is necessary to drive a nail. When these rivets are better known, we ought no longer to see the disgraceful, unsightly, nay dangerous, attempts to repair harness with string, wire, or the first material that comes to hand, a fruitful source of accidents for which there is no longer any excuse. The rivet is simply driven through the leather to be joined, and the ends are clinched outwards. For belting they are especially useful. Machines are supplied, by which quicker and more accurate work can be done, at moderate prices.

Article 2255. *Captain H. S. Tunnard*, Bilton Road, Rugby. Keay's Incubator, price 8*l.*—The temperature is regulated automatically by means of a thermometer of special construction. A platinum wire is fixed in the vacuum end of the instrument,

and penetrates far enough to form contact with the mercury at the temperature it is desired to maintain. The other end of this wire is connected with a small battery and magnet; the latter (when the circuit is complete by reason of the mercury touching the platinum wire) draws down one end of a beam and lifts the damper at the other, which allows the heat from the lamp to escape into the outer air. This seems a more simple and reliable system of regulation than any of its predecessors. The battery only requires recharging at long intervals, and the cost of this is small.

An ingenious laying box was shown on this stand. It is intended to baffle misguided hens who only lay eggs for their own eating. The nest-egg is fastened on to a slightly inclined plane which forms the bottom. A false back leaves enough space for an egg to roll underneath, and behind it, into a division provided for the purpose, and here the new-laid egg finds a sanctuary.

Article 2285. *The "Westmeria" Co.*, Leighton Buzzard, Beds. Storm Proof Lamp, price 5*s*.—This lamp has much to recommend it. The external part consists of about 8 strips of ordinary window-glass, which slip easily into the tin framework. These are readily renewed when broken; there is no chimney to break. The lamp itself burns petroleum with a $\frac{3}{8}$-inch wick, and the burner spreads a flame 1 inch wide, consuming very little oil. By swinging it round rapidly at arm's length it is impossible to put it out, and probably it might be swung at the end of a rope with equal impunity. The value of such a lamp as this is recalled by experience of stormy nights on the coast of Northumberland, when "looking round" to see what damage was done, stacks blown over, &c. This was often a difficult matter in the dark, for it involved scrambling over the gates when the wind was too strong to allow of their being opened.

Article 2526. *Strawsons, Ltd.*, 77, Queen Victoria Street, London, E.C. Potato Sprayer, price 20*l*.—This machine (fig. 8) is capable of distributing fungicide on seven rows of potatoes at once, and can be adjusted to suit any width of drill up to 30 inches, making a total width of $17\frac{1}{2}$ feet over all. A light framework in rear of the barrel carries the horizontal tube which supplies the hanging spraying nozzles, and these are capable of either vertical or lateral adjustment.

Article 2577. *East Yorkshire Cart and Waggon Co., Ltd.*, Beverley, Yorks. Manure and Turnip Drill, price 25*l*.—This drill is specially constructed to deal with damp artificials. At the bottom of the manure hopper is placed the reciprocating feeding slide, to which a slow motion is given; this feeder puts the manure in contact with the distributor and keeps it constantly

fed. The distributor consists of skeleton sheaves into which a series of movable cups are inserted. This revolves underneath the feeder, the manure falls into the cups, and these in revolution pass under a hinged door held in place by a spring. This door scrapes the face of the distributor sheave as it revolves, and after each section has passed this door it is opened with its bottom flush with the face of the distributor sheave, and while in this position it passes over a steel scraper which cleans each cup in succession. This drill was tried in the timber-yard, first with damp soil, and afterwards with damp superphosphate. Both the cups and the reciprocating feed slide worked clean. On the bare ground each separate cupful could be clearly distinguished, the intervals being a few inches in length. With such materials it was not to be expected that an even stream could be delivered,

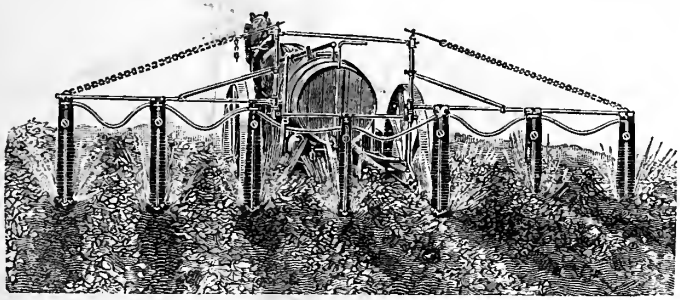


Fig. 8.—Strawson's Potato Sprayer.

and to work, as this drill did, without clogging, the Judges considered highly creditable.

Article 2930. *T. A. Wynne Edwards*, The Foundry, Denbigh. Hay Press, Woodville's Patent Double Rack, price 16*l.*—This (fig. 9) is a compact, strong, handy press, at a moderate price, and goes far to meet a growing demand for machines of this description. It is mounted on three wheels for transport, and can be drawn by hand to any part of the yard as required. The wheels are not removed when the machine is at work. It is only necessary to rear it up, as shown in the figure, over the hind wheels, and it stands on these and the two front legs, which are bolted to the frame. No chains are used in connection with the pressure, and springs are entirely avoided so far as the working is concerned.

Article 3222. *R. A. Lister & Co., Ltd.*, Victoria Iron Works, Dursley. The Patent "Lister-Babcock" Milk Tester, price 2*l.* 5*s.*—This was noticed at some length last year,[1]

[1] *Miscellaneous Implements Exhibited at Warwick.* Journal (3rd Series), Vol. III., part III., 1892, p. 543.

and therefore it is not necessary to describe it again, as the general structure and principle of working are the same. The wire cradles in which the test tubes are placed, instead of being fixed as formerly, are now hinged at the top and free to swing from the centre outwards till they assume a more or less horizontal position, in obedience to the centrifugal force imparted to them. This machine was tried in the dairy, and the manipulation did not appear to be difficult. The results were clear and easy to read, and by reference to a printed table the percentage of butter-fat obtainable by the churn, and by analysis respectively, also the solids not fat and the total solids, were seen at a glance,

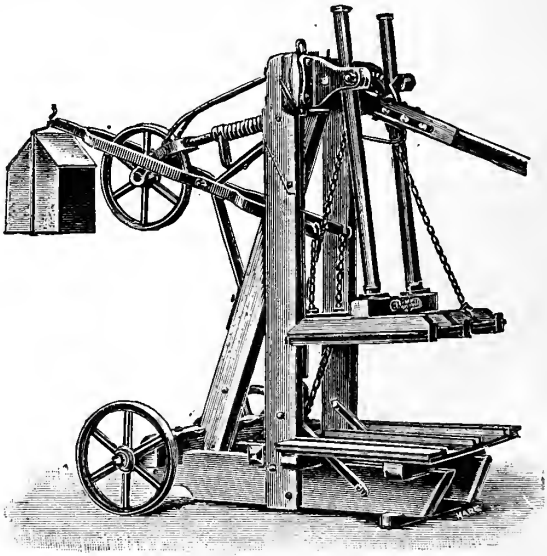


FIG. 9.—Wynne Edwards's Hay Press.

and possible errors of calculation thereby prevented. This certainly is the nearest approach to a milk-tester for farm purposes that we have yet seen, not only in simplicity but also in price.

It is a question, perhaps, whether the nicety required for the accurate use of such appliances as this *ought* to constitute an argument against their introduction to the farmhouse. It might be urged with some force that nicety in one direction will tend to carry with it an appreciation of nicety in other directions, a result much to be desired in all dairy operations. This department, however, might well be delegated to an intelligent grown-up daughter, when available, especially if she has attended a dairy school, as likely to obtain more reliable

results than the clumsy fingers of the "lords of creation," as represented by the farmer himself.

Article 4033. *Massey-Harris Co., Ltd.*, 54 and 55, Bunhill Row, London, E.C. Cultivator, price, 12*l.* 12*s.*—This is perhaps a misnomer as the implement is generally understood in this country, though what it should be called is not so easy to say. Perhaps a grub harrow is nearest of kin in operation, but in personal appearance the family likeness is not striking; I could more easily understand an "outsider" mistaking it for a horse rake. Anyhow, it is a decided innovation, and, call it what one will, there is no question that it is capable of very useful work on fallows, especially after the first furrow, and on light land it would probably answer the purpose of a cultivator.

This machine (fig. 10) is of excellent construction, com-

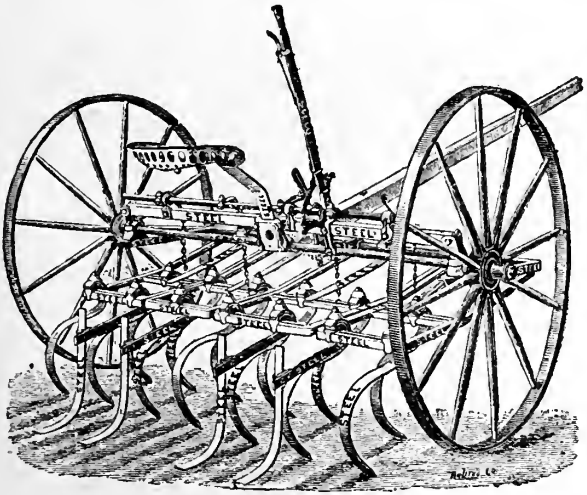


FIG. 10.—The Massey-Harris Co.'s Cultivator.

bining great strength and lightness. The peculiarity consists in the oil-tempered curved-spring tines. These are in two ranks, six in front and seven in rear, carried on four solid angle steel sections, each section hinged to a solid angle steel frame in front of the axle. There are no bolted corners in either the main frame or the sections; they are all forged from solid steel angles. The tines can be readily and strongly adjusted to any rake required, to allow for wear or varied conditions of work. Pressure is applied to each section independently, by means of four powerful flat springs. All of the sections are raised out of work, or lowered by a lever within

reach of the driver's seat. An adjustable shoe on each section, in rear of the teeth, controls the depth of work. The horses are yoked to a pole and the implement is mounted on a pair of high wheels. The width of work is 5 ft. 9 in., and a pair of horses work it without difficulty, sufficient proof perhaps to a strong land farmer that this is not exactly what he is accustomed to call a cultivator. Nevertheless, when set to work on land of medium strength, from which vetches had been cut for the Royal Showyard, it covered a great breadth in a very short time. The first stroke was about 3 inches and the second about 4. The roots were strong and there was a tendency to choke, whilst some tough thistles were missed. Unfortunately, there was not any more suitable land available. The spring tines seemed very strong and had great penetrating power. The recoil of the spring also would be likely to tatter the dirt and bring it to the surface in a very effectual manner. Probably this tool would be found useful to break up turnip land fed off by sheep in preparation for barley. We also allowed it to "try its strength" on a hard baked headland, roaded by manure carts. This, again, it showed no disposition to shirk, and in three strokes made a very respectable tilth about 2 inches deep, without straining the teeth.

Article 4034. Shoe Seed Drill, on the same stand. Price 25*l.*—This, like the last implement, is of excellent construction and workmanship throughout. It takes its name from the peculiar shape of the coulters. These are reversible, and appear well adapted to work clean, at a regular depth, with a light draught. The depth of sowing is regulated by spiral springs and a split key. Corn is delivered by a force feed.

Article 4203. *James Holt*, Dunham Massey, Altrincham, Chester. Potato Digger, price 16*l.*—This is a machine (fig. 11) that requires to be seen at work. It is of very novel construction, and the idea seems a good one. Instead of the single large pronged wheel rotating in rear and across the furrow, a common type of which the First Prize machine at the Newcastle Trials of 1887 is a good example, we have in this case three smaller sets of rotating prongs. Two are close in rear of the share, or shovel, inclined at a slight angle to the ground, and this pair both rotate inwards, receiving the lifted soil between them, conveying, and at the same time disintegrating it, rearwards, and to one side, shaking the potatoes clear of soil in doing so. This process is completed by the third set of prongs, rotating in the same direction and in rear of the first pair. The speed of the prongs is about 4 to 1 of the travel of the implement. It seems probable that the action of this machine would be less

likely to bruise and injure the potatoes than the heavy cross blow struck by the diggers that have lately held the field, and, as the cross strain is dispensed with, the weight should be correspondingly reduced.

Article 4236. *The Stockton Heath Forge Co.*, Warrington.—Spades, Shovels, and Hand Tools were here exhibited in great variety and of excellent pattern and manufacture. These tools are forged throughout from solid steel, with no cofer, no wedgewood, and no rivets in the blade. The sheet-steel shovels were marvellously cheap and good. Anyone who can appreciate the value of good hand tools would admit that this stand was well worth a visit.

Article 4323. *Blackstone & Co., Ltd.*, Stamford, Lincolnshire. Horse Rake, price 12*l.* 12*s.*—On this rake the tines can be instantly adjusted for collecting and also for close raking. In

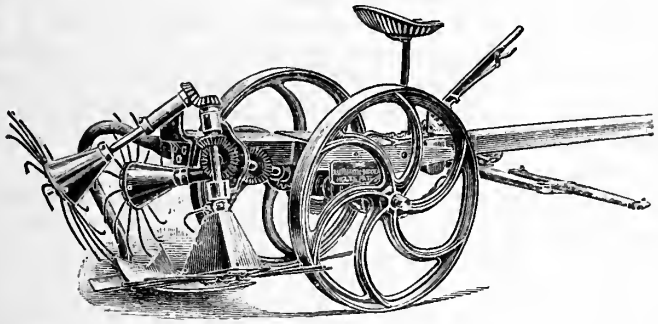


Fig. 11.—Holt's Potato Digger.

the former case they form a double rank with a space of a few inches between the ranks. In the latter case they all come into line. We tried this rake with some loose straw in the fodder yard, with the tines set in double rank for collecting. There appeared to be a tendency to bind on the tines, consequent, probably, on the same straw being held by both rows of tines at the same time. This prevented the straw from running freely up the tines, and the rake did not carry a full load. When this is the case, stones, clods, sticks, &c., instead of passing freely through the tines, are carried or driven with the load, to the injury of the sample of hay, and perhaps the chaff-cutter knives. If this tendency occurs with dry straw, it is probable that the least *rawness* would increase the evil. At the same time it must be admitted that in this instance, the sweep of the tines, and especially their inclination to the ground, were not those best adapted to free raking.

Article 4404. *Thomas Cooper*, Ryburgh, Fakenham, Norfolk. Steam Digger, price 750*l.*—The digger is combined with a 12-horse triple expansion engine, mounted on a pair of wheels, with a lead roller wheel in front; weight 8 tons 5 cwt. It is stated to be capable of digging 10 acres a day, using 1 cwt. of coal per acre, and of cultivating 4 to 7 inches deep at a cost of 3*s.* per acre. Width on the road 9 feet, and at work 12 feet.

This digger has been improved in many important details. Amongst others an elliptical travel is given to the forks, 17 inches in horizontal length, 14 inches of which are effective. Also, the right angle end guards on the bearings of the digging cranks prevent dust and dirt from entering the journals and clogging them, and ensure efficient lubrication, thus overcoming what had previously been a serious difficulty. The depth of work is regulated by the length of the renewable points on the forks, but for a depth of more than 7 inches heavier longer forks are provided. The controlling levers are all very effective and well-placed. On level land of fair depth, with a porous subsoil—or at any rate without shallow drains—this implement would probably do excellent work, and no doubt there is full scope for its use under these conditions. Under the reverse conditions, however, the width of work must cause an uneven depth of cultivation, resulting in bringing subsoil to the surface to an undesirable extent, and in the case of any other than deep drains the risk of injury from displacement, owing to the weight of the implement, must be considerable.

The special feature of the machine is that in the engine working it we have the first application of triple expansion to this class of engine. The three cylinders are placed side by side over the smoke box end of the boilers, and the slide valve on each is worked by a single eccentric set to cut off at the same point of the stroke in each cylinder. For starting, live steam can be admitted to the intermediate and low pressure cylinders, or the pipes to which automatic regulating valves are fixed to control the pressure in these cylinders. The customary fly-wheel is dispensed with, as it is claimed that the running of the engine is sufficiently uniform without it. The further development of this engine will naturally be watched with interest. In its design and arrangement it showed much evidence of care and thought. At the same time, it would not be fair to express a decided opinion thereon until some, at least, of the details are more fully worked out.

Article 4573. *Woodroffe & Co.*, Albion Iron Works, Rugeley, Staffs. Knife-holder, price 9*s.* 6*d.*—A handy device for holding the knives of reapers and mowers for sharpening. It can be

readily and firmly attached to a gate, a fence, or the pole of the machine. A portion of the holder serves as a convenient anvil for riveting sections. The importance of sharp knives is not quite sufficiently appreciated by the rising generation, and it is common to see them in a quite disgraceful condition, but their fathers would know that the "strongest man in the world" cannot drive a blunt scythe very far, while even a weak man can swing a sharp one from daylight till dark. Sharp knives reduce friction in every part of the machine and save horseflesh. A good knife-holder, therefore, goes a long way to secure good sharpening, and with it these important results.

Article 5006. *W. N. Nicholson & Sons, Ltd.*, Trent Iron Works, Newark-on-Trent. Hay Kicker. The "Switchback Hay-turner and Tedder," price 15*l.*—This machine goes far to justify the claim of the exhibitor, viz., that it gives the same motion to the forks as the human wrist and arm. In addition to the straight backward kick, a rotary motion is given to the fork when near the limit of its throw back, causing it to *turn* the hay. The amount of turn can be regulated at pleasure, or it can be set to "kick straight" if required. To remedy the tendency to dig into the ground when working on ridge and furrow, the shank of each fork is free to lift vertically 4 inches in its socket on meeting with an obstacle, dropping into its normal position again by its own weight and without the aid of any spring. The fork itself, also, by means of a very ingenious universal joint attaching it to the shank, has sufficient freedom to yield in any direction and avert breakage.

Article 5070. *Ransomes, Sims, & Jefferies, Ltd.*, The Orwell Works, Ipswich. Potato Digger, price 17*l.* 10*s.*, if with ordinary screen, 15*l.*—This machine (fig. 12) is similar in principle to that shown at Warwick last year,[1] with the addition of a novel rotary net screen. This, again, is one of the potato raising appliances it would be interesting to try. The screen catches the potatoes and the rotary motion tends to shake them clear of earth, &c., and drops them in a line for collecting. This it is well calculated to do, as the somewhat loose string net would immediately cancel the force of delivery from the prongs. Neither can there be any danger of bruising or rebound. It is also lighter than the hanging wooden screen it supersedes.

The *Lactoserin Co., Ltd.*, Stockholm, Sweden, exhibited an interesting apparatus (not in the Catalogue) for use in factories, the object being to reduce the solids in whey and skim-milk to dry cakes, so forming a marketable product with great keeping properties, suitable for a great variety of purposes as a food for

[1] Journal, 3rd Series, Vol. III., 1892, p. 548.

human beings when mixed with cocoa or coffee, or for stock when mixed with other materials. This exhibit arrived too late to permit of its being seen in operation, but, as far as we could judge of the construction, it appeared well adapted for its work. The skim-milk and whey—in the proportion of one of the former to two of the latter—are together boiled in the container, which is steam-jacketed for the purpose. An exhaust carries off all superfluous moisture, the residual curd is passed through

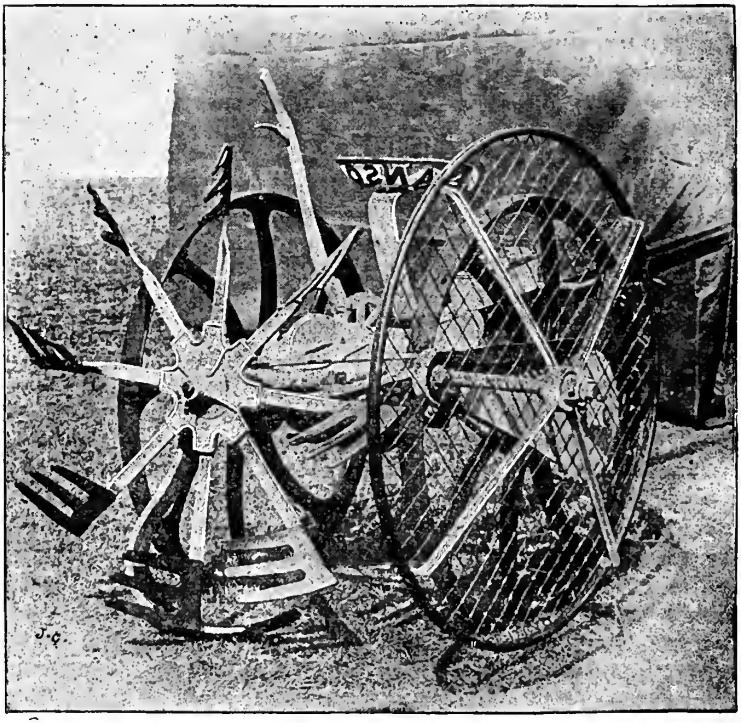


FIG. 12.—Ransome's Potato Digger.

a curd-crusher, and finally is pressed and cut into cakes, and these are dried in an oven. We were informed that 100 lb. of skim-milk and whey, in the above proportions, give 7½ lb. of dry cakes.

Article 2134. *R. & J. Garton*, Newton-le-Willows, Lancashire. "Specimen Ears, Grain, &c., showing the results of 13 years' experiments in the improvement of the cereals." This was a most interesting exhibit, and though it scarcely comes within the scope of an implement report, it would be a matter of regret if it remained unnoticed. Messrs. Garton, at their experimental grounds, Newton-le-Willows, Lancashire, have for the last 13

years conducted experiments in the improvement of cereals, by crossing the indigenous and cultivated varieties of wheat, barley, and oats respectively, from all quarters of the globe, in such a manner as to develop the best features in each, whilst eliminating undesirable characteristics. The microscope plays an important part in their investigations. I understand that a visit to the experimental plots at Newton-le-Willows has been made since the Chester Meeting by the Consulting Botanist of the Society, and I therefore leave in his more competent hands any detailed account of Messrs. Garton's experiments.

In closing this report we wish to express our sincere thanks to the exhibitors, who were all most civil and obliging; to the gentlemen who placed land at our disposal for trials of implements; and to the Stewards of Implements, who, with the Society's Engineers, rendered us most kind and efficient assistance.

JAS. EDWARDS.

TYPICAL FARMS IN CHESHIRE AND NORTH WALES.

FOR a number of years prior to 1870 reports were annually published in the Journal on the agriculture of the different counties of England and Wales. In the year named a system of Farm Prize Competitions was established by the Society, the competition in each year being confined to the district in which the Society's Show was held. The earlier essays were much valued in their day, for the Farm Prize system stimulated agricultural progress, and, through the reports upon the successful farms in the Society's Journal, brought under the prominent notice of the agricultural world the most approved systems of husbandry and stock management throughout the country, to the general advantage of the agricultural community. A period of twenty-two years of Farm Prize Competitions has enabled the Society to award premiums throughout the whole country, and the Council recently determined to discontinue the system, and to institute a new method by appointing a Commissioner to inspect and report in the Journal upon certain selected farms, typical of the varying systems of agriculture within the district in which the Country Meeting of the Society should be held. How far this experiment may prove useful remains to be seen, but the regulations imposed clearly defined that the inspection was not to be looked upon in the light of a competition, and that comparisons were not to be indulged in which would extol or condemn the prevailing systems of one occupier in relation to those of another.

The farms selected on the present occasion are situated in North Wales and in the county of Chester. They may be divided into the following classes:—

I. Holdings in mountainous districts (two in number).

II. Small holdings (two).

III. Farms devoted principally to the manufacture of dairy produce (eight).

IV. Farms upon which the breeding, feeding, and management of stock and the raising of crops are the essential features (two).

V. Dairy, stock, and crop farm (one).

A complete list of the occupations visited is given on the opposite page.

The inspection was made from the 5th to the 10th of June, 1893, inclusive, but, the season being one of exceptional drought, the farms were not seen to the best advantage.

I. No special feature of interest or information is forthcoming from the management of the mountain farms, as will be seen from a perusal of the system of husbandry pursued. The occupiers rely on the resources of their land and on their own industry for successful results. Most of the crops are consumed on the farms, and but little extraneous assistance is given by the purchase of foods or fertilisers. The rent is dependent upon the sales of live stock and of dairy produce.

II. The two small holdings exemplify different systems of management, the farm of Mr. Burrows showing the amount of production that can be attained by the intensive system of cultivation pursued, and that of Mr. Edwards the effect of practical economical management.

III. The management of dairy herds, the process of cheese-making, and the customs and agreements with respect to the tenure of land so far resemble one another on the various dairy farms visited in Cheshire, that they will, to avoid needless repetition, be best described generally, instead of in detail in connection with each holding. The admirable pamphlet by Mr. Joseph Rigby on the practice of Cheshire cheese-making,[1] issued under the authority of the Dairy Committee of the Royal Agricultural Society of England, fully describes the whole of the details, but as these particulars may not be available to readers, I will briefly recapitulate in his own words the methods of cheese-making which were more or less closely followed on the occupations at the period when they were visited this year. These are respectively styled, "the Early" and "the Medium" ripening processes.

[1] *The Practice of Cheshire Cheese Making.* By Joseph Rigby. Published at the Society's House, 12 Hanover Square, London, W. Price 2*d.*

Nature of Holding	Name of Occupier	Address	Name of Owner	Acreage of Farm								
				Arable			Grass			Total		
				a.	r.	p.	a.	r.	p.	a.	r.	p.
I. Mountainous	1. THOS. JONES	Plymog, Llanferris, Denbighshire	Algernon Potts, Esq.	62	0	0	44	0	0	106	0	0
							Mountain			56	0	0
	2. D. ROBERTS	Fron, Mold, Flintshire	— D'Arcy, Esq.	59	0	0	54	0	0	113	0	0
II. Small holdings	3. — BURROWS	Whitegate, Cuddington	Lord Delamere	18	0	0	54	0	0	18	0	0
	4. S. EDWARDS	Norbury, near Wrenbury, Cheshire	The Marquis of Cholmondeley	20	3	38	4	0	0	24	3	38
III. Dairy	5. J. ANKERS	Cholmondeley, Malpas, Cheshire	"	55	0	0	188	0	0	243	0	0
	6. JOS. ASTON	Brassey Green, Tarporley, Cheshire	J. Aston		—		208	2	0	219	0	0
			Lord Tollemache		—		10	2	0			
	7. D. BYRD & SON	Spurstow Hall, Tarporley, Cheshire	Lord Crewe, Lord A. Paget	57	0	0	302	0	0	359	0	0
	8. W. COOKSON	Alpraham Hall, Tarporley, Cheshire	Lord Tollemache	108	0	0	108	0	0	216	0	0
	9. R. FEARNALL	The Lea Farm, Aldford, near Chester	Duke of Westminster		—		352	3	29	352	3	29
	10. JOHN LEA	Stapleford Hall, Tarvin, Chester	Col. France-Hayhurst, Bostick Hall, Middlewich	110	1	39	180	3	1	291	1	0
	11. T. PARTON	Weston Hall, near Crewe, Cheshire	Sir Henry Delves Broughton, Bart.	284	0	0	316	0	0	600	0	0
	12. R. P. WALLEY	Cotton Abbotts, near Chester	Duke of Westminster		—		282	2	0	282	2	0
IV. Stock and crop farms	13. G. J. ROBERTS	Trefarthen, Llanfair P. G., Anglesey	Assheton Smith, Esq.	102	0	0	218	2	26	320	2	26
	14. J. ROBERTS	Well House, Saltney, near Chester, Flintshire	The Trustees of the late W. H. Gladstone, Esq., M.P.	422	0	0	209	0	0	631	0	0
			S. K. Mainwaring, Esq.		—			—		197	0	0
V. Dairy stock and crop farm	15. JOHN SMITH	Sudlow Farm, Knutsford, Cheshire	Lord De Tabley	132	0	0	78	0	0	210	0	0

The Early Ripening Process.

The night's milk is sieved into the vat in the dairy, and left until morning; the cream is then skimmed off, and the morning's milk sieved into the vat, with the cream slightly warmed; the heat of the whole is then raised to 78° or 80° F., and sour whey is added in the proportion of one quart to thirty gallons of milk, to promote the formation of the necessary acidity in the curd. Rennet is then added, and the curd should be ready to be cut in an hour; the quantity used is larger by 50 per cent. on this process of making than on the other systems; when it is ready the curd will break clean over the finger without adhering when dipped into it and raised sideways. The knives or cutters are then used and the curd is carefully cut, the operation ceasing when the pieces are the size of beans; it is then allowed to settle, and the whey remains on until there is a decided development of acidity. The curd is then gathered to one end of the vat and the whey drawn; then it remains for a short time on the bottom of the vat to drain; it is then salted, in the proportion of one quart of salt to 50 lb. of curd, and filled into moulds (into which a cheese cloth has been laid), in moderate-sized pieces, without grinding. After standing twenty-four hours the cheese is turned into another hoop; a clean dry cloth is used; it is turned again the following morning, and put under light pressure, and pressed for two or three days, being turned each morning, and a clean dry cloth used. The cheese is then taken from under press whether the drainage has ceased or not, a thin calico binder is pasted round it, and it is removed to the ripening room. For the first week it is turned every day, then every other day, and at the end of three or four weeks it should be ready for sale.

The Medium Ripening Process.

The practice usually adopted is to sieve the night's milk into the vat and to cool it down (if necessary), so that it will be at a temperature of 66° to 70° F. in the morning; this is regulated by the season of the year, the temperature of the dairy, and the quantity of the milk. Next morning the cream is skimmed off, the morning's milk is added, and the cream, slightly warmed, passed through the sieve with it, and the temperature of the whole is raised to 86° or 88° F. by turning the steam under the vat. If coloured cheese is being made, the annatto is run in at this stage and well mixed with the milk; the rennet is next added and another stirring given, and in an hour it should be ready to cut, being at that time elastic enough to break clean over the finger without adhering when placed in it and raised sideways. The top of the curd, which may have a thin film of cream on it, is then turned over with a skimmer, and the breaking down proceeds with the curd knives or breaker until the pieces are the size of an Indian corn.

This takes from thirty-five to forty minutes, and should be carefully carried out. Good work is known by the whey coming off green and clear, while indifferent work is known by white-looking milky whey. The temperature is then raised to 92° or 94° F., the mass being kept well stirred until it is thoroughly and uniformly heated; then the curd is allowed to settle to the bottom of the vat, and the whey is left on, until there is a slight development of acidity, tested by the sense of smell or by the acid reaction on blue litmus paper. The curd is then gathered to one end of the vat and the whey drawn; two pieces of the draining racks are now put on the bottom of the vat and covered with cheese cloths, the curd is cut into cubical-shaped pieces of 5 in. × 5 in. and lifted on them, cut again, and turned over several times for two or three hours, when it is ready to grind;

then it is passed through the curd mill, the salt well mixed and filled into the hoops in the interior of which a cloth has been placed; and it is then carried to the press-house and placed in the cheese oven, where it is kept warm to promote drainage. At night it is turned into a clean dry cloth and put back in the oven; next morning it is again turned and put under press, where it remains four or five days, or until dry, being turned each morning into a dry cloth. When taken from under press a calico binder is pasted on it, and it is carried away to the curing room. Each end is rubbed twice with soft grease like the fat of bacon, or oiled with linseed-oil twice to prevent the rind cracking, after which it is turned daily for the first few days, then every other day for a month, then twice a week for the ensuing month, when it should be ready for sale.

General Management of Dairy Herds in Cheshire.

The milking cows are usually housed at night from the early half of October onwards. As a rule, they run in the daytime on the pastures until Christmas, and are then kept in the byres altogether until about the first week in May, when they leave the stalls, and are depastured on the grass land till the following October. They are fed according to the position they occupy relative to immediate profit. The cows are dried six weeks or two months prior to calving, and at this stage are kept on straw with a few roots. After calving, their diet is more generous, and they have, in addition, hay which is frequently chaffed, and mixed corn, and linseed or cotton cake, varying from 3 to 6 or 7 lb. per day, in accordance with the views of the owner. Oats, bran, thirds flour, and Indian meal are more or less used, according as they are respectively considered best and most economical. The herd is timed to commence calving in November, but the larger proportion of calves are designedly dropped in the early spring, viz., in February and March. The allowance of corn and cake is continued after the cows are turned out, varying according to the abundance or scarcity of keep, and the nature of the season. In the autumn, and at the commencement of winter, as already stated, it is sometimes discontinued for a period. The practice varies with regard to the disposal of the surplus cows annually removed from the herd to make room for the incoming heifers. Some farmers sell them as stores, others fatten them for the butcher. Rejection is based first on deficiencies, and then on age. Cows are considered at their best after the birth of the third calf, and they are not often kept over six years old.

The calves are usually sold within a few days of birth at whatever price they will realise—this season the low figure of, say, an average of 15*s.* each—the milk being of more value for disposal otherwise than in feeding the calf. The heifer

calves which are selected to fill up the herd suck their mothers for about a fortnight; they are then taken on hand, and fed on scalded whey or skim-milk, and linseed or oatmeal. In due course they are turned out on the pastures, the meal and cake or thirds flour being continued until they come into the yards in the fall of the year. Liberal treatment continues throughout the winter, and from the following May, when they are turned out, they in some cases receive 2 lb. of meal and cake per day, and in others depend on the natural pastures until they calve. The heifers are put to the bull at from 15 to 18 months old, and calve down at the age of two years to two years and three months.

IV. & V. We proceed to notice the customs and agreements that apply more or less to the remaining farms visited in Cheshire.

Customs and Covenants in Cheshire.

The customary tenure is an annual one with six months' notice, to terminate at Candlemas Day. The incomer sometimes has right of pre-entry on the meadows and tillage land on Christmas Day, and the offgoer retains possession of the house and buildings and a boozy [1] pasture (set aside by the landlord) till the 1st of May. The outgoing tenant is entitled to way-going crop of wheat, viz., one half if after green crops, and two-thirds if after bare fallow. He is allowed the cost of seeds sown in the last year of his tenancy, provided they have not been depastured after October. The manure falls in to the landlord at the expiration of the tenancy, and the unconsumed hay, straw, and roots after the 1st of May would also become his property, but two-thirds of the value is allowed for the hay and straw. The recommendations of the Cheshire Chamber of Agriculture adopted in the year 1884 have to some extent modified these customs with regard to outgoing allowances, and, if they have not the full force of custom, they have since been more or less embodied in agreements, and would also receive recognition under the Agricultural Holdings Act. They were as follows:—

Landlords should be reimbursed by outgoing tenants—

(*a*) For failure to keep house and premises in tenantable repair;
(*b*) For failure to maintain gates, fences, and watercourses in proper order;
(*c*) For damage for breaking up excess of pastures or for exhaustive cropping—

the full valuation of such repairs or damage.

[1] A well-known term, applied to a pasture for stock which are kept till May to consume hay, straw, and roots after the land is relinquished. A "boozy" is a manger, hence the expression.

Tenants should be paid by landlord or incomer according to the following sliding scales of allowances for durable improvements and expenditure in manures and feeding-stuffs:—

(*a*) For outlay on bone manure applied to pastures, on eight years' scale.

(*b*) For outlay on bone superphosphate applied to pastures, on four years' scale.

(*c*) For outlay on bones, raw or dissolved, or purchased animal or mineral manures applied to clovers and meadows mown once, on two years' scale. Mown twice, nil.

(*d*) For outlay on cake fed on pastures, on four years' scale.

(*e*) For outlay on draining (whole cost by tenant), on twelve years' scale.

(*f*) For outlay on eradicating hedges, filling up pits, &c., on fifteen years' scale.

(*g*) For outlay on erecting new buildings (whole cost by tenant), on twenty years' scale.

(*h*) For manure left at end of tenancy, and for hay and straw unconsumed, two-thirds their market value.

Agreements.

A recognition of sale of any produce under certain conditions is being made in some agreements, but most of them are more or less restricted, and some are antiquated. They penalise for breaches of covenant in breaking up old permanent pastures or clover roots after notice has passed on either side; for deviating from fixed rotations of cropping; for growing more than stated areas of particular crops, potatoes for instance; and for disposal of hay, straw, roots, &c. In some instances sliding-scale allowances for compensation for unexhausted value of fertilisers and improvements to out-going tenants at the expiration of the tenancy have been introduced; in others this has not been done, and claims would require to be made under the Agricultural Holdings Act. These agreements were more honoured in the breach than in the observance. The tenants cultivated as they pleased, and sold what produce they thought proper; and, as long as the farms were satisfactorily managed, they apprehended no admonition or interference.

Descriptions of the Inspected Farms.

1. *The Farm of* Mr. Thomas Jones, *Plymog, Llanferris, Denbighshire.*

Plymog Farm is situated in the parish of Llanferris, Denbighshire, on the main road half-way between Mold and Ruthin, and in the valley of the Alyn which runs through the centre of the farm. It extends a short distance along the bottom of the narrow vale, spreading upwards on either side on the rapidly rising land, and surmounting the steep hill on the north behind the house. This hill, occupying an area of 56 acres, is mountain

land, divided from the farm by wire fencing, to prevent the encroachments of rabbits, and is underlet to a sporting tenant. The valley lies some 700 feet above the sea level, the hills on either side rising to 1,000 feet. The bottom land is alluvial drift, and is principally permanent pasture. The remainder of the farm is of a light nature, the soil varying from 5 to 6 inches deep, and being underlaid chiefly by argillaceous deposits, and in some places by limestone. It rests on the Upper Silurian formation.

The house and buildings are built of local stone, and are sufficient for the holding. There is stabling for 7 horses, 23 cows, and 12 calves, with yard, cart-sheds, and pig-styes. There is also a small water-mill worked by a stream from the mountain side, which is used for grinding wheat and other home-grown cereals. The dairy, which is within the house, is old-fashioned both in construction and in appliances. The garden and orchard adjoin the house. This farm has been rented since Lady-day, 1888, by Mr. Jones from Algernon Potts, Esq., on an annual tenancy, at a rental of nearly 130*l.*, but a temporary reduction of 10 per cent. has been allowed on the last half-year's rent. The former tenant is said to have paid 160*l.* for the same holding. Excluding the mountain land, the farm contains 106 acres, which, on the date of inspection (June 9), was cropped as follows:—

18 acres of oats.	28 acres first and second year's clover.
5 acres of barley.	44 acres meadow and pasture.
11 acres of swedes.	

Mr. Jones is unrestricted as to cultivation and sale of produce; but he consumes the whole of the hay, straw, and cereals grown upon the farm.

The course of cropping varies, but usually runs—Oats and wheat, swedes and turnips, oats and barley, seeded down for two or three years, and then broken up again for cereals. Farm-yard manure is ploughed in on the stubbles in the autumn for green crops, and 5 cwt. of superphosphate is sown broadcast on the surface before ridging and sowing.

About 15 acres of hay and first year's clovers are mown every year, and farm-yard manure is applied as far as it goes on this land in the spring of the year; a portion is also dressed with superphosphate. The mixture for artificial grasses consists of 2 lb. Alsike, 2 lb. white Dutch, 6 lb. red clover, 2 lb. trefoil, and one peck perennial rye-grass per acre. The oats were a fair crop; the swedes, drilled 2 feet apart, were well up and ready for horse-hoeing. The pastures and clovers were suffering from the drought, and those which were set apart for hay were considerably dried up and burning, thus auguring badly for the hay-crop. The riverside and permanent meadows looked verdant, and were grazing satisfactorily. The roadside fences were neatly kept; but the remainder, which were set on high banks, were strong and but little attended to. The gates also required restoring in several instances.

Mr. Jones expended, during the first year of his tenancy, about 13*l.* in improvements to his fences, and he has filled up a useless watercourse which ran through the centre of the farm. The stock on the farm consisted of—

2 cart mares.	13 yearling heifers.
1 hackney.	10 calves.
1 yearling cart colt and 1 foal.	1 yearling bull (Shorthorn cross).
14 milking cows.	45 ewes and 32 lambs.
1 two-year-old heifer.	1 breeding sow and 8 pigs.
2 two-year-old bullocks.	5 strong store pigs.

One cart foal is bred every year. The dairy cows are cross-bred Welsh and Shorthorn, and appear to be hardy and good milkers. They are used

exclusively for butter-making, the product being potted in the summer, and generally sold at more than 1*s.* per lb. The skim milk is divided between the pigs and the calves, the latter being reared by hand with skim milk and oatmeal. The young stock are pastured in the summer and brought into the yards in the winter, and live upon roots, straw, and hay. No corn or cake is given them. The two-year-old bullocks are sold off the grass for winter feeding elsewhere, and the selected heifers take the place in the dairy of older cows, which are sold off. The sheep are a flying flock. Some Welsh and Scotch cross-bred yearling wethers are usually bought in the autumn and sold off fat the following spring and summer. Ewes similarly bred are put to a Shropshire tup, and run out through the winter, the lambs being sold fat from the following June to August, off the grass. The offspring of the one breeding sow are mostly fattened with dairy offal, barley, and oatmeal, to 12 score weight. Some are cured for home use, and some sold to the butcher. The remainder are disposed of as stores. A considerable number of turkeys, chickens, and ducks are reared, and Irish geese are bought after harvest for stubbling.

The labour is chiefly done by the family, Mr. Jones and two sons on the farm, and Mrs. Jones and two daughters in the dairy and house. About 30*l.* per annum for extraneous assistance covers the labour bill of this holding.

2. *The Farm of* Mr. David Roberts, *Fron, Mold, Flintshire.*

This farm is in the parish of Arddynwent, and is situated at an altitude of 840 feet to 900 feet. It slopes to the north-west, and is considerably exposed. The climate is severe, and the district is more backward than the valleys in the vicinity. It rests on the Millstone Grit formation, and the soil varies considerably from a moderate light friable nature to that of a strong and tenacious character. The house and stone buildings are such as usually characterise Welsh Hill holdings. The buildings contain stabling accommodation for 10 horses, 12 cows, and a similar number of calves, besides yard for young stock. Hay and straw lofts are arranged over the stabling, and there is a granary over the cart-shed, a room adjacent being used for cutting chaff, pulping roots by hand, mixing corn, and preparing food. Mr. Roberts, who succeeded his father-in-law, has occupied the farm four years under a yearly tenancy. The farm contains about 113 acres, 32 of which are under cereal or green crops, viz.: 7½ barley, 5 wheat, 12½ oats, and 7 divided between potatoes, mangel, and swedes; 27 are under first, second, and third year clover leys; and the remainder is in pasture and meadow. The general rotation is—Wheat after third year's ley, bastard fallowed and limed, barley or oats, green crop (viz. potatoes, mangel, and swedes), oats, clover ley left down for three years. Farm-yard manure is chiefly applied for roots, but a small quantity of superphosphate is also used. The barley was looking moderately promising, oats well, and wheat good. The potatoes, Magnum Bonum variety, were regular; mangel and swedes were good, the plants not hoed out, and fairly clean.

The pasture land appeared to be grazing well; but the clovers, with the exception of 9 acres of first year's growth, drawn for mowing, which was an excellent crop, were suffering from the drought. About 15 acres of clover and hay are annually mown by grass-cutting machine. Some of the fields are fenced by stone walls; the remainder are planted on high banks, and are of the usually rough Welsh character. Several have been planted and improved by the tenant.

The stock comprises—

3 cart horses.
1 pony.
1 yearling colt.
1 sucker.
8 milking cows.
4 two-year-old heifers and yearlings.
8 calves.
3 three-year-old bullocks (stores).
2 „ feeding in meadow.
11 cross-bred Welsh mountain ewes and 17 lambs.
2 breeding sows (large white).
16 feeding pigs.

The horses are small and active and suitable to the holding. The milking cows are cross-bred Shorthorn and Welsh, of a good milking strain. The milk is converted into butter as on Mr. Jones's farm, already described, part being churned as milk and the rest as cream. The calves have part butter-milk and part sweet skim-mik with their meal, and hay night and morning. The young stock are of useful type. Two of the bullocks were being finished off for the butcher with barley meal on the grass, and the others would come into the stalls to be fattened in the winter with meal and hay. The farm is principally relied upon for supporting and feeding the live-stock carried by it.

Some of the ewes are changed every year, and the others are put to the ram. A portion of the lambs are sold fat, and the rest are fed in the winter on roots and hay and sold to the butcher. The pigs are fattened on the dairy offal and home-grown meal, and turned off at from 12 to 15 score weights. The labour is performed by Mr. and Mrs. Roberts, aided by one man residing in the neighbourhood, at 8*s.* 6*d.* per week and food, and 25*s.* extra for harvest; two indoor lads at wages of about 11*l.* and 5*l.* per annum respectively; and a small servant girl.

3. *The Farm of* Mr. Burrows, *Whitegate, Cuddington, Cheshire.*

This small holding, 18 acres in extent, is at Whitegate, in the township of Marton, and six miles from Northwich, Cheshire. It stands between 100 and 140 feet above the sea level. Climate and rainfall are much the same as in Cheshire generally. The farm rests on the new Red Sandstone (New Red Marl) formation. The surface soil runs from sand to peat, and at a depth of 9 to 10 inches a brash is reached which continues from 1 to 3 feet down, and is underlaid by red and white sand. The property belongs to Lord Delamere. The cottage is an old-fashioned thatched structure, and the buildings are rather primitive, but meet the requirements of the tenant, who has occupied the farm for 44 years on an annual taking at a rental of 42*l.* 10*s.*, with additional charges of some 7*l.* for tithe and rates and taxes. The drainage from the buildings and yards is carried by pipes on to the land, and spreads itself by gravitation. No change has been made in the rental during the tenancy. The agreement is antiquated and not acted upon. The tenant has taken down 1,034 yards of old fences, and replaced 720 yards by new ones, the landlord finding quick. He has drained 1,940 yards from three to four feet deep, the landlord finding the pipes, at a cost of about 10*l.* He has also sunk a pump well at an expenditure of 5*l.* 10*s.*, and planted 223 fruit-trees, chiefly damsons, besides putting on 1,350 loads of marl costing about 135*l.* The whole of the land has been covered with marl, which has greatly improved its condition, it having been when first occupied of a very inferior nature.

The holding, when viewed, was under the following crops:—

8 acres of kidney potatoes.
$2\frac{1}{2}$ „ 1st year's seeds.
$2\frac{1}{2}$ „ 2nd year's seeds.
5 acres of 3rd year's seeds and pastures.

No cereals are grown. About 8 acres are annually devoted, as shown above, to the growth of early potatoes. The rotation followed is—

1st year, potatoes and green crop.	4th year, seeds.
2nd year, potatoes and seeds.	5th year, seeds.
3rd year, seeds.	

The second or third year's leys are broken up and well cleaned, and manured with stable manure, before trenching or laying out the land into butts[1] about February. This work is done by a high-breasted plough, and the lands are formed about 4½ ft. wide and 18 in. high, the trenches between them being about 18 in. wide. Burrows's early kidney potatoes are grown; they are sprouted in boxes in the building, and are planted carefully by hand, one man making holes with setting-stick, and two following and dropping the potatoes in, whilst a fourth covers them with a light rake. Potatoes are up in May and are kept clean by hand-hoeing, and raised in June and July the land being entirely cleared by the end of the latter month. Cabbages (red pickling, ox, and savoy), mangel (yellow tankard), and swedes are raised in seed beds. The cabbages are transplanted in the trenches of the potato lands and the mangel and swedes follow in two rows on each butt, at a distance of about 1 foot apart, as the crop is removed. After the root crop is taken away the ground is again ploughed and prepared for potatoes the following year. This course is succeeded by seeds the same season, sown the beginning of August at the rate of one bushel Italian rye-grass and 9 lb. Alsike and red clovers to the acre. The seeds are mown green for the stock in October, and are then dressed with 12 cwt. of bone dust per acre.

The following June they are again cut green for stock, and then mown in the autumn for hay, after which they have another top-dressing of 4 cwt. of bones per acre. The following one or two years, as the case may be, they are grazed until brought into cultivation again. The potato land was perfectly clean and the crops were excellent. Red pickling and Savoy cabbages were already transplanted in the trenches for root crops, and mangel and swede plants were ready for use. The seeds for mowing were very heavy, and those for grazing were exceedingly good, notwithstanding the drought. The banks of a deep ditch intersecting the holding had been fenced out and planted with damsons and black currants by Mr. Burrows, and damson trees prevailed in the fence surrounding the stack-yard and some of the fields. The hedges adjoining the road were neat and well brushed, but the remaining ones were strong and rough. Mr. Burrows purchases straw for his stock, and on an average 120 tons of stable manure from Winsford (3½ miles distant), and 1 ton of bone turnings per annum. He estimates that he grows 7 tons per acre of potatoes, and he sends these and his fruit to Leeds, where he realises high prices for the early potatoes. As much as 7 tons of fruit is sometimes sold in one year. No space is left idle either on farm or in garden, and five hives of bees occupy a place in the latter.

The live-stock comprise—

1 cart horse, a powerful five-year-old, which does all the work of the farm.	1 heifer calf rearing on hand, remainder fed and sold to butcher.
5 milking cows (crossbred).	2 breeding sows.
	Poultry (all chickens).

The cows are well fed, and receive about 4 lb. of bran and Indian meal per day; they are principally kept for butter-making, which is done by Mrs. Burrows. A few skim-cheeses are made for household use in the summer. The produce of the sows are fed on dairy refuse, small potatoes, and Indian

[1] Ridges or "lands."

meal; two or three fat pigs are annually killed for home use, and the rest are sold when weaned. Some 3 tons 10 cwt. of Indian meal and 2 tons 10 cwt. of bran are consumed in a year.

Besides Mr. and Mrs. Burrows there are four men and one boy living in the house, and also one woman servant. The wages run from 6*s.* to 12*s.* per week and one quart of beer per diem in the summer, and extra if working late. In addition there are never less than six Irishmen for two months from middle of June. They receive 18*s.* per week and one quart of beer per day. They work 12 hours a day, less one hour for meals, and if required make an extra quarter when busy.

4. *The Farm of* Mr. Samuel Edwards, *Norbury, near Wrenbury, Cheshire.*

This holding of nearly 25 acres has been in the occupation of the present tenant for eleven years, and was held by his father for twenty years previously. The rent of 40*l.* 16*s.* per annum is nearly 34*s.* per acre, which, with tithes and taxes about 3*s.* per acre, makes the total about 37*s.* per acre. No change has been made in rental during the tenancy, and Mr. Edwards considers the outgoings for rent, rates, and taxes much the same now as when he first took the farm. No allowances in the form of manures have been made on account of the agricultural depression.

The tenancy is a yearly one, from Lady-day to Lady-day, and the agreement is drawn pretty much on the lines of the old Cheshire custom, which at the termination of the tenancy gives right of pre-entry to the incoming tenant on the arable and meadow ground at Christmas and on the pastures at Candlemas-day, the outgoing tenant retaining the house and boozy pasture till May 1. The tenant is debarred by agreement from ploughing up old pastures and from selling off hay and straw, but the sale of such produce is not objected to in practice. The tenant is allowed the unexhausted value of manure used the last year of the tenancy.

This farm is situated 3½ miles from Wrenbury, in South Cheshire, upon the estate of the Marquis of Cholmondeley. Its altitude is 266 feet above the level of the sea. The rainfall of the locality averages about 27 inches, and the climate approximates to that of the West Midland district generally, being fairly good, with bracing winds from the Atlantic, and rather severe spring months. The farm rests on the New Red Sandstone formation covered by drift (clay, sand, and gravel), and the soil is mostly of a loamy nature, underlaid by clay loam and clay subsoil. A small portion of the meadow land is of rather a peaty character.

The house and buildings are sufficient for the requirements of the holding, the latter containing stalls for ten cows and accommodation for calves, granary, food-mixing room in which the chaff-cutting and root-grating are done by manual power, two-stall stable, and cart shed. The Dutch barn, 45 ft. long by 15 ft. wide and 17 ft. high, was put up by the tenant in 1885, the timber uprights being found by the landlord. A small garden, devoted this year to the growth of vetches, contained the usual garden fruits and several damson trees, which also extend in the hedges on each side of the approach to the house from the main road.

The following rotation is usually pursued on the arable land:—Oats, green crop (consisting of mangel, swedes, turnips, and potatoes), wheat, green crop, oats, and clover, which remains down two or three years according to circumstances and is then broken up again for oats. The land is cleared in the autumn by skimming up the stubbles lightly with the plough, and scarifying and harrowing, and again ploughing deeper for winter. Roots are sown on the ridge. Farmyard manure is used, together with about

5 cwt. of prepared bone manure per acre. The same meadow land (about 4 acres) is mown every year, and is manured annually with farmyard manure in the winter, or, if there is insufficient manure to complete it, with 5 cwt. of prepared bone per acre. About 4 acres of the grazing land is also annually treated with a similar dressing of bone manure. The farm was cropped this year as follows:—Cereals 3½ acres, green crops 2 acres, first year's seeds 1½ acres, the remainder in seeds longer laid down and permanent grass. The fields are irregular, and are surrounded by strong quick fences. The land was clean. The potatoes looked well, but the mangel was irregular, and the swedes had been troubled with the fly, but were growing vigorously when seen. Cereals were a good crop, whilst the hay was deficient and the grass land bare.

The live-stock on the farm consisted of—

1 strong general-purpose horse.	2 heifer calves.
9 crossbred Cheshire Shorthorn milking cows.	10 pigs.
2 yearling heifers at ley.	20 hens.

Cows are put to a neighbour's bull to drop calves in February or March. Their general management is similar to that already described. The calves are kept by their mothers for the first month after birth, and are then sold to the butcher. Two heifer calves are taken into the herd annually and reared on hand, a corresponding number of cows being sold fat in winter. The heifers are put to the bull to calve at two years old. Cheese-making is commenced early in April, and the cheeses are disposed of either at home or at the fairs established at Whitchurch, Salop. The price realised had been 60*s.* per cwt. this year, but it was not anticipated that this would be sustained. Pigs are fattened off at about ten score weight; they are fed on whey and Indian meal and thirds flour.

The labour on the holding is principally done by Mr. and Mrs. Edwards and a boy and a girl who live in the house and are paid 6*l.* and 4*l.* respectively per annum. Extra labour amounts to about 5*l.* per annum. Mr. Edwards sells a few turnips, but no hay, straw, or cereals, all of which are consumed on the holding. The family live principally on the produce of the holding, but although feeding-stuffs are cheaper and pigs selling well, he finds there is less coming in than when he first became tenant. His outlay for feeding-stuffs and purchased manures is about 45*l.* per annum.

5. *The Farm of* Mr. J. Ankers, *Cholmondeley, Malpas, Cheshire.*

This farm is in Malpas parish. The geological formation is the New Red Sandstone covered by drift (clay, sand, and gravel). The surface soil runs from strong loam to clay, and the subsoil is sand and a marly red clay. The springs are cold, but the climate is not otherwise severe. The farm is rented on an annual tenancy from the Marquis of Cholmondeley, and has been in the occupation of Mr. Ankers for 17 years. No change has been made in the rental, and no temporary remissions have been allowed. The agreement contains the usual restrictive clauses as to sale of produce, and as to cropping and cultivation, which, in this case as in others, are not observed. Rates are much the same as in the past. The house is small, with garden at front and back, and an orchard adjoining. The buildings are comparatively new and well built. There are a stable, ties for 50 cows, and piggeries capable of housing 50 pigs; also implement sheds and corn-mixing room, in which chaff-cutting, pulping, &c., are done by machinery driven by horse-power. The tenant has erected two Dutch barns at a cost of 90*l.*, the timber uprights being found by the landlord. He has drained about 85

acres, from 2 ft. 6 in. to 3 ft. deep, with 2½ in. pipes found by the landlord, at a cost of 170*l.*, and has removed about 4,000 yards of old fences, at an average of 3*d.* per yard. He has straightened and replanted other fences, has enlarged some of the fields, and has also made new pits where required and filled up unnecessary ones.

The farm contains 243 acres, of which about 55 acres are each year under crops and seeds, whilst the rest is in permanent pasture and older leys. This year's crops consisted of—

15 acres of oats.	5 acres of swedes.
5 „ barley.	15 „ first year's seeds.

The rotation is—Oats, oats, green crop, oats, clovers left down two or three years. Green crops are sown on the ridge, stable manure and 2 to 3 cwt. Peruvian guano being split in. Fifteen acres of the first year's seeds and about 45 acres of the older leys or pastures, making 60 acres in all, are mown each year. These are afterwards manured with 15 tons of stable manure per acre, or dressed with 6 cwt. per acre of bone turnings. Other parts of the grass land are similarly treated, and the whole of the ground is manured at least once in seven years. The outlay in Peruvian guano and bones is 80*l.* per year, and stable manure costs 20*l.* more and the cartage. The grazing land when seen was not much burnt, and had a moderate amount of keep upon it. The fields vary in size from 50 acres to 5. The fences bounding some of the pastures were old but not neglected, and the mowing ground was not particularly encouraging.

The stock consisted of—

2 ponies.	15 heifer calves.
3 cart horses (1 mare in foal).	1 bull.
51 milking cows.	66 Shropshire ewes and lambs.
16 two-year-old heifers.	55 half-bred wethers.
17 yearling heifers.	100 pigs purchased per annum.

The cows were a useful-looking lot of milkers, principally bred at home, and sired by a fairly-bred Shorthorn bull. Some Irish heifers are occasionally bought. There being very few roots grown, the milking cows and heifers depend chiefly on hay for their winter food. This is supplemented with cotton-cake, purchased corn, and home-grown oats. The cows are calved down about the beginning of February, and, with the exception of 15 heifers reared on hand for replenishing the herd, are sold off a week old at the current market rate. A fresh lot of ewes are bought every autumn and put to a Shropshire ram. The ewes lie out on the pastures till the beginning of March, when they are brought to the buildings and are given some hay and 1 lb. of mixed corn and cake per day. They are moved out on the clovers a week after lambing, the cake being continued, and the lambs run with their mothers until sold fat in May and June, the ewes following as they become ready. The pigs also are bought as strong stores, and fed off with dairy refuse and corn at about 10 scores weight. The whey and meal are mixed but not cooked or scalded. The purchased food account amounts to 350*l.* per annum, and the oats and barley grown are consumed on the farm, as is usually the case also with the whole of the hay and straw. The medium-ripening system of cheese-making is pursued, and the cheeses, which average about 80 lb. weight, are of good quality, and readily disposed of to dealers at home. No milk is sold.

There are no cottages belonging to the holding. The waggoner, who lives in the neighbourhood, receives 10*s.* a week and food, with extra for hay and corn harvest; he is also allowed potato ground. A regular labourer

gets 15*s.* a week, with 2*l.* extra for hay and corn harvest, and beer and luncheon. Three young men and two maids live in the house, their wages amounting to 60*l.* a year and keep, and two Irishmen are employed for three months in summer at 15*s.* a week and milk. The wages account amounts, with keep, to about 250*l.* per annum.

6. *The Farm of* Mr. Joseph Aston, *Brassey Green, Tarporley, Cheshire.*

Mr. Joseph Aston farms in Tiverton Township, not far from Beeston Castle, upon the New Red Sandstone (white sandstone), 140 feet above the sea level. The soil is mostly a stiff clay, and the subsoil for some depth is stiff marl or clay. The farm contains 218 acres, and, with the exception of ten acres rented from Lord Tollemache, is Mr. Aston's own property. It is all in permanent pasture. There are two houses and sets of buildings on the holding. Mr. Aston resides in an interesting and picturesque old-fashioned black-and-white timbered house. The buildings run at right angles on either side in front, forming together a quadrangle, through which the residence is approached. They also are old-fashioned, but there is room for tying fifty-nine cattle, besides stabling, loose-box, corn-mixing and chaff room, piggeries, and a good Dutch barn. The new house and buildings are on part of the farm purchased some fifty years ago. The latter contain space for tying sixty-four cows, with good hay tallats[1] above, cart-shed, with corn room above, and newly constructed dairy with press house, and cheese room well designed and arranged, where the cheese manufacture is conducted. A boiler with 3-horse-power engine works shafting for pumping, curd-grinding, curd-breaking, &c., and the whey, after being drained from the milk vat and standing in the cisterns and being skimmed for whey-butter making, is pumped into the whey-troughs at the pig-sties and mixed with the feeding-meal.

Mr. Aston does not mow the same fields continuously. He reserves about forty acres for hay each season, and applies farmyard manure every other year to the land from which he takes a hay crop. He also dresses one-fourth of his land each year with 10 cwt. of bones per acre. No hay is sold, and straw is purchased for littering stock. Sand also is used in the shippons to save straw and promote cleanliness. The fields are large and the fences strongly grown. The land is laid out on the old high rounded butts, and has been drained 2 ft. 6 in. to 3 ft. deep in each rein,[2] with 2-in. pipes, connected by deeper mains with the outfalls.

The stock upon the farm consisted of—

2 hacks.	34 two-year-old heifers in-calf.
2 cart horses.	3 yearling heifers.
84 milking cows.	55 pigs.

All the cattle stock are purchased, usually as two-year-old heifers, and they replace the older cows fed off. The cows are divided into two herds, one located at each homestead. They are not selected for uniformity, and are mixed with Welsh and Cheshire cross-bred Shorthorns, but they are considered to be a good milking lot. They rely on the grass land for summer keep, and on hay and artificial support in winter. Mr. Aston prefers the calves to be dropped in May. He reserves the dairy cows entirely for the sale of milk in the winter, for which he obtains 9*d.* per gallon,

[1] This word, applied to a hay-loft over a stable, is variously spelt. It will be safe, however, to follow Mr. Blackmore ("Lorna Doone," Chap. LXXIV.),—"I let Jem Slocombe go to sleep in the *tallat*, all one afternoon."—Ed.

[2] The finishing-up line between the "lands" ploughed.

delivered at Beeston Station, and cheese-making in the summer. He sells the calves shortly after they are dropped, at 12*s.* 6*d.* to 15*s.* each, the milk being of more value for sale or cheese-making than for calf-feeding.

The manufacture of cheese is the principal feature of the holding. It is conducted with the best of machinery, and the output is sold at high figures. Whey butter is made, and also yields part of the income of the dairy. Mr. Aston estimates his return of cheese per cow at 5½ to 6 cwt. per year. No sheep are kept on the holding. The pigs are all bought as stores and fattened for the butcher. Their food is mixed whey, Indian meal, and thirds flour, and is steamed from the dairy boiler before being eaten by the pigs.

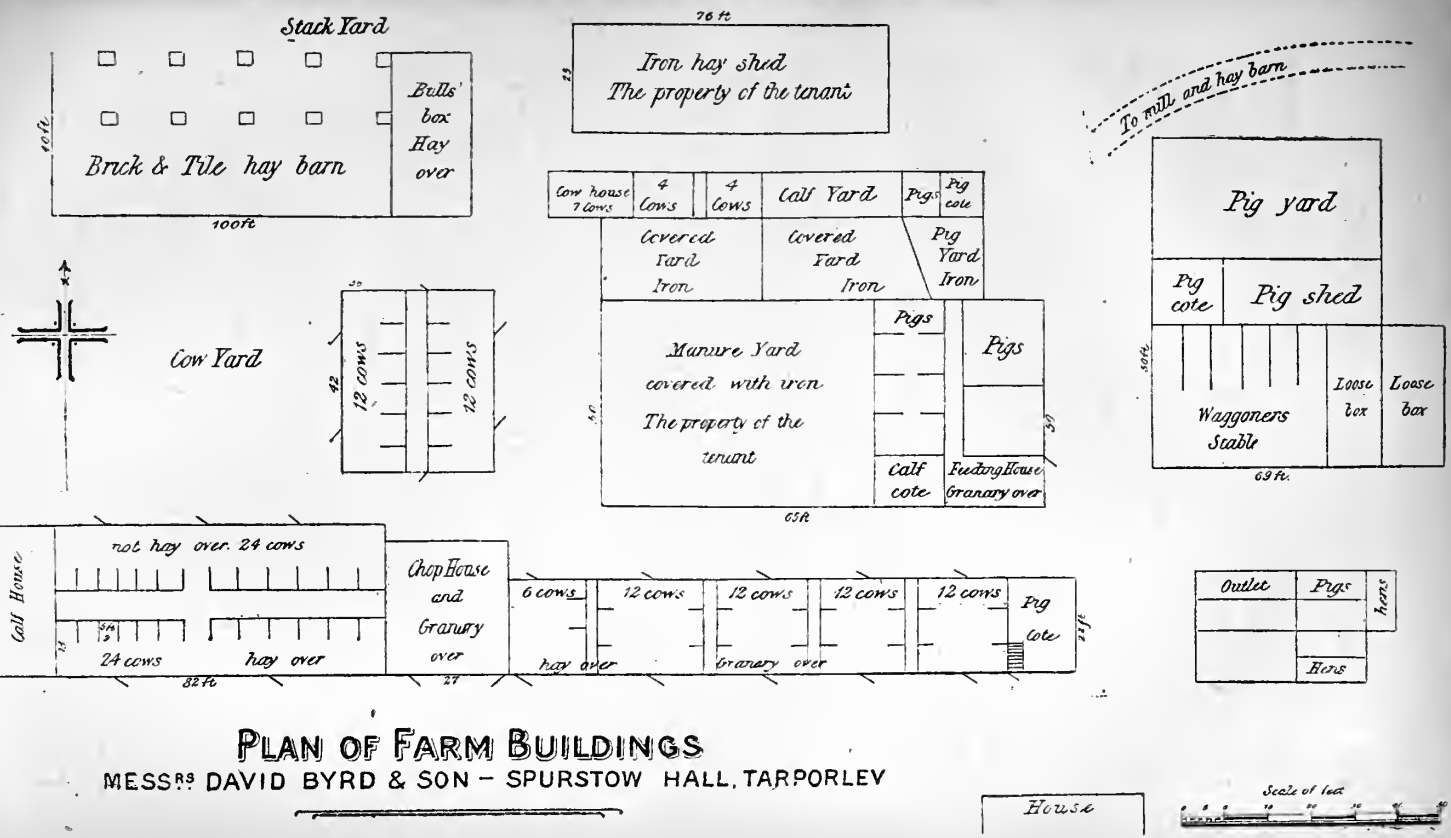
Three labourers reside in cottages with good gardens, at rents of 2*s.* per week. Two of them rent about three acres of grass land in addition for keep of cow. The stockmen, who also assist with the milking, commence at 5 A.M. and finish about 6.30 P.M. They receive 16*s.* per week, and extra for hay harvest, and other labourers 15*s.* a week, their hours being from 6 A.M. to 6 P.M. The three labourers' wives assist in the milking, for which they receive 3*s.* per week each. A little extra labour is employed for hay harvest. There are also two indoor men servants at 10*l.* and 5*l.* wages, and three indoor female servants at from 16*l.* each per annum. Mr. Aston states that depreciated prices of stock and higher payments for labour have lately reduced profits.

7. *The Farm of* Messrs. David Byrd & Son, *Spurstow Hall, Tarporley, Cheshire.*

The Messrs. Byrd's farm is situated in the extensive parish of Bunbury, near Tarpoley, its altitude being 125 feet to 135 feet. It rests on the New Red Sandstone (New Red Marl) formation covered by drift (sand and boulders) and the nature of the soil varies very much on the holding, in some parts being sandy, and in others somewhat peaty, while on the south-west side it runs to a stiff clay. The subsoil is equally variable, consisting of sand, marl, and clay.

The house is most commodious. It is nearly surrounded by an old moat, and the gardens, grounds, and shrubberies are extensive, well kept, and well timbered. The accompanying plan (p. 587) of the farm buildings, which are well and substantially erected, will show the extent of their accommodation, the practical nature of their construction, and the enterprise of the tenants in assisting in their completion. They have erected a Dutch barn at a cost of 75*l.*, and have also covered the manure yard with iron roofing at a cost of over 100*l.*, thus protecting the concentrated manure of the cow sheds, which is conducted thereto along an iron tramway, from loss by rain or evaporation.

As regards the arrangement of the fields, the occupiers have stocked up about two miles of old hedges, and relaid more than one mile of new ones, whilst they have drained 5,981 roods (of 8 yards) at an average cost of 8½*d.* per rood, at an expenditure of 211*l.* 16*s.* 7*d.*, the landlord supplying the pipes. The farm is the property of Lord Crewe, and, with the moat, house, grounds, and buildings, which occupy 8 acres, comprises 367 acres, 57 of which are arable and 302 permanent pasture and meadow. It has been occupied on a yearly tenancy by Messrs. Byrd for 21 years, their tenure having commenced in 1872. The agreement is restrictive alike as regards cropping, cultivation, and sale of produce, but as long as the farm is worked satisfactorily the tenants farm as they please, and sell what they think proper. The agreement embodies the old Cheshire custom with regard to change of tenancy, and the tenants would claim compensation for unexhausted outlay under the Agricultural Holdings Act. Ten per cent.



PLAN OF FARM BUILDINGS

MESSRS DAVID BYRD & SON – SPURSTOW HALL, TARPORLEY

temporary reduction has been allowed on last year's rent. The rates have slightly increased in the past ten years.

The arable land is worked nominally on the five-course shift, but this rotation is not strictly adhered to. Oats are succeeded by a green crop; this is followed by wheat or oats, which are seeded down, and the young seeds are dressed with farmyard manure, and mown the following year; the clover ley is left down a second year and then ploughed up, and the course again commenced with cereals. Autumn cleaning is resorted to, and farmyard manure ploughed in before winter in preparation for green crop, which is sown early with a small application of mineral superphosphate. About 30*l.* to 40*l.* worth of artificial manures and bones are applied per annum. The area under crops this year is as follows:—

Wheat	3 acres	Permanent pastures (grazing)	254 acres
Oats	32 „	Permanent pastures and meadows (to mow)	48 „
Potatoes	4 „		
Turnips	5 „		
Mangel	4 „		
Cabbage	1 acre		
First-year clovers (to mow)	8 acres		

About 20 acres of clovers and 40 acres of hay are mown annually, 32 acres of the latter being meadow land which is put up for hay year after year. The land that is mown is generally dressed with farmyard manure in the autumn. The pastures are also occasionally boned with a mixture of 5 cwt. of bones and 3 cwt. of superphosphate per acre. The hay crop had here as elsewhere suffered from the drought, and was light, but the 8 acres of mowing clover were good. The oats, both Tartarian and White, and the wheat were heavy. The four acres of Stourbridge Glory potatoes were healthy and regular, and the roots, which were well cultivated and clean, were ready to hoe out, and looked likely to prove an abundant crop.

The outlay on artificial manures for the land under cereals and root crops averages about 20*l.* per annum, and the pasture land is occasionally dressed with 5 cwt. of bone and 3 cwt. of superphosphate per acre.

The live-stock upon the farm at the time of the inspection comprised:—

2 hack horses.	25 heifer calves.
6 working cart horses.	2 two-year-old stock bulls.
4 unbroken colts.	2 yearling bulls.
109 milking cows.	162 cross-bred ewes and yearlings.
19 two-year-old heifers (feeding).	138 cross-bred lambs.
28 yearling heifers.	74 pigs.

The cart horses were of useful stamp and in good condition. A considerable number of the milking cows were descended from Ayrshires, but they and their progeny, having been crossed by Shorthorn bulls selected from milking strains for the last 21 years, now show little or nothing of the Ayrshire type. They are a fine herd, well fed and cared for, and deep milkers. The practice on this farm is to sell the milk from the whole of the cows during the six or seven autumn and winter months of the year, and to convert it into cheese the remainder of the time. The medium-ripening system of Cheshire cheese-making is practised, and usually commences with the month of April. All available hands are employed for the milking, and extra assistance is obtained from the women in the village. The cows are numbered in the stalls and about eight go to each milker. Each cow's milk is weighed once a week. The milk is strained through a sieve outside the

dairy and conducted by an open trough into the milk vat, thus preventing any ingress by the milkers into the dairy. After cheese-making the whey stands for two days; the cream is then skimmed off by hand and churned into whey butter. The whey is afterwards carried by a pipe to a cistern in the piggeries and pumped therefrom into the pig troughs for pig-feeding. The dairy, although adjoining, is distinct from the house. It is fitted with a 3-horse-power vertical boiler and a 1½-horse-power engine, which is used for churning, and for applying steam for other dairy purposes, and hot water for the system of pipes passing through the cheese store or ripening room situated above the dairy.

Messrs. Byrd keep an accurate detailed account of the returns from their cows, which shows year by year the aggregate receipts and the average per cow for the last 13 years. The average during this period is 18*l.* 17*s.* 10*d.* per cow, while the year 1892 has fallen, under the same management, to 17*l.* 1*s.* 10*d.*; this is attributed principally to the ungenial character of the last season. It is estimated that the cows would make about 4½ cwt. of cheese per annum. This cheese is of superior character.

The following are the interesting and instructive details of the returns from this herd of dairy cows for the past 13 years:—

Dairy Produce, 1892, *from* 104 *Cows.*

				Average per cow			Total		
	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*
475 lb. butter at 11½*d.*				0	4	4	22	15	2½
37 calves sold	24	14	4	0	13	9¾	69	14	4
30 „ reared	45	0	0						
26,175¾ galls. of milk sold	938	18	10						
Less freight	135	1	1	7	14	7½	803	17	9
31,353 galls. of milk made into 459 cheeses = 12 tons 3 cwt. 0 qr. 29 lb. (121 lb. to cwt.) (= 553½ galls. per cow = 2 cwt. 1 qr. 22¼ lb. cheese)				7	12	1¼	794	16	9
Whey 17*s.* per cow				0	17	0	88	8	0
Total				17	1	10½	1,779	12	0½

Average per cow for

	£	*s.*	*d.*		£	*s.*	*d.*		£	*s.*	*d.*
1892	17	1	10½	1887	18	3	3¾	1883	18	6	6¼
1891	18	6	4	1886	17	5	3¾	1882	20	8	10¼
1890	19	18	3	1885	17	14	3¼	1881	19	3	1½
1889	17	19	10½	1884	20	12	8	1880	21	1	5½
1888	19	9	11½								

Or an average for the 13 years, 1880 to 1892, of 18*l.* 17*s.* 10*d.* per cow.

The bulls now in service are good-looking Shorthorns from milking strains, and seem likely to perpetuate the good dairying qualities of the herd. The heifer calves are reared on hand and are well done till they are one year old. They are then grazed out without artificial food, and are put to the bull on July 7 each season, at about 15 to 18 months old, and calve down about 2 to 2¼ years old and take their place in the dairy.

The flock of ewes are cross-bred Cluns and Shropshires. They lamb down in February and March, and are well fed, receiving about ¾ lb. of linseed cake, crushed oats, and Indian corn per day. The lambs run with their mothers, and most of them are sold fat to the butcher in drafts from the end of May till July. Some of the ewes are disposed of to the butcher,

and a portion of the ewe lambs are drafted into the flock, which is again restored to its normal number of 120 by repurchases in the autumn.

Thirteen breeding sows of the Large White breed are kept. The first farrows of the year are fattened and sold off at from 9 to 10 score weights. The second bellies are disposed of as suckers. They are fed on dairy offal and mixed Indian meal and thirds flour.

The farm carries more stock in the aggregate than it did ten years ago.

The annual expenditure and average for the last 17 years in food purchased is shown by the subjoined table:—

Corn and Cake, 1892.

	£	*s.*	*d.*
Cotton-cake and linseed-cake	335	10	0
Maize, &c., meal and flour, and grinding	589	19	0
Home-grown corn consumed	181	0	0
Manures	20	7	5
Freights on do.	46	11	1

	£	*s.*	*d.*		£	*s.*	*d.*		£	*s.*	*d.*
1892	1,173	7	6	1886	960	14	10	1880	836	16	10
1891	1,332	8	7	1885	1,074	17	6	1879	939	6	11
1890	966	15	1	1884	975	13	4	1878	893	4	7
1889	1,092	19	2	1883	1,055	9	5	1877	805	0	8
1888	767	17	11	1882	946	13	2	1876	684	6	6
1887	804	0	1	1881	881	18	6		16,191	11	7

Or an average for the 17 years of 952*l.* 8*s.* 11*d.* a year.

There are two cottages belonging to the holding. They have good gardens, and are occupied by stock-man and waggoner. The other labour requisite for the working of the farm is drawn from Lord Crewe's estate. The cottages are let at reasonable rents direct to the labourer, who is expected to work on the estate. Several have 3 acres of land attached to their cottages, and are thus enabled to keep a cow. This, as Mr. Byrd remarked, is a great boon to the cottager—an opinion with which the writer fully concurs.

The labour bill has not increased of late years. In 1892 it amounted to 1*l.* 7*s.* per acre, while the average for the last 17 years was 1*l.* 8*s.* 5*d.* This diminution may perhaps be accounted for by the completion of improvements of a permanent character. No Irish or casual labour is employed. Mr. D. E. Byrd, who is the responsible manager, is a most systematic and accurate book-keeper, but unfortunately the records reveal the fact that the past year was the worst experienced since 1879. This he attributes to less returns in cheese, with diminished prices, up to Lady-day, and lower prices of stock.

So far the present season has been discouraging, but let us hope that Mr. Byrd's pessimist record of last year will not be beaten.

8. *The Farm of* Mr. William Cookson, *Alpraham Hall, Tarporley, Cheshire.*

Mr. Cookson farms in the parish of Bunbury, near Beeston Castle, on the New Red Sandstone (New Red Marl), between 150 and 200 feet above the sea level. The land is partly of sandy loam and partly of a stronger consistency, underlaid by a subsoil of sand, clay, and some peat. The farm has been in Mr. Cookson's occupation for 10 years, and is held under a 21 years' lease from Lord Tollemache, terminable by the tenant at one year's notice. The agreement embodies the usual Cheshire customs, and sets forth a liberal sliding scale of allowances for tenant's outlay. The rent has not been altered,

but 10 per cent. allowance has been made on the last two half-years' payments, to be laid out in bones and applied to the land. The farm occupies 216 acres, half of which are arable and the other half pasture. Rates have considerably increased during the last 10 years. The house, with nice garden and orchard, the dairy, and buildings are well erected and arranged, and in excellent order. The buildings provide for 5 horses, 64 cows, and include cart-sheds and granary above. A 4-horse-power engine works shafting which drives cake and corn crusher, chaff cutter, pulper, &c. in corn room, to which a garner from above feeds bran and other foods for mixing for consumption by the stock. Two Dutch barns, 75 ft. by 24 ft. by 19 ft. high, and a lean-to implement shed have been erected by the tenant at a cost of 180*l.*; his outlay on draining has been about 50*l.*, and he has relaid a good many of the high butts on the permanent pasture. Mr. Cookson has also expended 116*l.* in uprooting and replanting 3,000 yards of hedges, the landlord finding quick and protective fencing. The new fields have been laid out with great judgment, and the young hedges are well cared for and efficiently trimmed.

The land was in the undermentioned crops:—

36 acres of oats.		12 acres of first year's seeds.	
6 „ wheat.		31 „ second „	
14 „ green crops (potatoes, mangel, and swedes).		4 „ third „	

The following course is pursued:—Oats; green crops (potatoes, mangel, swedes, and sometimes beans); wheat or oats; seeds for two or three years. Farmyard manure is applied to the green crop, which is grown on autumn cleaned and cultivated land after white Poland and Canadian oats. The manure is placed in the ridges, which are then split. The wheat usually sown is the square-headed variety, grown without manure. The clovers are mown twice the first year, and also again the second year. After mowing they are well manured with stable dung, in the autumn, or with a dressing of boiled bones. The uncut clover for hay was a heavy crop, showing great condition in the land. The oats also indicated the same, being heavy and of good colour. The wheat was fair, and the roots (8 acres), which had been troubled with fly and maggots, clean and well cultivated; the 3 acres of kidney potatoes and 3 acres of Magnum Bonums, &c., were well developed on the top, regular, and likely to produce an abundant return. The permanent pasture is always grazed, and looked remarkably well for the season. Boiled bones are applied to the pastures every 5 years at from 8 to 10 cwt. per acre. About 45 acres of clovers are mown every year, and yield about 100 tons of hay, some of which is sold if making a remunerative price. About 30 tons of straw are sold each year. Purchased manures average 100*l.* per annum. An extremely good set of implements are available for the use of the farm—grass-mower by Samuelson, and mower and reaper by Pixley and Sims, with harvest carts, and digging, double, and turnwrest ploughs, and the other necessary cultivating and sowing appliances.

There were of live-stock on the farm—

1 hack.	11 heifer calves.
4 cart horses (including 3 mares with foals).	1 Shorthorn bull.
1 two-year-old cart filly.	6 breeding sows (2 with young pigs).
2 yearling cart fillies.	41 feeding pigs.
64 milking cows.	Some chickens and ducks.
8 yearling heifers.	

The herd of milking cows, which are carefully selected Cheshire Shorthorns of Mr. Cookson's own rearing, in-calf to a good and well-bred Shorthorn

bull, is managed as already described. Mr. Cookson feeds the fresh-calved cows with a very generous diet of corn, cake, and hay. With the exception of a dozen heifer calves, kept to introduce into the milking herd, the calves are disposed of within a week of being dropped, at about 12*s.* 6*d.* per head, and the milk is utilised in the dairy. The heifer calves retained are left on their mothers from a fortnight to three weeks, and then reared on hand, and go into the herd about two years old. A dozen turn-off cows are fattened and sold each winter. The cows do not go out to grass until the first week in May. Mr. Cookson sells surplus milk for the three winter months at 10*d.* per gallon. He commences cheese-making, by the medium-ripening process, about the end of February, and obtained this year a high price for the cheese he had sold. He averages 5 cwt. per cow per annum, besides some 40 to 50 lb. of whey butter per week during the cheese-making season. About 100 home-bred pigs (Large White breed crossed with Tamworth) are fattened in the year, the first lot going out at 12 score weight, and the second as porkers. The outlay in food purchased is 200*l.* a year.

There are two cottages attached to the farm, and three regular labourers at wages of 15*s.* per week. The cottages have good gardens with 3¼ acres of grass land attached to them, and are let at 10*l.* a year. Hours are from 6 A.M. to finish of evening milking, say 6.30 P.M. The cowman lives indoors, and receives 18*l.* per annum. The head horseman lives at home, but is boarded at the farm; his hours are long, and wages 12*s.* per week and food. The extra wages for hay, corn, and potato harvest amount to 50*l.* per year. One female servant living in the house and assisting in the dairy has 16*l.* per annum. Mr. Cookson says that the lower prices of produce and the increased cost of labour have diminished profits.

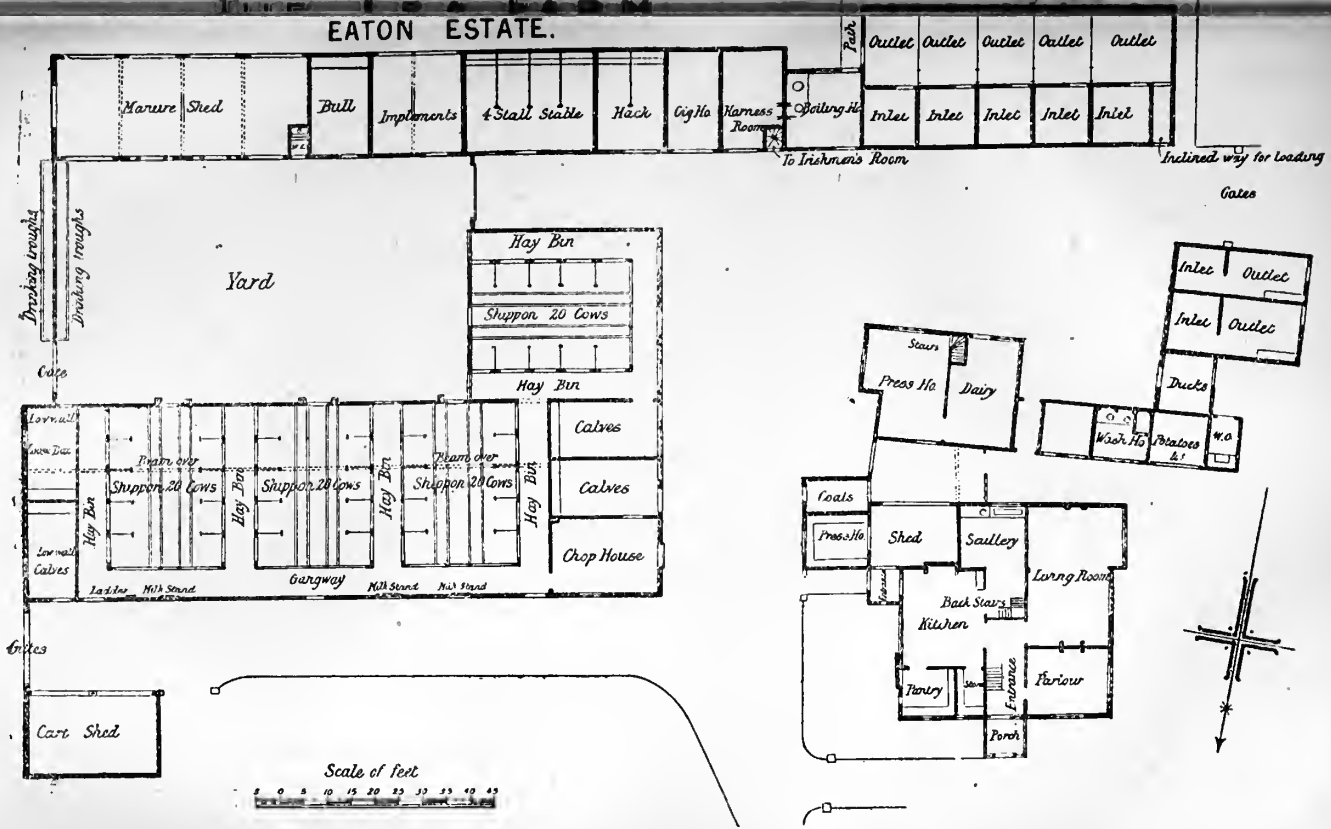
9. *The Farm of* Mr. Richard Fearnall, *The Lea Farm, Aldford, near Chester.*

Mr. Fearnall farms in the parishes of Lea and Newbold, some four miles from Chester, on the New Red Sandstone (Lower Soft Red Sandstone). Altitude below 44 feet. The climate is moderately good, and the rainfall has during the past 5 years averaged 27 inches, whilst this year, to June 10, 7·22 inches had fallen, as against 9·80 for the corresponding period of last year. The land is strong clay which runs to a considerable depth, and is all under-drained. It belongs to the Duke of Westminster, and contains 353 acres, entirely in permanent pasture. Thirty-three acres are subject to flood from the Aldford Brook, a tributary of the Dee.

The farm has been occupied by Mr. Fearnall for 18 years, and is held on an annual tenancy on the usual Cheshire terms. No permanent reduction of rent has been made, but 10 per cent. allowance was granted on last half-year's rental. The rates and taxes have not varied to any extent since the farm was first occupied. The house is an excellent farmhouse with gardens and orchards at back.

The dairy is well fitted with the usual appliances, and has recently been renewed and extended, by making above it a spacious and well-constructed cheese room, into which the cheeses are raised from the press room by lifts. The whey vats are connected by pipes with the new piggeries, which afford space for 20 pigs, and over which the meal rooms are situated. In the shed adjoining the dairy there is a 3-horse-power vertical boiler and engine combined, which works soft-water pumps, forcing the water into cisterns at the top of the house, and also supplies boiler for dairy. Shafting is extended into the dairy, and does the churning, and pumps the whey into the cistern in the roof of the whey house. Another pulley turns

EATON ESTATE.



the curd mill for grinding the curd. A pipe from this boiler also conducts steam to the cake-room and chop-house, where it is utilised to cut hay, break cakes, &c.

A hydraulic ram, which works from the brook at some distance from the homestead, drives pure water from a spring well into a cistern holding 2,000 gallons, which supplies house and cottages and drinking troughs for the milking cows in the yards at both of the homesteads. Last year the buildings adjoining the house were destroyed by fire, and new ones, most substantially built and conveniently arranged, have been erected in their place.

Another set of buildings belonging to the holding occupies a site not far-distant from the house. The plan on p. 593 will best show their design and capacity. The drains are, throughout, carried on the surface, and ultimately discharge in the manure shed, to which all the manure of the buildings is conveyed. There are good implements and cart-sheds, and a fire-proof floored day and sleeping room for the casual Irish labourers employed. The hay tallats and granaries of the newly erected buildings are divided by several fire-proof walls, which extend upwards a few feet above the level of the roof. The causeways and floors are laid with concrete of leadmine refuse and Portland cement grooved with roller, and presenting the appearance of a floor laid with channeled blue bricks. The Dutch barn, with galvanised iron roof, at back of buildings, 60 ft. by 21 ft. by 18 ft. high, has been erected by the tenant. The old buildings, occupying three sides of a rectangle, are substantially constructed, and have accommodation for 70 milking cows and 20 yearling heifers. Hay tallats run above the shippons and boxes. The manure is here stacked in the centre of the yard; the pigsties, facing at right angles to the buildings, will house from 40 to 50 pigs; and there are hay barns behind the buildings.

About 120 acres are mown each year, but the area mown is varied, with the exception of the 33 acres subject to flood, which is always kept up for hay, and relies upon the flood deposit for restoration. The growing hay crop was by no means encouraging. The other pastures, to the extent of between 50 and 60 acres, are manured with farmyard manure every year, and 20 tons of boiled bones and superphosphate are used on the grass land annually at the rate of 6 cwt. per acre, thus covering the whole of the land in the course of two or three years. The outlay for artificial manures is from 80*l.* to 100*l.* per annum. The fields are large and the quick fences strong, as is necessary with cattle grazing together in considerable numbers. Mr. Fearnall has also drained 140 acres at a depth of about 2 feet, the landlord finding and laying the pipes. These are 2½ inches in the ordinary drains and 4 inches in the mains. Some 80 acres of draining was also accomplished a few years ago with a mole plough without pipes, but this work is now exhausted. There were on the farm—

1 hackney and 1 pony.	25 heifer calves.
4 cart horses.	5 cross-bred Shorthorn bulls.
120 milking cows.	10 breeding sows.
14 two-year-old heifers (feeding).	1 boar.
25 yearling heifers.	125 store and feeding pigs.

Two horses are sold each autumn, and two four-year-olds bought to replace them. The cows are managed with a view to cheese-making, and are a lot of excellent cross-bred Cheshire Shorthorns originally founded on Welsh strains of blood. They are divided into two herds, which are worked separately, 65 belonging to the old buildings or to that side of the farm, and 55 being managed from the new homestead. Each of the herds has

a day pasture and a night pasture, which are always grazed. The cows are timed to calve as soon after January as possible, and the bull calves born before cheese-making are kept on their mothers for a month or six weeks and sold fat to the butcher. The 25 heifers selected for retention from the earlier-dropped calves are reared on hand, and well fed until they calve at two years and three months old and take their place in the dairy. After cheese-making commences the calves are sold at a few days old for low prices. The old cows are fattened for butcher. Mr. Fearnall attaches importance to the male being selected from a good milking herd, and believes that early breeding on the part of the heifers promotes and develops their milking properties.

The cheese-making is the great feature on this holding, and is conducted under the active superintendence of Mrs. Fearnall, assisted by three dairy-maids and helpers. The season commences about the middle of February; the medium-ripening process is pursued, and a beautiful display of cheeses varying from 40 to 90 lb. weight each were maturing in the cheese room at the date of my inspection. The cheese from this farm realizes high prices, and the weight produced per cow exceeded the general estimate given. About 20 lb. of whey butter is made per week, and during the winter months before cheese-making begins the milk is sold at about 10*d.* per gallon, which is a remunerative price. No sheep are kept on the farm. The pigs are a mixed breed by a black Berkshire boar; about 150 are bred and turned off in the year, the first lot fat, the second usually as stores. They are fattened on whey which is mixed with meal, and in winter the food is steamed. Poultry is not a special feature, but the surplus after supplying the house is sold. The whole of the land being in pasture, Mr. Fearnall has to purchase straw. He does not sell hay, and the amount expended in purchased food is about 1,000*l.* per annum.

The labour bill exceeds 400*l.* per annum. Three cottages and gardens, belonging to the estate, supply regular employees, who are nominated by Mr. Fearnall, but rent their cottages direct from the landlord. The hours of labour are from 5 A.M. till 6 P.M., and the wages are 15*s.* per week, with cottage and garden rent free. These men help with the milking. One man at 21*l.* wages, and two youths at 16*l.* and 13*l.* a year respectively, live and board in the house, and there are also four female servants kept. Five Irishmen work through July and part of August, receiving 15*s.* per week and one quart of milk per day and dinner on Sundays. They also assist in milking. Labour has advanced in the past decade at the rate of 2*s.* per week for outdoor labourers, and 4*l.* per head a year for indoor male and female servants. Mr. Fearnall states that profits have diminished, stock having made 4*l.* to 5*l.* per head less last year than on the average of the previous ten years. The decline in dairy produce had not been so large.

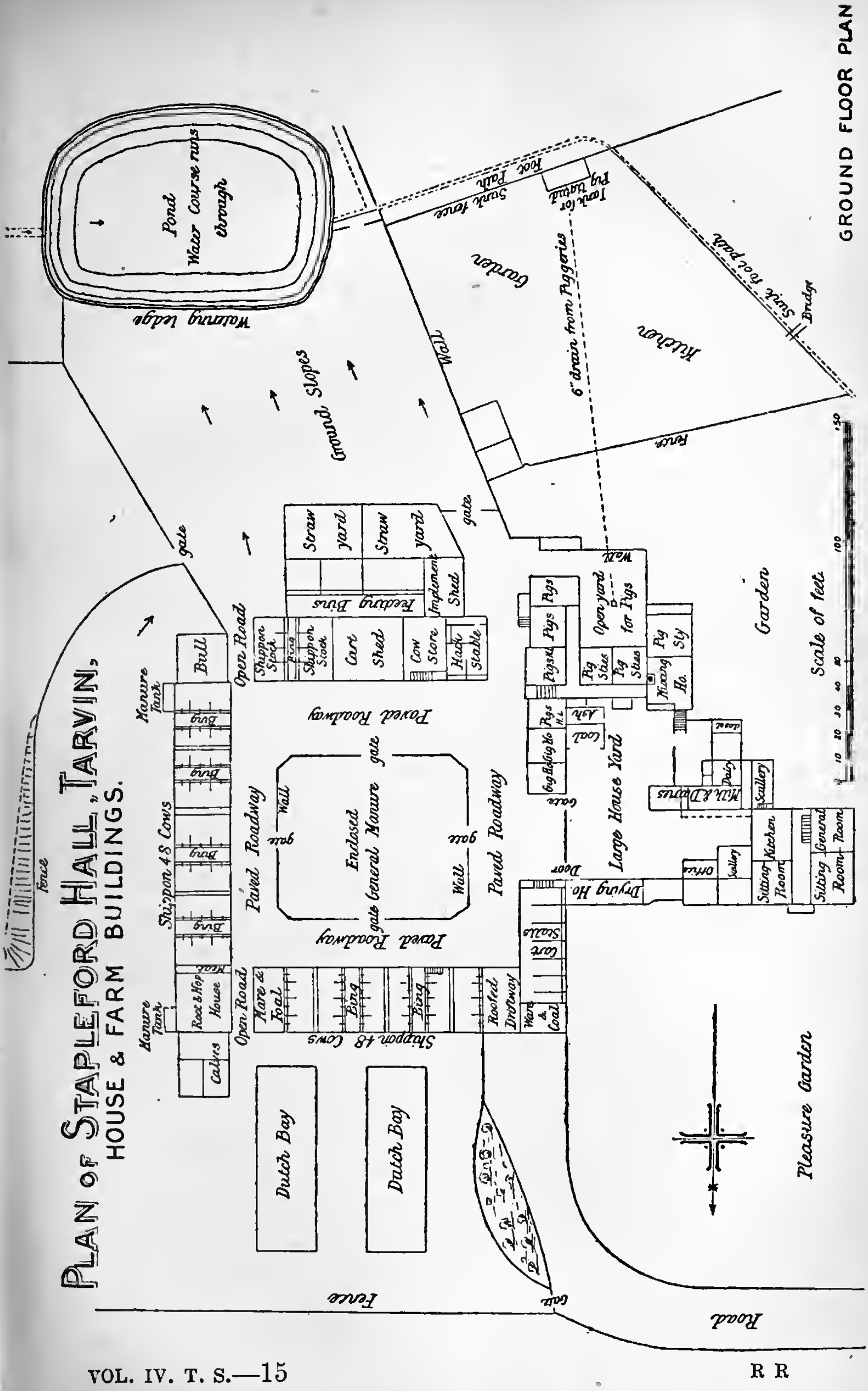
10. *The Farm of* Mr. John Lea, *Stapleford Hall, Tarvin, Chester.*

This farm is in the parish of Tarvin, 6 miles from Chester. It is between 50 and 100 feet above the level of the sea, the climate being moderate, and the rainfall about 27 inches per annum. It is upon the New Red Sandstone (pebble beds) formation. The soil varies from a sandy loam to a stiff clay underlaid with sandstone rock and clay. The meadow land adjoining the river is on the peat. The residence is good, and stands back in its own pleasure grounds. The kitchen garden and orchards, running at the back and eastwards, cover several acres, and the most is made of every available space, much fruit being grown. The buildings are extensive, and well arranged, as is shown by the plan on p. 597. There is accommodation for 8 waggon horses, 3 hacks, and 100 cattle, besides two yards for 30 head

of young stock, and well arranged new piggeries, and summer quarters for Irish labourers. The manure is accumulated in an enclosure in the centre of the yard, and the liquid is collected in tank and removed therefrom by carts. There are granaries and hay tallats over the cart house and buildings, and a corn room, with pulper, chaff-cutter, and cake-breaker. There is also a good implement shed and a well-paved watering-place in large pond at back of buildings, through which a constant stream of water flows. Mr. Lea has erected two Dutch barns 25 yards long by 8 wide, and 18 feet high, at a cost of 80*l.* each. He has eradicated upwards of two miles of rough irregular and worn-out fences, and replaced and straightened the fields with new ones, the owner finding quick, and posts and rails for protection. He has laid out upwards of 100*l.* in filling pits, levelling, &c. He has drained such parts of the farm as required it about 30 inches deep, the drains running into mains 3 feet in depth, at an outlay of upwards of 200*l.*, the landlord finding pipes; also embanked river at considerable cost, and recently laid down 13 acres to permanent pasture. The farm is rented on an annual tenancy terminating at Lady-day from Col. France Hayhurst under the usual Cheshire agreement, which is here disregarded. It has been occupied by Mr. Lea for 25 years. No change has been made in the rental, but a temporary allowance of 10 per cent. was remitted on the last half-year's payment. Rates remain about the same. The farm contains 291 acres, 181 of which are permanent pasture. This pasture is on the heavier part of the farm, and 30 acres of peaty meadows adjoin the brook at the bottom of the holding. The remaining 110 acres are this year under the following crops:—

13¼ acres wheat.	17¼ acres first year's seeds.
47 „ oats.	11 „ second year's seeds.
22 „ green crops (potatoes 15, mangel and swedes 7).	

Rotation of cropping is: 1st year, oats; 2nd year, green crops, viz., potatoes, mangel, swedes, or sometimes beans; 3rd year, wheat; 4th year, oats laid down with clover; 5th year, first year's seeds; 6th year, second year's seeds. The seeds are sometimes left down longer. The leys are ploughed up for oats in winter. No farmyard manure is applied. White Poland and Black Tartarian oats are sown, and after these are harvested the land is skimmed, autumn cleaned, and winter ploughed, deeply cultivated, and ridged 24 inches wide in spring for green crops. Farmyard manure is applied in the ridges. Potatoes are planted in April, and mangel and swedes in May. The mangel (Intermediates) are dibbled in about 18 inches apart, and the swedes are sown on the ridges at the rate of 4 lb. per acre. Wheat and oats follow successively without manure, but, after harvesting the latter, the seeds are dressed with 10 cwt. of boiled bones per acre. The clovers are seeded with 10 lb. of Alsike, white Dutch and red clovers, 1½ bushel of Italian, and ½ bushel of perennial rye-grass. They are mown the first year, sometimes twice, and top-dressing of bones is again applied after mowing. The pastures also receive occasional dressings of bone or farmyard manure. Artificial manures purchased average somewhat over 100*l.* per annum. The hay and straw sold realise about half this sum. The oats when seen were a fine crop, except where caught on the banks from the long-continued dry weather, and the wheat was good in colour, and looked like making a fair crop. The mangel and swedes were ready for hoeing out, and were regular. The potatoes looked well and were clean; about five acres were the Bruce variety and the rest Magnum Bonums and Main Crop. The 28 acres of first and second year's seeds for mowing were good crops, especially the former, and 30 acres of bottom meadows, which are always mown, were also good for the season. The fields have been well


PLAN OF STAPLEFORD HALL, TARVIN,
HOUSE & FARM BUILDINGS.
GROUND FLOOR PLAN
Pond
Water Course runs through
Watering ledge
Ground Slopes
Wall
Garden
Kitchen
6" drain from Piggeries
Sunk fence
Foot Path
Tank for Pig Liquid
Sunk foot path
Bridge
Fence
gate
Straw yard
Straw yard
Implement Shed
Feeding Bins
Shippon Stock
Shippon Stock
Cart Shed
Cow Store
Hack Stable
Bull
Manure Tank
Open Road
Paved Roadway
Shippon 48 Cows
Enclosed General Manure
Root & Hop House
Calves
Mare & Foal
Rooted Driveway
Wain & Coal
Cart Stalls
Dutch Bay
Dutch Bay
Pigs
Open yard for Pigs
Pig Sties
Pig Sty
Mixing Ho.
Ash
Coal
Large House Yard
Door
Drying Ho.
Office
Scullery
Dairy
Milk & Dairy
Kitchen
Sitting Room
General Room
Garden
Scale of feet
10 20 30 40 50 100 150
Pleasure Garden
Road
Fence

laid out by the tenant, and the fences on the arable land neatly kept, those surrounding the grass being allowed to grow strong for shelter. Hay is cut by Samuelson's grass mower, and Hornsby's self-binder is used for the corn crops. The face of the pastures looked well, and they were grazing satisfactorily. An outlying portion of grass land of strong nature, about 27 acres which had been laid down 12 years, had been stocked since May 10 with upwards of 100 ewes and lambs and 30 yearling heifers, and was a good pasture.

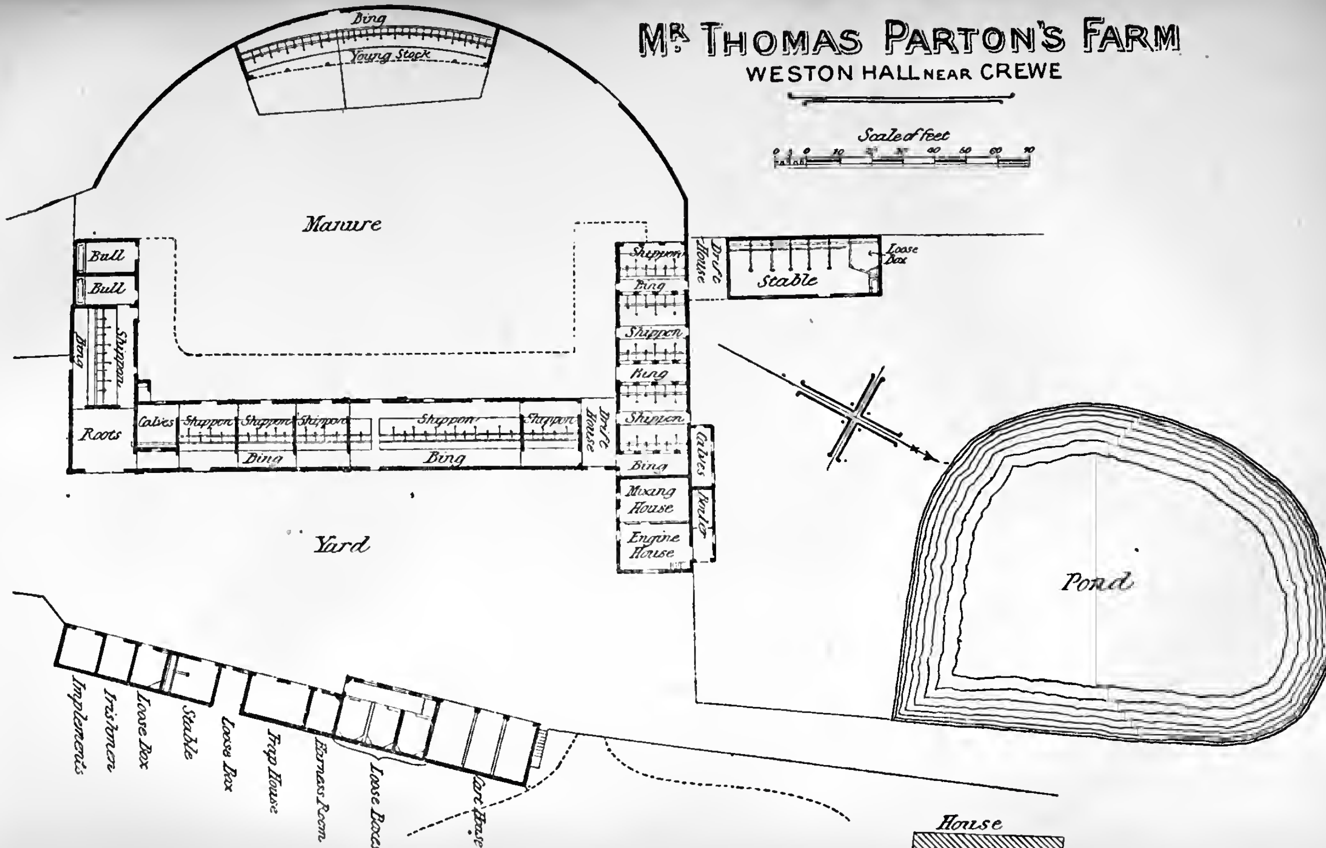
The stock upon the farm included:—

6 cart horses.
2 hack „
1 yearling filly.
87 milking cows and 6 calves (2 to calve and 1 dry).
30 yearling heifers.
26 heifer calves.
1 two-year-old and 1 yearling bull.
2 bull calves.
57 ewes.
77 lambs.
2 rams.
5 breeding sows (Middle White), and 50 feeding and small pigs.
70 head of poultry.

Mr. Lea's beautiful herd of dairy cattle show much character and quality, and great aptitude for milking, and the 30 yearling heifers selected for the herd are calculated to sustain its reputation. He obtains well-bred Shorthorn bulls, and has now in service a heavy-fleshed two-year-old which has done most of the work the last season. This animal is assisted by a useful yearling Shorthorn. About 30 heifers are brought into the milking-herd each year, and the same number of cows disposed of. The early bull calves are usually sold fat at 3*l.* 10*s.* a head average, but after cheese-making commences the calves are disposed of shortly after birth. The bull is put to the cows in July, and to the heifers when they are about 16 months old. Mr. Lea likes the cows to calve down in April. The heifer calves for rearing are kept for a short time on new milk, and gradually taken on hand and well done. The cows are kept off the land entirely for three or four months of the winter. The milking is done by three servant maids, a labourer's wife, two labourers, and two of Mr. Lea's sons. They are assisted in the summer by the Irishmen, who are engaged for a few months in the year. Cheese is the principal product derived from the cows, and its making is superintended by Mrs. Lea. Milk has been for some years sold during the winter, but this was discontinued last year. The dairy premises are contiguous to the house, and the pressing is done in the cheese-making dairy. The medium-ripening system is adopted. The rennet is now added to milk at a temperature of 86° F.; but as the season advances it is raised to 90°. The whey is conducted from milk vat to troughs. It stands until the following morning, when it is skimmed and the cream converted into whey butter. It then runs by pipes to the food-mixing house for the pigs. Three cheeses per day are turned out. They are white cheeses, no annatto being added to give colour. They remain under press four days. Mr. Lea estimates his return in cheese per cow at four cwt. (of 121 lb.) per annum, and the whey butter now produced is about 60 lb. per week. A little cream cheese is also manufactured. He finds a ready sale for the cheese, and sends it off as it becomes fit, at from 65*s.* to 66*s.* per cwt.

The sheep are cleared off each season; about 75 Clun and Shropshire ewes are purchased in the autumn, and tupped in September by Shropshire and Leicester rams. They run the grass land during the winter, and have turnips, oats, and cake after lambing. The lambs, which vary in colour according to the parentage, are sold off as they get fat, at about 30*s.* each, and the ewes go to the butcher as they become dry. They

Mr. Thomas Parton's Farm
Weston Hall near Crewe


Scale of feet
0
10
20
30
40
50
60
70
Bing
Young Stock
Manure
Bull
Bull
Shippon
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Calves
Shippon
Shippon
Shippon
Shippon
Shippon
Bing
Bing
Drift House
Shippon
Bing
Shippon
Bing
Shippon
Bing
Mixing House
Engine House
Calves
Boiler
Drift House
Stable
Loose Box
Yard
Pond
House
Implements
Irishmen
Loose Box
Stable
Loose Box
Trap House
Harness Room
Loose Boxes
Cart House

generally realise more than their original cost, and the lambs and wool leave a profit for their keep. Wool has recently made 9½*d.* per lb. No cake or corn is given on the grass after the beginning of May. The five breeding sows produce about 80 pigs per annum. The first bellies are fed from 10 to 15 score weight on whey and some Indian meal and bran, and the second lots are sold as stores. They are of good quality. The outlay for food purchased is heavy, amounting to an average of 500*l.* per annum, while at the same time about 150*l.* worth of home-grown beans and oats is consumed on the holding. It is not surprising, then, to find that the farm carries as much again stock as when Mr. Lea first took it, 25 years ago. Fruit and poultry are both sources of profit on this well-managed farm. As much as 140 hampers (112 lb. weight) of plums have been sold in a year, while apples and pears bring in some revenue, and considerable returns are realised from the smaller fruit of the garden and other produce there grown.

There are three cottages let with the farm, and these are sublet by Mr. Lea to the horseman, who receives 16*s.* a week and cottage and garden rent free; to the head cowman, who occupies cottage and garden and four acres of land rent free, with 12*s.* a week as wages, equivalent to 1*l.* per week; and to a labourer at 15*s.* per week and cottage and garden rent free. Another labourer who comes from an adjacent village gets 15*s.* per week. The ordinary hours of work are from 6 A.M. to 6 P.M., but stock-men are earlier and later. The labourers have piecework in potato-raising, and beer and extra wages in hay and corn harvest. Three Irishmen are employed for a month in the summer months at 14*s.* per week and a little skim-milk each day. The indoor servants consist of under horseman, who receives 18*l.* per annum and all found; under cowman, the same; and two boys at 10*l.* each. Mr. Lea's two unmarried sons, aged 23 and 19 years respectively, also take part in the work of the farm. The labour account, however, is not debited with their industry, without which it amounts to about 30*s.* per acre, or 450*l.* per annum, and has increased during the last decade. Last year was the worst Mr. Lea has experienced for many years, and this he attributes partly to the wet season, and partly to higher labour charges, damage to crops, and depreciated values of produce.

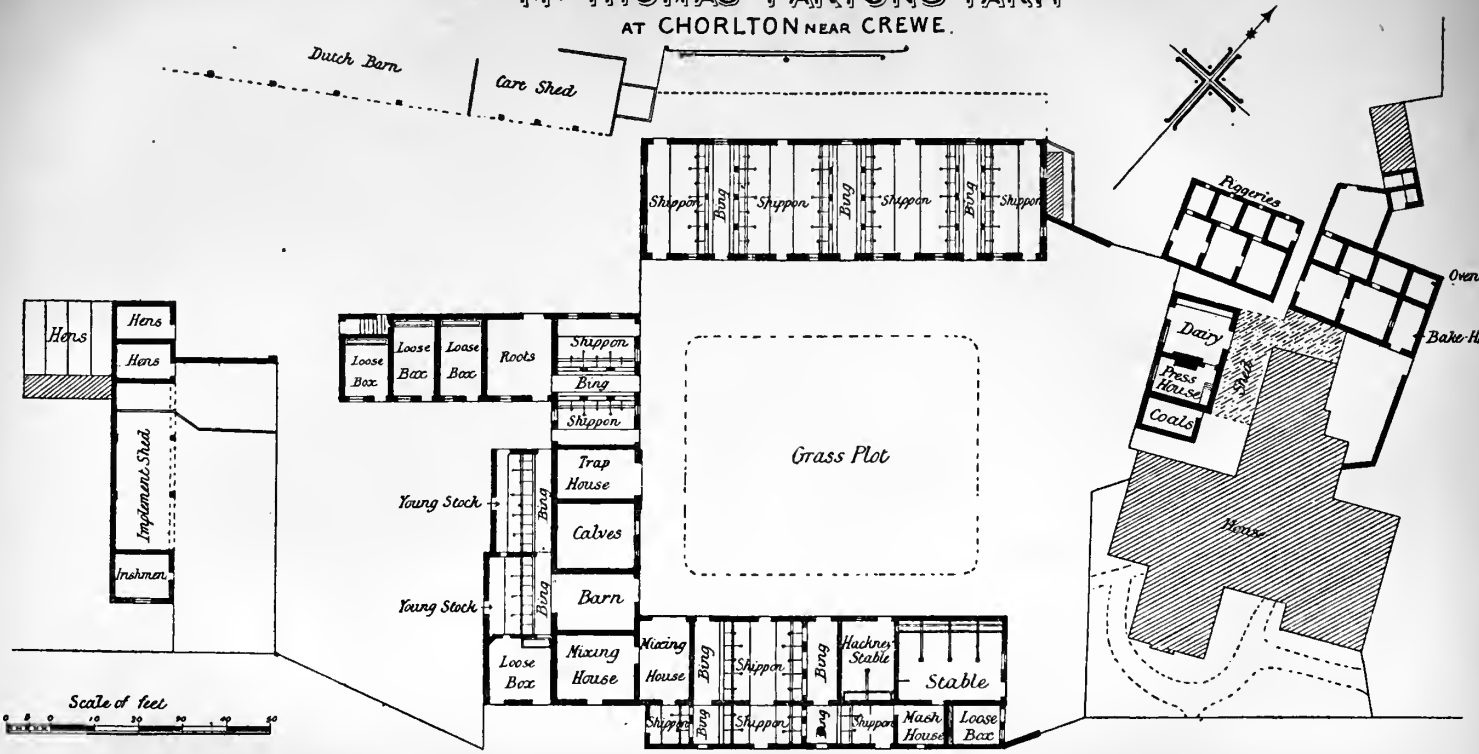
11. *The Farms of* Mr. Thomas Parton, *Weston Hall, near Crewe, Cheshire.*

Mr. Parton's two holdings are in the townships of Weston and Chorlton, three miles from Crewe. The arrangement of the buildings at Weston is shown in the plan on p. 599, and at Chorlton in the plan on p. 601. The altitude is over 200 and under 250 feet, and the climate fairly good, but rather severe in the spring.

They lie upon the New Red Sandstone formation, covered by drift (clay, sand, and gravel). The soil varies from sandy loam to heavy clay, and there is a small acreage of a peaty nature. The lighter soil is devoted to arable culture. The Chorlton holding is, as a whole, of a heavier character than Weston Hall. There are two residences, Weston Hall being occupied by Mr. Parton, and Chorlton by one of his sons. The gardens and orchards cover about 2 acres. The latter contain apples, pears, and plums, from which some monetary return is derived. The buildings are commodious and well arranged. A large capital outlay has been incurred upon them by Mr. Parton, and the conversion of the old steadings to meet the requirements of the times has been thoroughly and economically carried out in accordance with his views. The plans given herewith will fully explain their construction and capacity. The cowhouses have hay tallats over them, and are ingeniously ventilated, and the floors are concreted. Surface drains

Mr. Thomas Parton's Farm

at Chorlton near Crewe.



provide for the escape of urine. There are ties for 95 cows, and boxes and sheds for 24 head of young stock at Weston, and for 48 cows at Chorlton, besides good stabling, sheds, yards, and well-appointed piggeries for 100 pigs.

A Dutch barn, 135 ft. by 18 ft. by 19 ft. high, has also been put up by the tenant at Chorlton at his own expense, with the exception of the timber uprights, and the new dairy and cheese room there were erected by him at a cost of 140*l.*, which has since been refunded in instalments at the rate of 50*l.* per annum. Besides his outlay in the past at Chorlton in draining 100 acres, in some parts completely and in others partially, in removing 8,000 yards of old fences, in planting and protecting 2,138 yards of new quick hedges, in filling marl pits, &c., at an outlay of 150*l.*, Mr. Parton has more recently incurred a heavy expenditure in improvements of the same character at Weston Hall. He has eradicated 1,700 yards of old fences, piped the ditches with 6 in. pipes, and levelled the banks at a cost of 3*s.* per rood of 8 yards; has planted 400 yards of new quick hedges, filled pits, &c. involving an expense of 200*l.*; drained with 6-inch pipes some 30 acres at depths varying from 4 ft. to 8 ft. 6 in. at the outfall; and has effected a great improvement in the construction of a new road by which the milking herd wends its way directly to the buildings. The labour of this work, besides forming, and levelling, involved the cartage of 140 yards of material a distance of four miles. In addition he has also built pavements 60 yards in length by 4½ yards in width.

The holdings belong to Sir H. Broughton, Bart. Weston Hall was taken by Mr. Parton six years ago. Chorlton has been in the occupation of the Partons for upwards of 200 years, and for 20 years of Mr. T. Parton, who, with the exception of the last six years, has resided there all his life. The tenancy is a yearly one terminating at Lady-day at a full rental. No permanent abatement has been made in the rent, but a return of 10 per cent. has been allowed during the past three years. Mr. Parton stated that the local rates had increased of late years, but, as a set-off, tithe has diminished in value. The prescribed rotation of cropping is the four-course system, and the sale of hay, straw, &c., is not permitted except with the sanction of the owner. These covenants are not observed. No compensation clauses in favour of tenant are provided, but he could claim under local customs or the Agricultural Holdings Act. The farms together contain 600 acres, about 320 in permanent pasture and 280 under arable culture. The latter was cropped with 120 acres of oats,—40 of white Canadian, 46 black Tartarian, and 34 yellow one-sided; 60 acres of green crops, viz., 30 acres of swedes, 20 acres of potatoes, 7 acres of mangel, and 3 acres of cabbage and kale; 104 acres of clovers, comprising 56 acres of first year's growth, 31 of second year's, and 17 of third year's leys.

The five-course rotation is usually pursued, viz.: Oats; green crop (potatoes, mangel, and swedes); oats or barley seeded down; seeds; seeds. Wheat is scarcely ever grown, but would follow the green crop. The seeds receive an allowance of 5 cwt. of boiled bones per acre, and are mown the first year once, and sometimes twice. Occasionally the seeds are mown the second year, in which case they receive a top-dressing of 2 cwt. of superphosphate and 5 cwt. of basic slag. They are then ploughed up for oats, after being dressed with farmyard manure. After oats the land is autumn cleaned and deeply ploughed, then stable manure is put on the surface and lightly ploughed in. In the spring it is worked with the grubber and ridged for green crop. In addition to the dung, which is put on at the rate of 16 tons per acre, 5 cwt. of bone superphosphate is applied. Mr. Parton sometimes limes after green crop, in which case he does not apply his bone and superphosphate mixture on the young seeds. The roots having been removed, the land is ploughed up and sown with oats or barley the follow-

ing spring, and seeded down with 3 lb. red clover, 3 lb. cow grass, 3 lb. giant white clover, 3 lb. Alsike, and 14 lb. rye-grass per acre. If the clover is intended to remain down longer than two years, more permanent grasses are added.

From the foregoing description it will be seen that the outlay in artificial manures and purchased stable manure from Crewe is very considerable, but I am debarred by Mr. Parton's wish from giving figures on this and on other points connected with his management. The result, however, was shown in the large crops of oats growing on the somewhat lighter and sharper lands of the holding, and in the grand seeds that were put up for hay or being depastured on the farms, and this notwithstanding the exceptional drought of the season. The potatoes were good and regular. The Bruce, Reading Giant, Cheshire Prince, and Myatts varieties were planted. The mangel (Yellow Intermediates) were not very regular, and the swedes were checked by the season and the fly.

Mr. Parton relies chiefly on his seeds for hay, and only mows some 16 acres of low-lying meadows. These are cut annually, and in addition 80 acres of seeds were this year set aside for fodder. The clovers, which were being cut when the farm was visited, were unusually good for the season, and looked like yielding over two tons per acre. The grazing leys were also most encouraging. The pastures were likewise satisfactory, and although they had carried a large head of stock showed but slight signs of burning. Mr. Parton has laid down 70 acres of land to permanent pasture during the last five years. This was dressed with bones after the first year, and is doing exceedingly well.

At the period of inspection there were on the holdings:—

9 cart horses (2 being breeding mares in foal).
2 ,, colts.
150 dairy cows.
60 yearling heifers.
43 rearing calves.
1 aged pure-bred Shorthorn bull ("Veteran II."), 2nd prize, R.A.S.E., Carlisle.
1 aged pure-bred Shorthorn bull ("Thorndale Waterloo Duke").
1 yearling pure-bred Shorthorn bull ("Squire Teasdale")
1 three-year-old Shorthorn heifer (Winner, Champion M. & L. Society, 1892).
1 two-year-old Shorthorn heifer ("Wild Duchess"), and several yearlings, all very fine animals.
112 breeding ewes (Shropshires) and 143 lambs.
35 yearling ewes ,,
2 Shropshire rams.
12 breeding sows (Middle White breed).
103 feeding and store pigs (33 feeding and 70 store and young ones).
1 boar.
A large number of poultry,—200 chickens, 82 goslings, 78 young turkeys, and 60 ducklings.

The dairy cattle are divided into two herds. Eighty are stationed at Weston Hall, 70 at Chorlton. They are not changed from one holding to the other, but graze upon the same fields exclusively, two large cow-pastures being set aside for them on each farm for a day and night pasture. The young cattle and sheep are allotted to other fields. The Chorlton dairy and cheese farm, built some 7 or 8 years ago by Mr. Parton on a sliding-scale arrangement, is thoroughly and practically equipped. The Chorlton dairy is devoted entirely to cheese-making on the medium-ripening process, and from two to three cheeses are turned out per day; that at Weston partly to

the sale of milk and partly to the manufacture of cheese. The cows are numbered in their stalls, from 1 to 9, and all available hands are requisitioned for milking night and morning, 9 cows being allotted to each milker, but one person does not always milk the same cows. The milking occupies about one hour, and is closely supervised. The whole of the Weston Hall milk is sold from May to August, and for the remainder of the season one-half is sold and the rest made into cheese. The cows are good milkers, and their produce both in quantity and quality will compare favourably with the best herds of the county. The management of the dairy and poultry at Weston Hall is under the control of Mrs. and Miss Parton; that of Chorlton is administered by a dairymaid.

The cows are a fine lot, with great similarity of type and colour, good quality, and very decided Shorthorn character. The bulls previously and now in service are pure-bred Shorthorns. But while looking to quality Mr. Parton does not lose sight of milking attributes, and selects bulls from good milking strains backwards for three or four generations. The cows are drafted off at 6 years of age, if not parted with for other reasons at an earlier period. They are housed early in October, and well fed and managed on the lines previously described, beginning to calve down in November and on through the winter till February and March, when the greater proportion drop their calves. The bull calves are kept about one month on the cows, and are readily sold for rearing at remunerative prices. The heifer calves not kept for replenishing the herd go away sooner, while those retained are reared by hand, well cared for till 16 or 17 months old, then put to bull in July, and ultimately take their place in the dairy.

The flock of Shropshire sheep was established three years ago from good strains of blood. The ewes were a creditable lot, and carefully attended to. They are rutted in October, run the pasture the winter, and are lambed down in the yards. They are supplied with few roots, some cut hay, and ½ lb. of crushed oats through winter, and 1 lb. after lambing, when they frequent the seeds. The lambs have their cake separately in May, and this is continued until they are sold fat to the butcher. The first draft goes at Easter; the last by the end of June. Thirty ewe lambs are brought into the flock each year. About 100 pigs are annually disposed of, half of which are sold fat at some 12-score weights, the rest as weaners. Their food is cooked, and the dairy offal and potatoes are mixed with a liberal allowance of meal.

Two-thirds of the home-grown oats are consumed on the holding, and the purchased food account is a very heavy item in the year's expenditure.

Mr. Parton has six cottages under his control, one occupied by the waggoner, one by the stock-man, and the rest by labourers. Waggoner's and stock-man's hours are from 5 A.M. to about 6 P.M., and ordinary labourers' from 6 A.M. to 6 P.M. The other labour required on farm is accomplished by four Irishmen, who arrive in March and remain till the autumn. They have piecework and extra wages for harvest. Three lads who work on the farm are boarded and lodged indoors, while of the two sons residing with their father, one takes the superintendence and management of the Weston Hall herd, and the other of the flock.

A 6-horse-power traction engine by Fowler with threshing-machine by Hornsby does the threshing, whilst the hay- and chaff-cutting, corn-grinding, cake-crushing, and pulping are done by machinery worked by a small fixed engine connected with a boiler which is utilised for cooking pigs' food, steaming dairy vessels, and other domestic purposes. Hay and corn are cut by Harrison, McGregor & Co.'s grass-cutter (combined and manual delivery), and the rest of the implements on the farm are well up to date.

12. *The Farm of* Mr. R. P. Walley, *Cotton Abbotts, near Chester.*

This typical Cheshire holding is in the township of Cotton Abbotts, near Chester. It is on the New Red Sandstone (Lower Soft Red Sandstone), and is about 100 feet above the sea level. There are some small portions of sandy land, but it is mostly of a retentive character, and is underlaid for a considerable depth by clay subsoil.

The tenant has occupied for 20 years, under an annual tenancy from the Duke of Westminster. There were 80 acres in tillage when he entered, but now the whole farm of 282½ acres is in permanent pasture. A permanent reduction was made in the rental some 10 years ago, and 10 per cent. was allowed on last half-year's rental, to be expended in bones. The house is good. The dairy, an adaptation of a building designed for other purposes, is conveniently arranged, and is equipped with a steam engine of suitable power for driving shafting connected with churn, curd-breaker, &c.; it also provides steam for heating the cheese room by means of pipes, for scalding vessels, and cleansing purposes. The engine forces cold water to cistern for domestic requirements, and pumps whey to mixing tanks for piggeries, &c. The cheeses are raised by a lift from the press room to the ripening or cheese-storing chamber. The buildings, on which a large outlay has recently been made, are skilfully arranged and elaborately finished. The plan on p. 607 will fully explain the details. The covered manure shed protects the concentrated manure of the cowsheds and piggeries which is daily collected in it, while the liquid manure runs from the buildings to a tank in a pasture field at back, and the overflow gravitates on the land. A pipe conducts the liquid to the next field, where the lower level admits of the liquid manure cart being filled from it, and it is then inexpensively distributed on other parts of the pastures.

A Dutch barn, 75 ft. by 24 ft. by 18 ft. high, has been erected by the tenant. The farm is all underdrained, two-thirds of it having been done before Mr. Walley came, and one-third since by him, the landlord finding and laying the pipes. The depth varies from 2 ft. to 2½ ft., with 2½-inch pipes. Portions of the draining done prior to his occupation are now becoming defective. The land is set out on the old Cheshire ridges. It is naturally adapted to pasture, but is renovated from time to time with mixed clovers and hay-seed. One hundred acres are mown each year, and the same land is not mown consecutively for two years if it can be avoided. After mowing it is manured with farmyard manure and bone alternately, and about 100*l.* per annum is expended on boiled bones, which are found from Mr. Walley's experience to be by far the most effective application that can be used. All the mowing is done by Harrison, McGregor & Co.'s grass-mowing machine. Straw has to be purchased for litter in the winter, but it is used sparingly, and sand takes its place in keeping the shippons clean as far as possible. The stock consisted of—

3 Shire mares (2 kept for breeding, with foals).	17 feeding heifers.
3 Shire colts.	14 two-year-old heifers.
2 hacks.	3 bulls.
105 milking cows.	82 pigs.
	A small stock of poultry.

The Shire mares are of good stamp, and there are three very promising unbroken colts, aged one, two, and three years, bred at home. Mr. Walley rears no cattle. The whole of his cows and heifers are purchased. He usually buys 25 rising two-year-old heifers in February and March, and puts them to the bull later on. They to some extent fill up his dairy, but

if insufficient he buys milking cows in the spring. He changes about one-third of his stock every year, and calves down his milking herd as much as possible in February and March. The cows necessarily rely on hay and corn in the winter, when they are not depastured, but this is discontinued after they are turned out in May. The calves are sold when they are a week old at about 15*s.* each. Mr. Walley does not think much of pure-bred cows or bulls for milking, and selects his stock accordingly. They were a useful-looking lot, without any particular type prevailing, and were divided into two herds for grazing.

Cheese-making is the principal industry on this holding, and Mr. Walley contends that if a farm is more suitable for cows than other stock it is illogical to have anything but the former. The medium-ripening system is adopted, and a small quantity of whey butter is churned for household consumption. Five cheeses of about 70 lb. weight apiece are turned out per day in the height of the season, and this year's price has been 65*s.* per 121 lb. 5 cwt. of cheese per cow is produced in the year.

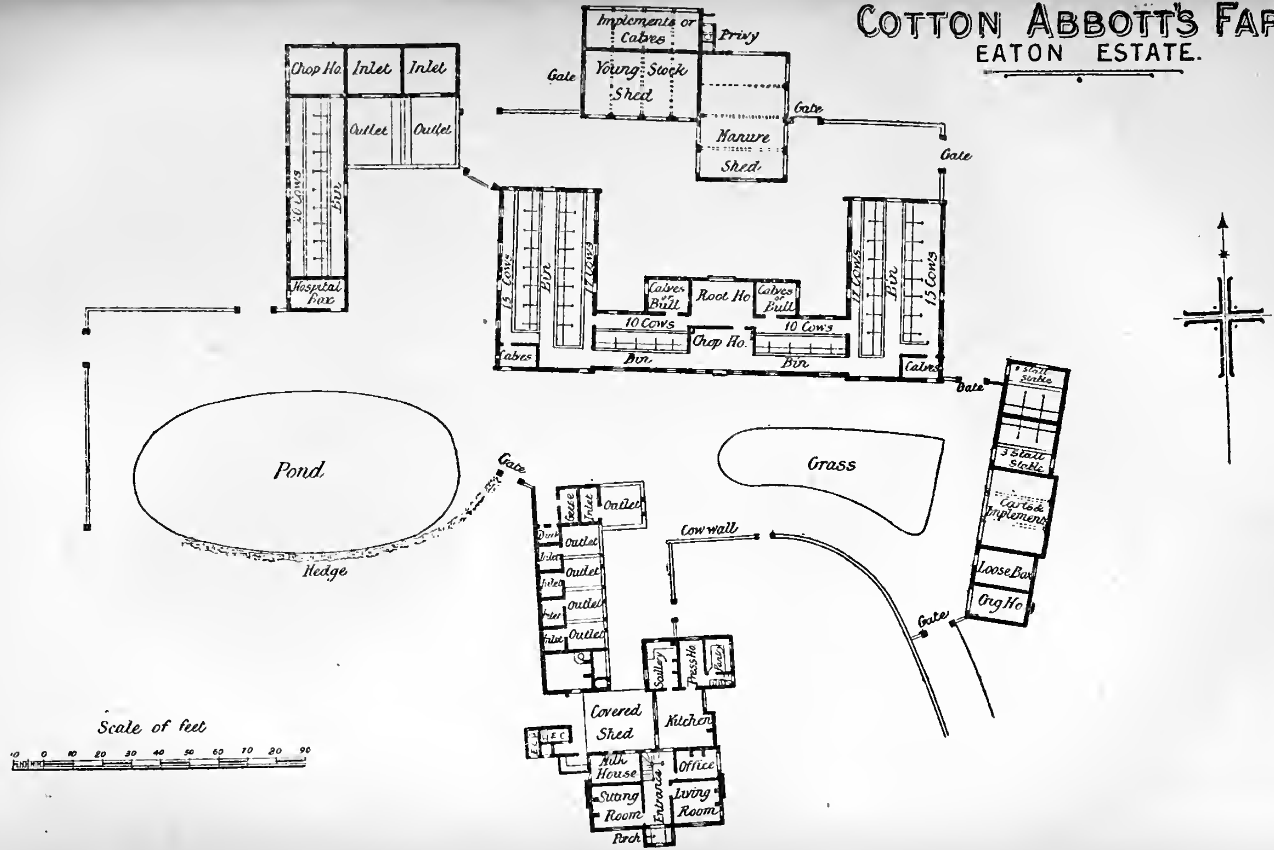
As with the cattle, so with the pigs; none of the latter are bred on the holding. They are purchased as strong stores, and correspond in numbers as nearly as possible to the dairy cows—*i.e.* one pig to one milking cow. The pigs are fattened on dairy refuse, with Indian corn, meal, thirds flour, and bran, and the food is scalded; they are turned out at 12 to 15 score weight. The outlay in purchased food is about 450*l.* per annum.

There are three cottages on the holding, to which Mr. Walley nominates the tenants. One of the occupiers has been there for 18 years. Wages are 17*s.* per week, less 2*s.* per week for rent, but the hours are long, from 4.30 A.M. till 6 P.M. For hay harvest 6*d.* per day extra is paid. A fourth regular labourer lodges with his father. Four Irishmen are employed for two months in the summer, through the hay harvest, at 16*s.* a week and one quart of milk per day. There are no indoor menservants. Three of the labourers' wives assist in the milking, receiving 4*s.* per week for their services, and there are two indoor female servants, receiving 16*l.* and 14*l.* a year respectively, whose wages should be charged to the labour bill of the farm. Mr. Walley does not consider his labour expenditure any heavier than in the past, and is a solitary exception in having found last year above the average in his monetary returns.

13. *The Farm of* Mr. J. Griffith Roberts, *Trefarthen, Llanfair, Anglesey.*

Trefarthen is situated on the shore of the Menai Straits, in the parish of Llanidan, Anglesey, facing the town of Carnarvon on the opposite side of the water. Carnarvon is the market town of the district, and communication is maintained by steamboat, which runs to and fro every hour of the day. The farm is on the Carboniferous Limestone formation, and rises to an altitude of about 50 feet from the shores of the Straits. The climate is genial, and early for North Wales. The surface soil immediately resting on the limestone rock is light and naturally poor. All of this is under arable cultivation; other portions of the surface are stronger, and rest on gravel and clay, and form the best grazing lands on the holding. The holding is rented from Mr. Assheton Smith, and has been occupied by Mr. Roberts for 16 years. The house, grounds, and gardens form a complete gentleman's residence, and the buildings (which are of stone) and approaches are well designed, constructed, and maintained. There is an excellent hackney stable for four horses, with coach-house and saddle-room, besides stabling for six cart horses, ties for 15 cows, and shedding in convenient yards for accommodating 50 or 60 bullocks and young cattle in the winter, cart and

COTTON ABBOTT'S FARM
EATON ESTATE.



implement sheds, with granary above; hay barns, piggeries, and poultry house; corn-mixing room with shafting driven by water-wheel for pulping, chaff-cutting, corn-crushing, turnip-cutting, &c. The water, which is collected in a reservoir, is conducted by underground culvert to the wheel, and the overflow is carried by pipes to the meadow and the shore. The outlay on this work exceeded 300*l.*, and was defrayed by the tenant. The manure is carefully collected in the yards, and that in excess in the fields is gathered up and mixed with soil and used as a top-dressing on the land.

The farm contains 320 acres, including foreshore and quarry waste, and these, together with the space occupied by the house and buildings, leave 300 acres for cultivation. Of this 102 acres are worked as arable land, and the remainder is treated as permanent pasture. The rent, tithes, rates and taxes exceed 600*l.* per annum, which, from a business point of view, seems a high sum, considering the moderate quality of the plough land, which if not highly farmed would be of an unproductive character. The tenancy is an annual one, terminating at six months' notice to quit on November 13. The agreement stipulates that two white straw crops shall not be taken consecutively without manure, and that no hay, straw, or roots shall be sold off without the written consent of the landlord. Sliding scales of allowances are made for tenant's outlay in durable improvements and for manures; for buildings upon cost, on a thirty years' scale; for stone-wall erection on a twenty years' scale; and for manures, one-third of the last year's expenditure and one-fourth of the previous one. No permanent deduction has been made in the rental. Abatements have been allowed for two years past at the rate of 10 per cent., and on the last half-year of 25 per cent. The farm has been excellently laid out, by one of Mr. Roberts's relatives and predecessors, in square fields of from 20 to 10 acres, with a few small crofts. These are bounded by well-built stone walls some 5 feet high and 3 feet wide at bottom, tapering to 18 inches at top, or stone walls enclosing banks on which quick hedges are planted and carefully trimmed and attended to, or quick fences guarded by slate pillars set in ground on end. Watering pits and a well 30 feet deep, with pump to supply water to several fields, have been constructed at Mr. Roberts's expense.

The rotation of cropping is—Oats, mangel and swedes, oats seeded and left down for three or four years. The oats sown after breaking up the clover have 3 or 4 cwt. of superphosphate per acre harrowed in at the time of drilling. Black Tartarians are alone grown, and the large quantity of 8 imperial bushels of seed is sown. The ground is well cleaned after the oat crop, and mangel and swedes put in on the ridge, the former with, the latter without, farmyard manure. They receive a heavy dressing of 10 cwt. of prepared turnip manure per acre. The succeeding crop of oats is seeded down with 8 lb. red clover, 2 lb. trefoil, 2 lb. Alsike, 2 lb. white Dutch clover, 2 lb. timothy, and 1 bushel perennial rye-grass, and these are always mown the first year. There were about 32 acres of oats, half succeeding ley and the rest after roots, 16 acres of roots, 16 acres of first year's seeds, and 51 acres of older leys, on the arable portion of the farm this season, and the remainder in permanent pasture. The oats were of a good colour, and likely to make a heavy crop. The root cultivation was very clean and creditable. The mangel, 27 inches apart, and the swedes 23 inches, were sown the middle of April. A few of the swedes had not been thinned. This work is done by hand-picking by boys, at wages of about 1*s.* 8*d.* a day, under the supervision of a careful man. The plants were strong and healthy. The whole of the clovers and pastures were beginning to suffer much from the prolonged drought. The seeds put up for hay were decreasing under this influence, and the rest of the hay was not likely to prove otherwise than a light crop. Mr. Roberts mows

his first year's seeds, about 16 acres, also 16 acres of two-year-old ley, and 18 acres of older pasture, annually, the latter being taken in rotation after the cake-fed grazing bullocks. These are all well top-dressed with farmyard manure, and occasionally bone superphosphate, either before or after mowing. The normal yield of hay is from 30 cwt. to 2 tons per acre. The expenditure in purchased manures amounts to 45*l.* a year, with an additional outlay of some 10*l.* occasionally for 100 tons of Irish ballast manure, delivered on the shore from the Irish boats.

Of live-stock, besides Mr. Roberts's carriage and riding horses, there were—

5 waggon horses (including 1 breeding mare).
80 black North Wales bullocks.
150 cross-bred ewes and 240 lambs.
100 mountain ewes and 96 lambs.
10 yearling and old rams.
2 pigs (feeding for home bacon).

The bullocks are all purchased, and fattened before being disposed of. They are bought in the autumn and spring of the year at two and three years old, averaging about 12*l.* each, and are sold out off the grass as they become ripe. The average duration of their stay on the farm is from ten to twelve months. They are well done from the time they come on the farm. The young stock (about 50 two-year-old bullocks) are wintered in the yards and run out on the pastures. They have straw and hay chaff and roots pulped, but no allowance of cake and corn. When turned out on the pastures in May, cake and corn is commenced at the rate of 5 lb. per day for each beast. That amount is not usually exceeded, but the abnormal drought this year has necessitated a double quantity being supplied. Even under these conditions the beasts are more backward than usual, and Mr. Roberts apprehended that they would not all be fattened off as usual on the grass. They are generally sold fat from July to November inclusive. The bullocks are divided into lots of about one dozen each according to age and condition, the most forward having the best keep, and the younger ones running with the sheep to keep the pastures evenly grazed. They were a fine lot of animals, and usually finish at from 9 to 10 score lb. per quarter, and realise the top market price. Cows are kept for supplying the house with milk and butter. Formerly the whole of Mr. Roberts's stock was consigned to the London market, but the prices there have become so much depreciated and so irregular that it is now disposed of more advantageously in the locality.

The 150 cross-bred ewes are a cross between the Shropshire and the Leicester. They are put to a Shropshire ram, as are also the 100 white-faced mountain ewes. The cross-breds are mated a fortnight or three weeks before the Welsh, and the lambs are dropped in February and March. The single ram lambs from the cross-bred flock are sold off as fat lambs at about 25*s.* each. The couples are castrated, and such as are not sold are finished on the roots and disposed of in the spring. A large proportion of the ewes are also sold, and the flock is brought up to its normal proportions by the introduction of some of the ewe lambs and the purchase of additional ewes. The lambs from the mountain ewes are all sold fat at about 20*s.* apiece, and the ewes make cost price and leave their wool as profit. Both flocks of ewes run out through the winter, and are brought up to a meadow adjoining the buildings in which a shepherd's temporary sleeping-house is placed. They are selected in lots as they approach lambing, the ewes being carefully marked as to date of lambing during the rutting season. No hay, straw, or roots are sold, and most of the oats grown at home are consumed on the farm. The cake and corn purchased account amounts to between 200*l.* and 300*l.* per annum.

There are four cottages with gardens let with the farm, and included in the rent. They are occupied by stock-men and labourers, whose wages vary from 15*s.* to 1*l.* per week. Extra labour is employed during the harvests. The indoor staff have nothing to do with the farm, the labour bill of which amounts to about 310*l.* a year. Mr. Roberts finds the net returns considerably diminished the last few years, on account principally of the decline in beef. The cost, in and out, of the bullocks and sheep in a great degree determines the balance sheet. Under the generous system resorted to in summer feeding of bullocks, a margin of 10*l.* is required to establish an adequate return, and this has not been forthcoming lately.

14. *The Farm of* Mr. John Roberts, *Well House, Saltney, near Chester* (*Flintshire*).

Mr. John Roberts occupies three farms adjoining one another in the Parish of Hawarden, Flintshire—the Well House (where he resides) and the Catherine Farm, the property of the trustees of the late W. H. Gladstone Esq., M.P., and a farm belonging to S. K. Mainwaring, Esq., Oteley, Ellesmere. The last-named has been in his occupation for 33 years, the Well House since 1866, and the Catherine Farm since 1876. The Well House is about the centre of the holding, some four miles distant from Chester, and the farm is intersected by the Chester, Mold, and Denbigh branch of the London and North-Western Railway, and has the two railway stations of Saltney Ferry and Broughton Hall upon it. The holding consists almost exclusively of sea-reclaimed land (Alluvium of river Dee), and lies but slightly above the high-tide level of that river, into which the drainage of the district and uplands above it is discharged by large watercourses terminating with automatically opening and closing sluice-gates at the Dee side. The main watercourses, three of which run through the farm, are repaired by the landowners of the district. The soil, which is alluvial in character, is for the most part of a strong nature and underlaid by clay, but the sand crops out at the surface to a limited extent in some of the fields.

The house on Mr. Mainwaring's farm is sub-let, and that at the Catherine holding is converted into three comfortable cottages. The three sets of farm buildings are fairly good, and accommodate the large number of stock that are wintered and fattened. The heifers are tied up for feeding in a conveniently arranged cowhouse, and the bullocks fattened in nicely sheltered yards. The drainage is conducted from the buildings by gravitation to the adjacent fields. An Abyssinian pump 84 feet deep brings up through a 2-inch pipe a never-failing flow of water, which supplies engine boiler, and cattle when feeding. Pulping, cake and corn crushing, &c., are done by fixed machinery worked by 6-horse-power engine.

Mr. Roberts has during his tenancy cleared 6,256 yards of old fences and replanted 2,064 yards, the landlord finding the quicks, and has laid out the fields with straight hedges, and in sizes from 15 to 40 acres. He has carted 700 loads of soil to fill round the Mainwaring Farm House, and has drained the Mainwaring and Well House Farms at his own expense, the Catherine Farm being done by the landlord. He has filled up many pits and carted ashes for three miles of occupation roads, besides breaking up the pasture land liable to flood and relaying it with improved mixtures of seeds. The Well House and Mainwaring Farms are held under an annual tenancy with agreements the covenants of which are not regarded, but the Catherine Farm is taken without any written contract; a permanent reduction of rent was effected some 8 or 9 years ago, and 25 per cent. has been allowed on the Well House and Catherine Farms for the last half-year's payment. The

rates have not varied much for some years. This season's crops consist of—

Wheat	133 acres	Seeds (second year's for grazing)	53 acres
Oats	89 „	Permanent grass land (mowing)	11 „
Beans	12 „	Permanent grass land (grazing)	193 „
Mangel	15 „		631 „
Potatoes	7 „		
Swedes	39 „		
Seeds (first year's for mowing)	37 „		
Do. (second year's for mowing)	42 „		

A five-course rotation of cropping is usually pursued, beginning with wheat, oats, or beans; next, green crop, viz., mangel, swedes, and potatoes; followed by wheat laid down with seeds, which remain for two years. The first year's seeds, which are mown, receive farmyard manure; the second year's ley is grazed and ploughed up for wheat in autumn, or for oats or spring beans. The stubbles are usually steam-cultivated, and lie for the winter, and a fine seed bed is thus secured for the mangel and swedes. These are sown on the ridge 28 inches apart, some with farmyard manure, and the remainder with bone superphosphate or Proctor and Rylands's prepared turnip manure. The Golden Tankard mangel is preferred, but the Intermediate is also grown. The mangel is top-dressed with 1½ cwt. of nitrate of soda per acre. The swedes were raised from a purple-top variety of fine quality, selected and improved by Mr. Roberts himself. This year's crop was grown from four-year-old seed, and has come up regularly and well. Manurial experiments were being conducted on swedes with phosphatic and nitrogenous manures, but at the date of inspection no fair comparison could be instituted. The potatoes (8 acres of Spencer's new), selected on account of their quality after the potato trials held on the farm in 1888, looked very promising. They were planted on manure in ridges 28 inches wide. The wheat, owing to the previous wet autumn, had not been put into the ground so well as usual, and had suffered accordingly. The spring beans and most of the oats were luxuriant, and the seeds excellent.

A series of interesting investigations on the formation of permanent pastures have been made by the Royal Manchester, Liverpool, and North Lancashire Agricultural Society on the farm, with the co-operation of the tenant. Mr. Roberts has instituted separate experiments on the subject, and also as to the best and most suitable mixtures of seeds for the ordinary clover rotations adopted on the holding. The Manchester and Liverpool Society's experiments occupy 7¾ acres of strong loamy clay which is not sea-reclaimed land, and therefore more closely approximates to the strong soils of the country generally. The field was thoroughly cleaned and steam-cultivated in the autumn of 1885. Five one-acre plots were set out and devoted to the trial of five different mixtures of grasses and other seeds for permanent pastures; three half-acre plots to mixtures suitable for one-, two-, and three-year-old clover leys respectively; and the quarter-acre was divided into 45 small sections on which plants of a similar number of different kinds of grasses, clovers, &c., were sown as an educational object lesson for the farmers of the neighbourhood, and others interested. These were all sown in the spring of 1886, and came up well. The cost of the mixture for permanent pastures varied from 16*s.* 9*d.* to 2*l.* 10*s.* 11*d.* per acre. Two of the trial plots contained perennial rye-grass and other grass and clover seeds; two had Italian rye-grass and other grass and clover seeds; and the remaining one—the most expensive—consisted of the mixture recom-

mended by the late Mr. Faunce De Laune (Journal, 2nd Series, Vol. XVIII., 1882, page 261), which contained no rye-grass.

A full and interesting account of these experiments has been published by the Manchester and Liverpool Society to the end of the year 1891, in which it is stated that, from the observations made, the following general deductions may be drawn:—

1. Italian rye-grass appears to be perennial to some small extent. The few plants still found after six years' growth may, however, be seedlings from the old plants, and probably are so.
2. Perennial rye-grass is distinctly permanent.
3. Meadow fescue, perennial rye-grass, timothy grass, and crested dogstail make up the bulk of the grass herbage; and meadow fescue appears to spread and retain its valuable character the best of any species.
4. The heavy sowing of cocksfoot on most of the plots does not seem at all too much for this locality. In some similar experiments carried out at Lancaster, three pounds of seed was found to be almost too much. The quantity it is desirable to sow in any locality must be decided by observation and by individual experience.
5. Hard fescue, sheep's fescue, fiorin, and wood meadow grass appear to have died out in every instance. They would, therefore, seem to be useless in this locality.
6. It is questionable whether much of the white clover now filling the bottom may not be the wild form of the plant existing in the land.
7. Take it altogether, however, the majority of the plants sown have remained permanent, and the number of interlopers is extremely small. It may be added that in plot No. 4, Bird's-foot trefoil has, from the first, proved itself a valuable plant.

Mr. Roberts's independent experiments on the growth of permanent pastures were carried out on one of several small paddocks which he has divided from the arable land adjoining the Well House for the convenience of the occupation, and which are now sheltered with a well-grown quick hedge, and used in the spring for the lambing of the ewes, and in the summer for his hacks and also for the poultry. Four small plots, about a fifth of an acre each, in one paddock were sown with the following four mixtures in the spring of 1890. The land was perfectly cleaned and the seeds were laid down with the oat crop in the usual way.

No. 1.—8 lb. Italian Rye-grass.	4 lb. Meadow Foxtail.
4 lb. Cocksfoot Grass.	4 lb. White Clover (Dutch).
6 lb. Meadow Fescue.	4 lb. Tall Fescue.
2 lb. Timothy Grass.	

In all 32 lb. per acre, costing 20*s*.

No. 2.—4 lb. Italian Rye-grass.	3 lb. Tall Fescue.
6 lb. Cocksfoot Grass.	4 lb. Meadow Foxtail.
5 lb. Meadow Fescue.	3 lb. White Clover (wild)
2 lb. Timothy Grass.	1 lb. Alsike Clover.

In all 28 lb. per acre, costing 20*s*.

No. 3.—5 lb. Devonshire Evergreen Rye-grass.	2 lb. Tall Fescue.
5 lb. Italian Rye-grass.	3 lb. Meadow Fescue.
4 lb. Meadow Foxtail.	3 lb. Timothy Grass.
3 lb. Cocksfoot Grass.	2 lb. White Clover (Dutch).

In all 27 lb. per acre, costing 14*s*. 8*d*.

No. 4.—3 lb. Italian Rye-grass.
2 lb. Meadow Foxtail.
2 lb. Cocksfoot Grass.
4 lb. Tall Fescue.
8 lb. Meadow Fescue.
2 lb. Timothy Grass.
4 lb. White Clover. (wild)
1 lb. Rough-stalked Meadow Grass.
5 lb. Devonshire Evergreen Ryegrass.

In all 31 lb. per acre, costing 19*s.* 6*d.*

The plots have done well, and a good permanent turf has been secured in each case, but No. 2 appeared to bear the best herbage when inspected. The mixture on this plot is almost identical with that on one of the experimental sections on the Manchester and Liverpool Society's land, which also looked extremely well, and which had stood the test of four years' growth. Mr. Roberts contends that the experiments on his farm have demonstrated that the more costly mixtures formerly recommended by seedsmen for permanent pastures were unnecessary, and in most instances results were obtained inferior to those from the No. 2. mixture he has so successfully used.

In 1890 Mr. Roberts on a 21-acre field of his arable course also tried the following mixtures of seeds for remaining down temporarily only. The plots were divided into 7 acres each, and were seeded as follows—

No. 1.—10 lb. Italian Rye-grass.
4 lb. Cocksfoot Grass.
1 lb. Timothy Grass.
3 lb. Red Clover.
1 lb Alsike Clover.
1 lb. Trefoil.
2 lb. White Clover (Dutch).
2 lb. White Clover (wild).

No. 2.— 6 lb. Italian Rye-grass.
6 lb. Perennial Rye-grass.
4 lb. Red Clover.
2 lb. White Clover (wild).
1½ lb. Alsike Clover.
1½ lb. Trefoil.

No. 3.—14 lb. Italian Rye-grass.
1 lb. Cocksfoot Grass.
1 lb. Timothy Grass.
6 lb. Red Clover.
1 lb. Alsike Clover.
1 lb. Trefoil.
1 lb. White Clover (Dutch).
1 lb. White Clover (wild).

These were mown in 1891, grazed in 1892, and mown again this year. Nos. 1 and 3 are far superior to No. 2, although the red clover has died out. The perennial rye-grass appears to overcome the other seeds on No. 2, and the stock will not graze it, while most of the original grasses are to be found on the others. The remaining plots were full of white clovers, and the herbage was succulent. No. 1 carries the palm, and its suitability to the land is shown on a 36-acre field (two-year-old ley), which is a magnificent pasturage, notwithstanding its having been heavily grazed with cattle, sheep, and horses since the early spring. Mr. Roberts in the earlier part of his tenancy had laid down and renovated some 70 acres of pastures, and since 1886 has put another 37 acres into grass on the Catherine Farm with his No. 3 mixture. This land bears a good face, having been dressed either with farmyard manure or compost of lime and soil mixed, and assisted much by the trough- and root-feeding of the sheep in the winter and spring. The practice pursued is to mow, in addition to the clovers, a moderate area of permanent grass, which afterwards receives a dressing of farmyard manure. The outlay for bone and nitrogenous manures is about 120*l.* per annum.

The live-stock on the farm consisted of—

14 cart horses (including 3 breeding mares and foals).
2 two-year-old cart colts.
3 yearling ditto.
18 milking cows in calf or milk.
85 steers and heifers rising two years old.
21 steers and heifers (calves).

—while 138 fat two-year-old off-bullocks and heifers, from 8 to 10 scores per quarter, were disposed of at Mr. Roberts's annual fat stock sale, which took place a day or two before the inspection, and several of the lots were uncleared when the farm was visited—

247 stock ewes.
69 yearling ewes.
126 yearling wethers.
243 lambs.
1 sow and 6 pigs.
A large assortment of poultry, including turkeys, ducks, &c.

The horses are clean-legged and useful, and 3 mares had good foals, two by Wellington Boy, and one by Magog, the Duke of Westminster's Shire stallion. The two-year-olds were good-looking, with nice hair, as also were the yearlings. Eight cows are kept for butter-making purposes. A few cows purchased prove in-calf, and their offspring after being left on their mothers 8 or 9 weeks are reared by hand and well done. Other calves are bought which they assist to rear, two calves being frequently allotted to one cow. Most of the cattle fed are purchased either as yearlings off or as calves. Some are well-bred Irish Shorthorns obtained at Bristol, and the remainder are picked up as opportunity offers. The calves when weaned at 8 or 9 weeks old are given 2 or 3 lb. of linseed-cake and meal, with hay and a few swedes. They are then fed on clover and grass, and still caked. They are wintered in yards with an augmented supply of cake and corn, some roots and hay, and then go to grass the following spring, and are tied up in October, commencing with 6 lb. of cake and meal with roots, and finishing with 10 lb. per beast. The yearlings-off, mostly steers and maiden heifers, if purchased before the grass is ready, are fed with hay, a few roots, and some cake. When first turned out in spring they still receive a little hay, with some cake and corn, and, when brought up to feed in October, are pushed on by heavy allowances of home-grown roots, Indian corn, cotton- and linseed-cake, and home-grown bean and oatmeal, in the stalls and yards, through the following winter, and sold fat at the annual sale the first week in June, at weights from 8 to 10 scores per quarter. The normal number of cattle on the holding is some 210 head. These are partly reared from calves, but the far greater proportion are bought at some 15 to 18 months old in April and May, and in the autumn for winter feeding. The large majority, being young steers and prime maiden heifers, make the highest market price. They do not suffer to the same extent from the competition of the foreign meat trade as in the case of older-fed beasts. The breeding ewes were formerly Hampshire Downs, but they have been crossed for some years with Shropshires, and have acquired in a great degree the Shropshire characteristics. They are put to ram at the end of September, and lamb down in February and March, run out the winter on grass, receiving chopped hay and bran, and some few roots, and, after lambing, they get hay, and the ewes with double lambs a little mixed linseed-cake and oats until May, when the grass is abundant. The ram lambs are all castrated early, and the best are sold fat as they are ready from the beginning of March up to June 1. The remainder run on the grass through the summer and succeeding winter, being fed on roots, cake, and corn. Some are disposed of to the butcher the following February or March in the wool, and the rest off the grass after being shorn, with the exception of about 70, which are drawn into the flock annually, replacing a corresponding number of old ewes fed off.

The returns from the sale of fat stock are very considerable. For the year 1892 they amounted to, for cattle, 3,302*l.* 9*s.*, for sheep 668*l.* 11*s.*—a total of 3,971*l.* The particulars for this year had not been ascertained. The outlay in foods purchased is large, usually between 600*l.* and 700*l.*

per annum, while some 4,000 bushels of home-grown oats, and the beans and seconds wheat, are also consumed on the holding.

The fields are large and generally well laid out, but their shape depends in some cases on the line of the watercourses and the railway. The fences are strong. The land is subject to flood in the winter, and requires very careful working when dry, or results would be unsatisfactory. The stubbles are usually steam-cultivated immediately after harvest.

There are six cottages let with the holding, all occupied by waggoners and stock-men. Six Irishmen work most of the year, being lodged in barracks on the premises. The rate of wages is about 16*s.* a week and cottage and garden rent free, with potato ground for stock-men. Sixteen shillings a week is the wage for ordinary labour. A good deal of taskwork is done; mangel and swede hoeing about 10*s.* per acre twice over; binding and stooking cereals after machine, 5*s.* per acre; cutting beans with sickle, and binding and stooking, 12*s.* Other manual labour is obtained from the neighbourhood. The labour bill averages about 1,000*l.* per annum, without allowing for the energetic assistance of three sons, one of whom supervises the sheep and another the cattle, and of two daughters. Mr. Roberts keeps a concise and clear record of his transactions in stock book, diary, and cash account, and says that had he not done so he would not have been farming at the present time.

15. *The farm of* Mr. John Smith, *Sudlow, Knutsford, Cheshire.*

Mr. Smith's holding is in the parish of Over Tabley, near Knutsford, Cheshire. It is on the New Red Sandstone (Red Marl) formation, and is between 170 and 200 feet above the sea level. The surface soil is a sandy loam, and the subsoil mostly sand. There is a good farmhouse, with small well-kept garden in front. The substantially built brick buildings form two sides of a rectangle facing the side of the house, and the drainage collects at the back in a small well, the overflow running into Lord De Tabley's park. There is stabling for 8 horses, besides shippons for tying 60 cows, 5 loose-boxes, engine house with vertical boiler and 5-horse-power engine by Nicholson with well-arranged shafting, which works corn and cake crusher, chaff-cutter, and pulper, conveniently fixed adjacent to granary, and hay tallat, in corn-mixing room beneath. A pipe also runs from the boiler to steam-chaffed food, &c., therein. The piggeries accommodate 25 to 30 pigs, and there is a living-room for the casual Irishmen employed, and implement sheds and yards. The large expenditure of 700*l.* has been incurred by Mr. Smith to perfect the buildings, and he also pays interest on the outlay on the new engine house and two Dutch barns, 90 ft. by 24 ft. by 18 ft. high, which have been erected by the landlord.

1,077 yards of old fences have been removed and 1,787 yards of new hedges have been planted, the landlord finding quicks and material for protection. Mr. Smith has drained 30 acres 5 feet deep and 7 yards apart at 7½*d.* per rod, and 44 acres 4 feet deep and 10 yards wide at 9½*d.* a rod; the landlord finding the pipes. Although in a great degree light in character, the drainage was requisite, on account of the impervious beds of foxbench (or sand) underlying the surface and preventing the percolation of the water from the land; 2½-in. pipes have been used for the ordinary drains, and 4-in. and 6-in. for the mains.

The tenant has also trenched and levelled, at very considerable expenditure, a large sandhole and marl pit, besides filling 5 smaller pits and 440 yards of deep and inconvenient ditches. He has likewise constructed six well-arranged watering-places for stock, and laid out and metalled a permanent roadway 300 yards long.

Mr. Smith has occupied the farm for eleven years, and now holds it on a 21 years' lease from Lord De Tabley. The rental has not been altered since the farm was first taken, but 10 per cent. reduction was allowed on the last half-year's payment. Rates and taxes have slightly increased. The holding is 210 acres, and with the exception of 10 acres is all arable, in the sense that there is no restriction as to breaking the land up. Practically, however, taking the existing arable crops and the first and second year's seeds as the rotation course, there are 132 acres arable and 78 acres pasture. The lease admits of freedom of cultivation. In case of mismanagement the landlord can interfere under arbitration clauses.

The undermentioned crops were growing at the date of inspection:—

16	acres	of potatoes.	23	acres	of first year's seeds.
5	„	swedes.	35	„	second year's seeds.
2	„	mangel (Yellow-fleshed Tankards).	22	„	third year's seeds.
			32	„	fourth year's seeds.
15	„	oats.	14	„	fifth year's seeds.
15	„	barley after wheat (first time sown barley).	10	„	permanent pasture.
			210	„	
18	„	wheat.			
3	„	rye.			

Mr. Smith pursues the following rotation:—Oats; green crops and potatoes followed by mangel, cabbages, kale, or swedes the same season; wheat or oats; oats or barley; seeds for one, two, or more years.

Poland oats are sown on a single furrow without manure at the beginning of March. The land is autumn cleaned and ploughed; and the oats are followed by green crops, a portion of which are early potatoes, succeeded the same season by transplanted mangel, cabbages, and swedes. Part of the green crops are grown on the ridge, the rows being manured and split in the usual way. That portion allotted to early potatoes is prepared on the trenching system in lands or butts, as described (p. 581) under Mr. Burrows's system of cultivation. Stable and butcher's offal manure is applied on the tops of the lands and covered with soil, with a high-breasted plough, before dibbling in the early potatoes. A little nitrate of soda is sometimes also used for roots. Wheat is sown after green crops without manuring. The wheat stubbles are heavily dressed with 4 to 5 tons per acre of lime, of which 100 tons are annually used and sown in the spring with oats or barley laid down with 4 lb. red clover, 3 lb. Alsike, 1 lb. timothy grass, $\frac{3}{4}$ lb. perennial, and $\frac{1}{4}$ lb. Italian rye-grass per acre, and the seeds remain two, three, or four years, until they are broken up again for oats at Mr. Smith's discretion. The clovers are topdressed with Warrington and Manchester concentrated manure on the first year's seeds, at the rate of 3 to 4 cwt. per acre, before mowing. The first and second year's leys are mown, but not more than once in the season. From 50 to 60 acres are annually made into hay. The root crops were regular and starting well after hoeing, and the late potatoes (Reading Giants) were looking well. The early potatoes—Kidneys, Duke of Albany, and Early Regents—which had been sprouted in boxes set on rafters over the heads of the cattle in the buildings, were an excellent crop, and would all be secured by the end of July. Beds of mangel (Yellow Tankards), swedes, Drumhead cabbages, and thousand-headed kale were interspersed at convenient distances throughout the potato field, for transplanting as the potatoes were harvested, and the furrows were already growing transplanted cabbages. These are all used for the stock in the winter, the potatoes alone being sold. The wheat was not very thick; the barley forward and good for the season. The seeds for mowing were fair crops, and the older

grazing leys bore a good face. The oats (Carter's Cluster, and Scotch Potato) were a heavy crop. The new fences were straight, and the fields laid out with good judgment. They were well grown and attended to, and creditable to the management of the tenant. The cost of purchased manures amounts to 100*l.* per annum.

The stock consisted of—

7 working horses (including 4 brood mares).
2 light horses.
1 yearling colt.
32 cows in-milk or in-calf.
14 heifers, aged from 12 to 18 months.
2 pure-bred Shorthorn bulls.
2 bullocks twelve months old.
32 rearing calves (bulls and heifers mixed).
39 ewes.
43 lambs
4 pigs (Middle White).
150 fowls and ducks.

The horses were very good. The Shire mares are fashionably bred, and are stinted to "Carbon" and "Lancashire Lad" and "Royal William." Two five-year-olds are disposed of every year at high prices and younger ones take their place. The cows are a very nice herd of animals, full of quality and breeding. They have been crossed with pure-bred Shorthorn bulls, the one in present use, "Butterman" 62242, being a superior animal. The dairy cows are kept almost exclusively for the sale of milk and cream, both in summer and winter. A little butter is made for the use of the house only. About 12 heifers are annually reared to make good the waste in the herd; they are reared on hand and fed with pure milk for about one month, then gradually put on skim milk and linseed-cake and meal. The remainder of the heifers are sold fat to the butcher at two years old, and the bulls are either sold for stock purposes before they are twelve months old, or, if not disposed of, are castrated and fed out as bullocks at 2 years of age at about 8 score 10 lb. weight per quarter. The yearlings and calves were an improving lot. Mr. Smith usually buys 50 cross-bred grey-faced sheep in the autumn and puts them to a Hampshire Down ram about the last week in September, and sells their produce as fat lambs at some 30*s.* each. The ewes are afterwards sold to the butcher. He also purchases some 50 store lambs and some wethers in October. These run on the aftermath, and are then well fed with roots and corn and disposed of fat by the following March. The pigs are bought as strong stores and fattened on buttermilk, house refuse, and corn, and killed at about 14 score weight. Between 400*l.* or 500*l.* worth of food is purchased each year, and the whole of the home-grown seconds corn, including wheat, barley, and oats, is consumed on the farm. The implements are well selected, Hornsby's self-binder being used for the cereals, and the hay and straw for sale are trussed by hydraulic pressure with Ladd's trusser, and bound with wire. Each truss weighs about ¾ cwt. Mr. Smith sells about 50 tons of hay and 40 tons of straw per annum.

There are two cottages and gardens attached to the farm, for which Mr. Smith pays rent; they are occupied by two workmen, who receive 17*s.* 6*d.* a week and are rent free. These men get 1*l.* extra for harvest, and their wages are estimated to be worth 1*l.* per week. One man lives in the house at wages of 25*l.* a year and board and lodging. Two female servants, receiving 16*l.* and 8*l.* respectively, are fairly chargeable to the farm; while as a rule eight Irishmen are employed for 4 months, from June to September inclusive, at 16*s.* per week. The labour bill amounts to 400*l.* per annum. Extra cost of labour and smaller returns for beef and other products reduced Mr. Smith's returns considerably last year.

Conclusion.

It may be asked, What deductions can be drawn from the foregoing brief description of the typical farms, and what lessons

can be learnt from its perusal? It is manifest that these can only be general; because although the proverbial courtesy of the British farmer was, on the writer's tour of inspection, found in no respect to have diminished, there was either an implied or an expressed disinclination on the part of most of the occupiers visited to allow many of the details of their private affairs to be published for the information of the public. The reports must, therefore, speak for themselves, but they are significant on several points. They indicate that Cheshire has not suffered agriculturally so much as many other counties. To what cause is this attributable? Partly, no doubt, to the spirited action of the owners and occupiers of the land. It is obvious, from a consideration of this Report, that owners of property have realised in the past, and still realise, the necessity of thoroughly equipping the farms so as to economise the cost of production. This is evidenced by the superiority of the houses and buildings inspected. Tenants have also shown remarkable energy and enterprise in the large outlay they continue to make on durable and permanent improvements, and they also pay sedulous attention to the details of their avocation. In some instances their outlay upon buildings is surprising.

Compared with the past, the farming has vastly improved. Draining has been generally accomplished, and the system of marling the land has been superseded by the general application of bones, which have a marvellous effect upon the pastures of Cheshire. In several instances the numbers of the live-stock on the holdings visited had been doubled in the course of a decade or a somewhat longer period, while the crops had largely increased in yield. Labour-saving machinery and appliances connected with the dairy and farm have also become the general rule.

But, although these changes for the better are in operation, similar improvements have not prevented the agricultural crisis from presenting itself in a more acute form elsewhere than in Cheshire, and we must seek other reasons for this county's comparative immunity from agricultural distress. Among these is the system of farming. Dairying, as of old, is still the great agricultural industry of the county, and in connection with dairying the breeding and feeding of pigs is an essential feature.

It would appear, therefore, that Cheshire has suffered less agriculturally because—

(1) There has been a smaller decline in prices of dairy produce and pigs than in other agricultural commodities.

(2) The prices of feeding-stuffs are lower than ever before.

(3) The cost of manurial fertilisers is less.

(4) The consumption of home-grown corn where suitable to the stock has been conducted at a profit.

(5) The natural aptitude of the land to lay down well and rapidly to grass suits the system of farming pursued.

(6) The practice of freedom of cultivation and free sale has enabled products to be raised with advantage, and sold at a profit, whilst fertility has been sustained by the exchange for cheaper commodities.

(7) The keeping of the labour bill within moderate dimensions, as compared with the returns from the holdings, is also one of the chief factors which account for Cheshire's comparative prosperity.

As a general rule, the proportion of root crops and cereals to the whole acreage on the arable farms is small. The five-course system largely prevails on the arable holdings, and is occasionally still further modified by leaving the seeds down a third, and in some cases a fourth year; and although such farms are ostensibly arable to a greater extent than the ordinary rotation implies, they are, with the exception of the cereals and roots, essentially grass farms. This system economises labour. It was generally asserted that none but the low-lying meadows could be regarded as permanent pastures, and that the fields that have been down for some years in grass were improved by being broken up. Such a doctrine as this would in most counties be considered heterodox. The power of deciding the matter is, however, retained by the landlord. A custom is gradually being established which recognises clover leys of over three years' standing as permanent pasture. Formerly, no period under seven years would admit of this interpretation, such fields being regarded as forming part of the arable area. On the farms inspected the proportions of roots and cereals varied from *nil* to 46 per cent., but the number of head of stock per acre did not fluctuate to so great an extent as might have been anticipated.

"Three acres and a cow" is a common phrase, but these Cheshire farms usually manage to carry a larger proportion of stock. The returns show that from $1\frac{1}{4}$ to 2 head of cattle per three acres, besides pigs, are carried on these well-farmed occupations, the number of pigs varying somewhat widely between one pig to three acres and one pig to five acres. The grass-land farms carry more stock in proportion to the arable than might have been expected, but this is accomplished at an increased outlay per acre of food purchased. In reference to the customs and agreements already referred to in the preliminary remarks, it was there asserted that, notwithstanding the restrictions imposed, the practice of freedom of cultivation and free sale of produce was generally acted upon by the tenants.

Admitting most fully the necessity of safeguarding the land from abuse, why, may one ask, are these obsolete clauses, insisting on discontinued practices, introduced in covenants and leases? In other districts farmers are required to observe them, and therefore stand at a comparative disadvantage. It may be

argued, if this be the case, the landlord suffers by submitting to a lower rent, because the restrictions reduce the returns. But the tenants are placed at a disadvantage also, and in many instances are within measurable distance of making no rent at all. To avert this, changes of some sort must be effected. One such that is likely to prove of advantage is free trade in the husbandman's avocation. Agriculture itself is sorely depressed, and its followers are despondent, and the time has arrived for the general recognition of freedom of cultivation and free sale of produce. Land may be exhausted under such conditions, but this may also be the case under existing ones. It is the farmer's interest to sustain the fertility of the land, provided he is protected from the fruits of his energy and outlay being confiscated. In the event of free cultivation and sale being the established rule, the owner could make an exception with regard to the latter privilege at the end of the tenancy, and thus in some degree retain the means to repair impoverishment. He could stipulate that the land should be kept clean. Given clean land, chemistry has taught us how to restore fertility rapidly, if not so thoroughly as by means of long-continued good farming.

These Cheshire farms have passed through the existing crisis with less disastrous consequences than others in adjoining counties, and one of the reasons for this is the immunity from restraint, tacitly ceded, with regard to the sale of commodities that can be replaced at a lower cost. The moderate expenditure in labour as compared with the returns is the last, but not the least, factor in Cheshire's agricultural success. The labour bill varies from 20*s*. to 35*s*. per acre, but in reality in but few instances is the tale all told by these figures. The work of the masters and mistresses, and of the sons and daughters, is not debited, and, if it were, probably the balances standing to the credit side of the account at the end of the year on many a holding would be transferred to that of the debit. The amount of indoor and summer Irish labour is also a special feature. Most of the farmers employed several men and lads indoors, and Irish quarters are specially provided at the homesteads. Probably this style of labour is economical, if well-directed and supervised, but, to a stranger in the land of peasant small holdings, it was somewhat of a revelation.

The farms visited were a credit to the agriculture of the country, and the writer, in concluding, has to thank the occupiers and the members of the Chester Local Committee for the kindness and assistance he received during his tour of inspection.

J. Bowen-Jones.

Official Report.

QUARTERLY REPORT OF THE CHEMICAL COMMITTEE,

JULY, 1893.

1. This case refers to a manure sold as "Pure Dissolved English Bones," but found on analysis to be adulterated with dried blood.

Colonel T. J. Levett, of Wychnor Park, Burton-on-Trent, sent on May 13, 1893, a sample of two tons of what had been sold to him as "Pure Dissolved English Bones," at the price of 6*l.* 10*s.* per ton, carriage paid, for cash. The vendors were Messrs. Chaplin & Vincent, Shrewsbury Estates Bone Manure Works, Weston, Stafford.

The report returned by Dr. Voelcker was—

	May 20, 1893	
Moisture	11·16	
[1] Organic matter and water of combination	30·05	
Monobasic phosphate of lime	9·10	
Equal to tribasic phosphate of lime (bone phosphate) rendered soluble by acid	(14·25)	100·00
Insoluble phosphates	21·40	
Sulphate of lime, alkaline salts, &c.	26·95	
Insoluble silicious matter	1·34	
[1] containing nitrogen	2·56	
equal to ammonia	3·11	

This is not pure dissolved bone, but contains admixture of dried blood, and the nitrogen is not derived merely from raw bone, as it should be.

Meanwhile, another four tons had been ordered, to be of the same description as the first two tons.

On Colonel Levett receiving Dr. Voelcker's report he wrote to the vendors asking if the original guarantee had been kept to, and he received the following reply :—

Weston, May 29, 1893.

Col. Levett, Wychnor Park.

SIR,—The last lot of manure we sent you was pure raw bone and vitriol, with about ¾ cwt. to the ton of sulphate of lime, used as a drier, the other lots sent to you the drier was *fine bone* instead. We hope it has given satisfaction.—We are, sir, yours faithfully,

CHAPLIN & VINCENT.

Dr. Voelcker then wrote to Colonel Levett :—

May 31, 1893.

DEAR COL. LEVETT,—A manure which is sold and invoiced (as your purchase was) as "Pure Dissolved Bones" should be made of "raw bone and acid only," and any admixture, be it gypsum, or blood, or anything else, constitutes adulteration.

Good manufacturers have no difficulty whatever in making dissolved bones in the way required.

The admixture of dried blood is reprehensible, as leading the purchaser to believe that he is buying a manure the whole of the nitrogen of which is derived from raw bone. . . .—Yours faithfully,

Col. Levett. J. AUGUSTUS VOELCKER.

The vendors wrote again :—

Weston Works, Weston, Staffs., June 2, 1893.

Col. Levett.

SIR,—In reply to yours of the 1st instant, we are surprised and very sorry to find that there was a small quantity of blood in the last lot of dissolved bone supplied to you. On inquiry this morning our foreman explains it by the season being advanced and the stock low; there was not quite enough pure bone to execute the order, and a little turnip manure was put into it to make up the weight: this contains blood, and will account for the slight trace discovered by the analyst.

The manure was manufactured here, and we have no doubt that the report of the analysis is correct.

We much regret the occurrence and are willing to make any concession you may require.—Yours obediently, CHAPLIN & VINCENT.

The two following cases refer to refuse materials of little value, and sold under the names "Fish Bone Manure" and "Fish Manure."

2. Mr. John H. Littlefair, of The Brinns, Shap, sent on May 20 a sample of "Fish Bone Manure," which cost 3*l.* 10*s.* per ton.

The report returned was—

May 30, 1893.

Moisture	21·23	100·00
[1] Organic matter	21·94	
Phosphate of lime	2·58	
Carbonate of lime, oxide of iron, &c.	23·86	
Sand	30·39	
[1] containing nitrogen	0·95	
equal to ammonia	1·15	

A refuse material, worth nothing like the price you are asked for it.

Mr. Littlefair subsequently wrote :—

Brinns, Shap, June 24, 1893.

DEAR SIR,—Fish Bone Manure, No. 833. Yours of the 30th ult. came duly to hand, for which I am obliged. I have delayed answering until I heard from the manure company. I wrote acquainting them of the

unsatisfactory way in which the crop upon which the manure was used was progressing, and of the poor analysis I had received. They wrote saying there were secrets in the manufacture which gave it a high fertilising value, and which would not be shown by analysis, and that someone near me had used it and had been astounded by the result, and that they could not understand it not working in this case. I got five tons of the stuff and used it at the rate of 10 cwt. to the acre on swedes. The first five acres got so badly away that I determined on an analysis. The drought may have had something to do with it, but I think we have had plenty of rain for turnips. I have sown five more acres and they seem to be doing fairly well. I am reluctant to give any names or do anyone any harm until I have given the manure a full trial, so should like to wait till the end of the season before returning the form.—Yours truly, JOHN H. LITTLEFAIR.

Dr. Voelcker, 12 Hanover Square, London, W.

Mr. Littlefair subsequently wrote :—

Brinns, Shap, July 17, 1893.

DEAR SIR,—Being in communication with the people from whom I obtained the manure, I have delayed answering your letter until I had finished with them. I have had the manager here and have settled with him for the five tons for 7*l.* 10*s.* . . .—Yours truly,

JOHN H. LITTLEFAIR.

Dr. J. Augustus Voelcker.

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3. Mr. R. H. Cleasby, of Broomside House, near Durham, sent on May 22 a sample of "Fish Manure" costing 3*l.* per ton delivered.

The report on this sample was—

	June 3, 1893.	
Moisture	23·42	
[1] Organic matter	22·73	
Phosphate of lime	2·87	100·00
Carbonate of lime, oxide of iron, &c.	23·73	
Sand	27·25	
[1] containing nitrogen	0·77	
equal to ammonia	0·93	

A material of very small intrinsic worth, and exceedingly dear at the price you are asked to pay. It is not worth paying carriage upon.

Under the name "Rice Meal" is sometimes sold what is really nothing more than rice husks or rice "shudes," as they are termed.

4. Mr. H. E. Raynbird, Steward's Office, Hackwood Park, Basingstoke, sent on June 6 a sample of an article which he said was sold to him as "Rice Meal." Mr. Raynbird's letter was as follows:—

June 6, 1893.

DEAR SIR,—Under another cover I send you a bulk sample of an article sold to me as "Rice Meal," which I have given to horses, cattle, sheep, and

pigs, both separately and mixed with other foods, and I cannot get anything to feed it. Will you kindly tell me what it is composed of, and the reason nothing will touch it, and also what is its value for feed, and what is likely to eat it, and oblige ?—I am yours truly, HUGH E. RAYNBIRD,
per A. R.

The report given by Dr. Voelcker was—

June 14, 1893.

Moisture	9·34	100·00
Oil	0·96	
[1] Albuminous compounds (flesh-forming matters)	4·01	
Digestible fibre, &c.	29·23	
Woody fibre (cellulose)	38·48	
[2] Mineral matter (ash)	17·98	
[1] containing nitrogen	0·64	
[2] containing silica and sand	16·13	

June 14, 1893.

H. E. Raynbird, Esq.

DEAR SIR,—The analysis which I send you will explain the inferior quality of the meal which you purchased, and its unsuitability as a feeding material.

It is not rice meal at all, but is really what is known as rice "shudes" or husks.

It has hardly any feeding properties whatever, and what there are are quite obscured by the high amounts of woody fibre and silicious matter of which the husk is mostly composed.

Such a material ought not to be sold as rice meal at all, and is not a fit food for stock.—Yours faithfully, J. AUGUSTUS VOELCKER.

From the particulars given, it appeared that Mr. Raynbird had purchased 26 tons at the price of 2*l.* 15*s.* per ton ex wharf in London, payment in one month. Mr. Raynbird, however, was unwilling to give any further information in respect of the case.

EMLYN,
Chairman.

July 25, 1893.

Notes, Communications, and Reviews.

LOUPING ILL.

[The Society is greatly indebted to His Grace the Duke of Northumberland, K.G., for his kindness in placing at the disposal of the Journal Committee the following interesting and valuable report made by Dr. Klein, F.R.S., under the instructions of the Duke, into the disease of sheep known in Northumberland, and elsewhere in the North, as the Louping Ill, this name referring to the "leaping," or jumping, which characterises the affected animal.]

REPORT ON THE ETIOLOGY AND PATHOLOGY OF "LOUPING ILL."

By the invitation and wish of His Grace the Duke of Northumberland, I have made an inquiry into the nature of the disease known in the north-west of Northumberland as the Louping Ill, and in the following pages I beg to report on the results of this inquiry. At the outset I wish to express my obligation to Mr. E. G. Wheler, the Duke's Commissioner, who, with great readiness and promptitude, made every endeavour to render this inquiry during my stay at Kielder as fruitful as possible. Amongst others to whose assistance I am beholden, my acknowledgments are especially due to Mr. Walter Hedley of Bewshaugh Farm, from whom I not only received most useful and reliable information, and his personal assistance in many ways, but who also, at no small inconvenience to himself, placed his buildings at my disposal for the purpose of making my post-mortem examinations.

Nature of the disease.—As is well known, the chief and most conspicuous symptom of the disease manifests itself in disorder of the muscular function of the head and limbs, consisting in abnormal contractions, loss of co-ordination of movement, and ultimately in loss of movement of the limbs altogether. During the earlier phases of these symptoms, which generally repeat themselves in paroxysms, the animals show actual or intended jumping movements; hence the popular name of "Louping Ill."

With the first onset of the disease the animal is quiet, does not feed, and separates from the rest; it shows at the same time loss of muscular power, and periodic contractions (trembling and cramp)

either of one limb or another, or of the extensors of the head ; soon (next day) this abnormality is much accentuated, the animal shows paroxysms of more extensive cramps when attempting to stand or to walk, and a more or less deficient co-ordination in the movements of the limbs, so that, while attempting to walk, its gait becomes perfectly unsteady and its movements more like "the reeling and the antics during alcoholic intoxication," as one farmer graphically expressed it. It is during such paroxysms that the symptom of louping or jumping becomes apparent. Either on the same or on the next day the animal is altogether unable to move its limbs, or is capable of doing so only in a very imperfect manner, or for a short period, and therefore remains for long periods lying motionless on its side. In this state the movements of the nostrils, mouth, tongue, eyes and ears seem unimpaired, and the animals are able to notice everything that is going on around them, to take food, and to swallow.

Death generally supervenes rapidly—within from a few hours to a day—after the animal has reached this phase. The climax often occurs unexpectedly, even before this phase is reached, since it is not unusual that animals, supposed to be only "slightly affected" or being on the mend in the evening, are found dead the next morning. But, as a rule, death is preceded by some hours (up to a day or two) by the state of more or less complete loss of movement of the limbs.

Among other and less conspicuous symptoms to be noted not unfrequently, in animals markedly affected in the above manner, are a rapid beat of the heart, rapid, sometimes laboured, respiration, and rise of temperature.

I have made post-mortem examinations of seventeen animals—eleven sheep and six lambs ; few of these died in the natural course of the disease, the great majority were killed, some in the earlier, some in the later stages of the illness.

Post-mortem appearances.—1. The constant and most conspicuous pathological feature was the condition of the brain and medulla oblongata. This consisted in great engorgement of the vessels of the pia mater, particularly of the base of the brain and the anterior surface of the medulla ; the latter being the more noticeable on account of an almost sharp boundary line between the congested pia mater of the medulla and the normal appearance of that of the adjoining cervical cord. The congestion of the vessels appears, however, limited chiefly to the surface, the cerebral and medullary substance itself not showing anything markedly abnormal in these respects. The congestion of the vessels of the pia mater extends to those of the ependyma of the ventricles. The second conspicuous change consists in an abnormal amount of fluid within the sac of the dura mater, or, more correctly, the subarachnoidal fluid ; this fluid, besides being always considerably more abundant than normal, is at the same time more or less blood-stained. In a few cases only the subarachnoidal fluid looks to the naked eye clear and limpid, though under the microscope red blood discs are per-

ceived in it ; in most cases the sanguineous character of the fluid is conspicuous to the naked eye, and when examined under the microscope it is found crowded with red blood discs.

2. The change next in importance as regards frequency, concerns the lungs. In sheep in an early stage of the disease the lungs show no conspicuous change, but when the disease is well established the lungs show lobular congestion with petechiæ, which, in the later phases, amounts to (red) consolidation of a large portion of a lobe, most commonly in the middle portion of the lungs. When the disease runs its full course and the animal is examined after death, the consolidation involves the greater part of one lung (middle and lower portion) or even both lungs. Such parts look dark red, are hepatised, and sink in water. On incision they are very juicy and yield much sanguineous fluid. In lambs the lung is always involved ; even in cases when the post-mortem examination is made a day after the animal showed the first symptom of the disease, one commonly finds the middle portion of one lung affected, being in a state of extreme congestion and red hepatisation. Pleural fluid, sometimes of sanguineous character, is present when the lung is involved, and the amount of this exudation is greater the more extensively the lung is affected.

3. A further important change is noticeable in the heart and pericardium. In sheep this condition is always present except in the earliest phases ; in lambs it is present only to a small extent, and then only in the well-pronounced and later phases. Amongst the six lambs the cardiac change was absent in two, and was present only to a limited extent in the other four. The change is this : Hæmorrhagic spots, patches and streaks on the endocardium of the right or left ventricle, or both ; in some cases the surface of the trabeculæ carneæ being streaked with bloody patches ; the auriculo-ventricular valves of the right or left heart, or both, show the same hæmorrhagic patches, and at the same time are slightly swollen ; the right auricle is occasionally swollen and glassy-looking in its visceral pericardium, and this appearance is very conspicuous in the visceral pericardium of the base of the ventricles.

In sheep in later phases this condition amounts to a conspicuous gelatinous or myxœdematous infiltration ; the parietal pericardium in the well-pronounced cases shows this gelatinous infiltration to a remarkable extent, being not merely an œdematous but a true myxœdematous infiltration ; the same is the case in the connective tissue between the sternum and pericardium, extending in some pronounced cases through the cervical aperture of the thorax into the deep connective tissue of the neck. The amount of this myxœdematous change of the connective tissue, in the anterior portion of the thoracic cavity, is in some cases so great that the gelatinous material can be taken out almost by handfuls. The myxœdematous condition of the pericardium and mediastinal connective tissue did not occur in any of the lambs. Here only the hæmorrhage into the auriculo-ventricular valves was noticed ; but in sheep the myxœdematous infiltration of the base of the ventricles, of the

parietal pericardium, and of the mediastinal connective tissue is present in most instances of well-pronounced disease to a greater or lesser degree. The pericardial fluid is increased in amount.

4. The thyroid gland of the adult animal appears of the normal size. In its interior there are white, creamy, grumous masses which, under the microscope, are made up chiefly of scaly epithelial cells. But such creamy masses are present also in normal sheep. As far as the examination of sections of the gland under the microscope goes, the structure of the thyroid appears normal. In the lambs the thyroid appears also of normal size, and in structure shows no change; in one lamb only was the right thyroid reduced in size (to about half that of the left) and showed in its substance what appeared as greyish streaks and patches; under the microscope these greyish portions were loaded with granular masses.

5. The liver shows in some cases congested patches, but in others seems normal.

6. The spleen is small and normal.

7. The stomach and intestines look normal; in lambs the ileum is congested.

8. The kidneys look normal.

9. The blood is normal in its appearance and coagulability; in cases only of pronounced lung disease it is of dark colour.

Summary.—Of all the appearances that I have described, those affecting the brain and the medulla are the only ones which could account for the symptoms observed during life and for the fatal issue. The affection of the lungs, severe only in few cases; and the affection of the pericardium, only in few cases conspicuous and almost absent in lambs, would not produce any notable symptom during life, and could not be the cause of death, so rapid in some cases. The actual changes of the lung and heart observed in lambs are in conspicuous disproportion to the severity of the illness and the fatal issue; and, similarly, in sheep (except in few cases), the intensity and amount of the lesions in the heart and lung were of such a nature that they could not, in a mechanical way, account for the rapid death. On the other hand, the changes in the brain and medulla are of a nature that, by causing "brain pressure," would be the very conditions which, by their rapid development and rapid increase in intensity, could, by mechanical means alone, readily cause the disease and its speedily fatal issue; an extensive congestion of the vessels of the pia mater setting in suddenly, an acute copious transudation from them, and a consequent rapid increase of the subarachnoidal fluid would, as a matter of course, readily cause those motor disturbances so prominent in this disease; while the increasing pressure on the medulla oblongata might, owing to its secondary effect on the centres of respiration and the cardiac centre, cause the fatal issue.

The primary cause of the disease should then affect, in the first place, the vessels of the pia mater, causing therein an acute congestion, with subsequent exudation and increase of the cerebral fluid.

And the question is, "What causes this congestion?" or, in other words, "What is the *causa causans*?"

Etiology.—The consideration of this question brings us to the discussion of the etiology of the disease. There are, in the first place, several points which are well established, and which, by themselves, strongly point to the malady belonging to the class of infectious diseases.

1. The disease has a seasonal and local epidemic character. As is well known, cases of "louping ill" commence during the second half of April; they steadily increase in number towards the middle of May, and then decrease again, so that, by the commencement of June, the disease vanishes for the year. In this respect its similarity to the epidemic and seasonal character of some infectious diseases in man and animals—*e.g.* cholera and grouse disease—is obvious and striking. As is well known, epidemics of the above diseases commence at a particular season; cases, at first few, gradually increase in number till the climax is reached, and then as gradually diminish so as to again almost completely disappear. With regard also to preference for one locality to another, the "louping ill" partakes of the character of infectious diseases. It is well known that this disease is present only in particular districts in Northumberland and Scotland, is absent from others, and is, as far as I can learn, not known south of Northumberland. Even in districts where the disease prevails, a fence between one sheep farm and the next is, I am informed by experienced farmers, occasionally found to be the boundary between an infected and non-infected area. This same fundamentally important local predilection forms a conspicuous feature in some infectious diseases, both of man and of animals—*e.g.* cholera.

2. The *causa causans* of the disease is contained on, or in, the soil. In illustration of this there is the well-established fact that if from any farm in which the disease had occurred the animals are removed and a new flock from a non-infected locality brought into the farm, the disease at the proper season will make its appearance amongst the new flock, and, as a rule, to a greater extent than before. The infectious diseases to which similar characters belong are not rare; thus, in anthrax or splenic apoplexy of sheep and cattle, the actual mode in which the animals contract the infection is by receiving the contagium of anthrax from the soil, in and on which it is diffused, and from which, by the respiratory or digestive organs, it is received into the animal. In malarial fever of man (ague) the contagium of the disease lives and thrives in marshy soil, and from here finds its entrance into the respiratory organs and the blood by the instrumentality of the air.

Now, with regard to "louping ill," I learned that it is the almost universal custom that, when an animal dies, its carcass is left on the moors and there rots away till it disappears. Supposing that, as in infectious diseases, the body of an animal that has succumbed to the disease contains the contagium in an enormous crop of the specific microbes, it is obvious that if such an animal is allowed to

remain unburied or unburned, during the dissolution of the carcass numbers of the specific microbes have an opportunity for becoming scattered and distributed over the soil, to remain there ready for new mischief when the favourable time (season) and opportunity (the susceptible animal) offer themselves. Conditions like these would readily account for and explain how the soil of a locality once infected remains a source of infection with great persistence, and also how a locality free from diseased sheep remains free from the infection, while an adjoining farm year after year harbours the disease.

There exists among the farmers and shepherds in the affected districts of Northumberland and elsewhere, a strong, and I may say an almost universal, opinion, shared in by many others who live in the district, that the disease is caused by a true *tick*—a poisonous species of the Arachnida known as the "white tick" as opposed to the ordinary or black sheep tick, and this opinion is founded on the following assertions : (*a*) this "tick" is present where the disease occurs, but (*b*) is absent where there is no disease or where the disease is unknown. About the first, viz., that where there is disease there is also the tick, there can be no doubt : the inspection of the skin (axilla, groin, and thigh) of a diseased sheep or lamb proves this ; but I must confess that I have grave doubts as to the correctness of the second, viz., the absence in all cases of the tick from localities where there is no "louping ill," and my doubts will, I am afraid, not grow less strong the greater the confidence with which that assertion is put forth. Unless, and not until, this statement is supported and confirmed by authority, I mean by a zoologist well qualified to give an opinion—until it is really proved that this tick does not exist in localities where the disease does not occur, *e.g.* on similar moorlands of Yorkshire and Cumberland, I must hold that the conclusion arrived at by the farmers and shepherds and other laymen is based on the well-known fallacy in argument : *post hoc ergo propter hoc* ; in other words: "The tick is found in a locality where disease prevails, therefore the tick is the cause of the disease, and therefore where there is no disease there is no tick."

My doubts in this matter are, in the first place, prompted by the remarkable and undeniable fact that the same tick is present in an infected locality on a good many sheep that are, and remain, free from the "louping ill" ; this is admitted by the same persons who consider the tick as the primary cause of the disease ; and, in the second place, it would be almost short of a marvel that the tick should be present in one farm and, by the farm-boundary—a loose stone fence or less—should be excluded from the next farm, which is free from the disease. I say such an explanation of things seems to me almost impossible of acceptance. There is certainly nothing known in the whole range of epidemic diseases that would offer a similar remarkable condition. An animal that is affected with the disease, as a rule, shows in the axilla or groin or thigh one or two ticks well buried with the head and legs within the skin ; in some cases the tick is no longer there, but has left a mark—a blood

speck, or a slight pimple—in others it is there, and full of blood which it has sucked up; its body is blackish red and as large as a medium-sized pea. As far as I can see, all that this tick seems to be doing to its host is that it sucks its blood and produces locally no more (in fact less) injury than many other well-known animal parasites. When the tick settles on the skin of a human being, I am told that it *sometimes* produces a conspicuous local irritation with swelling; the only instance in which I had the opportunity of seeing a child that had been bitten some hours previously by this tick, and from whose skin the mother had removed the tick, there was certainly nothing of any local irritation visible. But even assuming that the tick generally produces a local irritation and swelling, this would be no more than is the case with other skin parasites, particularly those that live on the blood of its host, for it is well known that such parasites secrete into the bite a substance which prevents the blood of the host, at the point of the bite, from coagulating, and thus keeps, as it were, the draught of the blood free by keeping the blood fluid. The undoubted fact, however, mentioned above and admitted on all sides, viz., that this same tick is found in the skin of animals that are, and remain, free of "louping ill," seems to me to finally dispose of the theory that the tick is the real or proximate cause of the disease "louping ill." This would still leave open the possibility of the tick being the carrier of infection, inasmuch as it might carry the virus from the soil to the body of the sheep, which by its bite it inoculates; but this theory is, it must be confessed, somewhat remote.

3. The disease is apparently communicated from one animal to another. It is well known that if a ewe contracts the disease, her lamb, with few exceptions, also becomes subject to the disease, but a lamb may have the disease without its mother becoming ill. The lamb always follows, and is always in close relationship to, the ewe. Amongst the first signs of illness is this, that the animal is dull and separates from the rest; now, if the animal happens to be a ewe, it does not matter whether it separates from the rest of the flock or not, its lamb is sure to remain with it, and therefore, if the disease be of an infectious nature, we should naturally expect that sooner or later the lamb would take the disease from the mother. This is actually of common occurrence. But this would not be the case if the lamb takes the disease first, for then we should find two things happening; first, that the lamb would not or could not follow its mother, consequently the ewe is not so much exposed to infection from its lamb; and secondly, for this reason, that owing to the apparent neglect on the part of the ewe, and for other reasons (be it of charity, or of lucre, or both), the shepherd removes the lamb from the flock, taking it into a shed and nursing it, though, as a rule, this does not avail much.

All these facts taken together would, then, strongly point to the disease being communicable from animal to animal.

Another fact pointing in the same direction is this: that cattle also become affected with the disease, though they, as a rule, recover.

I have myself seen at a farm where the disease prevailed amongst sheep, a bullock affected with it; the animal recovered in a day or two, but was distinctly affected; its symptoms were very striking, and as the shepherd graphically described them: "The animal behaved and moved as if it were tipsy." As soon as it showed the disease it was isolated from the rest of the herd and attended to, and no further case appeared amongst the cattle. It is curious that in the case of this bullock no question of tick was, or could be, put forward, yet this happened on a farm where the disease had been rife amongst the sheep.

There is one other phenomenon which seems to me worth mentioning, although I do not, and indeed I could not at present, until further and more extended observations have confirmed it, put it forward as more than a suggestion. It is this: in all previous years the climax of the epidemic in the farms about Kielder, I am assured, is not reached until the middle of May; this year, however, by May 10 few, if any, cases were available—the epidemic had practically ceased and run its course on these farms. Now, this year, for the first time, on and after April 27, *i.e.* soon after the epidemic commenced, every animal, as soon as it was smitten with the disease, was removed from the rest and brought down to me for investigation, so that thereby every diseased animal ceased to be a focus of infection to the others. The curious fact that the epidemic had by May 10 already so abated as to be practically over, was admittedly striking; and though the disease did not commence earlier than usual, *i.e.* about the end of the third week in April, it nevertheless ceased this year considerably earlier than usual. As I said above, I by no means wish to insist that the immediate removal of the diseased sheep from the rest is the true explanation of the abnormal shortness of the epidemic in these farms, especially as the unusually fine and dry spring may have had something to do with its cessation; but, at any rate, it is highly suggestive and worth acting on.

I strongly advise action being taken in the future in this direction, viz. as soon as a sheep shows the illness let it be separated from the rest and kept isolated in an enclosure for the purpose; no harm can come from this; whereas it may be, as I hope it will, a means of diminishing the number of cases and of mitigating the epidemic. It could not altogether do away with the disease, for we have pointed out that the cause of the disease, in the first cases at any rate, must be sought in the soil; but it might limit the infection spreading from a diseased animal to the others. The two conditions: viz., the contraction of the disease in the first instance by contagium present and left on or in the soil by a previous epidemic, and the subsequent spread of the disease from an infected animal to others, are well known to occur in other infectious disorders, both in man and animals.

All these considerations lead us, then, to the conclusion that the disease belongs to the group of infectious or communicable diseases. There can be no doubt that if it can be shown that the growth and

multiplication within an affected animal of a particular microbe is intimately associated with the disease; if, further, this microbe can be artificially cultivated, and with a trace of such a cultivation, or with the morbid matter from which it is derived, the same disease can, by inoculation, by ingestion, or by inhalation, be reproduced in a susceptible animal, with the multiplication in this experimental animal of the same specific microbe; then the proof has been established that such disease is of the order of the infectious diseases and is caused essentially by that particular microbe. In the case of such disease the early isolation and removal, and the careful destruction, of the affected animals is the surest means of the prevention and spread of the disease. Though this series of proofs is desirable before the problem can be said to be satisfactorily solved, it is not always possible to obtain it. In some of the well-known communicable diseases—*e.g.* small pox of sheep, small pox of man, hydrophobia or rabies, and others, though these belong to the best known communicable diseases—the *causa causans*, or the specific microbe causing these diseases, has hitherto eluded discovery. Some of the ablest pathologists have in vain searched for it, yet we may take it as a fact that, like other infectious diseases in man and animals in which the search has been successful—*e.g.*, anthrax of sheep and cattle, tuberculosis, swine fever, grouse disease, and a host of others —these diseases must be caused by living, self-multiplying microbes.

I have therefore directed my particular attention to investigating in this direction the various diseased organs in the sheep affected with, or dead from, "louping ill." The result of this part of the investigation is the following :—

1. The blood was examined in all cases in the fresh state, and after the usual methods of preparation by staining, but no extraneous particulate matter, and no microbes, could be detected. Cultivations made from the heart's blood, and duly incubated, remained free from any growth. So that no microbes were to be detected in the blood by the known methods of examination.

2. The examination of the cerebral fluid microscopically and culturally, yielded in six out of the seventeen cases positive results, inasmuch as under the microscope, and particularly by cultivation in these six cases, one and the same definite species of bacillus was detected. This, in specimens prepared after the usual methods of making coverglass specimens (drying a thin film on a thin coverglass, staining and mounting this), a few short bacilli singly and in dumb bells could be detected; and in cultivations made on the surface of nutrient gelatine and nutrient agar—by rubbing a drop of the cerebral fluid over the surface of these media by means of a sterile platinum loop—colonies came up when these were incubated respectively at about 20° C. (=68° F.), and at 35–37° C. (=95–99° F.). In two cases the number of the colonies was considerable, in the other four there were in each tube two or three colonies of this species. By saying that in six cases the cerebral fluid yielded colonies of one species, I ought to add that in some of these cases, as well as in others, from a drop of the cerebral fluid in one or the

other culture tube (there were in each case at least three gelatine and three agar cultures made), one colony of a different species of bacteria was obtained. But these other species were not the same in any two cases, and owing, therefore, to their scarcity and to their exceptional appearance, they may be at once dismissed as accidental contaminations ; that is to say, as introduced in the process of preparing the cultivations. But the above species that occurred in the six cases was uniformly present, and, besides, was in the case of two of the animals very abundantly present in each culture tube.

The colonies of this species are round, somewhat raised above the surface of the nutritive medium. They appear only slowly on gelatine, being three to four days before they are sufficiently developed to be seen with the naked eye ; but on agar incubated at 35–37° C. they are noticeable by the second or third day. The colonies are *of a distinctly yellowish aspect* when looked at in reflected light, but when seen in transmitted light are brown.

In streak-culture they form a yellowish band-like growth in the line of the streak, which at first is greyish and narrow, gradually as growth proceeds becoming broader and of a yellowish colour. The outline is knobbed or crenated, thinner at the margin, thicker in the middle. When this band has been growing for some time—one to two weeks—on gelatine, it looks moist and markedly yellow in the thicker parts. Later on the edge becomes filmy and slightly corrugated. In stab-culture the line of the stab becomes marked as a linear aggregation of greyish round droplets, brown in transmitted light. On the surface of the stab there is, after some days, a slightly prominent yellow knob ; at first very limited, but gradually spreading out into a patch-like yellow mass. The gelatine is not liquefied. Milk is not coagulated by the growth of the microbe.

Faintly alkaline broth becomes, by the growth of this organism, turbid in a couple of days ; later the broth shows a fairly copious floccular greyish precipitate.

Examined under the microscope, the growth is composed of minute non-motile rods or bacilli ; short ovals to fairly long rods, measuring on the average 0·6–0·8–1 μ[1] in length, 0·2–0·3 μ in thickness. As a rule the ovals and rods form dumb-bells ; the individual elements are sometimes almost spherical, in most instances, however, distinctly ovoid. I have tried inoculation with material from cultures of these bacilli on rabbits, guinea-pigs, and mice. The result of these is as follows :—Injecting a fair dose of the growth (gelatine or broth cultivation) into the subcutaneous tissue, a swelling is produced which, after 48–72 hours, becomes very marked ; then it diminishes, becoming at the same time firm. Constitutionally no abnormal symptom is produced ; the animals remain lively and continue to feed well. This practically negative result cannot, however, be accepted as indicating that the bacillus

[1] 1 μ is $\frac{1}{25000}$th of an inch.

is not directly concerned with the disease of the sheep, since the rodents experimented upon need not be, and probably are not, susceptible to the "louping ill."

3. In the heart and pericardium, including the gelatinous infiltration, no microbes could be demonstrated, either by the microscope or by cultivation.

4. In the thyroid gland no microbes could be demonstrated, except in one case where several colonies of a gelatine-liquefying coccus—a form of sarcina—were obtained in one out of several culture tubes. In microscopic specimens of the fresh thyroid of this same case, a few examples of dumb-bell- and sarcina-like cocci were also demonstrable.

5. From the diseased portions of the lung the same short bacillus that had been found in the cerebral fluid was also obtained in two cases. It formed a yellowish growth, not liquefying the gelatine. In each of the cases in question considerable portions of the lung were involved, and in the cover-glass specimens made of the fresh lung in these cases numerous examples of these short bacilli were demonstrable.

In the remaining cases, a few colonies of other and different species (longish motile bacilli, cocci, or short motile bacilli resembling the *Bacillus coli*) were obtained by culture from the diseased portions of the lung. These microbes, however, owing to their great scarcity in cultivation, and to the fact that each was only exceptionally found, may be dismissed as accidental contaminations.

We arrive, then, at the conclusion that the only microbe which has any claim—small, I admit—to be considered as in any way causally related to the "louping ill" disease, is the small bacillus described above. This was cultivated from the cerebral fluid of six cases, and in addition from the lung of two of them. In two of the six cases the microbe was recovered from the cerebral fluid in such numerous colonies that it seems very probable that it has an important bearing on the causation of the disease; for it can hardly be assumed that a microbe, numerously present in the cerebral fluid, could be merely an accident. That this same microbe was not demonstrated by cultivation in eleven cases is, I admit, an argument against its being the specific microbe of the disease; but it has to be remembered that most of these cases were sheep or lambs that were killed in an early phase of the disease, and that for each cultivation tube only a small drop, or a fraction of a drop, of the cerebral fluid was used; so that it remains quite possible that in the early phase of the disease the microbe is not yet abundantly present in the cerebral fluid.

But the *argumentum crucis* is whether or not this short bacillus, when introduced in one way or another into the normal sheep, is capable of producing the disease. As to this, I inoculated subcutaneously two lambs with the cerebral fluid of a sheep killed in an early phase of the disease; but the fluid had been kept in sealed tubes about a week prior to its being used. The lambs in question

seemed a little quiet after 48 hours, but continued to feed and then became again normal.

Two lambs were next inoculated subcutaneously in the groin with a culture of the suspected bacillus. After one to two days they showed about the seat of the inoculation redness of the skin and a slight swelling in the subcutaneous tissue ; the animals were at the same time quiet and did not feed well. But after the end of three days they were again lively and fed well, and of the swelling very little could then be noticed. By the end of five days they seemed in all respects normal. From this it would appear that by subcutaneous injection of the microbe no definite disease is producible.

E. Klein.

PRICES AND QUANTITIES OF LIVE STOCK AND FARM PRODUCE IN IRELAND.

It is proposed to submit in this communication a few extracts, which it is believed will prove of interest to English farmers, from a paper on the prices of Irish agricultural produce, which I had the honour of reading before the Statistical and Social Inquiry Society of Ireland on March 1, 1893. The paper was illustrated by diagrams, whereby a means was afforded, not only of seeing at a glance the absolute course of prices, but of making comparisons. The diagrams are too numerous and too extensive to reproduce here, so that if he should wish to consult them the reader must be referred to the original paper, where also will be found due acknowledgment of the various sources, official and otherwise, whence the figures are derived.

Prices of Irish Cattle and Sheep.

In Table I. are recorded the average prices of cattle and sheep at Ballinasloe October Fair for the 65 years, 1828–92. The oxen and heifers are each divided into four classes, the ewes and wethers likewise, the term "class" referring to size, age, and quality.

Ballinasloe was, and probably still is, one of the largest sheep and cattle fairs in the world. The animals are chiefly stores, as distinguished from fat animals, and no record of the value of store cattle and sheep seems to have been regularly kept for such a long period anywhere else in the United Kingdom.

In 1856 the fair reached its maximum, when nearly 100,000 sheep and 26,000 cattle were exhibited, representing a money value, at the prices of that year, approximating to 600,000*l*. Since 1856 the number of sheep on the fair-green has decreased, with little interruption, to 26,000 head last year. Cattle have also decreased in numbers, but less rapidly.

TABLE I.—*The Average Price for Oxen, Heifers, Ewes, and Wethers at the Great Fair of Ballinasloe for each Year from* 1828 *to* 1892, *to which is Appended a Gross Average covering the whole Period.*

Years	Oxen [1]			Heifers [1]			Ewes [1]			Wethers [1]		
	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*
1828	11	0	0	11	7	6	1	11	0	1	14	8
1829	8	5	0	9	0	0	1	3	0	1	8	3
1830	8	10	0	8	15	0	1	3	6	1	4	3
1831	10	15	0	10	2	6	1	7	9	1	17	0
1832	11	13	6	11	17	6	1	15	3	2	0	0
1833	11	7	6	11	8	9	2	2	0	2	3	6
1834	10	7	6	10	8	9	1	19	1	1	18	6
1835	10	17	6	10	18	9	1	14	4	1	10	6
1836	10	17	6	10	17	5	1	17	6	1	18	9
1837	12	5	0	11	12	6	1	16	0	2	0	10
1838	11	5	0	10	12	6	1	17	6	1	19	3
1839	13	10	0	11	7	6	1	15	4	1	17	1
1840	14	12	9	12	12	6	1	10	1	1	17	1
1841	15	2	6	13	1	6	1	14	3	2	0	4
1842	12	10	0	10	2	6	1	6	6	1	18	0
1843	13	10	0	11	14	0	1	6	9	1	15	0
1844	12	5	0	10	19	0	1	8	9	1	17	0
1845	13	5	5	10	18	0	1	14	9		—	
1846		—			—			—			—	
1847		—		14	15	0		—			—	
1848		—		13	6	3	1	12	0	2	3	3
1849	10	17	6	10	2	6	1	6	9	1	13	3
1850	7	5	0	9	5	0	1	13	0	1	18	3
1851	7	12	6	9	12	6	2	0	6	2	0	0
1852	8	17	6	10	17	6	2	2	0	1	18	0
1853	16	0	0	12	0	0	2	3	0	2	3	3
1854	15	17	6	14	18	9	2	1	10	2	4	10
1855	16	1	9	15	5	0	2	0	3	2	5	9
1856	14	19	6	13	19	4	2	2	9	2	8	1
1857	15	13	1	14	11	3	2	7	9	2	12	6
1858	14	7	4	13	0	0	2	10	1	2	9	1
1859	13	16	10	12	12	6	2	6	6	2	4	9
1860	14	18	1	14	6	3	2	4	3	2	7	7
1861	14	10	7	13	9	3	2	3	6	2	6	3
1862	13	15	0	12	17	6	2	4	10	2	6	1
1863	14	8	1	13	10	0	2	2	7	2	4	4
1864	14	9	4	13	12	6	2	6	9	2	5	0
1865	15	17	6	15	2	6	3	15	0	3	0	0
1866	16	0	7	15	4	4	3	10	0	2	15	4
1867	15	19	4	15	10	6	3	5	9	2	5	0
1868	15	8	9	15	5	0	2	14	1	2	6	3
1869	15	13	9	15	13	1	2	18	4	2	13	3
1870	15	18	9	15	17	6	3	2	6	2	17	7
1871	16	8	9	16	18	9	3	10	0	3	3	1
1872	16	2	6	16	5	0	3	9	3	2	17	9
1873	15	2	6	15	0	0	3	1	3	2	9	9
1874	15	2	6	14	5	0	2	9	9	2	6	0
1875	15	17	6	14	17	6	2	13	3	2	15	9
1876	14	1	3	13	2	6	2	17	0	2	19	1
1877	14	1	3	13	17	6	3	0	3	2	19	9
1878	14	15	0	14	17	6	2	18	9	2	17	6
1879	15	0	0	15	0	0	1	14	0	2	11	3
1880	18	5	0	18	7	6	2	6	3	3	0	3
1881	16	10	0	17	7	6	2	1	9	2	15	3
1882	18	2	6	18	17	6	2	6	10	3	1	4
1883	17	16	3	18	7	6	2	4	1	2	13	6
1884	16	13	9	16	13	9	2	2	9	2	14	7
1885	15	2	6	15	7	6	1	18	9	2	8	9
1886	14	7	6	14	2	6	2	3	0	2	7	7
1887	11	0	0	11	13	1	2	1	9	2	2	7
1888	13	18	0	13	16	3	2	11	9	2	8	9
1889	13	1	3	13	8	9	2	12	6	2	10	7
1890	12	7	6	12	2	6	2	6	9	2	7	9
1891	11	17	6	11	13	1	1	14	9	2	2	6
1892	10	18	9	10	6	3	1	11	1	1	16	10
Gross Average, 1828-92	**13**	**0**	**5**	**13**	**1**	**0**	**2**	**2**	**5**	**2**	**3**	**4**

[1] Average of four classes.

It will be seen that the prices for oxen and heifers were lower in 1892 than in any other year since 1852.

The maximum and minimum average prices on record are :—

	Highest average			Lowest average			Difference		
	£	s.	d.	£	s.	d.	£	s.	d.
Oxen	18	5	0 in 1880	7	5	0 in 1850	11	0	0
Heifers	18	17	6 in 1882	8	15	0 in 1830	10	2	6
Ewes	3	15	0 in 1865	1	3	0 in 1829	2	12	0
Wethers	3	3	1 in 1871	1	4	3 in 1831	1	18	10

With regard to ewes and wethers the average price is seen to be lower in 1892 than in any year since 1849. Attention may be directed to the great fall in the prices of ewes in 1879, owing to the wet summer and the fluke disease consequent thereon. Their value is influenced by the price of lambs, and does not fluctuate in the same ratio as that of wethers. The rapid rise of both in 1865 was due in a measure to wool, which, simultaneously with flax, rose to a very high price after the American Civil War. Mutton at the same time became dearer.

Official Prices of Irish Agricultural Produce.

The Irish Land Commision, which is more interested in an accurate table of the prices of Irish agricultural produce than any private individual, made no arrangements for systematic returns until 1887, six years after its establishment. By the provisions of the Land Act of that year (50 & 51 Vic. cap. xxxiii. sec. 29) it was compelled to do so for the temporary adjustment of judicial rents, and since then annual returns have been published, of which a summary is given in Table II.

Table II.—*Average Prices of Agricultural Produce in Ireland, for the Six Years*, 1887–92 (*collected by the Irish Land Commission*).

Year	Wheat, per cwt.	Oats, per cwt.	Barley, per cwt.	Potatoes, per cwt.	Hay, per cwt.	Flax, per stone
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1887	6 3	4 10½	6 0	2 3	2 6¼	5 11
1888	6 11½	5 4	6 7	2 6¼	2 0	6 1½
1889	6 5½	5 8¼	6 7	2 8¼	1 9	5 8¼
1890	6 8½	6 1	6 6½	3 0½	1 11½	5 2¾
1891	7 2	6 10	7 0¾	3 6¾	3 3	5 11
1892	6 9¾	6 6¼	7 0½	2 5½	3 11¾	6 8½

Year	Butter, per cwt.	Pork, per cwt.	Beef, per cwt.	Mutton, per cwt.	Wool, per cwt.
	s. d.	s. d.	s. d.	s. d.	d.
1887	90 7	40 5½	50 1½	56 9	10
1888	89 10	42 5½	53 6	65 2	10
1889	96 0	43 11¾	56 0½	67 4⅛	9¼
1890	86 6¾	40 1	57 1	67 0⅝	9½
1891	103 6½	39 5½	54 8¼	57 10¼	9⅜
1892	107 1½	48 2	52 4¼	58 1	8¾

Up to August 1, 1888, the Land Commission figures are from reported prices for beef and mutton; after that date they have been calculated for dead weights by taking seven-fourths of the average reported live-weight sales. Thus, if live-weight price is 32*s.* per cwt., the dead-weight quotation is given as 56*s.* per cwt. The highest price for beef in Dublin market since 1845 was in 1873, the lowest for beef and mutton was in 1852, and last year (1892) saw the lowest level for both since that date, the year 1887 excepted. Mutton reached its maximum price in 1883. Generally speaking, it has maintained a higher level than beef, but was considerably below it in 1867, when sheep increased rapidly in number (*see* Table III. p. 640) and became a drug in Ireland.

The lowest price for beef and mutton in England since 1815 was reached in 1822-23. Mutton fell to 35*s.* per cwt., and beef to 38*s.* 6*d.*, or nearly as low as prices in the Valuation Act of 1826. Tooke (*History of Prices*, vol. ii. p. 85) states that, in 1822, the extremely low value of cattle attracted much attention. Wheat, oats and barley, and other produce, were likewise abnormally low in England.

The nearest approach to the great depression of 1822 would seem to have been 1852. The maximum price for beef in London was, simultaneously with Dublin, in 1873; but mutton was dearest in London in 1877—91*s.* per cwt.—whereas 1883 saw high water mark in Ireland.

Cattle and Sheep in Ireland, and in Great Britain.

The first census of live-stock in Ireland was taken in 1841, when the numbers were—cattle, 1,860,000; sheep, 2,100,000. They have increased—cattle to 4,531,000, sheep to 4,828,000, as shown in Table III (p. 640). There were more cattle in Ireland in 1892 than at any previous period, and sheep were almost as numerous as in 1868, when they attained their maximum. Sheep apparently have fluctuated more than cattle. It is to be remembered, however, that one beast is equal to at least three sheep. In other words, an increase of three million cattle would be equivalent to an addition of nine million sheep to our pastures.

It is worth noticing that in Ireland there is nearly a beast for every sheep, whereas England has more than four sheep to each beast.

In Ireland the sudden increase in the number of sheep (in 1865–66) after the American Civil War was caused by the rise in wool and meat. The great falling off in numbers after the wet summer of 1879 occurred when our flocks were decimated by disease, and farmers were timid in purchasing stock.

Exports of Cattle and Sheep from Ireland to Great Britain.

For the first twenty-five years of this century the number of cattle exported from Ireland to England averaged about 40,000 per

[*Continued on p.* 642.

TABLE III.—*The Number of Cattle and Sheep in Ireland in the Years* 1847 *to* 1892, *and in the Year* 1841 ; *also in Great Britain in each Year from* 1866 *to* 1892.

"Thousands" (000) omitted.

CATTLE			SHEEP	
Ireland		Great Britain	Ireland	Great Britain
Year	Number	Number	Number	Number
1841	1,863		2,106	
1847	2,591		2,186	
1848	1		1	
1849	2,771		1,777	
1850	2,918		1,876	
1851	2,967		2,122	
1852	3,095		2,614	
1853	3,383		3,143	
1854	3,498		3,722	
1855	3,564		3,602	
1856	3,587		3,694	
1857	3,621		3,452	
1858	3,668		3,495	
1859	3,816		3,593	
1860	3,606		3,542	
1861	3,472		3,556	
1862	3,255		3,456	
1863	3,144		3,308	
1864	3,262		3,367	
1865	3,498		3,694	
1866	3,746	4,785	4,274	22,048
1867	3,708	4,993	4,836	28,919
1868	3,647	5,424	4,901	30,711
1869	3,734	5,313	4,651	29,538
1870	3,800	5,403	4,337	28,398
1871	3,976	5,338	4,233	27,120
1872	4,059	5,625	4,263	27,921
1873	4,147	5,965	4,484	29,428
1874	4,125	6,125	4,442	30,314
1875	4,115	6,013	4,254	29,167
1876	4,117	5,846	4,009	28,173
1877	3,998	5,698	3,988	28,161
1878	3,985	5,738	4,095	28,406
1879	4,068	5,856	4,018	28,157
1880	3,922	5,912	3,562	26,619
1881	3,957	5,912	3,256	24,581
1882	3,987	5,807	3,072	24,320
1883	4,097	5,963	3,219	25,068
1884	4,113	6,269	3,245	26,068
1885	4,229	6,598	3,478	26,535
1886	4,184	6,647	3,366	25,521
1887	4,157	6,441	3,378	25,959
1888	4,099	6,129	3,627	25,257
1889	4,094	6,140	3,789	25,632
1890	4,240	6,509	4,323	27,272
1891	4,449	6,853	4,723	28,733
1892	4,531	6,945	4,828	28,735

Incomplete.

TABLE IV.—*Number of Cattle and Sheep imported into Great Britain from Ireland in each Year from* 1846 *to* 1891.

"Thousands" (000) omitted.

Year	CATTLE	SHEEP
1846	193	259
1847	200	324
1848	203	256
1849	212	241
1850	189	177
1851	186	152
1852	201	158
1853	186	224
1854	212	357
1855	223	489
1856	292	602
1857	345	485
1858	286	398
1859	334	429
1860	288	420
1861	359	407
1862	429	539
1863	442	517
1864	348	371
1865	247	333
1866	399	399
1867	474	589
1868	418	782
1869	509	1016
1870	454	621
1871	484	685
1872	616	519
1873	685	605
1874	551	744
1875	595	918
1876	666	687
1877	649	631
1878	729	643
1879	641	673
1880	721	715
1881	572	578
1882	782	558
1883	557	461
1884	716	533
1885	640	629
1886	717	734
1887	669	549
1888	739	638
1889	670	614
1890	632	637
1891	631	893

TABLE V.—*Number of Cattle and Sheep imported into the United Kingdom in each Year from* 1848 *to* 1891.

"Thousands" (000) omitted.

Year	CATTLE	SHEEP
—	—	—
—	—	—
1848	63	131
1849	53	129
1850	66	143
1851	86	202
1852	93	230
1853	125	259
1854	114	183
1855	97	163
1856	83	145
1857	93	177
1858	89	184
1859	86	251
1860	105	320
1861	107	313
1862	98	299
1863	151	431
1864	232	496
1865	283	914
1866	238	791
1867	178	540
1868	137	340
1869	220	710
1870	202	670
1871	249	917
1872	173	810
1873	201	851
1874	194	759
1875	264	986
1876	272	1,041
1877	201	874
1878	253	892
1879	248	945
1880	390	941
1881	319	935
1882	344	1,124
1883	475	1,116
1884	425	945
1885	373	751
1886	320	1,039
1887	296	971
1888	377	956
1889	555	678
1890	643	358
1891	507	344

annum, and sheep about 22,000. In 1891 these numbers had risen to 631,000 and 893,000 respectively (*see* Table IV., which may be read in conjunction with Table V. beside it). As against this, however, it is right to mention that there was a considerable export trade to England and foreign countries in dead meat between 1800 and 1825. Live cattle, landed at Liverpool in those days, were *driven* to Birmingham, Coventry, Leicester, and elsewhere.

Prices of Irish Corn.

The values of wheat, barley, and oats have been compiled with much care in England. Records are to be found in the almanacs, copied from official sources, showing the quotations per imperial quarter for over a hundred years, and the researches of various writers have carried these figures backwards several centuries. Duties under the Corn Laws varied, like tithes, with prices, so it became necessary to have accurate information. Parliamentary papers bristle with returns showing prices of grain. The Corn Returns Act of 1882 (45 & 46 Vict. cap. xxxvii.), repealing former Acts, now regulates the collection of such prices in England and Wales. In Ireland there is no such Act, and no Government official whose duty it is to record the prices of Irish wheat, oats, or barley.

From 1800 to 1846 returns of the prices of grain in Dublin were at different dates presented to Parliament. After the repeal of the Corn Laws less interest was taken in prices, but up to some date between 1880 and 1887 a Corporation official would seem to have been associated with the prices in the *Dublin Gazette*, which are now signed by the Secretary to the Corn Exchange Company. The old *Irish Gazette* prices appear to be returns collected by the Corporation, but they are not collected under the authority of an Act of Parliament, and by a numerous staff like the *London Gazette* quotations.

English returns are by the imperial quarter—a measure of capacity containing eight bushels of 2,218·19 cubic inches each. Irish quotations are all by the barrel—wheat, 20 stones ; barley, 16 stones ; oats, 14 stones—the stones being 14 lb. This needs to be mentioned, because the stone weight was different in many parts of Ireland. In Ireland the year 1885 saw wheat, for the first time for over a century, fall below 20*s.* a barrel, and, with the exception of 1891, it has never since raised itself above the 20*s.* line. In 1886 it descended to 16*s.* 3*d.* The average annual price for 1892 was not so low, but last December it fell to 26*s.* 4*d.* per quarter in England, equal to about 14*s.* 7*d.* per barrel ; and at this figure, not equalled since 1761, the farmers had to sell their wheat.

Ireland is fortunately not now a wheat-growing country, and though cattle and sheep are at present a drug, wheat is still cheaper. Taking the annual returns of the Dublin markets, the highest and lowest averages since 1786 in Ireland were :—

	Highest price per barrel				Lowest price per barrel				Difference		
	£	s.	d.		£	s.	d.		£	s.	d.
Wheat .	3	7	3 in 1812	.	0	16	3 in 1886	.	2	11	0
Barley .	1	11	9 in 1801	.	0	9	8 in 1787	.	1	2	1
Oats . .	1	6	8 in 1812	.	0	7	9 in 1789	.	0	18	11

Oats have not fallen below 10*s.* per barrel since 1800, save in 1850, 1834, and 1835; barley twice descended below 12*s.* per barrel during the same period, in 1821 and 1850.

The feature of recent years in the price of almost every article has been uniformity. The great irregularities have disappeared, and a process of levelling is in operation, but the slope is downwards, not upwards. There is a bright side, however. If statistics show anything, they indicate that we are consuming more; the great mass of the people are living better. Cheap food is to them a blessing.

RICHARD M. BARRINGTON.

THE PROGRESS OF CHEMICAL INDUSTRY.[1]

IT would be a hopeless task to try to indicate the whole of the advances in chemical knowledge that have been made within the last fifty years. Even at the commencement of that time, chemistry was by no means in its infancy. Its foundations had been securely laid, not only on the Continent, but in this country, and the names of Priestley, Cavendish, Scheele, Lavoisier, Davy, Wollaston, and other investigators were already household words.

On the whole, the changes and advances in inorganic chemistry have not been extreme. It is in organic chemistry that what cannot be regarded as anything short of a revolution has taken place.

But whatever may have been the advances in chemistry within the last half-century, whether as a pure or as an applied science, the extension of its boundaries towards physics in the one direction, and biological studies in the other, is at least as remarkable. While the study of spectrum analysis has rendered most valuable assistance in the chemistry of the constituent substances with which we are familiar upon earth, it has enabled the astronomer to carry his speculations not only to the constitution of the sun and stars, but to that of nebulæ, comets, and meteors. In the domain of electricity it is hard to say whether that science does not owe nearly as much to chemistry as chemistry does to it. In the practical application of electricity to lighting purposes, chemistry has still to be called on to produce some improved form of secondary battery, and some

[1] Extracts from the Anniversary Address delivered at the Liverpool Meeting of the Society of Chemical Industry, by the President, Sir John Evans, K.C.B., LL.D., F.R.S., on July 12, 1893.

portable form of primary battery, which shall prove of ready application by our miners. Electricity has also placed at the command of chemists greater intensity of heat than can be derived from ordinary sources.

The study of heat, irrespective of electricity, has largely reacted on chemistry, and while the Bessemer process has entirely revolutionised the manufacture of steel, and almost annihilated the distinction in value between that and other forms of iron, the Siemens and other furnaces have led to unprecedented economies in the expenditure of fuel, and at the same time have facilitated the application of heat in various chemical processes. In the other direction —the absence of heat—Professor Dewar has, during the present year, made most important advances. Although air had previously been liquefied, he has now been able, by means of intense cold alone, to reduce atmospheric air to the liquid condition. His further results, by a combination of enormous pressure and extreme cold, are well known, and now that oxygen and nitrogen have yielded themselves to the advances of science and have been obtained in quantities in a liquid state, it is hard to say that hydrogen is destined always to remain intractable. What may be the ultimate result of the investigations that can now be carried on at temperatures ranging from 100° to 200° Centigrade below the freezing point of water it is impossible to foresee. From researches already made in this country and in France, it would appear that most substances under extreme cold are, so to speak, dead, and that their ordinary affinities are in abeyance. Possibly what may be termed "glacial chemistry" may eventually enlarge our views as to the various properties of matter.

As to the advances in our knowledge of the chemistry of light, the present condition of photography may testify. When we can take the image of a bullet flying at the rate of 3,000 feet per second, with its accompanying cone of compressed air; when we can produce photographs which are practically permanent; and when we call in the action of light to engrave our steel or copper-plates and to produce efficient substitutes for wood-cuts, we seem to be getting near the limits of the practical application of photography. And yet many of us may remember the days when the daguerreotype was regarded—and justly so—with wonder; and I can myself call to mind a still earlier form of photography, by which natural leaves were reproduced on paper sensitised with a salt of silver, of which I saw specimens in an exhibition at Dresden so long ago as the year 1839.

In the introduction of artificial light much also has been done. It is true that Pall Mall was experimentally lighted by gas in 1807, but it was not until 1842 that gas found its way into Grosvenor Square and some other aristocratic quarters of the metropolis. Since that time immense strides have been made in the art of gas manufacture, while, in consequence of the waste products arising in the process having now found commercial uses, great reductions have been made in its cost. At the present time gas has to compete

with electricity as an illuminant, while, in many cases, it has been superseded by mineral oils, which are now so abundant and cheap, and of which the "flashing point" may be said to be almost a burning question. If, however, gas is losing ground as an illuminant, it seems to be gaining it as a source of power, and there are prospects of a considerable increase in the use for this purpose of hydrogen and its compounds, containing far less carbon than ordinary coal-gas.

In metallurgy also, in addition to the improvements in the manufacture of steel already mentioned, many noteworthy discoveries have been made. One of the most important of these is perhaps that of the production of aluminium on a cheap scale, and in quantities sufficient for various applications to ordinary use. It seems somewhat remarkable that the progress in the use of a metal at once so light and so strong is not more rapid. The applications of some of the more modern alloys, such as phosphor-bronze, seem also susceptible of considerable further development. The extensive manufacture of sodium affords another instance of what was formerly the mere subject of a laboratory experiment being now conducted upon a commercial scale.

It is in the domain of organic chemistry, which has been defined to be the chemistry of the hydro-carbons and their derivatives, that, as I have already observed, the most wonderful development has taken place within the last half-century. Who, for instance, in 1840 could have foreseen the important part that aniline was to play in dyeing and colouring? It was not, I think, till 1856 that Perkin's mauve was really brought into commercial use, but since that time what a rainbow of colours has been produced from coal-tar—from what would have seemed a most unpromising source! How brilliant are their hues, but as yet, in many cases, alas, how fugitive! It is a source of some satisfaction to know that the woad, the native cruciferous plant with which our ancient British predecessors stained their bodies, is still cultivated among us for the purpose of dyeing wools, even though it has acquired the name of *Isatis tinctoria* and the colouring extract is now classed as an indigotin.

Among inorganic colours I may here briefly mention ultramarine, which, instead of being patiently produced by the careful treatment of lapis lazuli and sold at many shillings an ounce, is now manufactured by the ton and quoted by the hundredweight. Would that the artificial colour was as fine and permanent as the natural! I have, in my own time, seen it supersede smalts as a colouring matter in paper-making, and I have known its use not unfrequently accompanied by the abundant presence of sulphuretted hydrogen as a product of its decomposition.

Not only colouring matters but our flavours and scents have been synthesised, though art, if superseding nature for a time, must eventually acknowledge her inferiority, even in pear-drops. Whatever our æsthetic feelings under these circumstances may be, we cannot but admire the skill and scientific energy by which such

results have been attained. How far "saccharine," one of the latest results of the chemist's ingenuity, is likely to supersede the use of ordinary sugar, is a question on which I decline to speculate. The manufacture of our every-day sugar has, however, itself undergone a complete metamorphosis within the last fifty years, with the result that it is now produced at what would formerly have been regarded as an absolutely impossible price. In 1840 the beet-sugar industry was in its infancy, but such has been the improvement in the growth of the beet, and in the process of manufacture, that nearly twice as much sugar is now produced from a ton of beetroot as there was at that date. In the production of cane-sugar also immense economies have been effected, especially in the process of evaporation. The study of the effects of saccharine solutions on the polarisation of light, and our acquaintance with the distinctions between dextrose and lævulose, and of the conversion of starch into sugar, all come within comparatively modern times.

Much of our knowledge of the mysterious processes of fermentation is also of recent date, and it is in connection with these processes that the chemist finds himself brought into close contact with the botanist and the physiologist.

Whatever suspicions Lecuwenhoek and the early miscroscopists may have had with regard to the vegetable character of yeast-cells, and however clearly Cagniard de la Tour and Schwann may have established their plant-like nature and their connection with fermentation, it was not until Pasteur's researches from 1857 to 1861 that the true character of the yeast-plant, and of other micro-organisms which lie at the base of most fermentative processes, can be said to have been absolutely demonstrated. The beneficial effect of his inquiries, and of his methods of obtaining a pure cultivation of yeast, is universally recognised, and has reacted in the most remarkable manner on the brewing industry.

But M. Pasteur's researches have also led to much wider results, as it has been mainly in consequence of his careful observations that the wonderful influence for good or for evil of organisms so minute as in some cases almost to defy the power of the microscope has now been so fully recognised. The germ-theory of the origin of many diseases meets with much more general acceptance than it did but a few years ago; and though the bacilli and bacteria which are characteristic of some virulent diseases, such as anthrax, are only agents in certain fermentative processes by which poisonous matters are engendered, their existence and character seem to be placed beyond all doubt. The process of obtaining immunity from the action of these poisons by the gradual introduction of the virus into the animal system, thus rendering it insusceptible of receiving further injury from the same poison, has been successfully introduced, both among men and animals, and hydrophobia and anthrax have been successfully combated.

A recognition of the influence of germs has led to the introduction into surgery of that antiseptic system of treatment with which the name of Lister will always be associated, and which has done so

much to diminish suffering and preserve life. While upon this topic I may just allude to another instance in which chemistry has come to the assistance of medical science ; I mean in the production and investigation of those anæsthetic agents which play so important a part in modern surgery, and which have done so much to alleviate human suffering.

But while the ferments produced by micro-organisms are on the one hand so pernicious, it is very doubtful whether, on the other hand, they are not equally beneficial, if it be really the case that such processes as digestion are in a great measure due to their action. How far the nitrification of the soil may be due to micro-organisms is a question not yet absolutely solved, though strong presumption has been raised of their being, at all events, potent factors in the case.

Now that so many diseases have been traced to pathogenic (*i.e.* disease-producing) organisms, which are constantly present in water contaminated by sewage, the question of the vitality of these organisms and their germs has been rightly regarded as one of great public importance, and the Royal Society in conjunction with the London County Council has instituted an investigation into it, which is being diligently prosecuted both from the botanical and the chemical points of view. The remarkable power of light, whether that of the sun or electric, in sterilising the germs of some micro-organisms, already to some extent previously known, has been conclusively demonstrated by Professor Ward.

Much has been done of late years by chemists towards the purification of sewage with the view of rendering the effluents from the ultimate drains of our large municipalities as innocuous as possible, and the results obtained have been in many instances satisfactory. They would, no doubt, have been even more so had not the imperative demands of economy limited the cost. Still, whatever may be done, I am inclined to think that there is much truth in the metrical abstract of a paper read some years ago before the Royal Society :—

> "Sewage, however disinfected,
> Is not from ill results protected ;
> Though made to all appearance pure,
> It still remains, not safe, but *sewer*."

I will not attempt to discuss the important question of the disposal of the sewage of our great towns, but to many it will appear as somewhat of a disgrace to our powers of applying chemical knowledge that such vast accumulations of what were originally highly fertilising substances should be discharged into the estuary of the Thames, and not only be absolutely wasted, but converted into a perpetual nuisance, brought up at each tide within the limits of the metropolis from which they started.

It is true that within the last fifty years we have imported enormous quantities of guano, phosphates, and nitrates, but of these there must eventually become a scarcity, if not an end. In the

meantime, may not chemists do something to reduce the waste of fertilising agents that is now taking place among us? Agricultural colleges have been founded—agricultural chemistry is a recognised branch of science; but with increase of knowledge has come increase of foreign competition, fostered by improved means of transport and communication, and it is at the present time a doubtful point whether many soils, even if rent free, can be cultivated in this country for cereals, except at a loss.

While touching on agricultural chemistry, I cannot pass over in silence the experiments which have now been carried on continuously for a period of fifty years at Rothamsted, by Sir John Bennet Lawes, assisted during the whole half-century by Dr. Gilbert. The extremely liberal provision which, during his life-time, Sir John Lawes has made for the purpose of continuing and extending his experiments would alone entitle him to a full measure of public gratitude. When, however, we consider the nature and extent of the experiments already conducted, we must feel that no expression of public estimation can be too high. As to the results already obtained, and as to the nature of the experiments still being carried on, it would be out of place here to enlarge. Remarkable, however, as are the effects of different manures on the botanical character and growth of herbage, and on the strength and yield of cereals, the different results arising from the mere variation of the temperature, sunshine, and rainfall, in successive years, are more remarkable still.

JOHN EVANS.

THE VALUE OF EARTH-NUT CAKE AS A FEEDING MATERIAL.

THE prominent notice given to the food value of earth-nut cake in Dr. Voelcker's report on the Woburn feeding experiments, in a previous number of the Journal,[1] has drawn attention to this little known oil-cake, and possibly a few additional facts, founded on a long experience in feeding farm stock with the cake, may be of interest.

This food first came under my notice about thirty years ago, in the laboratory of the late Dr. Voelcker, at the Royal Agricultural College, Cirencester. Afterwards, on taking up my residence in South India, I found the cake on sale in the bazaars of most of the larger towns. It was in demand, however, more as a manure than as a food for stock; indeed, much of the cake offered at that time was so largely mixed with castor seeds, and other similar oil seeds, that it could be applied to no other use. This admixture with other oil seeds was due to no fraudulent intention; the object was simply

[1] *Earth-nut Cake as a Feeding Material for Cattle.* Journal, 3rd Series, Vol. III., Part IV., 1892, p. 727.

to secure an oil suited to certain special native requirements, the residue, or cake, not being considered worth notice. However, cake made only of earth-nuts[1] was procurable, and I used it largely in feeding all kinds of farm stock for a period of nearly twenty years.

Horses not being employed for agricultural purposes in South India, those I fed on the cake were only the horses used for riding and driving. Such horses did their work fairly satisfactorily, and kept in good condition, when fed on the cake with forage; but I think they throve better when a mixture of equal weights of cake and corn was substituted for the full allowance of cake. For ordinary farm-horses in England the cake alone would, I feel sure, form an excellent food along with the usual fodder. In India the oil-mill generally employed is a sort of pestle-and-mortar arrangement, but the pestle, instead of being lifted and allowed to fall on the seed to be crushed, rotates around the inside of the mortar over the seed, and is worked by a bullock. The machine is inexpensive to construct, but it does its work in a very imperfect manner, leaving a large proportion of the oil in the residue. Indeed, the presence of so much oil is the reason that, in some instances, the cake has not found favour when a trial of it has been made in feeding horses, the diarrhœa which resulted being but the natural consequence of the excessive quantity of oil present in the cake. It is not likely, however, that the earth-nut cake obtainable in England will contain too large a proportion of oil, inasmuch as there is reason to suspect that the importers or dealers, through whose hands the cake must pass, re-press it, and remove much of the oil. An allowance of about

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[1] The earth-nut, ground-nut, or pea-nut (*Arachis hypogæa, L.*), is an annual herb with procumbent branches. It belongs to the *Leguminosæ* (sub-order *Papilionaceæ*), and to the same tribe (*Hedysareæ*) as includes sainfoin (*Onobrychis sativa*), serradella (*Ornithopus sativus*), and Japanese clover (*Lespedeza striata*), to which plants it is closely allied. It presents somewhat the appearance of a large kind of clover, and has small, bright yellow, pea-like flowers, borne on long stalks; these, after flowering, curl downwards and *force the immature pod into the soil*, where it ripens, and whence it must be dug up when harvested. The pod is about $1\frac{1}{2}$ inches long, is somewhat cylindrical, is constricted in the middle, and contains from two to three seeds, seventy-five of which weigh one ounce. This plant is probably of American origin, although it has been long cultivated in India, on the West Coast of Africa, and in many other tropical countries. Professor Church, in his *Food Grains of India*, states the following to be the composition of pea-nuts:—

	In 100 parts	In 1 lb.
Water	7·5	1 oz. 87 grs.
Albuminoids	24·5	3 „ 403 „
Starch	11·7	1 „ 382 „
Oil	50·0	8 „ 0 „
Fibre	4·5	0 „ 315 „
Ash	1·8	0 „ 126 „

"As half the weight of pea-nuts is oil, they require a considerable admixture of starchy food in order to become a wholesome and economical article of diet. The green and unripe pods are less oily and more easily digested; they have an agreeable taste when roasted. Pea-nuts, after the greater part of the oil has been extracted by pressure, yield a cake well adapted for feeding cattle."—Ed.

6 lb. of the cake per day was sufficient to keep a horse in good working condition.

For horses the cake was broken into small pieces, and steeped for 24 hours in cold water, just sufficient of which was used to make a stiffish paste. This paste is white, and has a rather agreeable nut-like smell and taste; it is readily eaten by most horses. Owing to the condition in which the cake leaves the mill, it is met with in large, hard blocks, which cannot, without being first broken by a hammer, be powdered in an ordinary cake-breaker. Dr. Voelcker refers, in the report already mentioned, to the acid character of the cake which was used at Woburn, but acidity is not a characteristic of the cake as ordinarily met with in India. I know no oil-cake which, when properly stored, will for so long a time preserve its good properties.

I have used the cake very extensively in feeding working cattle; an allowance of 4 lb. per head per day, with forage, kept the animals in perfect health and condition. A pair of such oxen, weighing each about 800 lb. live-weight, would plough $\frac{3}{4}$ of an acre of light land daily for several months of the year. For fattening cattle I do not know of any better food, in regard alike to its feeding value and to the superior quality of the beef produced. As a food for dairy cows it is admirable, both in increasing the yield of milk and in improving its quality. The butter of cows so fed is firmer and keeps much better than that of cows fed on any of the ordinary oil-cakes. A daily allowance of 4 to 6 lb. of the cake, given in the form of paste, and mixed with 2 or 3 lb. of wheat bran, constitutes a perfect food for milch cows. I have had cows so fed, for several years, yielding well and breeding regularly. One cow which, to my knowledge, was fed thus for nearly ten years, enjoyed perfect health, produced a calf every year, and milked exceedingly well.

For sheep there is no better food than earth-nut cake; but for these animals I found it best to give the cake dry and broken into small pieces. I had a large flock fed on the cake for several years, and never knew any bad results attending its use. The ewes so fed bred regularly, milked well, and reared excellent lambs, while the mutton of these cake-fed sheep was of superior quality, though perhaps hardly equal to the gram-fed mutton so highly appreciated in India.

Many experiments have proved the value of the cake as a food for pigs; for these animals it was generally made into a thin gruel and given mixed with bran. The same preparation, but in not quite so thin a condition, constitutes a superior food for fattening poultry, though it is not so useful for laying-fowls. The flesh of poultry fattened on the cake is white, fine, and of a superior flavour.

It is remarkable that earth-nut cake has not made more progress in coming into regular demand in England. It has long been known and esteemed in the United States. Though the cake is imported into England somewhat extensively from India, it is not ordinarily procurable in our markets, being, it is believed, bought up by the

manufacturers of cattle foods, the makers of soap, &c., on account of the large proportion of useful oil it contains.

The earth-nut crop occupies annually about 30,000 acres of land in South India. It is grown both under irrigation and as a dry crop. The leaves of the plant are useful as fodder. Frequently the whole pods, with their contents, are crushed in the oil mill, when, of course, the cake made is much inferior. The foregoing remarks apply, however, to cake made from the so-called nuts only.

W. R. ROBERTSON.

RECENT AGRICULTURAL INVENTIONS.

The subjects of Applications for Patents from June 12, 1893, *to Sept.* 9, 1893.

N.B.—Where the Invention is a communication from abroad, the name of the Inventor is shown in italics, between parentheses, after the name of the applicant.

Agricultural Machinery and Implements, &c.

No. of Application.	Name of Applicant.	Title of Invention.
11507	ROBERTS, E. & H.	Horse rakes.
11566	KING, H.	Carrier and clips for stacking hay.
11599	BAMBER, J.	Portable hay press.
11623	BOURDIN, A. & A.	Cultivator.
11666	GEEVES, T.	Turnip raising and topping machine.
11698	HOLDEN, E. & SAVAGE, R.	Horse hoes.
11702	PERKINS, J.	Potato ploughs.
11850	SARGEANT, T. C.	Drills.
11885	BOULT (*Cockshutt Plough Co., Canada*)	Riding ploughs.
11963	COOPER, T.	Cultivating machinery.
11566	KING, H.	Carrier and clips for stacking hay.
12035	FOWLER, R. H. & others.	Steam cultivators.
12223	ARTER, A. C.	Reaping and mowing machines.
12225	HASLAM & MAWDSLEY.	Topping and digging potatoes.
12505	COULTAS, J. P.	Poles and whippletrees for binders and reapers, &c.
13866	BEAUMONT, W. W.	Threshing, &c., machines.
14312	ROBINSON, J. B.	Grapple fork for loading, &c., hay, straw, &c.
14388	THOMAS, J.	Threshing machines.
14391	WALLACE, J. & R.	Self-binding reapers.
15352	WILSON, W.	Turnip cutting and pulping machine.
15522	KLAGGES, A.	Seed sowing apparatus.
16148	GUILHEM, R.	Appliance for bundling hay.

No. of Application.	Name of Applicant.	Title of Invention.
16224	RICHMOND, J. G.	Kibbling mills for beans, &c.
16334	RICHARDSON, W.	Artificial manure drills.
16616	COOPER, T.	Digging machines.
16818	SAMUELSON, E.	Sheaf-binding harvesters.

Stable Utensils and Fittings—Horse-shoes, &c.

11473	ATKIN, H.	Curry-combs.
11677	MILLER, J. & another	Horse-shoes.
11722	KREWSON, J. A. & othrs	Combined riding stirrup and foot warmer.
11843	PHILLIPS, W. E.	Removable horse-shoe.
12114	HAAS, S. H.	Fastenings for harness.
12235	JAGELITZ, C.	Controlling restive horses.
12268	EMMETT, J. & H.	Collar gauge.
12347	CAULFIELD, F. H.	Stirrup pad.
12529	HORNSBY, G. S.	Roughing horses.
12539	FINUCANE, P.	Horse-shoes.
12670	CARRINGTON, H.	Safety riding stirrup.
13130	ELLIOTT, J. A.	High-knee action appliance for horses under training.
13267	HADDAN, R. (*Pax, Germany*)	Horse-shoe.
13303	SEYMOUR, E.	Head collar for thoroughbred yearlings.
13457	LEATHERBY, C. B.	Lady's side-saddle.
13476	OHL, G. D.	Horse collars and hames.
13520	BIRTZ, N.	Preventing horses running away.
13526	GOAMAN, J.	Head collars.
13620	HAMPSON, W. & others	Safety stirrups.
13641	MARTIN, G.	Riding saddles.
13704	LAKE, H. H. (*Baron Kaiserstein, Austria*)	Food for horses.
13891	ZIELLENBACH, J. W.	Fastenings for horses in stables.
14293	JACOBS, S.	Saddles, bridles, stirrups, &c.
14335	BOULT (*Legros*)	Frost nail keys for horse-shoes.
14392	DE PASS (*De Sales, France*)	Calks for horse-shoes.
14442	BROWN, R.	Instrument for drenching horses.
14625	HEWITT, J.	Safety saddle-bars.
15335	HEMMING	Riding saddles.
15388	MINTON & EASOM	Horse-shoe.
15871	ANDERSON, J. F.	Expanding horse-shoe.
15893	HALLANAN, M.	Horse-shoes and pads.
16150	GURY, P. & C.	Connecting and releasing horses to and from vehicles.
16181	RUNTZ & EDWARDS	Air-pads for horse-collars, &c.
16292 16294	MUZZALL, J.	Horse-shoes.

No. of Application.	Name of Applicant.	Title of Invention.
16318	HOWARD (*Weissmann*)	Horse-shoes.
16398	CHARTER, C. E.	Horse-collar.
16453	MAYHEW, F. W.	Side saddles and girths.
16424	POUPARD, M. E.	Horse-shoes.
16582	BENNETT & others	Cushions for horse-shoes.
16620	WILKINSON, H. E.	Saddles, collars, and breast-straps.
16658	TRUSWELL, G.	Collars and saddles.
16768	MELVILLE, R.	Horse-shoes.
16873	HUGHES, F. (*Belon, France*)	Stopping runaway horses.

Carts and Carriages.

12215	WHITCOMB, W. W.	Brake shoes.
15547	COLLINGE, J.	Cart, &c., wheels.
15713	LANDER, H. & TASKER, H.	Farm carts and waggons.
16162	KEILLER, J. T.	Hind foot-boards of dog-carts.
16241	HOLLINGWORTH, W.	Carts conveying heavy loads.
16495	HOGARTH & another	Carts.

Dairy Utensils, &c.

11539	BOND, F. T.	Buttermaking.
11662	CARROLL, T.	Milking apparatus.
11748	LANE, E. A.	Refrigerating milk churn.
11808	TRAISER, P.	Cheesemaking.
11829	DUNCAN, J. H	Churns.
11860	COTTON, G.	Milk sieves for milking pails.
12190	SHIELS, A.	Teat cups for milking machines.
12892	KEY & COOPER	Churn.
12938	BEGRIE, E. W.	Buttermaking apparatus.
13043	DENNEY, W. J.	Cheesecutter.
13061	BOULT (*Berrigan, U.S.A.*)	Cream separator.
13125	BOND, F. T.	Butter making.
13400	DUNCAN, J. H. H.	„ „
14241	BOND, F. T.	„ „
15843	LUNDSTROM & BURRELL	Centrifugal separators.
15905	STRÖM, O. J.	„ drums.
15909	STRUTHERS, J.	Churning butter.
16158	WOODALL, C. H.	Refrigerating butter block or slab.
16416	SEAL, H.	Protecting milk-cans and contents.
16493	LLEWELLYN, E. H.	Truck for milk-churns.
16841	GIBBINGS, W.	Milk-churns.

Poultry and Game, &c., Appliances.

No. of Application.	Name of Applicant.	Title of Invention.
12890	WALKER, F. T.	Poultry feneing.
15723	BROWN & GANNON	Fowl ring.
15901	BOULT (*Haarstick*)	Poultry-houses.
16248	MCCLURE, C. E.	Preparing eggs for commercial use.
16878	SAUNDERS, T.	Hen coops.

Miscellaneous.

11790	ADAMSON, W.	Hurdles.
11919	LAMB, R. M.	Bee-hives.
11976	TORGEOT-RODANGE, J.	Clipping animals.
12016	HUISH, C. H.	Castrating instruments.
12110	DE ROSSI-GALLICO, A.	Mangers and head-guards.
12140	FORD, M.	Sheep shearing machine.
12260	HOLLINGWORTH, W.	Weight-indicating hay-needle.
14007	BOUQUET, R.	Label for marking sheep, &c.
14111	MORGAN, E.	Feeding troughs for cattle.
16457	BURCH, T.	Hurdles.

Numbers of Specifications relating to the above subjects Published since June 7, 1892.[1]

Specifications of 1892.

9610, 11140, 12013, 12448, 12863, 12929, 13140, 13331, 13457, 13651, 13810, 13823, 13884, 14651, 14704, 14729, 14740, 14803, 14955, 15215, 15460, 15673, 15728, 16288, 16345, 16384, 16760, 17248, 17552, 17631, 17953, 18610, 18720, 21466, 22343, 23205.

Specifications of 1893.

1047, 2223, 3400, 3445, 3485, 4080, 4118, 4343, 4515, 4516, 5209, 5984, 6165, 6974, 6980, 7073, 7344, 7442, 7856, 8566, 8647, 9233, 9631, 10055, 10112, 10236, 11066, 11263, 11885, 12066, 12140, 12235, 13476.

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[1] Copies (price 8*d*. each, post free) may be obtained at the Patent Office (Sale and Store Branch), 38 Cursitor Street, London, E.C.

STATISTICS AFFECTING BRITISH AGRICULTURAL INTERESTS.

Summary of Agricultural Returns of Great Britain for 1893.

Note.—The Returns were collected on June 4 in the Years 1891 *and* 1892, *and on June 5 in the Year* 1893.

Acreage of Land in Great Britain under—

Year	Wheat	Barley	Oats	Potatoes	Hops
	Acres	Acres	Acres	Acres	Acres
1891	2,307,277	2,112,798	2,899,129	532,794	56,142
1892	2,219,838	2,036,810	2,997,545	525,361	56,259
1893	1,897,488	2,076,097	3,171,756	527,821	57,576
1893 compared with 1892 — Increase	—	39,287 or 1·9 per cent.	174,211 or 5·8 per cent.	2,460 or 0·5 per cent.	1,317 or 2·3 per cent.
1893 compared with 1892 — Decrease	322,350 or 14·5 per cent.	—	—	—	—
1893 compared with 1891 — Increase	—	—	272,627 or 9·4 per cent.	—	1,434 or 2·6 per cent.
1893 compared with 1891 — Decrease	409,789 or 17·8 per cent.	36,701 or 1·7 per cent.	—	4,973 or 0·9 per cent.	—

Number of Cattle in Great Britain.

Year	Cattle			
	Cows and heifers in milk or in calf	2 years old and above	Under 2 years old	Total
	No.	No.	No.	No.
1891	2,657,054	1,504,649	2,691,118	6,852,821
1892	2,650,891	1,666,706	2,627,186	6,944,783
1893	2,554,624	1,580,242	2,565,810	6,700,676
Decrease in 1893 compared with 1892	96,267 or 3·6 per cent.	86,464 or 5·2 per cent.	61,376 or 2·3 per cent.	244,107 or 3·5 per cent.
1893 compared with 1891 — Increase	—	75,593 or 5·0 per cent.	—	—
1893 compared with 1891 — Decrease	102,430 or 3·9 per cent.	—	125,308 or 4·7 per cent.	152,145 or 2·2 per cent.

Number of Sheep and Pigs in Great Britain.

Year	Sheep and Lambs			Pigs
	Sheep	Lambs	Total	
	No.	No.	No.	No.
1891	17,786,941	10,945,617	28,732,558	2,888,773
1892	17,957,049	10,777,655	28,734,704	2,137,859
1893	17,039,739	10,240,595	27,280,334	2,113,530
Decrease in 1893 compared with 1892 . .	917,310 or 5·1 per cent.	537,060 or 5·0 per cent.	1,454,370 or 5·1 per cent.	24,329 or 1·1 per cent.
Decrease in 1893 compared with 1891 . .	747,202 or 4·2 per cent.	705,022 or 6·4 per cent.	1,452,224 or 5·1 per cent.	775,243 or 26·8 per cent.

Table showing the Acreage under **HOPS** in England, as returned upon June 4 in the Years 1891 and 1892, and June 5 in the Year 1893.

Counties	1891	1892	1893
	acres	acres	acres
Berks	11	10	11
Gloucester	25	39	33
Hants	2,749	2,775	2,795
Hereford	6,560	6,797	7,079
Kent	34,266	34,058	34,815
Notts	14	14	12
Salop	112	117	123
Suffolk	20	18	21
Surrey	1,955	1,938	1,845
Sussex	7,150	7,124	7,326
Worcester	3,280	3,369	3,516
Total	56,142	56,259	57,576

JOURNAL

OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

THE FARM LABOURERS OF ENGLAND AND WALES.

Introduction.

The evidence as to the condition of the agricultural labourers collected by the Royal Commission on Labour in 1882 and 1883 is the most complete ever published. Eleven Assistant Commissioners were appointed to visit different parts of the Kingdom, with a Senior Assistant Commissioner, Mr. W. C. Little, to superintend their arrangements, but not to travel. Most of them were at work for about twelve months, and the seven who were engaged chiefly in England and Wales visited all the English counties except Westmoreland, Durham, Rutland, and Middlesex, and all the Welsh counties except Cardigan and Flint. The heads of inquiry, under some of which several subheads were ranged, were the supply of labour, the conditions of engagement, wages and earnings, cottage accommodation, gardens and allotments, benefit societies, trade unions, general relations of employer and employed, and the general condition of the agricultural labourer. The results have been published in seven bulky volumes as far as England and Wales are concerned, and to these I confine my attention upon the present occasion, in order to compress my analysis of the evidence within the limits of an article of ordinary length. For the same reason, while subdividing my remarks under the several heads of inquiry, I shall deal briefly with benefit societies, trade

unions, and the general relations of employer and employed, especially as the last three subjects can be summarised without disadvantage.

To avoid repeating the names of the Assistant Commissioners when referring to their conclusions, it is desirable to give the name of each, with his districts, as follows :—

Mr. Arthur Wilson Fox—Districts in Northumberland, Cumberland, Lancashire, Norfolk, and Suffolk.

Mr. Roger C. Richards—Districts in Cheshire, Derbyshire, Gloucestershire, Herefordshire, Monmouthshire, Northamptonshire, and Warwickshire.

Mr. Edward Wilkinson—Districts in Derbyshire, Lincolnshire, Staffordshire, and Yorkshire.

Mr. William E. Bear—Districts in Leicestershire, Nottinghamshire, Huntingdonshire, Bedfordshire, Hampshire, and Sussex.

Mr. Cecil M. Chapman—Districts in Buckinghamshire, Cambridgeshire, Hertfordshire, Berkshire, Oxfordshire, Shropshire, Devonshire, Cornwall, Brecon, and Radnor.

Mr. Aubrey J. Spencer—Districts in Essex, Kent, Surrey, Dorsetshire, Wiltshire, Worcestershire, and Somersetshire.

Mr. D. Lleufer Thomas—Districts in Anglesey, Carmarthenshire, Carnarvonshire, Derbyshire, Glamorganshire, Merioneth, Montgomery, and Pembrokeshire.

Supply of Labour.

In nearly all the districts, in spite of an almost universal decrease of population, the supply of labour is described as sufficient for the diminished demand in ordinary seasons; but in a great many shortness at busy times is complained of by the farmers, and in nearly all it is said that skilled labourers are inconveniently scarce, and much scarcer than they used to be. In most of the districts, too, there is a difficulty in obtaining a sufficient number of boys for work which they used to perform; and in all the number of women working on the land has greatly diminished, while in some their services can hardly be obtained at all, even in haytime and harvest. Indeed, so strong has the disinclination of women to farm work become that in some counties it is very uncommon to see one of them at work even in an allotment or a cottage garden. It must be borne in mind, however, that the conclusions stated in the reports in nearly all instances refer to whole districts; and in some of them there are certain parishes in which labour is short, while it may be superabundant in others. Again, very generally it was complained that the majority of the best young men had migrated, leaving few besides old and inferior men behind. A deficiency of men skilled in thatching, fencing, and hay and straw binding was particularly mentioned in a number of counties,

while in others it was said that there was a dearth of men experienced in the management of stock, or of youths willing to learn to plough.

As a rule, the migration of agricultural labourers has been greatest from places near the mining and manufacturing districts, while elsewhere the railways are named as the greatest attractions. The reason given for migration is usually the desire to earn more money. In my own districts this was the only explanation given by farm labourers when asked why the young men left the villages, and I am convinced that the idea of their leaving because they find country life dull emanates almost entirely from outsiders, and has only a slight foundation. It is true that there is very little in the way of recreation outside the public-house in most villages, and that a good deal might be done to render village life more attractive; but life in the country is not dull, as a rule, to those who have been brought up to it. In reply to the question whether the men improved their position by migrating to the towns or the mining or manufacturing districts, most disinterested observers, as well as men of the labouring class, said that generally they did so, though not by any means in all instances, and not commonly to the full extent expected. In not a few cases, although the money earnings were increased by migration, the loss of payments in kind and of the advantages of gardens or cheap allotments, together with increase of house rent and other expenses, rendered the change one of doubtful advantage, and sometimes distinctly disadvantageous. Many a man on revisiting his native village has informed his former employer that he had been better off in the country than he was in the town.

Generally, migration has been greatest from districts in which agricultural wages are highest. This is not anomalous, though at first sight it may appear so, the fact being that agricultural wages have always been highest where the greatest temptations to migration existed, and partly for that very reason. But it is also necessary to explain that these temptations are not very far-reaching; for otherwise it might be supposed that a man getting 11*s.* a week as ordinary wages in southern or eastern county would be more likely to go where he could get 20*s.* or upwards than a man in the Midlands who earns 15*s.* But, as a rule, the farm labourer shifts only to a district near him, with the circumstances of which he is well acquainted; and the man getting 15*s.* can obtain as great an advance in a neighbouring district as the man receiving 11*s.* can secure in a place equally near to him. It is further to be observed that there is less difference in the average earnings and accompany-

ing advantages of labourers in different counties than in the nominal weekly wages.

Conditions of Engagement.

Under this head periods of engagement, regularity of employment, hours of work, and extent of Sunday labour were subjected to inquiry. The periods of engagement in the several counties are as follow:—

Northumberland.—All by the year, except a few odd men.
Cumberland.—Single men by the half-year; married men by the week.
Yorkshire.—Horsemen and stockmen (including shepherds) usually by the year; ordinary labourers by the week.
Lancashire.—Ditto.
Cheshire.—Ditto.
Lincolnshire.—Ditto.
Nottinghamshire.—Single horsemen and stockmen by the year; married men of both classes by the week; ordinary labourers by the week or day.
Leicestershire.—Ditto.
Derbyshire.—Horsemen and stockmen by the year; ordinary labourers by the week.
Staffordshire.—Ditto.
Shropshire.—Unmarried horsemen and stockmen yearly; other labourers usually weekly, but in some cases monthly or quarterly.
Herefordshire.—Unmarried horsemen and stockmen yearly; other men, as a rule, weekly, but occasionally fortnightly or monthly.
Monmouthshire.—Ditto.
Worcestershire.—Horsemen and stockmen in some cases by the year, and in others by the month; other labourers by the week or fortnight.
Warwickshire.—Horsemen and stockmen usually by the year or half-year, but subject to a month's notice for the termination of the engagement; other men weekly, or occasionally fortnightly.
Northamptonshire.—Horsemen and stockmen usually by the week or month, but occasionally by the year; others weekly.
Bedfordshire.—All regular men weekly.
Huntingdonshire.—Ditto.
Cambridgeshire.—Usually all classes weekly, but a few horsemen and stockmen for longer periods.
Norfolk.—Ditto.
Suffolk.—Ditto.
Essex.—Ditto.
Hertfordshire.—All weekly.
Buckinghamshire.—Usually all classes weekly, but a few horsemen and stockmen yearly.
Oxfordshire.—Ditto.
Gloucestershire.—Horsemen and stockmen yearly; others weekly.
Berkshire.—Ditto.
Surrey.—All weekly.
Kent.—Horsemen generally yearly; others weekly.
Sussex.—All weekly.
Hampshire.—Horsemen and stockmen yearly; others weekly or occasionally fortnightly.

Wiltshire.—Ditto.
Dorsetshire.—Usually all classes of regular men yearly, but subject to a fortnight's notice to terminate engagement.
Somersetshire.—All weekly.
Devonshire.—All weekly or fortnightly except the few who live in farmhouses, and they are liable to be dismissed or to leave at a month's notice.
Cornwall.—Ditto.
Wales.—Unmarried men in farmhouses by the year or half-year; most married men by the week, though usually with board in the farmhouses on working days.

It must be explained that these statements apply to regular men, casual labourers everywhere being sometimes engaged by the day. Some of the Assistant Commissioners, learned in the law, insist that men hired by the week nominally are really hired by the day if they have to lose time in wet weather; but, as far as that argument goes, it would show that they are engaged by the hour, as they frequently lose part of a day. In some counties men hired by the year or half-year are boarded in the farmhouses; in others, in cottages; while in a few they have cottages rent free without board.

With respect to regularity of employment all the year round, where men are hired by the week, there are great differences, not only in the several counties and districts, but also with different employers. But it is safe to say that the great majority of men in the country are regularly employed, not only because in many counties most of them are hired by the year or half-year, but also because, even where this is not the case, horsemen, stockmen, and shepherds are kept on all the year round. The differences referred to above are quite as great in relation to loss of time in bad weather; but in this respect also it may be confidently asserted that a large majority of the labourers do not lose any time unless from choice or illness. The men hired yearly or half-yearly and the weekly horsemen, stockmen, and shepherds, none of whom lose time from bad weather, would make a majority of all the classes of farm labourers, and a great number of employers, if not most of them, always find some kind of work for their day labourers who come to work, whatever the weather may be, except when they are at piecework, and then the men's time is their own. Others dock off wages for every quarter of a day lost through wet weather, and of course casual labourers lose a good deal of time from this cause. It is a fact, however, that only a small minority of farm workmen lose time necessarily, unless from sickness, when they are paid by time.

With respect to hours of work, they vary greatly not only

in different counties, but also in the several parishes of the same district, and even on the farms of the same parish, especially when some farms are distant from a village. For ordinary labourers the hours are as short as from 7 A.M. till 5 P.M., and as long as from 6 A.M. till 6 P.M. in summer, while they are usually from light till dark, or from 7 A.M. till 5 P.M., in winter. Formerly the hours in summer were nearly everywhere from 6 A.M. till 6 P.M.; but they have been shortened in most counties, and are now more commonly from 6 A.M. to 5.30 P.M., 6.30 A.M. to 6 P.M., or 6.30 A.M. to 5.30 P.M. They are longest, as a rule, in the North and the Midlands, where wages are highest. As to meal times, there is always an hour for dinner, and men who go to work at 6 A.M. or 6.30 A.M. usually have half an hour for breakfast, while those who do not begin till 7 A.M. have no right to any time but an hour for dinner, although pretty generally they have got into the habit of taking at least a quarter of an hour for lunch. Thus meal times occupy $1\frac{1}{4}$ to $1\frac{1}{2}$ hour usually, and sometimes longer, and the actual working times of day labourers in summer are nominally from $8\frac{3}{4}$ to $10\frac{1}{2}$ hours a day. But when a man is working at some distance from the homestead he usually begins to get ready for going home about half an hour before the fixed time for leaving the farm. In winter the day labourer's actual working time may be reckoned as from $8\frac{1}{2}$ to 9 hours.

The hours of horsemen and stockmen vary more widely than those of day labourers, while those of shepherds may be said to be unfixed. In many counties where the horsemen used to be with their horses at 4 A.M. they are now an hour later, and there is as wide a range as from 4 A.M. to 6 A.M. in different parts of the country. As to the evening limit, it varies greatly with the custom of feeding. Where horses are turned out into the yards for the night, or into the fields or pastures in summer, the horsemen go home as early as the day labourers, and sometimes earlier, as, for instance, when they have turned the horses into the fields, or provided them with green stuff for the night. But where it is the custom to keep the horses in the stables at night, the men are usually with them till 6 P.M. or later, and again for a short time to rack-up or "supper-up" at 7 P.M. or 8 P.M. Thus, the working hours of horsemen in many counties may be said to extend over the whole period of the day, from their rising very early in the morning until bed-time, with intervals for meals. A large portion of the time is occupied with the light work of feeding the horses, and it is the restriction upon liberty which is chiefly objected to. This restraint might be lessened materially, as it is in some cases,

though not usually, by letting one horseman in turn do the racking-up for a whole stable. This remark applies also to feeding the horses on Sunday, in which, in many counties, all the horsemen take part.

Wages and Earnings.

It is extremely difficult, in some of the reports, to get at the ranges of nominal weekly wages and estimated average weekly earnings the year round. These details were by far the most important of all those embraced by the inquiry, as well as the most difficult to ascertain. A sufficient number of inquiries would have elicited the range of ordinary weekly or yearly wages for each class of labourers, and it is a pity that it is not given for each district; but the variations in the value of payments in kind and other perquisites are so puzzling that an immense amount of research and calculation is necessary in order to give the total earnings during the year, and the weekly averages. Then the details under the several heads of inquiry were so numerous that it was almost too much to expect the same witnesses to give information upon all of them, and no stress was laid upon one subject more than upon another. Perhaps these reasons may account for the fact that in some of the reports the information relating to wages and earnings is not as full or so precise as could be desired. Again, there is no uniform method of stating wages and total earnings, the estimated averages being given in some cases and the range of amounts commonly paid in others, while possibly the extremes are shown in some instances. Thus it may be that comparisons to be drawn between the amounts set down for different counties are to some extent unfair. It is further to be observed that only one union in each county was visited, and in that particular union wages might happen to be lower or higher than in any other district of the county.[1] A more correct set of county returns might have been obtained by selecting for inquiry parishes in all the unions of each county.

In the following table I have usually taken the estimated ranges of wages and average earnings as given in the several summaries when any are presented in the reports, though in a few cases in which the actual earnings of particular men are given I have included them in the ranges of amounts. Where

[1] At the meeting of the Central and Associated Chambers of Agriculture on October 31, it was complained that the selected districts of Bucks, Herefordshire, and Monmouthshire were those in which wages were lower than in any other parts of the counties.

an amount is so precisely stated as to include a fraction of a penny, it is always the weekly equivalent of an annual total.

Except when actual receipts by particular men are given, the estimates of average earnings must be regarded as dependent to a great extent upon the judgment of the Assistant Commissioner, or upon that of some witness upon whom he relied for correct information. In any case such payments in kind as free cottages, board, the use or keep of a cow, milk, beer, firewood, coal, and bacon, where included in the takings, had to be valued, although there was usually a safe guidance as to cottage rents and board in the customary payments for cottages let in the district, and for men boarded by foremen or other persons on behalf of the farmers. The differences between the ordinary weekly wages and the average weekly earnings may seem too small in some cases to include a fair allowance for all extras for piecework, harvests, payment in kind, and perquisites; but it must be borne in mind that in some parts of the country the extra earnings at piecework are extremely small, and payments in kind also; while it is also to be remembered that hired servants living in farmhouses usually have nothing extra but beer, or beer-money, or food in harvest or haytime. Thus the differences between the ordinary weekly wages and the average weekly earnings are much greater in some counties than in others, and, as might be supposed, the difference is greater in arable than in pastoral counties.

As a rule, the wages of casual labourers are not included in the summaries given in the reports. Such wages are often higher than those of regular men, but still their recipients usually earn less in the course of the year. The evidence as to shepherds' wages and earnings is not generally full enough to render it desirable to include them in the table. With respect to farm bailiffs, their receipts vary so greatly even in the same districts that no regular return on this point could be expected. A farm bailiff may be a head man on a farm of moderate size, getting only a shilling or two more than an ordinary labourer, or an educated farmer managing the home farm of a duke, and receiving two or three hundred pounds a year. But in several of the reports the wages of "foremen" (usually head horsemen, of whom there are sometimes two or three on a large farm, one being often employed on a small farm, especially in the North of England) are given, and their wages or average earnings are inserted, in some cases, in the table, because without them the range of horsemen's earnings would be under-estimated. With these explanations I present on pp. 666–669 the table, which

has been prepared after a careful and prolonged study of the reports.

A good many of the estimates of average earnings are taken from farmers' books, the actual weekly payments to certain men being counted up, and the value of payments in kind, including cottages, added. In most cases the allowance for a cottage is the rent of a similar cottage in the same district, and in some instances only 1*s.* a week is allowed. Now, as 1*s.* a week is a nominal rent, and not half the commercial value of a cottage in any parish, this plan of allowing for rent-free cottages makes the men's earnings, for districts in which it was adopted, lower than they should be to compare fairly with the earnings of workmen engaged in other industries than farming. In my own estimates I adopted 2*s.* a week as the value of a cottage in all cases, seeing that fully that rent would have to be paid for a cottage let commercially in a village.

In taking notes from farmers' labour-books I have sometimes been surprised at the number of small extra payments which would never be thought of when making an estimate of a labourer's average earnings apart from the books. For this and other reasons I am persuaded that the average earnings are more likely to be under-estimated than over-estimated. But the lowest averages are not given in the reports, as a rule, any more than the highest, and for day labourers loss of time sometimes counts for a great deal. All the men represented in the tables are assumed to be in regular employment the year round, although some of them may lose time in wet weather or through illness. When average earnings are obtained from farmers' books, such loss of time is allowed for, but in most other cases probably not.

The plan of boarding most of the men on working days in the farmhouses, even when they dwell in cottages and have to provide food for their families, appears to be peculiar to Wales. A poor dietary for the men who are thus boarded, including the hired servants, also appears to be peculiar to the Principality or to parts of it. Farmers who say that they can feed their men for a week at 3*s.* to 4*s.* 6*d.* a head must either make bad calculations or keep a very miserable table. In England the allowance to a foreman who boards men for a farmer is usually 8*s.* to 10*s.*, and the meals supplied in the farmhouses are most liberal, often including meat of some kind three times a day.

With respect to the earnings of shepherds, they vary immensely, not only in different counties, but also in the same parish, in accordance with the sizes of flocks. No evidence is given as to the earnings of this class of men in some reports, and in some of the rest the information is not sufficient to

[*continued on p.* 670.

Ordinary Weekly Wages and Average Weekly Earnings.

Contractions.—B, board. L, lodging. C, cottage. S, summer. W, winter.

England County and District	Ordinary weekly wages			Average weekly earnings		
	Day labourers	Horsemen	Stockmen	Day labourers	Horsemen	Stockmen
Northumberland: *Glendale*	"Spademen" 17/ with C	17/	17/	20/9	20/9	20/9
Cumberland: *Wigton*	18/ with C	12/3 to 13/ with B & L	10/3 to 11/3 with B & L	18/6 to 23/	19/3 to 20/	17/9 to 18/3
Yorkshire, N. Riding: *Easingwold*	15/ to 16/	8/6 with B & L. "Foremen" 16/ & upwards	16/ or 15/ & C, 8/6 with B & L	16/6 to 17/4	16/2 to 17/6. Foremen 20/ to 25/	16/ to 17/3
Yorkshire, E. Riding: *Driffield*	15/ to 16/	8/ with B & L, 16/ without. Foremen 16/ to 21/	8/ with B & L, 16/ without	16/8 to 17/6	16/2 to 18/1. Foremen 18/ to 35/	8/ with B & L, 16/ to 17/6 without
Yorkshire, W. Riding: *Wetherby*	15/ to 17/	8/ to 8/6 with B & L, 16/ to 17/ without. Foremen 16/ & upwards	8/ to 8/6 with B & L, 16/ to 17/ without	16/ to 18/	17/6 to 18/. Foremen 18/ & upwards	17/ to 18/
Lancashire: *Garstang*	17/ to 20/	7/ to 10/ with B & L	7/ to 10/ with B & L	18/ to 21/2	14/ to 17/ incl., 7/ for B; L not vald.	14/ to 17/ incl., 7/ for B; L not vald.
Cheshire: *Nantwich*	15/	8/ to 9/5 with B & L	8/ to 9/5 with B & L	16/ to 19/2	8/ to 9/5 with B & L	8/ to 9/5 with B & L
Lincolnshire: *Holbeach and Louth*	13/ to 15/	8/ to 13/ with B & L	8/ to 13/ with B & L	15/ to 18/	17/ to 18/6	17/ to 18/6
Nottinghamshire: *Southwell*	15/	16/ to 18/ with C	15/ to 16/ with C, 16/ to 18/ without	16/ to 17/	18/ to 20/	17/ to 19/

LEICESTERSHIRE: *Melton Mowbray*	15/. In a few parishes 13/6 W	16/ to 18/ with C	15/ to 16/ with C, 16/ to 18/ without	15/ to 17/	17/ to 20/	17/ to 19/
DERBYSHIRE: *Belper*	16/ & C	16/ & C	16/ & C	17/4 to 20/	20/	17/4 to 20/
STAFFORDSHIRE: *Uttoxeter*	15/ to 17/	8/ with B & L, or 15/ to 17/ & C	15/ to 17/ & C	16/ to 18/	17/ to 18/	17/ to 18/
SHROPSHIRE: *Atcham*	13/ to 15/	13/ to 15/ & C	13/ to 15/ & C	16/2 to 18/9½	17/7 to 19/1½	18/6 to 19/4
HEREFORDSHIRE: *Broomyard*	10/ to 12/	12/ to 14/, some with C	11/ to 13/, some with C	12/ to 17/4	14/ to 17/4	12/4 to 15/5
MONMOUTHSHIRE: *Monmouth*	12/ to 13/	15/, or 7/ with B & L	15/, or 6/ to 7/ with B & L	12/8 to 14/	14/3 to 15/5	14/3 to 15/5
WORCESTERSHIRE: *Pershore*	11/ to 13/	12/ to 16/	12/ to 16/	12/6 to 15/	15/ to 18/	15/ to 18/
WARWICKSHIRE: *Stratford-on-Avon*	11/ to 12/	14/	14/	14/	15/5	15/5
NORTHAMPTONSHIRE: *Brixworth*	13/ to 15/	—	—	15/ to 16/	18/ to 20/	18/
BEDFORDSHIRE: *Woburn*	12/	14/ to 15/	14/ to 15/	14/ to 15/	15/ to 16/6	15/ to 16/
HUNTINGDONSHIRE: *St. Neots*	13/, in some parishes 12/ W	13/ to 15/ with C, 15/ to 16/ without	14/ to 15/	15/ to 15/6	16/ to 18/	16/ to 17/
CAMBRIDGESHIRE: *N. Witchford*	12/	12/ & C	12/ & C	14/ to 16/6	14/ to 15/	14/ to 16/6
NORFOLK: *Swaffham*	11/ to 13/	14/	13/	13/6 to 16/4	15/ to 20/	14/ to 16/
SUFFOLK: *Thingoe*	12/	14/	13/ to 14/	13/ to 17/4	16/ to 18/6	14/6 to 18/
ESSEX: *Maldon*	11/ to 12/	12/ to 14/	12/ to 14/	13/6 to 17/6	16/ to 18/	16/ to 18/
HERTFORDSHIRE: *Buntingford*	S 12/, W 11/	S 14/, W 12/ to 13/	S 13/ to 14/, W 12/ to 13/	11/6½ to 16/	15/ to 20/	14/ to 19/2

ORDINARY WEEKLY WAGES AND AVERAGE WEEKLY EARNINGS—*continued.*

ENGLAND COUNTY AND DISTRICT	Ordinary weekly wages			Average weekly earnings		
	Day labourers	Horsemen	Stockmen	Day labourers	Horsemen	Stockmen
BUCKINGHAMSHIRE AND OXFORDSHIRE: *Thame*	S 12/ to 13/, W 11/ to 12/	S 14/ to 15/, W 13/ to 14/	S 14/ to 15/, W 13/ to 14/	13/3 to 16/1½	—	15/9 to 16/11
GLOUCESTERSHIRE: *Cirencester*	10/ to 11/	13/ to 14/	12/ to 14/	12/8 to 16/	12/8 to 20/ with C	12/8 to 20/ with C
BERKSHIRE: *Wantage*	10/ to 11/, sometimes 1/ more in S	11/ to 13/	11/ to 13/	15/ to 16/	15/ to 20/	15/ to 20/
SURREY: *Godstone*	15/	15/ to 18/	15/ to 18/	15/ to 17/	19/ to 20/	19/ to 20/
KENT: *Hollingbourn*	14/ to 15/	15/ to 16/	15/ to 16/	15/ to 20/	18/ to 20/	18/ to 20/
SUSSEX: *Thakeham*	11/ to 13/, usually 12/	13/ to 15/ with C	13/ to 14/ with C	14/ to 16/	15/6 to 18/	14/6 to 17/
HAMPSHIRE: *Basingstoke*	11/ to 12/	13/ to 14/ with C	13/ to 14/ with C	14/ to 16/	15/6 to 18/	14/6 to 17/
WILTSHIRE: *Pewsey*	10/	12/	12/	12/6 to 16/	15/ to 16/	15/ to 16/
DORSETSHIRE: *Dorchester*	10/	11/ to 13/	11/ to 13/	14/6	15/ to 18/	15/ to 18/
SOMERSETSHIRE: *Langport*	10/ to 12/	10/ to 12/	10/ to 12/	11/6 to 13/6	13/ to 15/	13/ to 15/
DEVONSHIRE: *Crediton*	11/ with C, 12/ to 15/ without	11/ to 14/ with C, &c., 13/ to 15/ without	11/ to 14/ with C, &c., 13/ to 15/ without	14/ to 16/	15/6 to 16/6	15/6 to 16/6
CORNWALL: *Truro*	13/ to 15/	13/ to 15/ with C	13/ to 15/ with C	14/6 to 16/6	16/ to 19/	16/ to 19/

WALES [1]						
GLAMORGANSHIRE:						
Bridgend & Cowbridge	15/ to 18/, usually 16/	8/6 to 10/ with B & L, 15/ to 18/ without	8/6 to 10/ with B & L, 15/ to 18/ without	About 17/6	About 17/6	About 17/6
PEMBROKESHIRE AND CARMARTHENSHIRE:						
Narberth	7/6 to 9/ with B & C, 12/ to 15/ without	7/6 to 9/ with B & L, &c., 12/ to 15/ without	7/6 with B & L, &c., 12/ to 15/ without	10/ to 16/ [2]	10/ to 16/ [2]	10/ to 16/ [2]
MONTGOMERYSHIRE:						
Llanfyllin	8/ with B & C, 12/ to 14/ without	8/ with B & L	8/ with B & L	13/6 to 14/7 [2]	13/6 to 14/7 [2]	13/6 to 14/7 [2]
MERIONETHSHIRE:						
Dolgelly	10/ with B & C, 15/ to 16/ without	7/ to 10/5 with B & L (in farmhouse), 15/ to 17/ with C without B	same as horsemen	15/4 to 18/1 [2]	15/4 to 18/1 [2]	15/4 to 18/1 [2]
DENBIGHSHIRE:						
Ruthin	8/ to 9/ with B & C, 15/ without	7/ to 9/7 with B & L (in farmhouse) or 14/ to 16/ without B, sometimes with C	same as horsemen	14/7 to 15/4 [2]	14/7 to 15/4 [2]	14/7 to 15/4 [2]
ANGLESEY:						
Anglesey	9/ to 10/ with B & C, 15/ without	9/ to 10/ with B & L, &c., or 15/ & C	same as horsemen	14/7 to 16/6 [2]	14/7 to 17/ [2]	14/7 to 16/6 [2]
CARMARTHENSHIRE:						
Pwllheli	8/ to 10/ with B, or 15/ without	8/ to 10/ with B & L, 15/ & C without B	same as horsemen	13/ to 14/ [2]	13/ to 14/7. Foremen 16/2 to 18/6 [2]	14/7 to 15/4 [2]
BRECON AND RADNOR:						
Builth	14/ to 16/ with C, or 18/ without	8/6 to 9/7 with B & L, 14/ to 17/6 without	same as horsemen	15/ to 19/6	15/ to 21/. Foremen up to 26/	15/ to 21/

[1] In Wales nearly all the men are either lodged and boarded in the farmhouses or boarded when at work if they live in cottages. Most of them on the small farms, which prevail, are men of all work, and no distinction, as a rule, is shown in the reports between the wages of ordinary labourers, horsemen, and stockmen.

[2] To a great extent the differences in the estimates of average earnings are due to differences in the values put upon the board of the men, which is as low as 3/ a week in some cases, and up to 6/6 in others. Mr. Thomas values it at 3/ to 5/ for Narberth, 4/ to 6/ for Llanfyllin, 4/6 for Dolgelly, 5/ to 6/ for Ruthin, 5/ for Anglesey, and 6/ to 6/6 for Pwllheli.

warrant a statement of the complete range of earnings. But, so far as the evidence goes, it represents the average weekly earnings of shepherds as follows :—

Approximate Average Weekly Earnings of Shepherds in certain Counties.

Districts previously named of		Districts previously named of	
Northumberland	21/ to 26/	Herts	16/ to 21/
Yorkshire	16/ to 20/	Bucks	16/ to 19/
Lincolnshire	16/6 to 19/6	Oxfordshire	12/8 to 20/ and cottage
Nottinghamshire	19/ to 21/	Berks	16/ to 21/
Shropshire	19/ to 36/7	Surrey	20/ or more
Herefordshire	15/5 to 17/4	Sussex	15/ to 26/
Northamptonshire	18/ to 21/	Hants	16/ to 20/
Bedfordshire	15/ to 16/6	Wilts	16/ to 25/
Huntingdonshire	16/ to 18/	Dorset	15/6 to 17/4
Norfolk	17/ to 22/	Devon	16/ to 17/
Suffolk	20/ to 28/		
Essex	16/ to 18/		

In some cases the amounts are given as actual payments, and the range of totals may be unduly favourable to one county as compared with another. The highest amount, 36*s.* 7*d.* per week, was given by Mr. Bowen-Jones, of Ensdon, Shropshire, as the earnings of his shepherd during a particular year, and 26*s.* in Sussex was given in like manner by the owner of a large flock.

The wages stated by the Assistant Commissioners are mainly those of 1892, and in some districts a reduction of a shilling a week has since taken place on account of the severity of agricultural depression ; but there is no doubt that the tendency of the men's wages will be upwards whenever farming becomes even tolerably prosperous again.

Cottage Accommodation.[1]

It is hardly necessary to say that in all the districts visited by the Assistant Commissioners good, bad, and indifferent cottages were found. The variations are greater within any given district than between one district and another, although it appears that the cottages in Wales, as a rule, are greatly inferior to those of any of the English districts. There is general agreement as to the testimony upon certain points as follows :—

1. That cottage accommodation is sufficient in each district as a whole, though not in every parish, the consequence being that men in some cases have to walk two or three miles to their work.

[1] See *Report of the Judges on Plans and Models at Manchester* (Journal, 2nd Series, Vol. V., 1869, p. 564) ; *Report on the Plans of Labourers' Cottages a Cardiff* (Journal, 2nd Series, Vol. VIII., 1872, p. 246) ; and *Cottage Sanitation* (Journal, 3rd Series, Vol. III., 1892, p. 631).—Ed.

2. That the cottage accommodation has greatly improved and is improving.
3. That the best cottages are to be found on the estates of large resident landlords, and the worst in the "open villages," or wherever squatters have erected dwellings on waste land.
4. That in most districts, in consequence of the decrease of population, some of the worst of the old cottages are now untenanted.

There is a great mass of evidence as to the condition of cottages in the reports, including descriptions of many dwellings more suitable for pigs than for human beings, and of others locally described as "little palaces." Indeed, so many points of inquiry were included under the head of cottage accommodation that the information gathered upon them made the section devoted to this subject longer than any other in most of the reports. Detailed remarks upon the construction of cottages would require more space than can be given to this branch of my subject. It seems desirable, however, to point out one serious defect. In the best and newest of cottages it is very uncommon to find a boarded floor in the living room, which is almost invariably bricked or tiled, and, even where there is a good layer of cement underneath, such floors are cold, if not damp, and conducive to the rheumatism which is so common among the rural working class.

Overcrowding is clearly much less common than it used to be, partly because it is prevented to a great extent by the sanitary authorities, and partly because there is less excuse for it. Where new and commodious cottages have been built, as they have been in the great majority of parishes within the last ten or twenty years, in spite of a decrease of population, there is no necessity for a large family to occupy a cottage with only one bedroom. Again, the old practice of taking lodgers where there was not sufficient sleeping accommodation for them is prevented if the sanitary authorities do their duty. But there are still in most districts far too many instances of families of all ages and both sexes sleeping in the same room.

With respect to ventilation, it is commonly neglected by cottagers, though the usual means of obtaining it, after a fashion, are generally available. New cottages, of course, always have windows which can be opened, which is not by any means always the case with old ones; but bedroom windows are usually kept shut at night, and, in not a few instances, are nailed or otherwise fastened so that they cannot be opened. Again, in old cottages the bedrooms are frequently devoid of fireplaces, so that there is no chimney ventilation, and they are not commonly provided in all the rooms of new cottages. Where they exist they are too frequently papered over. Under such circumstances it is fortunate that doors or windows are often so

badly fitted that a good draught can enter the rooms, in spite of the efforts of the inmates to exclude fresh air. Seeing that few middle-class houses are provided with any other means of ventilation than windows, chimneys, and doorways, it is not surprising to find no other means of the kind in cottages. Moreover, with the existing ignorance of sanitation prevalent among the working classes, the best of ventilators, if provided, would certainly be stopped up in the great majority of instances.

As to drainage, it has been greatly improved in most large villages. Fortunately, the water-closet system is not common in rural districts, though there is usually a drain for surface and slop water in a village. The adoption of the earth-closet system, with wise and benevolent despotism, is insisted upon by the owners of some large estates, as on that of the Duke of Bedford, for instance. I was agreeably surprised to find the system in use in several villages in different parts of the country, and to learn that it was carried out by the cottagers in a satisfactory manner.

The most widely prevalent defect in rural sanitation is an insufficient or impure water supply. This is sometimes due to soil or situation, but more often to indisposition on the part of landowners or that of local authorities to incur the expenditure necessary in providing a better supply.

In nearly all districts the tenure of cottages is of three different kinds—direct hiring from the landlords, indirect hiring through the farmers, and ownership. Very few cottages, however, are owned by the occupiers, except in some of the open villages, or where they have been built on the waste of a manor, and the tenants pay a nominal quit-rent or none at all, through the claim for it having been somehow allowed to lapse.

In most districts cottages on farms are let, or, as is more common, provided rent free by the farmers, while in the villages they are let by the large landowners directly, or by speculative builders and other investors. The letting varies from a weekly one, as far as rent-collection is concerned, to a yearly one, and the notice to quit varies from a month to six months, or even a year; or, at any rate, where a notice is nominally less than a month, it takes at least so long to force a tenant to quit by legal process. Much fault is found with the plan of allowing farmers to have the letting of cottages owned by their landlords, and where they are in villages there is something to be said against it. But it would be unfair to farmers to prevent them from reserving cottages on their farms, or built close by for their accommodation, for the men who work for them, and turning out men who leave their service. Besides, there is another consideration,

ignored by those who dwell on the hardship of turning out a cottage tenant because he cannot get on with a particular farmer. The man who succeeds him at his work on the farm, if not allowed to occupy the cottage, may have to live far distant from the place of his occupation, and this is a much greater hardship than being compelled to leave a farm cottage when ceasing to work on the farm.

Cottage rents on the large estates are almost uniformly low, 1*s.* to 1*s.* 6*d.* a week being most common, while it is seldom that they are more than 2*s.*, and some small cottages are let at 6*d.* to 8*d.* But in many villages the rents are from 4*s.* to 5*s.*, and sometimes up to 6*s.*, a week as the maximum, where they are let by small owners. As a rule, rents are lowest where wages are lowest, and highest where wages are highest, at least where they are commercial rents; but this is not by any means always the case on the large estates, for there they are generally not over 2*s.* a week, however high wages may be, and, as already stated, are more often 1*s.* to 1*s.* 6*d.* Cottage rents are not graduated in proportion to the value of cottages, as the rents of the best dwellings on the large estates are commonly lower than those of the worst, or all but the worst of cottages let by small investors.

Farmers who let cottages hired with their farms almost invariably pay the rates upon them, and the large landowners usually compound for the rates on the cottages which they let directly, but not invariably in the Midlands and the Northern Counties. It is certain, however, that the vast majority of agricultural labourers pay no rates directly, and, where they are charged only nominal rents—sums which do not pay the lowest commercial rate of interest on the cost of construction—it cannot truly be said that they pay rates indirectly.

Gardens, Allotments, &c.

Gardens attached to cottages are much more general or much larger in some parts of the country than in others, while there are also great differences in these respects among the several parishes of every district. As a rule, cottages on farms have large gardens attached to them, and this is also commonly the case in small villages and hamlets in which the few houses are often spread over a wide extent of ground. But in the "open villages" and in other large ones the dwellings are in many cases too closely packed to allow of gardens of any considerable size, and in some of them large proportions of the cottages have no attached gardens, or only mere scraps. In such cases separate gardens are sometimes provided for the

inmates of the cottages, but rents are usually charged for them in addition to the rents of the houses. Speaking generally, gardens are fewest and smallest in the Midlands and the Northern Counties, especially in contiguity to the manufacturing or mining districts. In some of those districts what would be styled allotments elsewhere are called gardens, and if within the bounds of a village they are usually let at very high rents. Potato ground is frequently allowed by farmers to all their labourers, free of charge, in districts where gardens are most scarce, and it is said by many witnesses that the men do not care for gardens or allotments. Where they earn high wages, it is added, they would rather buy all their vegetables than take the trouble of growing them. There is a great deal in custom, and where young labourers have grown up in cottages devoid of gardens they do not feel the want of them; but the value of a garden to a family is out of all proportion to the labour bestowed upon it, and it is a bad sign when a man does not care for one. In Hampshire and Sussex, where allotments are comparatively few in number, the gardens are generally large, and often well stocked with fruit trees; while in Bedfordshire and Hunts, where gardens are sometimes few or small in the villages, allotments are more numerous and larger than in any other counties. But in some parts of Nottinghamshire and Leicestershire allotments are fewest where gardens are least numerous and smallest.

A garden of moderate size attached to a cottage is more advantageous than a large allotment a mile away, not only because of the superior convenience of working in the former for the man and his family, but also because fruit is commonly grown in gardens, and seldom in allotments. Even in the large and cheap allotments of the Woburn district, attached to cottages though they commonly are, the lack of fruit trees is unpleasantly striking. A farm labourer who has a good garden frequently pays his rent from the sale of fruit.

Allotments are most numerous, and as a rule cheapest, in parishes forming parts of the estates of large landowners. But not a few of the smaller landowners are strongly favourable to the allotment system. The rents are usually low for land a mile or more from a village, and frequently very high within it. In some of the "close villages" on the great estates, however, the rents of allotments are moderate. It seems absurd for agricultural land to be let by the square yard, but allotments are so let in a few counties. The statement common to nearly all the reports in the several districts that the supply of allotments is equal to the demand must often be taken to mean only

equal to the demand at the price. Men do not object to paying for allotments 10*s.* an acre more than the rent of adjoining farm land, but do complain bitterly when they have to pay twice or three times as much. They do not make sufficient allowance for the extra value of land near a village or for the common payment of rates by the landlords; but I have met with cases in which the rent of allotments was 6*l.* or even 9*l.* an acre, and the lack of demand in districts where such high rents prevail is not surprising. At the same time it must be pointed out that men frequently complain of the insufficiency of allotments, and, when asked if they have applied to the landowners of their parish for more, admit that they have not made any such application. Generally, nowadays, landowners are willing to supply land for allotments when convinced that there is a genuine demand for them. In not a few instances they have gone to the trouble and expense of cutting land up into allotments, only to find that they were not appreciated.

In Wales, according to Mr. Thomas, gardens are common, and allotments are not popular. One reason is that potato land is usually supplied by the farmers to all their regular men. In a great many English counties this custom of supplying land for potatoes, especially to hired servants who have no time to cultivate allotments, is common. The farmers usually plough the land and provide the manure, while the men find only the seed, and set it in their employers' time. Or sometimes a few rows of potatoes in the farmer's crop are given to a man. The remark concerning hired servants reminds me of the fact that allotments are least in demand where the yearly or half-yearly system is common, for the very good reason that where most of the men are boarded they do not need to grow vegetables. Even the married labourers, if employed with horses or cattle, often have no time to cultivate any land outside a small garden.

Cow plots or common cow pastures are not numerous, except in the cheese-making or other dairy districts, and not in all of these, as in Somersetshire, for example. They are highly advantageous to labourers and their families as sources of health as well as of profit, and it would be well if they could be more generally provided. Wherever they are brought into use a cow club should be formed in order that the occupiers may insure their cows, so as to be independent of charity in the event of the loss of an animal. Such insurance is common where cow plots are most numerous, and it is generally agreed that, whereas small arable holdings are frequently disadvantageous to

farm labourers, because by cultivating them they lose regular employment, cow plots, which involve very little work beyond what the wife can do, are almost always beneficial.

The question of small holdings other than cow plots and allotments was not one of the points of inquiry committed to the Assistant Commissioners; but in some of the reports more or less is said on the subject. As a rule, small holdings appear to be successful in the cheese-making, fruit-growing, and market-gardening districts, but not commonly so where the ordinary system of farming is pursued, unless the returns from the land are supplemented by earnings at some kind of work outside the holdings.

With respect to live stock kept by labourers, it is hardly necessary to say that, except in the cow-pasture districts, the pig is the only animal kept by any considerable proportion of the farm labourers, while men employed with horses or cattle are frequently debarred from having one, pork or bacon, either in part payment of wages or at wholesale prices, being sometimes provided instead. Fowls and bees are kept in a few instances in most parishes; but generally both are sadly neglected, even where there are capital opportunities for doing well with them.

Other Points and General Conclusions.

The remaining heads of inquiry must be dealt with briefly. As to the extent to which agricultural labourers belong to benefit societies, and the character of those which are most favoured in the several districts, the details are multitudinous. It is probably safe to say that a large majority of the young labourers belong to a benefit society of some kind, while too many of the old men, who formerly belonged to one of the miserable little public-house clubs which usually failed before their members needed help most, are not in any such society. Fortunately the large registered societies are nearly everywhere gaining ground; but there are still too many of the little local clubs in the stability of which no confidence can be felt. There is one form of insurance which is undesirably increasing among the agricultural labourers in some parts of the country—that of insuring the lives of their children. In almost every village an agent of the Prudential Society is to be found.

The only counties of England and Wales in which a trade union among agricultural labourers is mentioned in the reports as still in existence are Warwickshire, Somersetshire, Lincolnshire, Norfolk, Suffolk, Essex, and Kent; and in all but Norfolk and Suffolk the adherents are said to be very few. Even

in the Stratford union of Warwickshire, the birthplace of the National Agricultural Labourers' Union, Mr. Richards says, only a few men continue to subscribe to it.

Upon the important question of the relations between employers and employed, the Assistant Commissioners have arrived at various conclusions with reference to the districts visited. Lack of space prevents me from quoting them, and I can only state that the prevailing verdict is that the relations are generally friendly, though less cordial than they used to be.

In all the districts except North Wales the general condition of the agricultural labourer is described as better than it used to be, and in many as better than ever it was before; and in the excepted district it is only said that perhaps he was slightly better off about 1879. This general verdict may be taken as applying to the year 1892, and in some districts it might now be modified by the reduction in wages which has since taken place. It is a mistake, however, in my opinion, to conclude that the labourers have not suffered from agricultural depression. Until recently, it is true, their nominal weekly wages have hardly anywhere declined, while they have actually advanced in some parts of the country since the depression set in. It is also true that the low price of nearly everything the labourer has to buy, which has been incidental to the general depression of agriculture and trade, has been the chief cause of his comparative prosperity. But it is to be borne in mind that the labourers have only staved off a considerable drop in wages by making themselves scarce by means of migration; also that their extra earnings at piecework and in harvest, in many districts, have been greatly reduced by the conversion of arable land to pasture. Before concluding that they have not suffered from agricultural depression, it is necessary to imagine what their condition would have been if agriculture had remained prosperous. Migration would have been checked to a considerable extent, no doubt; but it would have been checked only by an advance of wages and other advantages. Bread and meat would have been less cheap, but need not have been dear; and the prosperity of agriculture would not necessarily have raised the prices of many of the other requirements of the men and their families. Enterprise in farming and in estate improvements would have increased, instead of necessarily diminishing, and the establishments of country gentlemen, now closed in too many instances, would have been kept up in full efficiency, giving much lucrative employment to workmen.

For my own part I cannot doubt that agricultural prosperity would have rendered the condition of the labourers much better

than it has been since 1879. At that time it had been generally improving, though with occasional fluctuations, for many years, and I believe that it would have improved more rapidly than ever with the advance of education and knowledge of opportunities of betterment if it had not been checked by the terrible depression. At any rate, there can hardly be a doubt that, unless the towns and mines can absorb a continuously increasing number of rural workmen, the continuance of agricultural depression would become a veritable disaster to the farm labourers. Let us hope that this crowning misfortune may be prevented by a turn in the long-ebbing tide of agricultural affairs.

William E. Bear.

MANAGEMENT OF BERKSHIRE PIGS.

At the present time, when a herd of pigs well managed pays probably better than any other live stock on the farm, it may be of interest to those who have a herd, or contemplate starting one, to read something about the routine of management of a large and fairly successful herd.

In this short paper—and it must naturally be brief, so many pre-eminently fitted to write on such matters having given their experience on previous occasions—it is my intention to treat only of the essentially practical part, and to give a few hints to those who may consider them worth taking.

That those of us who make pigs our special study differ on certain points is only what might be expected, and this is one reason why I give my experience based upon daily observations.

In the first place, success depends in no small degree upon the herdsman; but a man who is naturally fond of animals very quickly learns the chief points to be observed to command success, and with a keen master to give the necessary instructions there should be no difficulty. I have personally known more than one man who, though previously having little or nothing to do with pigs, took to the work with great success. These men, no doubt, were really fond of all animals, and would have done well with any stock entrusted to their care, provided their master gave them that desirable encouragement without which it is an uphill game for the servant and loss to the master.

The sties should be away from the other buildings of the farm if possible, although this is seldom so except on recently constructed premises; but in any case they are

better facing south, and so placed as to drain all moisture off. The nearer they are to pasture, or a run out, the better, this being one of the surest roads to the successful breeding of pigs, as nothing can take the place of a daily run on grass for the brood sow and her litter. For the flooring I have not found anything superior to old railway sleepers, and these can be usually obtained in good condition at from 6*d.* to 1*s.* each, nine feet in length and nine inches wide. Twelve of these will suffice for a really good sty, fit for a sow to farrow in. There should be a rail placed round it about nine inches from the ground inside to protect the youngsters; or, if required for fattening pigs, it will hold six or eight baconers. The outside of the sty may be chalk and flint well rammed, or rough cement so laid as to run itself dry.

For the inside divisions I like oak plank: this I consider warmer and more convenient than walls, but on the outside a wall may be preferable. The best wicket I have seen was made from the old bonds of a wheel, about $1\frac{1}{2}$ inch wide, straightened: any blacksmith can make it.

For the roof, nothing equals thatch, as it is warmer in winter and cooler in summer. The only drawback is when there is scarcity of water or when there is required a roof that will catch the rain. In this case I would recommend a thin layer of thatch under tile.

Having given a rough sketch of the sties, we will now discuss the best way of filling them with a rent-paying animal. I am very decided in my opinion that a pedigree herd pays the best, and gives most pleasure to the owner, for it must be very strange if the most careless breeder does not occasionally produce a show specimen; consequently it makes a good price and incites the breeder to give greater care and judgment to his herd, while at the same time the best bred animals always fatten quickly.

For choice of breeds I certainly much prefer the Berkshires. They fatten easily, produce good litters, and make the best of bacon, and, in my humble opinion, stand the climatic changes of this country better than other breeds.

Having decided on the breed to keep, whatever it may be, I think the best way to start is to buy one or two straight, deep, light-shouldered sows, each having not less than twelve sound teats, and due to farrow their second or third litter. This is preferable, I am sure, to buying elts, as often great disappointment comes through these breaking their service or proving bad mothers. Having secured a nice sow or two the breeder can save the best elts from them, and by selecting a straight, deep clean-

shouldered boar, one should have the foundation of a good herd at a small outlay. To obtain these one may attend an advertised sale, or communicate with one of the many breeders of the class required. Care must be exercised in order to obtain sows with as much quality as possible. The coat and skin are, as in other animals, the best indications of quality; the former should be fairly long and fine, while the latter should be smooth and free from wrinkles of any sort. I have been often asked whether the boar or the sow has the greater influence on the progeny. I am inclined to favour the sow, from the fact of having had many sows breed good pigs from different boars. At the same time I would not use anything but a good boar.

In breeding from elts the latter should in no case be allowed to have their first litter till they are twelve months old; if bred from earlier they seldom reach that size which we like to see in the brood sow. Similarly with the young boar; never use him till nine months old, and then sparingly, bringing the sows to him and taking them away as soon as served. I have known two or three good young boars spoiled through being allowed to run with elts and getting overworked, and refusing to notice sows afterwards for many months.

When a sow is farrowing the herdsman should be always present; he will know when to expect the little ones by occasionally trying the sow's teats. About twelve hours after the milk appears she generally commences farrowing.

As the young pigs come on the scene they should each one be taken away and put into a box or hamper kept in readiness, and their little teeth nipped off by pliers made for the purpose. There are eight teeth, two on each side of the upper, and two on each side of the lower jaw: they are as sharp as needles, and if not cut off they punish the sow considerably. This causes her to be uneasy, and in getting up and down she usually kills some of the youngsters. I am sure I save a great many pigs each year by insisting upon having the teeth attended to; if the little pigs are many days overdue the teeth appear extra long, no doubt making additional growth in the sow. In cold weather the tails of the little pigs should be rubbed at the root with lard or lard-oil for a week or ten days after birth, say each alternate morning; it prevents their getting chapped and falling off, and thereby saves a great loss in the value of breeding or show pigs.

I like to place the sow in her sty about a week before she is due to farrow, at the same time giving her a little exercise every day unless the sty is unusually large; the same after farrowing, exercise being very essential for moving off the urine,

or any secretion that may be left back, through the after-birth not coming away as it should. This latter is of course moved from the sty before the little pigs are put back to the sow, after having their teeth attended to.

In the first meal after farrowing, which should be given as soon as convenient, I always use two ounces of Epsom salts and two ounces of powdered sulphur, mixed with a little warm milk. This I find answers well; it prevents fever, yet in no way injures the milk.

The next point we have to consider is a most interesting and at the same time a most important one, namely, the food best suited to pigs at various ages, and I have not yet been able to find a work that left the reader (especially if a beginner) quite clear that he could feed pigs equally well with the experienced herdsman. This I think goes far to prove that we can only feed successfully by daily observing how each pig, or pen of pigs, is thriving, and using judgment accordingly.

I grind most of my barley with a Barford & Perkins mill, using a sifter, the screenings going for the rougher pigs and brood sows. This I find keeps them in good condition cheaply; the finer meal goes to the younger pigs and those I may be forcing. Although barley meal is my sheet anchor, I cannot do without buying some toppings and bran. The former is mixed with barley meal for little pigs, and for those up to four months old, at the rate of one of meal to two of toppings. As the pigs get older I increase the meal, as it comes much cheaper to use one's own corn. The bran I use mixed with ground oats for the sows and litters, and when the young pigs are from five to six weeks old I add a little barley meal, simply to strengthen the sow to carry on her family until weaning time. I like the young pigs to feed as early as possible; I think future success depends much on this, as little pigs learning to eat when young expand, and by so doing consume a larger amount of food, and consequently grow and fatten at an earlier age. I never feed more than twice a day with the meal mixture, but a few split beans given about eleven o'clock very much help the store pigs.

A few ashes occasionally will benefit the animals that are kept confined in sties. I use all my damaged corn, but at the same time I would never buy damp or musty corn, as the meal from such gets heated, and is not only unpalatable but injurious, especially to the younger pigs.

It will be noticed that I have left out perhaps one of the principal foods; I refer to skim-milk. Some feeders go so far as to say that pigs cannot be reared successfully without it. This,

however, I cannot admit, as many of my best pigs practically had no milk. The fact that for some years I had only two cows, with no means of getting milk elsewhere, will be quite conclusive. Yet, to make myself quite clear on this subject, I must say that could I get skim-milk at a fair price, I should use it largely, as nothing forces pigs on so well, especially when mixed with barley meal.

I am a great advocate for potatoes, and also for parsnips, growing an acre of each especially for the pigs. These are boiled, mashed up, and mixed with the meal for all except the yard sows. I have not often used mangel, but am inclined to think it should be employed with great care, particularly in the case of the male animals. Clover, vetches, and such like are much relished in their season, and more especially by those pigs not allowed a daily run. It will pay to grow this sort of feed near the farmyard if an extensive herd is kept, and to cut and draw it to the sties.

I cannot say anything about the various diseases of swine, for fortunately my herd has kept wonderfully free, and I have never yet seen a pig suffering from swine fever. Now that attention is being given to this troublesome disorder by the Board of Agriculture, I hope it will soon disappear altogether.

The little derangements that pigs suffer from can, I think, usually be cured by regulating their diet, changing or lessening as the case may require; but with very small pigs this must of course be done through the sow.

There is very little doubt that, upon the first symptoms of really failing, the pig, if large enough, should be slaughtered, when the trouble usually turns out to be enlarged liver or something of that nature.

Ruptured pigs should be made into pork as quickly as possible. Castrating them I have found a failure, even when they are operated upon scientifically; and, as rupture seems to be hereditary, no sow should be kept for breeding which has once thrown ruptured pigs. In choosing a boar such things as these should be inquired about and guarded against.

A few words on the fattening of pigs will not be out of place, especially as many who have not the convenience for breeding nevertheless like to have a sty of fat hogs by them, and know how handy they are when converted into cash to meet the weekly labour bill. No doubt the breeder has here a distinct advantage over the buyer, as, apart from being able to select those he likes the best for the various weights he requires to make, he also saves a great loss of time in starting his pigs, those that are

purchased usually going back in condition for a time, to say nothing about the risk of introducing disease.

To make the best bacon, I like to start with pigs about four or five months old that have been running at large and just kept growing. Such pigs will stand being shut up, and forced on at once. Nearly all barley meal can be used at this age, and quite all before they are fat, if necessary. Nothing makes such good bacon, especially if mixed with boiled potatoes and parsnips; and nothing can be cheaper.

For porkers up to about five score the pigs must not be allowed to lose an ounce of flesh, for the quicker they can be fed off the more profit there is attached to them. Skim-milk here comes in as the quickest and best feed.

There are a few drawbacks in the fattening of hogs, loss of appetite through over-feeding being very common, notably where the feeder is too eager to cram on weight at any risk, and thus causing surfeit. A dose of powdered sulphur, from one to two ounces according to the size of the pig, given in milk, fasting, will generally put things right again. Another very annoying complaint is cramp: this, I feel quite sure, is due to the situation of the sties, and not to the diet, as many affirm. I have known sties that invariably gave cramp to any pigs put into them; yet when these same pigs were put into other places they speedily recovered. In fact, a certain row of piggeries always produced cramp, whilst those on the opposite side of the yard never did. This makes me rather inclined to the belief that it is the flooring that originates it; yet, strange to say, some apparently dry floors produce cramp, while others which seem to be damper do not. Consequently, cramp would appear to be due to something in the land upon which the sties are built.

I fear that, in these brief notes, I have added nothing fresh to what has been often written before. Yet I feel how utterly I have failed to bring home to the keeper of pigs the extreme pleasure and satisfaction it has given me to watch over and manage a large herd of Berkshires. If, however, this paper should induce only one or two to take a deeper interest in the animal that supplies the table with such dainties, my object will have been gained; for I have yet to discover any animal that pays more for its keep than a good-natured brood sow.

EDNEY HAYTER.

CROSS-FERTILISATION OF CEREALS.

THE improved varieties of our cereals now under general cultivation have been obtained almost entirely from the selection of individual plants which were observed to differ from the rest of the crop by their size, or by possessing some other desirable quality. A sufficient quantity of seed for practical use has been obtained by sowing and resowing the seeds of the selected plant and its progeny; and the purity of the variety has been secured by carefully removing all the plants in each generation that did not exhibit the characteristics for the possession of which the original plant was selected. The intelligence of the grower was exercised, not in the production of the variety, but in detecting the presence of the original plant in the field, and in producing by cultivation a true and fixed form.

The production of new varieties by crossing or hybridising is of comparatively recent origin. It is true that Knight, who did great service to agriculture as well as horticulture, tried crossing wheats a hundred years ago, and that at intervals thereafter similar experiments have been made; but no practical results were secured till recent years. Successful results in crossing have been obtained in Germany, France, and America, as well as in England.

To appreciate the process of fertilisation, and the difficulties of cross-breeding, it will be well to consider for a little the general subject, using for illustration the flower of wheat engraved from Bauer's beautiful drawings (page 687).

In all plants that have seeds there are produced, in the same or in different flowers, two necessary organs—stamens and pistils. The function of each of these organs is to prepare certain minute bodies—pollen grains in the one and ovules in the other. When fully grown these small bodies are incapable of further development by themselves. It is not till the materials of two of these products of the flower are brought together that further development takes place. This is accomplished by the pollen grain, when it has fallen on the stigma, sending out a minute tube that penetrates the stigma and pushes its way through the tissues until it reaches the ovule. As soon as the growing apex of the pollen tube touches the ovule, fertilisation takes place. A new growth immediately begins in the ovule, which ends in the formation of a minute embryo plant. This embryo is present in all seeds capable of germination. Under suitable conditions the embryo germinates, and, living on the

food stored up in its tissues or beside it within the seed, it forms its roots and leaves by which it is able to provide food for itself.

The action of the substance of the pollen grain upon the substance of the ovule is the beginning of the life of the new plant. The new plant is necessarily affected by both elements. When the pollen which fertilises and the ovule which is fertilised are both parts of the same flower, there is obviously little likelihood of modification in the new plant. On the other hand, when the pollen comes from the flower of another plant which though of the same species has its individual peculiarities, modifications will appear in the progeny of the same kind, though not so obvious to us as those we are familiar with in the animal kingdom, when two different-looking individuals of the same species inter-breed.

In the strict sense this is cross-fertilisation. Greater energy comes from it, which is manifested in the production of an increased number of larger seeds. The great attention that was given to this subject by Darwin, and the results of his numerous experiments, have produced an extensive literature dealing with the extraordinary and almost endless modifications in the structure of many flowers for the purpose of securing cross-fertilisation. In many plants, belonging to various sections of the vegetable kingdom, cross-fertilisation is necessary because the pollen is produced on different plants from those that bear the ovules. The most familiar instance of this is found in willows, where the seed-bearing catkins are found on shrubs or trees that never bear the male or anther flowers. Such plants are called dicœcious. Very few grasses have flowers of this kind, and none of our British grasses or cereals are among that number.

Another case of necessary cross-fertilisation is found in plants where the two kinds of organs are produced in separate flowers though both kinds of flowers are borne on the same plant. This is familiar in the oak, in which the long slender tassels are composed of pollen-producing flowers, while the pistil-bearing flowers are less numerous and are borne closer to the branch. These plants are called monœcious. Among grasses we are best acquainted with such flowers in maize or Indian corn. The male or antheriferous flowers are produced on a branched inflorescence which terminates the stem, while the female or pistillate flowers are borne in dense spikes (cobs) lower down the stem. It would seem that the position of the staminal flowers would secure when the anthers burst an abundant shower of pollen grains on the stigmas of the flowers below. But the antheriferous flowers which crown the maize

are perfect, and their pollen grains are scattered, before the stigmas of the female flowers on the same plant are ripe and fitted to receive them. The pollen grains are consequently carried by the wind to other plants which are more advanced, and the stigmas are fertilised by the pollen of later flowering plants. In some monœcious grasses the stigmas are first ripe, and cross-fertilisation is equally secured; while in others the two kinds of flowers are ripe at the same time, and fertilisation by the flowers of the same plant is favoured.

In the vast majority of grasses each flower contains both stamens and pistil, though among them we also find modifications for securing cross-fertilisation. In the two well-known pasture grasses, foxtail and vernal grass, the stigmas are pushed out beyond the glumes of the flower some time before the opening of the flower and before the escape of the pollen grains; and as the stigmas remain receptive of the pollen for only a short time, they must be fertilised by pollen grains from the flowers of other plants which are more advanced.

The stamens and pistils are, however, generally ripe at the same time in grasses, and thus obviously favour self-fertilisation; though, as the anthers contain a large quantity of pollen, which is ejected into the air, cross-fertilisation is not excluded. A most complete case of self-fertilisation is found in barley. Here the pollen escapes from the anther, and is received on the moist stigma before the flower opens, and while the ear is still within the sheath. When the stigmas are pushed out beyond the scales of the flower they are dead. The quality of our barley crops sufficiently proves that cross-fertilisation is not necessary in all grasses for the production of large and vigorously germinating grains.

The fertilisation of the ovules in wheat takes place at the time when the flower is ripe and suddenly expands. The very short time during which the flower remains open, being not longer than a minute or so, makes it difficult to observe with care the operation, and has led to very different opinions as to what actually takes place. The observations of Francis Bauer, as recorded in his drawings, the engraving of which from a previous volume of the Journal[1] is here reproduced, show the anthers already burst, and some of the pollen grains discharged before the flower naturally opens, for the stalks or filaments of the anthers are not yet elongated (7 and 8, fig. 1), and the pollen grains are already adhering to the divisions of the feathery stigma (12 and 13, and the more highly magnified branch,

[1] Journal R.A.S.E., 3rd Series, Vol. III., 1892, p. 97.

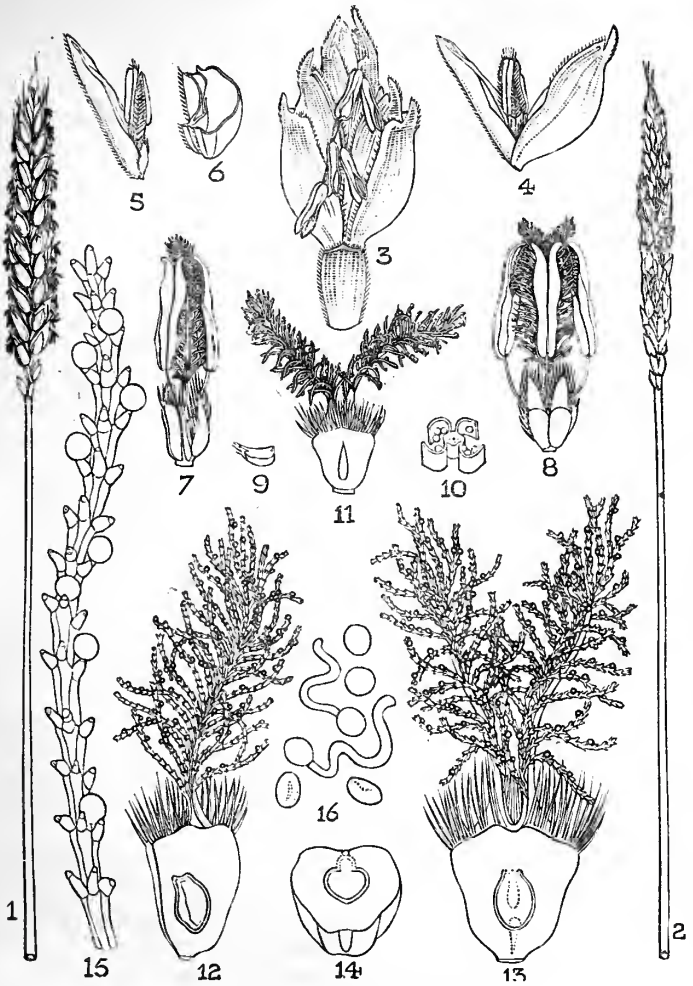


FIG. 1.—The Flower of Wheat.

1. Ear in flower, June 20, $\frac{1}{3}$ nat. size.
2. Another view of 1, $\frac{1}{4}$ nat. size.
3. Spikelet of 1, × 2 times.
4. A flower of 3, × 2 times.
5. The same flower (4) without the glume, × 2 times.
6. Section of glume and pale of 4, × 2 times.
7, 8. Flower with lodicules, stamens, and style, × 4 times.
9. Section of a lodicule of 7, × 6 times.
10. Transverse section of a burst anther, × 8 times.
11. Ovary and styles with pollen grains, × 4 times.
12, 13. Section of 11, × 8 times.
14. Transverse section of ovary of 11, × 8 times.
15. A hair of the style of 11, × 80 times.
16. Pollen grains, entire, emitting the tubes and empty, × 80 times.

15, fig. 1). The sudden opening of the flower is due to the pressure of the included organs. The short cells of the filament are ready to elongate, the feathery stigmas are pressing, while the lodicules (two little scales at the base of the flower, 5 and 9, fig. 1) are waiting to expand. At the same instant each of these organs exerts its influence: the filaments, pushing the anthers before them, extend to three or four times their former length; the feathery stigmas spread themselves in the air; and the bases of the lodicules rapidly swell.

The forces thus suddenly and simultaneously exercised as speedily exhaust themselves, and the glumes return to their former position, covering in the fertilised stigmas; while the filaments, unable to support the heavy anthers, double over the glumes and hang outside. The very slight attachment of the filament permits the anther to be shaken by the least movement of the wind, and it is in this way speedily emptied of all the remaining pollen grains, and these may be carried by the wind to the stigma of the flower of another plant. But the simultaneous ripening of the stamens and stigma and the partial discharge of the pollen on the stigma before the flower opens show that self-fertilisation is the rule in the wheat. Observations in the field confirm this view, for in experimental grounds where different varieties of wheat are grown in close proximity in parallel rows, no accidental cross-fertilisation due to wind-carried pollen grains has been observed.

It is obvious that the work of cross-fertilising wheat or barley is an extremely delicate operation. It has to be performed on the living plant in the open field. The flower is difficult to deal with, being supported on a long, slender, and easily moved straw; the parts of the flower are small, and the organs operated on are extremely delicate. The stamens must be removed before the pollen grains are ripe, and the stigmas must be protected from the access of pollen grains from the flowers of the same spike or of neighbouring plants. The application of the pollen grains to the feathery stigma is a delicate work, and should be done, when possible, by applying the ripe pollen grains direct from the anthers to the stigma by gently moving them over its surface. Many an experimenter has been baffled by the difficulties or has been disappointed at the mixed results. The more credit is due to those who have preserved and succeeded.

The pollen grains are efficient for fertilisation in proportion to the closeness of affinity between the plant which produced them and that to which they are applied. The affinities of the plants which by natural or artificial fertilisation have produced

seeds capable of germination may be appreciated by a glance at the following table.

Seeds fertile.

SELF-FERTILISATION .	1. Pollen of the same flower.
CROSS-FERTILISATION .	2. Pollen from another flower of the same plant. 3. Pollen from the flower of a similar plant of the same species. 4. Pollen from the flower of a dissimilar plant of the same species, that is a variety.

Seeds of the hybrid almost invariably infertile.

HYBRIDISATION . . .	5. Pollen from the flower of a different but closely related species of the same genus. 6. Pollen from the flower of a remotely related species of the same genus. 7. Pollen from the flower of a species of another but nearly related genus.

The best results are obtained from fertilisation by pollen taken from another individual of the same species, whether that has the same characters as the female plant (3) or differs from it to such an extent by characters transmitted from generation to generation as to be recognised as a distinct variety (4). An improvement may be detected by using the pollen from another flower of the same plant (2) over those that are fertilised by the pollen from the same flower (1). Fertile seeds are produced, generation after generation, fertilised in any of these methods.

In the case of hybrid plants it is very different. When the pollen is taken from an allied species of the same genus (5), it is easy to secure fertilisation and to obtain perfect seeds that will germinate. But the hybrid plant in the next generation rarely produces fertile seeds. The plants themselves usually present vigorous vegetative characteristics—a taller straw and larger leaf—but the sexual organs are weak. The stamens may look perfect, but the pollen grains do not ripen and the anther cells do not open. The ovules, too, are incapable of fertilisation. Should ripe pollen grains get access to the stigma and penetrate to the ovule, they may excite some activity and lead to the growth of the ovule, but without resulting in the formation of an embryo plant; or an embryo may be formed which, however, is incapable of germination when the seed is ripe; or even the further stage may be reached and some of the ovules may develop into perfect seeds capable of germination.

To the nurseryman who seeks only to obtain fine flowers the production of barren hybrids is no disadvantage. From a number of seeds thus produced he obtains a considerable variety of plants, and those that possess any striking peculiarity in the

flower, and so commend themselves to the purchasers of plants, are the more valuable because they are unique plants, incapable of reproducing themselves. But it is very different with the agriculturist, whose object is to get the largest quantity of seed of the best quality. Hybrid plants must be avoided even though it can be shown that the seeds of the second generation are capable of generation.

The fertilisation of pollen from a widely separated species of the same genus (6) is difficult, and the seeds of the hybrid are very rarely fertile. Still more difficult and rare is fertilisation when the pollen is obtained from a plant belonging to another genus (7). Yet fertile seeds have in several cases been thus produced in plants cultivated for their flowers; and an instance is recorded of fertile seeds being produced by a hybrid between plants belonging to different genera of cereals. Mr. A. Stephen Wilson made over four hundred experiments to fertilise plants of wheat, rye, barley, and oats with pollen from each other; but he failed except in two cases in which he applied the pollen of rye to the pistil of wheat. The two seeds produced in this way germinated, and developed into plants which were intermediate between the two parents, but the pollen never ripened, and the ovules not being fertilised no seed was produced.

From what has been said it is obvious that attempts to produce improved varieties of cereal crops must be limited to the individuals of a single species, including under the term species all the cultivated as well as natural varieties. But no original wild form is known of any of our cultivated cereals, though they belong to genera which have wild species. Even in our British flora there are three indigenous species of the genus to which wheat belongs, viz. *Triticum caninum* (Huds.), *T. repens* (L.), and *T. junceum* (L.); four species of the genus to which barley belongs, *Hordeum sylvaticum* (Huds.), *H. pratense* (Huds.), *H. murinum* (L.), and *H. maritimum* (With.); and three species of the genus to which the oat belongs, *Avena fatua* (L.), *A. pratensis* (L.), and *A. pubescens* (L.).

Having been from the earliest times under culture, the cultivated species are represented by a large number of fixed varieties, and of these it is very difficult to discover which most nearly represents the primitive form. Indeed it is often hard to determine whether the cultivated forms of each of the genera belong to one or more original species. Seven distinct types of cultivated wheat are easily distinguished. These are the following:

1. *Triticum monococcum* (L.), which has a single grain in each spikelet, and the pale divides into two when ripe.

2. *T. Spelta* (L.), which has a loose four-sided ear, the grains do not fall out in threshing, and the empty glumes are truncate with a blunt middle tooth.

3. *T. dicoccum* (Schrank), with ears dense and two-sided, the grains do not fall out in threshing, the empty glumes taper and have a sharp middle tooth.

4. *T. vulgare* (Vill.), with compact ears, the grains fall out when threshed, and the empty glumes are keeled on the upper half.

5. *T. turgidum* (L.), with dense four-sided ears, the grains fall out when threshed, the empty glumes are keeled to the base, and the grains are short, thick, and blunt.

6. *T. durum* (Desf.), with dense long-awned ears, the grains fall out when threshed, the empty glumes are keeled to the base, and the grain is long, narrow, and very hard or flinty.

7. *T. polonicum* (L.), with long, compressed ears, long papery glumes, and long and narrow, grains.

The question as to how many species are represented in these seven forms is very differently answered. Blomeyer in his recent work on cultivated plants considers that they represent but the single species *T. sativum* (L.) Hackel, who is our first living authority on grasses, considers *T. monococcum* (L.) an independent species. Besides the obvious characters by which it is distinguished, the fact that it has not been possible to produce fertile hybrids between this plant and any of the varieties of *T. sativum* (L.) justifies its separation as a species. *T. polonicum* (L.) he also treats as a species, but as fertile plants have been obtained by crossing with the varieties of *T. sativum* (L.), he suggests that it may have originated under cultivation, and consequently not be a true species. Bentham recognised *T. monococcum* (L.) and *T. Spelta* (L.) as independent species. The axis of the ear is jointed in both these forms, so that when threshed the ear breaks up into fragments at the joints. As this jointed ear is found in many of the wild species of the genus *Triticum*, it may represent a primitive characteristic which has not disappeared in these two forms under culture. This would point to *T. Spelta* (L.) as the nearest living representative of the original *T. sativum* (L.) That it is only one of the forms of this species seems to be established by the ease with which it is crossed with the other forms.

It must be apparent, then, that in seeking improved varieties of wheat by crossing we cannot use *T. monococcum* (L.), and we should not use *T. polonicum* (L.), but that all the other varieties, seeing they are but forms of one species, are available for this purpose.

The object of the cross-breeder is to secure the combination in a single variety of valuable characteristics now possessed by two or more varieties. A perfect wheat for cultivation in Britain should yield abundance of straw of good quality, and it should be sufficiently strong or tough to carry the ear until it is ripe, without being laid; it should tiller freely and ripen early; and it should produce a good weight of fine well-filled seeds.

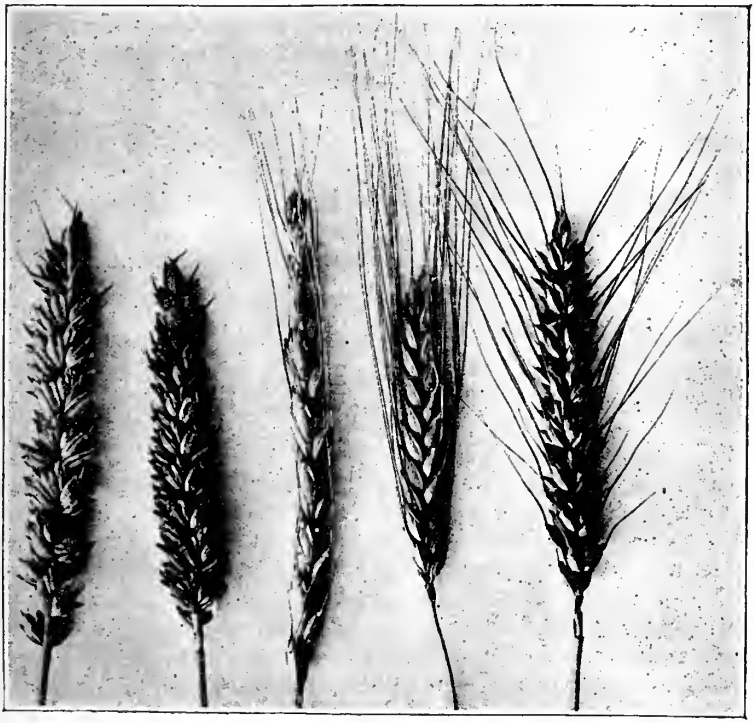
In selecting parents it should be remembered that the male appears to exercise a special influence on the seed, while the female affects the character of the vegetative parts of the plant.

The practical outcome of cross-breeding in wheat, as carried out by Messrs. Carter, has been placed before the readers of this Journal by Mr. Evershed.[1] I will use the results obtained by Messrs. R. and J. Garton in their experimental grounds at Newton-le-Willows, Lancashire, in illustration of the success of cross-breeding. For thirty years these gentlemen have been carrying on their experiments, at first with practically no results, but these early years were not wasted, as they were spent in learning the difficulties they had to overcome, and in collecting numerous varieties from Britain, and from all quarters of the globe, from which to select suitable parents. Having grown this extensive collection on their farm, they have been able to detect the various qualities of the different varieties so as to guide them in their selections. They have kept in view the qualities of straw and grain, and have selected parents, not only from the established varieties with which they began, but also from the improved varieties which they have obtained in the course of their experiments. Where any good point was detected they have sought to maintain, if not to increase, it by using the plant in turn as a parent, and adding through another parent some additional quality. The varieties with which they are now experimenting are consequently not simple crosses; they are the products of so many previous crosses that it is better to speak of them as composite crosses. While benefit accrues from this selected and repeated crossing, it brings also with it serious difficulties, for the progeny of every cross is subject to great variation, showing not only the qualities and characteristics that belong to both parents, but often peculiarities which one cannot detect in either parent. This tendency to variation increases with the number of parents that have had part in the produc-

[1] *Varieties of Wheat and Methods of Improving Them.* By Henry Evershed. Journal R.A.S.E., 2nd Series, Vol. XXV., 1889, p. 240.

tion of the progeny. The work of the cross-breeder begins with the delicate process of artificial fertilisation, but it has to be continued for years in the careful selection of one or more desirable forms, and in their continued cultivation, until, after the persistent elimination of sports and defective plants, a fixed variety is established. This is the stage at which the Messrs.

FIG. 2.—Some of the varieties used as parents.



Hardcastle | Mainstay | Spelt (*T. Spelta*, L.) | Hard Wheat (*T. durum*, Desf.) | Grey Wheat (*T. turgidum*, L.)

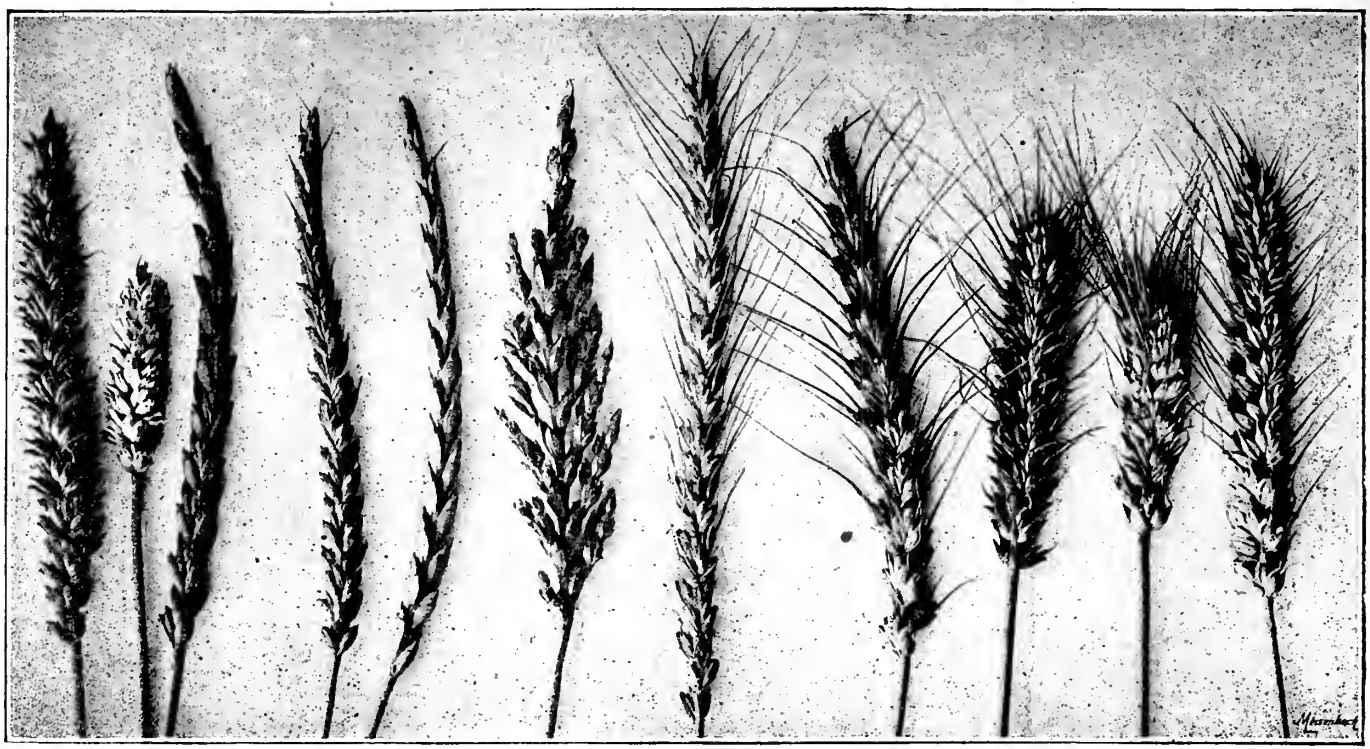
Reduced one-half natura size.

Garton have arrived in much of their work, though they are still continuing the production of new forms by crosses between approved and established varieties.

A few of the parents of their new varieties of wheat are represented in fig. 2. Of the commonly cultivated varieties thus used only two are given—Hardcastle and Mainstay. A considerable number of other varieties have been used in the

production of the crosses. The Spelt has been employed chiefly in the hope of obtaining a variety which would inherit from it a seed so entirely enclosed in the glumes as not to fall out in the harvesting, and thus prevent the loss which takes place in the wheats commonly under cultivation. The flinty seeds of hard wheat and the abundant cropping of grey wheat supplied properties that it was desirable to combine in one variety. After several years' crossing a selection was made of the most hopeful varieties, and these have been under careful cultivation for three years. In fig. 3 are represented eleven of these composite crosses grown in 1893, all of which are the progeny of a selected plant of the harvest of 1890. The tendency to sport, so obvious in these specimens, results, as we have already stated, from the number of parents employed to produce the plant of 1890, from the seed of which these have been grown; and the important work of the Messrs. Garton is now to obtain pure and fixed varieties from these and the other forms they have produced.

A careful examination of the eleven specimens figured will show the properties that have been inherited from the different parents. No. 1 is a large ear, showing characteristics derived from Hardcastle and Mainstay; the ear has a half more spikelets, each of which bears an increased number of larger grains than are found in the parents. In No. 2 the ear is shorter and more compact, qualities which have been observed in wheats that are not liable to be laid. Nos. 3 to 6 have the characters of the Spelt parent most strongly impressed on them. No. 5 differs from the parent Spelt in the larger spikelets, and in their greater compactness on the main axis of the ear. Nos. 3 and 4 are more removed from the Spelt by characters obtained from the commonly cultivated varieties. No. 6 is a branched ear, in which the spikelets have produced two normal seeds, and then the axis, instead of bearing the two or three additional flowers which ordinarily make up the spikelet, is developed into a secondary axis, bearing spikelets after the manner of a normal main axis, but smaller. This monstrosity is similar to that causing the branched variety of Grey Wheat (*T. turgidum*, L.), which is known as Mummy Wheat (*T. decompositum*, L.). In No. 7 the Spelt element is obvious, though considerably influenced by a Bearded Wheat of a common cultivated variety, which formed one of the several parents. In Nos. 8 and 9 the influence of the Grey Wheat is obvious. No. 10 has a compact head like No. 2, which is, however, abnormally congested in the upper part. No. 11 is nearer to the selected Bearded Wheat, but exhibits a decided influence from the Grey Wheat.



1 2 3 4 5 6 7 8 9 10 11

FIG. 3.—Composite Crosses, the progeny of the same parents, in the third year of cultivation. Reduced to two-fifths natural size.

There seems no reason to doubt that all our cultivated barleys belong to a single species. The spikelets of the ear are borne in groups of three, on the opposite sides of the axis, but in the usually cultivated varieties only the centre spikelet of each group is perfect and produces seed. The ear is two-rowed, but each row has a barren flower on each side; the two from the opposite groups of spikelets are placed close together along the centre of the flat face of the ear, hiding the axis (Fig. 4, Two-rowed Barley). This is *Hordeum distichum* (L.), including all the two-rowed forms, whether the ears are white or coloured, the glumes adherent or free from the grain (*i.e.* naked seeds).

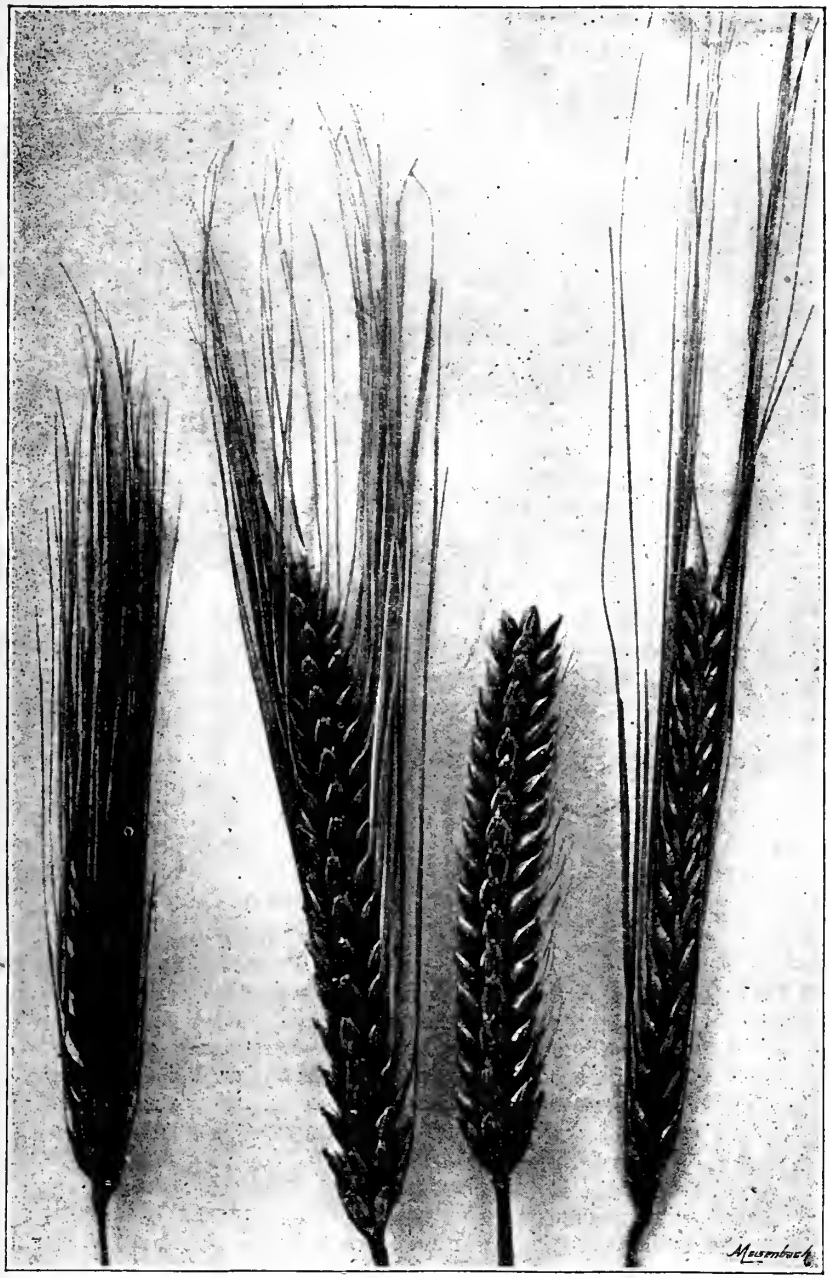
Sometimes the two lateral barren spikelets are fertile, while the central one is barren, and we have a four-rowed variety, which is the *H. vulgare* (L.). To this belongs the Himalayan barley, which has three short horns to the flowering glume, the central one being broad, blunt, and curved over the grain. This is, no doubt, an inherited monstrosity, and often disappears under cultivation; I have before me some ears in which a few of the flowering glumes terminate in the normal awn, while the others have the three short horns.

Frequently all three spikelets are perfect, and a six-rowed ear is produced. To such plants the name *H. hexastichon* (L.) was given. This explanation of the different forms of cultivated barleys, if it be accepted, makes them merely varieties of a single species, and gives the reason for the ease with which cross-fertilisation has been carried out between them.

In the hope of developing all the flowers in the spikelet, and still retaining the quality of seed of the best cultivated varieties, Messrs. Garton crossed the short-eared six-ranked Bere (fig. 4, No. 1) with the two-ranked Golden Melon (fig. 4, No. 4). This has, after further crossing, resulted in the composite varieties shown in fig. 4, Nos. 2 and 3; the one normally awned, the other with only rudimentary awns, both possessing grains equal in size and quality to those of the Golden Melon, but, being six-ranked, three times more numerous.

There are three well-marked forms of oats to which the various cultivated varieties can be reduced: (1) The Common Oat (*Avena sativa*, L.), which has an open panicle, spreading equally all round the axis, and spikelets with two thin barren glumes enclosing two or more flowers. The flowering glume generally adheres to the grain, but there are varieties with a naked seed, in which the flowering glume is thin and paper-like. (2) The Tartarian Oat (*A. orientalis*, Schrœb.), in which the branches of the panicle lie to one side of the main axis: it has white and black-seeded varieties. (3) The Chinese, or Naked

Fig. 4.—Parents and Cross-progeny of Barley.



1. Bere (Parent). 2 and 3. Crosses (Progeny). 4. Two-rowed Barley (Parent),

A little less than natural size

Fig. 5.—Parents of the Oat Crosses.

Tartarian Oat Potato Oat Naked Oat

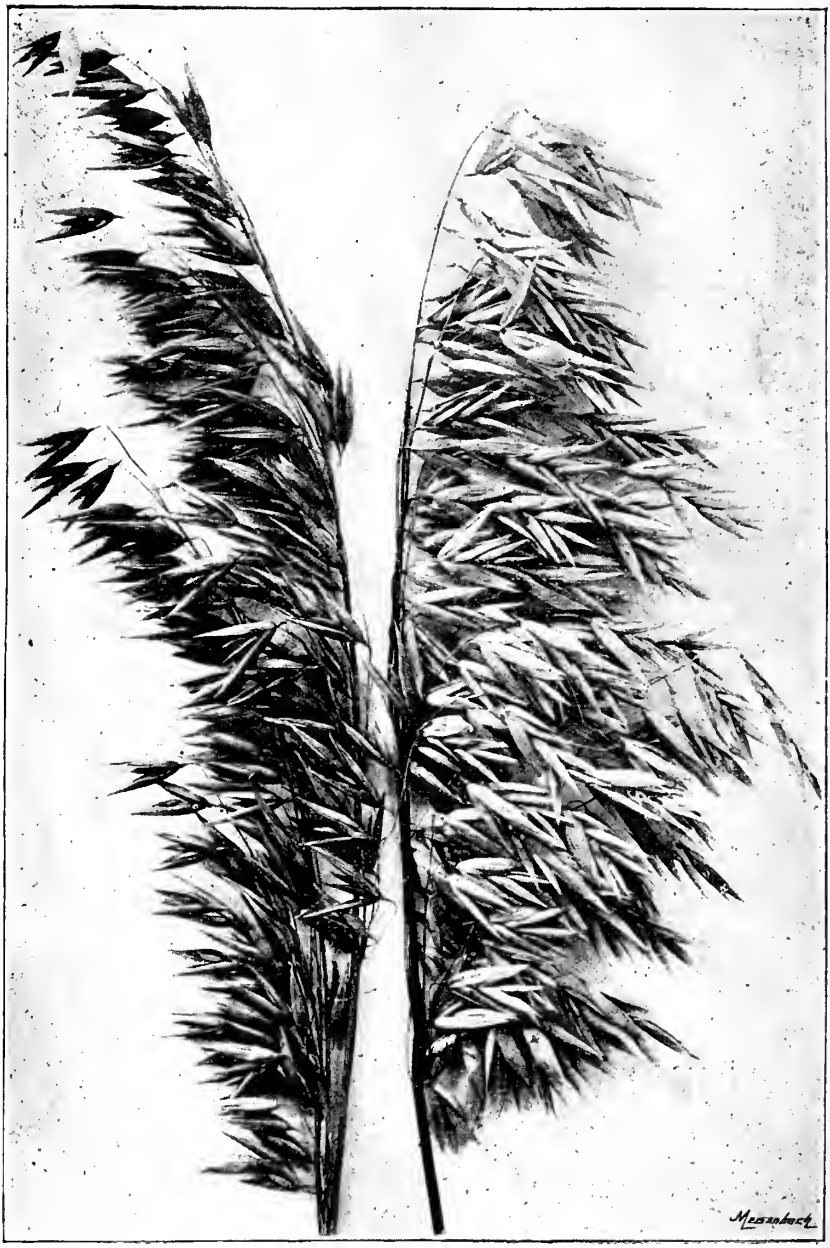
One-half natural size.

FIG. 6.—Composite Crosses of Oat.

No. 1 No. 2.

Reduced to two-fifths natural size.

FIG. 7.—Composite Crosses of Oat.



No. 1. No. 2

Reduced to one-half natural size

Oat (*A. nuda*, L.), in which the axis of the spikelet is elongated, and bears from four to fourteen flowers: the glumes and pale are paper-like, and do not adhere to the seed. Though the differences between these three forms are very obvious, they may represent only one species, and this view is confirmed by the fact that they all freely cross, and produce fertile progeny. The Messrs. Garton have made full use of this property, and have produced some marvellous heads from a mixed parentage. Some of the parents employed are represented half the natural size in fig. 5. Individuals of the three groups into which the oat is divided are given, the Common Oat being in the centre, the Tartarian Oat on the left, and two forms of the Chinese on the right.

The result of repeated crosses has been to produce a considerable variety of luxuriant new forms, possessing characters which can be traced to one or more of the parents. The form represented in fig. 6, No. 2., is strongly influenced by the common Potato Oat, but has a much larger panicle, more upright branches, and greater seeds. The form shown in fig. 6, No. 1, displays the characters of the Common Oat, overpowered by those derived from the two other parents, the Tartarian and Chinese Oats. In fig. 7, No. 1, the influence of the Tartarian Oat is predominant; but in No. 2, the great length of the spikelets, and their numerous flowers, show the potency of the Chinese Oat.

The photographs of the cross-bred oats here reproduced exhibit the gain in size of the heads, but the size and quality of the grain have been attended to with the result that the large heads yield heavier grains.

The important services being rendered to agriculture by the Messrs. Garton will be more appreciated when they have secured sufficient quantities of the seed of their new varieties to permit of their being grown as farm crops.

It may be useful to add here that an interesting series of observations and experiments on cross-fertilisation in Pears is given by Mr. I. F. James in a recent number of the *American Agriculturist*. He had found that the blight in the flowers of the pear was carried from flower to flower by insects; but in excluding insects he found that the blossoms did not set fruit. He tried to fertilise the ovules with pollen taken from the same flower, from another flower of the same cluster, from a different flower on the same branch, from another tree of the same variety, and from a tree of a different variety. The result was that when *Bartlett* pollen, whether from the same flower, or a differ-

ent flower on the same tree, or from another tree, was applied to the pistil of the same variety no fruit was produced; but when the pollen from another variety of pear was applied good well-formed fruit was produced. The varieties *Anjou* and *Winter Nelis* were also unable to fertilise themselves, though they produced fruit when crossed with the *Bartlett* pollen, as the *Bartlett* did when crossed with their pollen. Mr. Waite, who had charge of the experiments, tentatively concludes that (1) most varieties of cultivated pears and apples require cross-fertilisation for successful fruiting; (2) insects are the agents in cross-fertilising these plants; (3) the weather when the bloom is open influences the visits of insects, and consequently the cross-fertilisation. Some pears are self-fertilised, but when dealing with varieties in which this is not the case the orchard should contain varieties which freely cross-fertilise, and care should be taken that the different varieties planted together should ripen at the same time.

WILLIAM CARRUTHERS.

THE TRIALS OF SELF-BINDING HARVESTERS AT CHESTER.

THE trials of Self-binding Harvesters that took place at the end of July last in the neighbourhood of Chester, for the substantial prizes of 50*l*., 30*l*., and 20*l*., offered for "the best Self-binding Harvester using other binding material than wire," were the fourth of the series of competitions held under the auspices of the Royal Agricultural Society, since self-binding harvesters came within the range of practical mechanics.

Of Reaping Machines that were not self-binding, the Society had held quite a number of trials[1] since Mr. Philip

[1] The official reports on the various trials of Reaping Machines and Self-binders held by the Society, since 1852, will be found in the following volumes of the Journal:

REAPING MACHINES

Lewes, 1852, Vol. XIII. p. 304 (H. S. Thompson).
Gloucester, 1853, Vol. XIV p. 366 (C. E. Amos).
Lincoln, 1854, Vol. XV. p. 367 (Anthony Hamond).
Carlisle, 1855, Vol. XVI. pp. 509, 525 (T. Fisher Hobbs).
Chelmsford, 1856, Vol. XVII. p. 577 (W. Spencer Cavendish).
Salisbury, 1857, Vol. XVIII. pp. 423, 445 (C. Wren Hoskyns).
Canterbury, 1860, Vol. XXI. pp. 490, 511 (H. B. Caldwell).
Leeds, 1861, Vol. XXII. p. 458 (H. B. Caldwell).
Plymouth, 1865, Vol. I. (2nd Series), pp. 375, 383 (John Coleman).
Manchester, 1869, Vol. V. pp. 530, 532 (Sir Edward Kerrison).
Birmingham, 1876, Vol. XII. p. 596 (Jabez Turner), and Vol. XIII. p. 246 (John Algernon Clarke).

Pusey first described with admiration and astonishment the machine which McCormick showed at the Great Exhibition of 1851. There were trials in 1852, 1853, 1854, 1855, 1856, 1857, 1860, 1861, 1865, 1869 (at Manchester, when there were 98 entries, 84 of which were tried by the Judges), and 1876 (at Birmingham); and it was in connection with the last of these that the Society added, at the foot of its prize list of 150*l.* for four classes of Reaping Machines, the attractive offer of its Gold Medal "for an efficient Sheaf-binding Machine, either attached to a Reaper or otherwise."

Mr. Walter A. Wood exhibited in the Birmingham Showyard a "Sheaf-binder," which, in the opinion of the Steward, Mr. Jabez Turner, "appeared on the stand equal to performing its duty" (Vol. XII. p. 596); but it did not turn up at the trials of Reapers held in tropical weather on the Leamington Sewage Farm in the following August, and the reporting Judge, Mr. John Algernon Clarke, was relieved, therefore, from the necessity of reporting upon it.

The display at the Philadelphia Centennial Exhibition of 1876 of four different inventions for self-binding, "the realisation," as Mr. John Coleman observed in his admirable report in Vol. XIII. of the Journal, "of a long cherished notion on which mechanics have been engaged for years," appears to have encouraged the Society to repeat at Liverpool, in 1877, its offer of a Gold Medal—the highest distinction in its gift. There were originally eight entries for this Medal, but only five machines appeared in the Liverpool Showyard, and only three competed at the trials held in August 1877 at Aigburth. These three machines had all been exhibited at Philadelphia, and of two of them Mr. Coleman had already given a description in the Journal. Mr. Coleman and Mr. Henry Cantrell were the Judges, and after a long and careful investigation they reported that "whilst great credit is due to the three inventions, viz. those of Walter A. Wood, D. M. Osborne & Co., and C. H. McCormick, for the considerable efficiency attained, none of them have, as regards the requirements of English farmers, attained that perfection which would justify the Judges in awarding the Gold Medal of the Society" (Vol. XIV. p. 133).

SELF-BINDERS { *Liverpool*, 1877, Vol. XIV. p. 105 (J. Hannam).
Bristol, 1878, Vol. XV. p. 73 (John Coleman).
Derby, 1881, Vol. XVIII. p. 264 (John Coleman).
Shrewsbury, 1884. Vol. XXI. p. 1 (Thomas Bell).

See also Mr. John Coleman's report on the Implements at the Philadelphia Centennial Exhibition of 1876, in Vol. XIII. (2nd Series), p. 4, and Mr. Dan Pidgeon's article on the "Evolution of Agricultural Implements"—section "Harvesting Implements"—in Vol. III. (3rd Series), p. 63.

They recommended, however, that a Silver Medal be awarded to Walter A. Wood "as a recognition of progress," and that high commendation be bestowed on Osborne's mechanism.[1]

Once more the Society offered its Gold Medal, at the Bristol Meeting of 1878—this time with more success. The machines shown at Liverpool had all used wire as the binding material; but in view of the danger and unsuitableness of wire, inventive ingenuity had been exercised in the interim to devise apparatus for binding with string. At Bristol there were four wire Binders (three American, one English), and three string Binders (one American, two English). Mr. John Coleman, who with Mr. Henry Cantrell and Mr. J. W. Kimber acted as Judge, gives, in Vol. XV. of the Journal, an extremely interesting report of the Trials, and of the difficulties encountered during their progress. Eventually the Judges came to the unanimous decision that McCormick's Sheaf-binder had fulfilled the conditions of the Society, and they awarded the Gold Medal to it accordingly.

Mr. Hemsley, the Senior Steward at Bristol, doubtless expressed the general view when he said in his report that "the Members of the Society might probably have felt more satisfaction if a less dangerous material than wire had been used for tying;" and it is not surprising, therefore, that when the Society next encouraged competition at Derby, in 1881, it should limit the offer of its Gold and its Silver Medals "to the Sheaf-binding Machines which, after a trial during the harvest season of 1881, shall, in the opinion of the Judges, be the best and the second best—the binding material to be other than wire." Mr. Coleman and Mr. Kimber again officiated as Judges, with Mr. W. Scotson for their colleague, at the trials of the eight Binders which competed for the Medals in August 1881; and as a result the Gold Medal was awarded to the McCormick Company and two Silver Medals to Samuelson & Co. and the Johnston Harvester Company, whose machines were bracketed as equal (see Journal, Vol. XVIII., 1882, pp. 264 *et seq.*).

Three years later the Society determined to have, in connection with the Shrewsbury Meeting of 1884, a further trial of Binders, offering this time, instead of its Gold Medal, two prizes of 100*l.* and 50*l.* respectively for "Self-binding Reapers, the binding material to be other than wire."

On this occasion there were 17 competitors, and the Judges (Messrs. Thomas Bell, Mason Cooke, and W. Scotson) awarded the first prize to Messrs. Hornsby & Sons, Ltd., of Grantham,

[1] See the late Mr. J. Hannam's report in Vol. XIV. of the Journal (1878), with diagrams of the different binders shown.

and the second to Messrs. J. and F. Howard, of Bedford (see Vol. XXI., 1885, p. 1 *et seq.*).

In view of the fact that it is now nine years since the Shrewsbury Trials took place, and that various improvements tending to greater perfection of work have been effected in the interim, no justification was needed for the decision announced by the Royal Agricultural Society, in March 1892, of its intention to offer prizes in connection with its Chester Meeting of 1893 for "Self-binding Harvesters, using other binding material than wire."

For the three prizes of 50*l.*, 30*l.*, and 20*l.*, twenty-three machines had originally been entered by nine firms, and the great majority of these had been exhibited in the Chester Showyard. On one ground or another, however, fourteen of these machines were withdrawn by their makers between the period of the Show and that of the trials, leaving only nine, shown by five exhibitors, to be tested by the Judges (Dr. Anderson, F.R.S., Mr. Mason Cooke, and myself).

The names of the exhibitors and details as to the weight, width, &c. of the machines (as ascertained by the Judges at the time of the Trials) are given in the table on the next page.

It will be noticed that the advantage of lightness is considerably in favour of the Keyworth machine, No. 2403, and that, with this exception, there is no great variation. The next column shows the marked advance that has been made in the last few years in the ease and quickness of shifting from work to road and the reverse. I think I am right in saying that the Massey-Harris Co. were the pioneers of this advance, and further, that ten years ago the double shift, which now occupies on an average about five minutes, would have taken one hour.

In the Table all the times are seen to be good, but an important fact must be noticed—viz. that the Massey-Harris Co. and Messrs. Hornsby operated with *one* man, and all the rest with *two*. In cases where the machine is sent by road to cut a field a mile distant it is evident that this is a great saving and convenience. The last column shows a slight advantage in favour of Mr. Kearsley and Messrs. Hornsby.

The Trials.

Early in June we were wondering whether there would be any corn to cut, and feared at least that, in consequence of the severe drought, it would be so light, so straight, and so

TABLE A.—TRIALS OF SELF-BINDING HARVESTERS AT CHESTER, JULY, 1893.

[The price of the machines was 45*l.* in every case.]

Exhibitor and number in Catalogue	Weight of binder	Time taken to change from transport to work and *vice versâ*.	Number of men required	Greatest width on road
SAMUELSON & CO., LIMITED, Banbury No. 1562	cwt. qr. lb. Without carrier 13 1 0 Carrier . . . 3 0 14 0 0	min. sec. Transport to cut 1 57 Reverse . . . 3 5 To attach carrier 5 0 Total 10 2	Two	ft. in. 9 3
SAMUELSON & CO., LIMITED, Banbury No. 1563	Without carrier 14 1 0 Carrier . . . 2 10 Total 14 3 10	Transport to cut 4 0 Reverse . . . 4 0 To attach carrier 5 0 Total 13 0	Two	9 6½
G. KEARSLEY, Ripon No. 2321	With small carrier for corners. Total 14 0 7	Transport to cut 1 9 Reverse . . . 1 58 Total 3 7	Two	8 6
G. KEARSLEY, Ripon No. 2322	With small carrier for corners. Total 13 3 0	Transport to cut 1 18 Reverse . . . 2 23 Total 3 41	Two	8 2
J. & H. KEYWORTH & Co., Liverpool No. 2403	No carrier. Total 11 3 7	Transport to cut 2 50 Reverse . . . 3 41 Total 6 31	Two	9 6
MASSEY-HARRIS Co., LIMITED, 54 & 55 Bunhill Row, E.C. No. 4031	With carrier. Total 14 0 7	Carrier on. Transport to cut 1 25 Reverse . . . 2 10 Total 3 35	One	9 5
MASSEY-HARRIS Co., LIMITED, 54 & 55 Bunhill Row, E.C. No. 4032	No carrier. Total 13 2 14	Transport to cut 1 57 Reverse . . . 3 42 Total 5 39	One	9 0
R. HORNSBY & SONS, LIMITED, Grantham No. 5171	Without carrier 13 1 22½ Carrier . . . 1 14 Total 13 3 8½	Transport to cut 2 32 Reverse . . . 2 32 To attach carrier 3 43 Total 8 47	One	8 3
R. HORNSBY & SONS, LIMITED, Grantham No. 5172	Without carrier 13 2 15½ Carrier . . . 1 14 Total 14 0 1½	Transport to cut 2 18 Reverse . . . 2 37 To attach carrier 3 43 Total 8 38	One	8 6

clean as not to permit of trials of a sufficiently crucial character. Had this been the case, judging would have been extremely difficult, because there is no doubt that, under such conditions, every one of the excellent machines sent for competition would at least have made very good work.

But in our climate it seems to be the unexpected that always happens. July brought with it heavy rains and very broken weather with fine intervals, which continued until the trials were finished on Saturday, July 29. This happy change from scorching drought, altering as it did the whole face of the country as if by magic, also placed us in possession of all that we required for the carrying out of the trials, and yet, fortunately, did not prolong their duration.

Thanks to the exertions and good judgment of our senior Steward of Implements, Mr. Samuel Rowlandson, the crops selected were very suitable, and were laid out to the best advantage. The oats and barley plots had each an area of three-quarters of an acre, whilst the wheat plots were each one acre in extent.

On Tuesday, July 25, the Stewards, Judges, and Officials assembled at Blacon Point Farm, about one and a half mile from Chester, occupied by Mr. Thomas Smith, who—I may say in passing—gave us every assistance in his power. The land was a somewhat loose loam, by no means good travelling on foot, and likely to cause a heavy draught on the machines. It was much infested with moles, and to this cause a good many stops in the working of the machines were attributable. The plots were opened out in a fairly good crop of oats, heavy, and much laid in one part of the field; this part, however, was not used in trials of which note was taken by the Judges. The remainder of the crop gave plots that afforded every opportunity for good work, the straw varying in length sufficiently to show the control of the reel, and sometimes leaning in one direction, though not to an extent sufficient to cause bad work. No trial plots were cut on this day, but each of the machines had a short run to see that everything was in working order. The remainder of the day was spent in examining details of construction.

On Wednesday, July 26, the trials had been publicly announced to begin at 9 o'clock, and shortly before this hour the Stewards, Judges, and Engineers were in the field, and also a considerable number of interested spectators.

Each of the exhibitors claimed to work his machines with two horses and one man, and all used Manilla twine.

Lots were drawn for the order of starting, and resulted as follows :—

Order of Starting	No. in Catalogue	Names of Exhibitors
1	4032	Massey-Harris Co., Ltd., 54 & 55 Bunhill Row, E.C.
2	2403	J. & H. Keyworth & Co., 35 Tarleton Street, Liverpool.
3	5171	Richard Hornsby & Sons, Ltd., Grantham.
4	2321	George Kearsley, Ripon, Yorks.
5	1562	Samuelson & Co., Ltd., Banbury.
6	5172	Richard Hornsby & Sons, Ltd.
7	2322	George Kearsley.
8	4031	Massey-Harris Co., Ltd.
9	1563	Samuelson & Co., Ltd.

This order of running was, however, only adhered to in the oats, and perhaps it was only here that sufficient variation existed in the conditions—as to weather, crop, and soil—under which the machines worked, to give any material advantage to one machine over another in choice of plots. In the barley it was found advisable to send the pairs of machines belonging to one exhibitor forward together for the dynamometer trials, and therefore they cut the barley in pairs.

In the trials with wheat the ranks were already somewhat thinned, as neither No. 2322 nor No. 1563 had previously done good enough work to require further trial.

It should here be stated that the time occupied in cutting each plot, though noted in each case and given below, is not to be looked upon as anything more than a very minor point of merit. The only object, in fact, is to ascertain that the work, besides being well and economically done, can also be executed with reasonable expedition. Racing did not commend itself to the Judges either from an agricultural or a personal point of view, especially when following on foot!

If the awards had depended on speed, Mr. Kearsley would have done well in cutting a barley plot at the rate of over 2 acres an hour, but this performance did not carry the First Prize with it.

A 4 ft. 6 in. cut, at a speed of three miles an hour, will cover over 1½ acre. This is quite fast enough, and hard enough, work for two pairs of horses a day.

Trials with Oats.

These trials occupied the Judges the whole of Wednesday, July 26, and their results are shown in the notes below :—

(1) Soon after 9 A.M. on Wednesday No. 4032 (Massey-Harris) began work. The straw of the plot was rather short and uneven, and this made it difficult to regulate the position of the band, and in consequence some of the

sheaves were rather loosely and irregularly tied. A shower of rain made the corn very damp before the plot was finished, and prevented the machine from doing the best work of which it was capable. Under the circumstances a travelling buttor would probably have tended to improve the sheafing, but on this machine it was conspicuous by its absence. Four stops, due to damp mole-heaps. Time, 34½ minutes.

(2) Next came No. 2403 (Keyworth), low platform, rear-discharge binder, and perhaps this attracted more attention than fell to the share of any other machine, as the construction and method of working differ very widely from those in any of its rivals. The separation is good, but there is some waste, both from the binding-platform and from the reel, the latter picking up odd straws in front and dropping them in rear of the cutting-platform. This was a good plot, but the straw was still damp after the shower. There is great control of the position of the band on the sheaf, and the draught certainly looks light. There were four stops, twice from string broken, and twice to clear finger-bar. Time, 38 minutes.

(3) No. 5171 (Hornsby). This was a fairly good plot, and the corn was dry. The work was well done, and with no stops. The separation was very good, and it was easy to see that this is largely due to the dependent rocking arms, which at the moment that the binding-arm comes forward, move in the opposite direction, meet the loose corn, and hold it back till the sheaf is tied and discharged. This very important addition is confined to the two machines exhibited by Messrs. Hornsby, and it is not too much to say that to this feature alone a large measure of their success is attributable. Very little waste. Time, 31 minutes.

(4) No. 2321 (Kearsley). Good plot. Sheafing very moderate. Two stops on account of broken string. Much waste. Nine loose sheaves. Time, 26½ minutes.

(5) No. 1562 (Samuelson). A good plot, corn rather longer. Sheafing inferior, and tension of band irregular. One stop, due to soil choking finger-bar. Time, 39½ minutes.

(6) No. 5172 (Hornsby). This was a somewhat uneven plot, but the work was thoroughly well done; the separation and sheafing were good, and the travelling buttor worked well. The sheaf-carrier was very efficient, both on this machine and on No. 5171, and enabled the driver to deposit the sheaves in rows with the utmost regularity. This is a matter of some consequence, as it saves labour in stooking. Time, 27½ minutes.

(7) No. 2322 (Kearsley). Good plot. Fairly good work. No stops. Time, 27 minutes.

(8) No. 4031 (Massey-Harris). Good plot as regards corn, but the ground very uneven, with one very bad open furrow and loose soil. Notwithstanding these difficulties there were no stops, though a very low cut was taken, and it was quite remarkable to notice how the finger-bar shaved the surface of the ground without choking.[1] The sheaves showed a slight tendency to *necklace*—i.e. to hang together by the heads; this was remedied by putting down the hinged heading-board. Sheafing and binding good. Very little waste. Time, 35 minutes.

(9) No. 1563 (Samuelson). In this plot were some badly-laid pieces, and

[1] This led to an inspection and comparison of all finger-bars, the result showing a very great difference in shape and sectional outline of the respective finger-bars and cutting-platforms, especially as regards the greater or less obstruction presented by the under surface to the ground when at work. This comparison was greatly in favour of the machines exhibited by Messrs. Hornsby and Messrs. Massey-Harris, in which the obstruction was practically *nil*.

after several stops the machine was tried in a fresh plot, with a light straight crop, but still the work was inferior. Two stops, broken string; nine loose sheaves. Time, 35 minutes.

The results with Oats of each of the competing machines are shown in the upper half of Table B, on page 712.

As a further test for the machines, a plot of oats where the crop was heavy, laid, and much tangled, had been reserved in which it was proposed to give each machine a short trial. It was found after a few rounds had been cut—and in a very unsatisfactory manner—that the crop was in such a condition, and the ground so covered by mole hills, that no farmer would attempt to deal with it in its then state with a reaping-machine. For this reason this part of the programme was abandoned, and thus brought Wednesday's work to a conclusion.

Heavy rain during the night made cutting impossible on Thursday morning, and there is no doubt that the day was more usefully spent in weighing the machines on the weighbridge kindly placed at our disposal by Mr. Robert Podmore, to whose farm at Deeside (about four miles from Chester) we had now adjourned for the barley and wheat trials, and also in testing the time required to change each machine from work to transport and *vice versâ*. (See Table A, page 706.)

Trials with Barley.

Whilst Thursday's work of weighing and testing was in progress the land dried considerably, and on Friday morning, at 8 o'clock, it was in fairly good condition for work. The barley was a crop of medium length and weight, and very even all over, leaning very slightly all one way, but none laid or twisted. The land, clean and flat, and a medium heavy loam, was sown down with seeds.

(1) No. 4032 (Massey-Harris). Neither the land nor the corn was as dry during the cutting of this plot as a little later. Good work was made, however, and with the exception of one sheaf all were well tied. There was a little waste from the rear of the binding-platform, showing that the sheafing was not perfect. No stops. Time, 24¾ minutes.

(2) No. 4031 (Massey-Harris). Little or no waste and no stops; ends of knot pulled through. Very good work, a share of which is probably due to a travelling buttor. Time, 21 minutes.

(3) No. 2403 (Keyworth). Several stops to clear finger-bar and alter. Cut, or rather missed cutting, an open furrow, in consequence to some extent of the distance from centre to centre of the driving and divider wheels being greater by more than a foot than some of the other machines, and therefore, when the open furrow was central between these points, the finger-bar was necessarily carried higher. There is some tendency to wrap the straw, and, after finishing the plot, this was found to be the case with the packer-shaft. Separation fairly good. Time, 29½ minutes.

(4) No. 5171 (Hornsby). Fairly good work. A little waste, otherwise good sheafing and tying. No stops; stubble rather long, scarcely such good work as in the oats. Time, 24½ minutes.

(5) No. 5172 (Hornsby). Hardly any waste; very good sheafing and cutting. No stops. Time, 24¾ minutes.

(6) No. 2321 (Kearsley). Sheafing and separation indifferent; less waste than in oats; one stop to clear. Time, 19½ minutes.

(7) No. 2322 (Kearsley). Sheafing slovenly; three stops to clear finger-bar; three loose sheaves. Time, 21½ minutes.

(8) No. 1562 (Samuelson). Sheafing inferior; four stops to clear finger-bar; four loose sheaves. Time, 23½ minutes.

(9) No. 1563 (Samuelson). Sheafing very irregular and wasteful. One loose sheaf; one stop to clear finger-bar. Time, 21½ minutes.

The results with Barley of the competing machines are shown in tabular form on page 712.

Trials with Wheat.

The wheat was a fairly good crop, standing well up, with a few fallen straws. It was a little foul in some places, and not over ripe.

(1) No. 4032 (Massey-Harris). This plot was a lighter crop than some others. With the exception of three loose sheaves and a little waste the work was fairly well done. Time, 34¾ minutes.

(2) No. 4031 (Massey-Harris). This machine made excellent work all round, with no mistakes, and very little waste. Time, 32½ minutes.

(3) No. 2403 (Keyworth). A rather dirty plot. Did not leave a good stubble; some waste, partly from reel. One stop; two loose sheaves; only moderate work. Time 34 minutes.

(4) No. 2321 (Kearsley). Sheafing poor; a good deal of waste. Thirteen loose sheaves; plot good. Time, 35 minutes.

(5) No. 5172 (Hornsby). Very good sheafing and good stubble; double loop knot. No mistakes. Time, 38 minutes.

(6) No. 5171 (Hornsby). Good work; separation good, but a few heads drawn back as the sheaf is discharged. Time, 36¼ minutes.

(7) No. 1562 (Samuelson). Bad knot. Inferior sheafing. Twenty-three loose sheaves; retainer choked. Time, about 1 hour.

It was not considered necessary to try No. 1563 and No. 2322 in the wheat.

Final Trials with Wheat.

(1) No. 4031 (Massey-Harris). Separation not perfect; heads drawn back; a little waste; carrier sometimes trails a sheaf; butts not perfect; stubble rather rough. Time, 33 minutes.

(2) No. 5171 (Hornsby). A very little waste; a few heads drawn back; butts better than No. 4031; a few sheaves trailed by carrier. Time, 39¾ minutes.

(3) No. 5172 (Hornsby). The most perfect separation attained throughout the trials; practically no waste; good sheafing, good stubble, and the best carrier. Time, 44½ minutes.

The results of the first and second trials with Wheat are shown in the lower half of Table B on page 712.

TABLE B.—*Results of Trials with* (*a*) OATS, (*b*) BARLEY, (*c*) WHEAT, (*d*) WHEAT, 2nd TRIAL.

(*A*) *Oats, July* 26, 1893.

	HORNSBY	HORNSBY	MASSEY-HARRIS	MASSEY-HARRIS	KEYWORTH	KEARSLEY	KEARSLEY	SAMUELSON	SAMUELSON
	5172	5171	4031	4032	2403	2321	2322	1562	1563
Width of cut	4 ft. 4 in.	4 ft. 6·25 in.	4 ft. 5·5 in.	4 ft. 4·3 in.	4 ft. 2·75 in.	4 ft. 8·5 in.	4 ft. 8·5 in.	4 ft. 2·5 in.	4 ft. 4·25 in.
Height of stubble	4 in.	3·5 in.	3 in.	3·625 in.	4·25 in.	3 in.	3·5 in.	3·3 in.	4·625 in.
Number of sheaves cut	490	500	595	710	571	532	551	768	655
Mean weight of sheaf	13 lb.	15·1 lb.	17·1 lb.	12·8 lb.	13·4 lb.	14·6 lb.	15·8 lb.	11·3 lb.	9·7 lb.
Total weight of sheaves	6370 lb.	7550 lb.	10174·5 lb.	9088 lb.	7651·4 lb.	7767·2 lb.	8705·8 lb.	8678·4 lb.	6353·5 lb.
Mean girth of sheaves	25 in.	26 in.	24·5 in.	23·8 in.	29 in.	28 in.	27 in.	24·25 in.	23·25 in.

(*B*) *Barley, July* 28, 1893.

Width of cut	4 ft. 3·5 in.	4 ft. 3·25 in.	4 ft. 7 in.	4 ft. 4·375 in.	4 ft. 7½ in.	4 ft. 7·5 in.	4 ft. 6 in.	4 ft. 7·75 in.	4 ft. 5 in.
Height of stubble	3·5 in.	4·6 in.	3·75 in.	4·16 in.	4·3 in.	4 in.	3·25 in.	3·375 in.	3·875 in.
Number of sheaves cut	398	338	435	498	439	357	388	503	549
Mean weight of sheaf	11·8 lb.	11·5 lb.	11·3 lb.	9·5 lb.	9 lb.	10·1 lb.	11·1 lb.	8·3 lb.	6·75 lb.
Total weight of sheaves	4696·4 lb.	3887 lb.	4915·5 lb.	4731 lb.	3951 lb.	3605·7 lb.	4206·8 lb.	4174·9 lb.	3705·75 lb.
Mean girth of sheaves	27·25 in.	25 in.	24·25 in.	24 in.	24·5 in.	25·5 in.	27 in.	22·5 in.	20·5 in.

(*C*) *Wheat, July* 28, 1893. (*D*) *Wheat* (*2nd trial*), *July* 29, 1893.

	HORNSBY	HORNSBY	MASSEY-HARRIS	MASSEY-HARRIS	KEYWORTH	KEARSLEY	SAMUELSON	HORNSBY	HORNSBY	MASSEY-HARRIS
	5172	5171	4031	4032	2403	2321	1562	5172	5171	4031
Width of cut	4 ft. 5·25 in.	4 ft. 7·6 in.	4 ft. 7·5 in.	4 ft. 6 in.	4 ft. 4·5 in.	4 ft. 4·08 in.	4 ft. 9·8 in.	4 ft. 4·44 in.	4 ft. 5·76 in.	4 ft. 7·44 in.
Height of stubble	3·5 in.	4·75 in.	4 in.	3·5 in.	4·75 in.	5 in.	3·5 in.[1]	2·75 in.	3 in.	2·7 in.
Number of sheaves cut	429	508	587	689	654	591	709	599	747	580
Mean weight of sheaf	21·9 lb.	18·12 lb.	16 lb.	13·35 lb.	13·1 lb.	16·2 lb.	13·25 lb.	16·1 lb.	13·4 lb.	17·4 lb.
Total weight of sheaves	9395·1 lb.	9204·96 lb.	9392 lb.	9198·15 lb.	8567·4 lb.	9574·2 lb.	9394·25 lb.	9643·9 lb.	10009·8 lb.	10092 lb.
Mean girth of sheaves	27·5 in.	26 in.	25·75 in.	24·75 in.	27·25 in.	28 in.	23·5 in.	—	—	—

[1] Frequent breakages of string.

Dynamometer Trials.

These trials took place on Friday, July 28, and although they had to be abandoned on the previous day owing to the wet, both the ground and the crop were in excellent condition. It would have been difficult to have selected a more uniform crop or a more favourable piece of ground.

The machines selected by the Judges, as they finished their trial in the barley, were sent to be tested by the dynamometer in order to ascertain their comparative drafts.

The dynamometer was the same as used in previous trials of reaping machines, with the addition of a self-registering arrangement, by which the range of variation of draft is recorded instead of being merely read off at sight as formerly.

The several machines were attached to the dynamometer, which was hauled by three horses. As these horses had to be led, the speed at which the machines travelled was very considerably less than that at which they would ordinarily work; and owing to unavoidable irregularity, due to leading three horses tandem, Mr. Courtney, the Society's Engineer, thinks it more than probable that an appreciable increase of speed and of consequent "work done" might be obtained without appreciably increasing the mean draught.

All the sheaves cut by each machine in these trials were collected and weighed; in the other trials the sheaves were counted and the weight estimated upon the mean weight of some twenty sheaves collected promiscuously.

This completes the history of the trials, and the Judges unanimously placed the successful machines in the following order:—

Messrs. Hornsby, No. 5172 . . . . . First Prize of 50*l.*
Messrs. Hornsby, No. 5171 } The Second Prize of 30*l.* and Third Prize
The Massey-Harris Co., No. 4031 } of 20*l.*, equally divided.

Very little remains to be said. We consider that we had every opportunity of deciding as to the respective merits of the several machines, and that if we followed them for a thousand miles (instead of the hundred or so that we probably did follow them) it would not alter our opinion.

The great lesson to be learnt from these trials is the paramount importance of *good separation*. Bad separation means waste in every direction—waste of corn, and waste of labour in raking, with an inferior sample. Also the importance of the sectional outline of the finger-bar and cutting-platform. It will be noticed that the First Prize goes to the *closed* and not the

open end binder exhibited by Messrs. Hornsby, and it certainly is possible that the crops were not of such a length as to test this point of merit. We do not wish it to be supposed, therefore, that an open end is in our opinion any demerit.

The following, Table C, gives a summary of the results :—

TABLE C.—*Results of Dynamometer Trials, July* 28, 1893.

—	HORNSBY 5172			HORNSBY 5171			MASSEY-HARRIS 4031			MASSEY-HARRIS 4032		
	Up		Down	Up		Down	Up		Down	Up		Down
Width of cut	—	5 ft. 1 in.	—	—	5 ft. 2 in.	—	—	4 ft. 8 in.	—	—	5 ft.	—
Height of stubble	—	5½ in.	—	—	6 in.	—	—	7 in.	—	—	7 in.	—
Number of sheaves cut	—	51	—	—	57	—	—	66	—	—	76	—
Mean weight of sheaf	—	18·6 lb.	—	—	17·81 lb.	—	—	14·841 lb.	—	—	13·63 lb.	—
Total weight of sheaves	—	952 lb.	—	—	1017 lb.	—	—	980 lb.	—	—	1036 lb.	—
Distance index	293·5	—	292	294·5	—	293	296	—	307	300	—	297
Register index (proportional to work done)	800·75	—	790·5	803·35	—	760·5	851·1	—	842·1	863·9	—	824·8
Foot-lb. of work per lb. of corn cut	—	401·6	—	—	372·7	—	—	415·1	—	—	392·6	—

—	KEYWORTH 2403			KEARSLEY 2321			SAMUELSON 1562		
	Up		Down	Up		Down	Up		Down
Width of cut	—	4 ft. 10 in.	—	—	5 ft.	—	—	5 ft.	—
Height of stubble	—	5 in.	—	—	5 in.	—	—	—	—
Number of sheaves cut	—	79	—	—	—	—	—	—	—
Mean weight of sheaf	—	13·46 lb.	—	—	16·211 lb.	—	—	13·39 lb.	—
Total weight of sheaves	—	1064 lb.	—	—	952 lb.	—	—	952 lb.	—
Distance index	291·5	—	291	293	—	302	295	—	301
Register index (proportional to work done)	770·1	—	753·1	807·45	—	837·5	870·05	—	864·4
Foot-lb. of work per lb. of corn cut	—	314·6	—	—	410·3	—	—	439·5	—

(Signed) F. S. COURTNEY, M. Inst. C.E.

My colleagues join me in thanking most heartily all the Society's officers for their very able co-operation; and also Mr. Thomas Smith and Mr. Robert Podmore for the courteous and valuable assistance they rendered us.

JAS. EDWARDS.

TECHNICAL DESCRIPTION OF THE PRIZE MACHINES.

HORNSBY'S *Open-back Binder*, No. 5171.

The foundation of this machine consists of a D-shaped gearing-frame formed of 2½ in. by ½ in. flat steel bars bent into two U-shaped frames fitted one within the other, and both their inner ends solidly connected to an angle steel frame which forms the

platform and carries the finger-bar, grain wheel, and divider. On the same foundation is erected a braced framework, to which the driver's seat, the reel, the conveyors, and the binding machinery are attached.

The main driving-wheel, 3 ft. diameter by 9 in. wide, runs inside the D frame, turning on a fixed axle on the ends of which are secured pinions which gear into curved racks formed in the segmental brackets attached to the main frame, in which the axle rises or falls when turned by a worm wheel keyed on the axle and actuated by a worm working in a bracket which slides in the upper part of the segmental slot in which the main axle plays, and is guided there by an antifriction roller.

The spindle of the worm is connected by a universal joint to a light shaft which passes to the rear of the machine, and terminates in a square on to which a handle fits.

The motion of the driving-wheel is communicated by a pitched chain to a second motion countershaft which crosses the gearing frame in rear of the main wheel, and is set parallel to, and about level with, the driving-wheel axle, and, at its near end, transmits its motion by means of bevel gearing to a third motion shaft or crank spindle, the forward end of which carries a crank plate which actuates the cutting apparatus by means of a pitman which traverses the forward end of the gearing frame.

The rear end of this third motion shaft carries a sprocket pinion which engages into a pitched chain which drives, in succession, the roller of the platform apron, then, rising upwards, the elevator roller, then turning downwards, the square shaft which actuates the binding machinery by means of either of two sprocket wheels of different diameters, which thus allow of a change of speed of binding in relation to that of the forward motion of the machine. A jockey pulley attached to the main frame is arranged to take up the slack of the chain.

The draft-pole is pivoted to eyes solidly attached to the forward face of the main frame, and is held at the proper slope by a diagonal stay secured to the upper gearing frame. The travelling-wheels are mounted on short axles which slip into sockets secured to the main frame, and are so placed that the machine is in perfect balance on them when the pole is transferred to its travelling position. This arrangement enables the dismounting of the machine for the road and subsequent preparation for work to be done by one man.

A bevel wheel on the forward end of the conveyor roll-spindle drives a short crank-shaft placed at right angles to the binder platform; the crank on the upper end of this is connected by a short bracket to the buttor, to which it thus com-

municates a compound motion resulting from a sliding motion of the lower end upon a supporting arm and the elliptical motion communicated by the crank.

A bevel pinion on the forward end of the inner elevator roll-spindle actuates a short shaft which runs across the machine about 3 ft. 6 in. from the ground and works the reel through a pair of jointed frames which rock in the direction of the motion of the harvester, and the lower one of which is pivoted to brackets secured to the forward end of the driver's footboard. The frames are controlled by the driver by means of a pair of levers, one of which actuates the lower member of the frame and serves to raise or lower the reel, and the other operates the upper member and moves the reel to or from the crop. Revolution is transmitted to the reel by means of pitched chains actuating sprocket-wheels keyed upon spindles situated in the line of the jointing of the frames, and therefore not affected by their motion.

The construction of the main driving-wheel is somewhat special. The rim is of thin steel rolled with two internal ribs spaced about one-third of its width apart. The nave is formed of a pipe box, which, on the off end, has a fixed flange to which the arms of the sprocket driving-wheel are attached, while on the near end is a loose flange sliding on the pipe box, and which can be drawn towards the fixed flange by means of four bolts.

The spokes of the wheel are composed of plain pieces of $\frac{5}{8}$ round steel, which drop loosely into sockets in the flanges and in the ribs formed inside the rim, but so that the alternate spokes cross each other; that is, the spokes whose inner ends abut on the near flange have their outer ends in the rib nearest the far side, and *vice versâ*. The effect of this arrangement is, that the drawing together of the nave flanges by means of the four bolts mentioned produces a toggle action of the spokes and sets them firmly into their places without further fastening. The sprocket driving-wheel is further connected directly to the inside of the rim of the main wheel by two tangent stays, which thus relieve the spokes of all transverse stress.

The off side of the platform is carried by the grain-wheel in the usual way, the height being regulated by a conveniently placed handle actuating a worm gearing into a rack. The grain dividers are secured to the steel framing in a very substantial manner.

The binding machinery is arranged in a traversing platform controlled by a lever at the driver's hand, so as to permit the string being placed accurately round the middle of the sheaf. The two packers which gather up the corn and press it against

the compressor jaw have their lower ends suspended by links from under the lower portion of the frame, while their centres are actuated by a pair of cranks formed in continuation of the main square driving-shaft.

The needle, which is of the usual curved shape, is keyed on to a crank shaft which traverses the machine fore and aft, and is actuated by a short rod which connects the crank formed on the needle shaft with one on the cam disc hereafter mentioned. The buttor and the packers are always running, but while the sheaf is gathering and forming, the binding machinery, the separators, and the ejector are at rest; but as soon as the sheaf has attained the required size it automatically raises a tripper and throws into action a driving-pawl, which sets the binding machinery to work. This is accomplished by the following arrangement.

On the forward end of the main square driving-shaft, and just in front of the packer cranks, is a pinion which runs loose on its shaft, and drives by means of a spur wheel a sprocket-wheel keyed on to a short shaft, and which, by the agency of a pitched chain, drives a sprocket-wheel, fixed on the knotter spindle, which actuates the knotter and the ejectors. A crank pin in the arm of the sprocket-wheel, by a connecting-rod, operates the needle, and a cam disc on the sprocket-wheel, through a rocking-lever and a connecting-rod, lowers the compressor for the sheaf to be discharged. The loose pinion on the main shaft is driven by a clutch formed of a crosshead fixed on the main shaft, and carrying on its ends driving rollers. Either of these may engage into a tripping pawl consisting of a short lever, which revolves with the loose pinion, rocks on a pin projecting from its side, and is kept in a radial position by a spiral spring similarly fixed, and acting on the tail end of the pawl. In this position one of the rollers at the end of the driving-arm falls into a recess formed in a projection on the side of the pawl, and carries the pinion round with it. But if the revolution of the driving pawl be stopped by a tripper arrangement it is turned out of its radial position, and the rollers on the driving arm then clear the driving recess, and the motion of the pinion and with it that of the binding machinery ceases. The tripper gear consists of a rocking lever attached to a short fore and aft spindle, on to which is keyed a lever, which in its normal position is depressed and, striking against the tripper pawl, prevents its revolution; and in order that this may be done with as little shock as possible, the end of the lever terminates in a spring arrangement, which not only allows of a certain amount of yield, but by the reaction of the spring serves also to take

up the backlash. The tripper is raised by the pressure of the sheaf, when complete, on either of two pieces of board which project a little above the surface of the binder platform, and is kept in the tripped position during the process of binding by an arm mounted on to its spindle, the outer end of which carries a roller which rests on a cam formed on the boss by which the needle is secured to its shaft.

The binding arrangements are generally of the usual kind, and comprise the Appleby knotter bill, and a string retainer of novel type.

The Appleby knotter bill, which is now so familiar,[1] consists of an arrangement like a bird held head downwards, the body being capable of intermittent revolution on its long axis, while the upper mandible of the beak, speaking of the bird in the upside-down position, is caused to open and close as the body revolves by the action of a cam on a small roller attached to the tail end of the mandible, which is produced backwards through the body, and curved up into almost a vertical position. At each tying the body makes a complete revolution. The strings from the retainer and from the new sheaf, round which the needle has just passed it, lie side by side over the upper mandible; the body turns, and by the time that it has accomplished about three-quarters of a revolution the double strings have passed round the mandibles, and are just facing the point of the beak when the upper mandible rises, the strings pass into the open beak by the further revolution of the body; the beak then closes and nips the strings tightly, and then the loop formed by them round the mandibles is pushed off the beak as well as over the portion of the strings retained between the mandibles, and, being drawn tight, forms a secure knot. The two strings on the retainer side of the knot are then cut by a knife which is advanced by a cam motion for the purpose, and the sheaf is ready to be ejected, while the free end of the string is again held by the retainer, and the string itself is, by the retreat of the needle, carried back below the platform, ready for the new sheaf.

The retainer consists of a pair of horizontal superimposed gripper discs, the upper one revolving one-third of a turn at the formation of every sheaf. The upper disc has three round edged notches or recesses formed on its periphery; into one of these the string on the needle falls, and is carried round till it jams between the two discs, which for this purpose are kept

[1] For an illustrated description of the "Appleby" Knotter, see Mr. Coleman's report on the Derby trials of 1881. (Journal, Vol. XVIII. p. 269.)

together by an axial spiral spring situated under the discs. While the knot is being tied the fixed end of the string is carried round towards the knotter, and by that means gives about 1⅝ in. of yield during the knotting operation, and so relieves the stress on the string, which is said to enable an inferior quality to be used with safety.

The several motions described are imparted at the proper

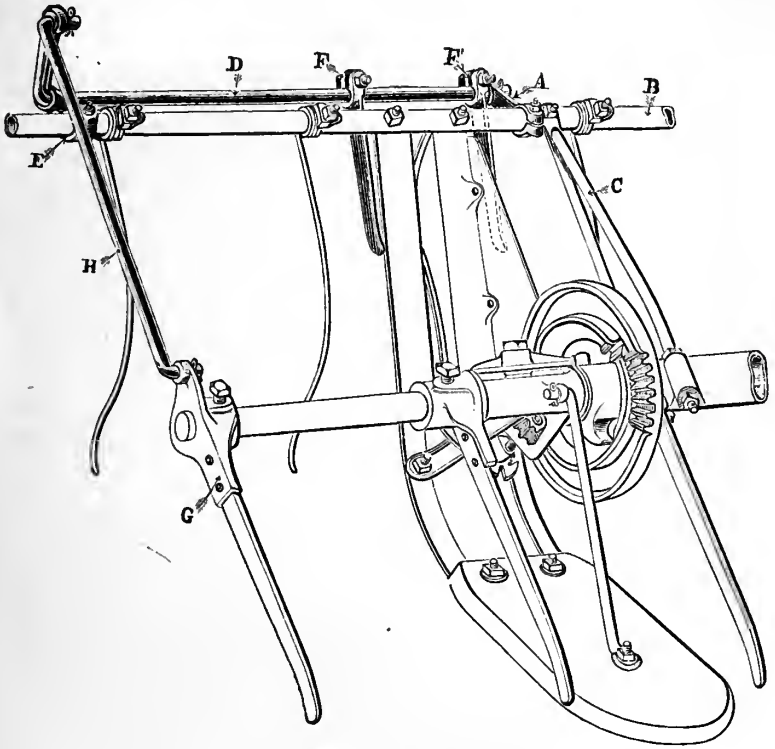


FIG. 1.—*Hornsby's Sheaf Separator.*

times by means of cams formed on discs which are started into action by the tripper arrangement described.

The ejection of the finished sheaf is performed by a pair of prongs keyed on to the knotter spindle, which makes one revolution to every sheaf that is bound. The compressor is held in position or lowered to allow the sheaf to be discharged by a rocking-shaft, which is brought into sharp motion by a lever actuated by a cam on the wheel to which the tripper pinion primarily gives motion. The outer end of this lever is connected

by a spring connecting-rod to a crank formed on the end of the rocking shaft.

An important and special feature in this machine, as well as in No. 5172, is the reciprocating separator, consisting of a rocking shaft armed with two prongs, which has an intermittent motion, the prongs vibrating between the sheaf forming under the needle, and the fresh corn being tumbled on to the platform by the elevators. The prongs assist very materially in preventing interlacing, and in ensuring that the ejected sheaf shall not carry loose corn destined for the next sheaf with it.

The sheaf-carrier consists of a frame which readily slips on to the main horizontal gear frame, and carries at its outer end a rocking-bar, to which are attached four light strongly-curved prongs of sufficient capacity to accommodate from four to six sheaves. A wooden board or platform pivoted close to the machine, and so that its outer edge can be depressed, guides the sheaves as they fall on to the prongs, the ends of which meet the edge of the board when both are in the carrying position, in which they are retained by a lever fixed on the rocking-bar, and connected by a rod to another lever attached to the board, which is thus constrained to move simultaneously with the prongs. The lever actuating the board is produced upwards, and connected by a chain running over guide-pulleys to a foot-lever secured to the driver's footboard. The driver is thus enabled to carry and deposit the sheaves in any manner he pleases.

HORNSBY'S *Closed-back Binder, No.* 5172. (First Prize.)

This machine is of the same general construction as No. 5171; it differs mainly in being deeper fore and aft, in having a closed end to the elevator, and a somewhat different arrangement of the binding gear.

The main driving-shaft of the binding mechanism is produced forward beyond the packer cranks, and at the front end of the gearing frame carries a bevel pinion, which is driven by the usual tripper gear, the end of the tripping-lever having the spring arrangement already described. This tripping-pinion drives an inclined shaft, which, by means of bevel gear, actuates the binder shaft and ejectors, and by a crank pin on the forward face of the bevel wheel actuates, by means of an adjustable connecting-rod, the crank of the spindle on to which the needle is keyed, while the compressor is actuated by a cam on the rear face of the same bevel wheel which operates a lever which transmits the motion of its outer end by means of a spring

connecting-rod to a crank in the rocking-shaft which carries the compressor.

The greater portion of the binding mechanism is thus plainly to be seen on the forward end of the machine, while in No. 5171 it is concealed from view under the binder platform, which, however, is so arranged that access for oiling and cleaning is readily obtained.

In both of Messrs. Hornsby's machines the form of the under side of the platform and the inclination of the finger bar, as well as the height of the forward end of the gearing frame from the ground, are such that they suffered comparatively little from the molehills and rough ground over which they worked, and which presented serious obstacles to some of the competing machines.

The Massey-Harris Co.'s *Open-backed Harvester, No.* 4031.

The main frame of this machine is D-shaped in plan, and is composed of steel bars $2\frac{1}{2}$ in. wide by $\frac{5}{8}$ in. thick, bent into a U form, the smaller U fitting inside the larger one, their ends running double to the off side of the machine, where they are joined to the angle steel which forms the foundation of the platform, the angle steel being brought in a curve and joined to a substantial angle steel finger-bar, and braced by a rod running diagonally from the front inner corner to the back outer corner. That part of the main frame to which the master wheel is attached is doubly strengthened by a double truss, also of angle steel. The main frame carries a braced steel superstructure, to which the elevating and binding gears are attached.

The draft pole is attached by a broad steel plate securely clipped to a bracket on the front of the main frame; also by a brace, at an acute angle, from the pole to the main shoe; and again by double straps clipped to the pole, and connected to a lever by means of which the driver can alter the height of cut and inclination of the platform. No bolts are required to attach the pole to the machine.

The main wheel is 36 in. in diameter by 9 in. wide, and has a wooden rim about 1 in. thick, shod with a steel tyre, and is constructed in some respects on the same principle as the wheels in Nos. 5171 and 5172, the difference being that it does not require any tangent stay to maintain the relative position of the sprocket driving wheel, provision being made, by an ingenious sliding hub, to keep the main wheel in all its parts stiff and rigid.

The main wheel revolves on a fixed axle which is capable of

being raised or lowered in curved guides securely attached to the main framing. Pinions fixed on the ends of the axle gear into racks formed on the curved guides, and the axle is turned by means of a worm wheel and worm, the spindle of the latter ending in a square at the rear of the machine, and being actuated by a handle which is shipped on, and is made to lock the spindle in any position.

Fixed on the nave of the main wheel is a sprocket driving-wheel which actuates a second motion shaft, which crosses the machine in rear of the main wheel by means of a pitched chain which drives a pinion running loose on the shaft, and set into gear by being slid on to a pin fixed on the shaft, by means of a vertical rocking spindle fitted with a crank which is actuated by the driver by means of a handle formed on the upper end of the spindle, and placed within his reach. By this means the whole of the machinery can be started or stopped at pleasure. The frames which carry the main wheel are strongly braced.

The third motion shaft, which runs fore and aft, is driven by bevel gear from the outer end of the second motion shaft, and terminates at its forward end in a disc which carries the crank by means of which the knife is actuated.

The rear end of the crank-shaft carries a sprocket-wheel which drives a pitched chain, which passes in turn first over a sprocket-wheel, driving the main shaft of the binding mechanism, next over a wheel keyed on the spindle of the top roller driving the lower elevating canvas, thirdly over a sprocket-wheel which drives the spindle, which actuates the reel and the buttor, and lastly over a sprocket-wheel which actuates the platform apron. The slack of the chain is taken up by an adjustable jockey-roller fixed to the main frame.

The upper elevator canvas is driven from the top roller of the lower one by means of a pair of spur wheels. The rear end of the upper elevator is floating so that it can adjust itself to the weight of the crop.

A roller is interposed between the top roller of the lower elevator and the upper edge of the binding platform in order to bridge over the space without unduly increasing the height of the elevators and imposing unnecessary work in raising the corn. This roller is driven through an idle wheel by a small spur wheel on the top roller spindle of the lower elevator.

All the bearings are self-adjusting, the bushes having spherical enlargements about their middles which permit of sufficient motion to ensure the axles pressing uniformly all along their bearings.

A board, some six inches high, crosses the rear of the grain

platform; it can be set to any angle, and serves to prevent the corn being pushed too far to the rear. In front of this is a canvas screen suspended from an arm hinged immediately under the driver's seat and to the underside of his footboard. It can be set to any position, and also serves to regulate the arrangement of the corn.

The grain-wheel rises and falls in a slotted bracket, and revolves on a stud which is fixed in a sliding-block, actuated by a scroll or cylindrical spiral, which engages into the teeth formed on the bracket. The handle actuating the spiral projects conveniently towards the rear of the platform.

The divider is secured to the steel framing in a substantial manner, and is fitted with a supplementary one for use in long and tangled corn; the latter can be very readily shipped or removed, as it is held by only a single bolt.

The reel is carried by a hollow iron pillar about $1\frac{1}{4}$ in. diameter and about 5 ft. high. Its lower end is hinged to the front of the gearing frame a little above the platform, and has sliding on it a bracket which carries the horizontal reel-spindle, which crosses the pillar a little to its rear. On the near side this spindle carries a bevel wheel which is geared into by a pinion sliding on a light square shaft which lies parallel to and close to the pillar, and which in its lower end is connected by a universal joint to a bevel wheel which is actuated by an inclined rectangular shaft which is driven at its upper end by means of bevil gear, in common with the buttor, by the special reel driving-shaft already mentioned.

The sliding bracket carrying the reel is supported by a forked lever the fulcrum of which is a rocking-pillar hinged at its lower extremity to the front end of the driver's footboard, and is held in position by a notched quadrant into which engages a pawl attached to a bar which is connected by a pin to the hand lever. The rocking-pillar has a slot in its upper end so that when the lever is pulled up the pawl is lifted and the pillar can be rocked in the fore-and-aft direction so as to bring the reel farther from or nearer to the crop. The lever extends backwards to the driver's seat, and is fitted with a spring catch which actuates a pin which may enter any one of a series of holes in the pillar, so that by means of one and the same lever the reel can be set for height or for position.

The pitman actuating the knife is made of white ash, and works, unbushed with metal, on a crank pin $1\frac{1}{8}$ in. diameter, and is said to wear very well.

The buttor on the forward end of the binding-platform is

actuated by a crank on the upper end of a short inclined spindle, which is driven by means of bevel wheels by the special shaft already described. Its lower end is coupled by a universal joint to the square inclined shaft which drives the reel gear. The lower end of the buttor is carried by a universal joint sliding on a supporting arm, which can be rotated so as to bring the lower end backwards or forwards to suit the crop, while the elliptical reciprocating motion is given by the crank above described through a connecting bracket.

The packing, binding, and ejecting mechanism is similar to that described in the two other prize machines. The main square driving-shaft carries the packer-cranks, and immediately in front of them is the shipping-pinion. The tripper actuating the pawl is not, however, furnished with any spring-buffer arrangement.

The tripper releases the pawl by the motion of a pressure board, which projects a little above the surface of the binder platform, when the sheaf has attained its proper dimensions. The shipping pinion engages into a spur wheel keyed to a shaft which runs forward and terminates in a sprocket pinion which, by means of a pitched chain, drives a sprocket-wheel on the forward end of the knotter shaft. On the front face of this wheel is a crank pin which by means of an adjustable connecting-rod actuates the needle shaft through a crank worked solid on its forward end. On the rear face of this driving sprocket-wheel a cam is formed which actuates a bent lever the longer and lower arm of which terminates in an eye through which the binding string is led from its box, passing through fixed eyes on about the same level and on each side of the lever, after which it passes under the platform to the needle. The object of the arrangement is to facilitate the paying out of string when the sheaf is being tied.

The sprocket-wheel has, besides, a second cam formed on its inner face; it actuates another lever which by means of an adjustable connecting-rod works a horizontal spindle, the rear end of which controls the compression jaw, and releases the sheaf at the right moment.

The knotter (fig. 2) is of a peculiarly distinctive type, known as the "Stark." Its only similarity to the Appleby type, previously described, is in the tying hook, which is beak form, but the upper mandible of the beak is arranged somewhat differently with respect to the manner of operating it. The tail end of the mandible produced through the body turns up into the vertical position, the mandible being kept closed by the pressure of a flat spring acting on the tail at right angles to the axis, while

the mandible is opened by a downward axial pressure, caused by the tail end bearing against a cam formed in the lower face of the boss through which the body works.

The string-holder is of peculiar construction. An annular bevel wheel about 6 in. diameter across its open centre has a short cylinder or rim formed on it close inside the teeth. On the edge of this cylinder are worked seven smooth rounded notches. The edge works into a kind of saddle, which fits over about 2 inches of the periphery, and as the needle lays the string over a notch the ring turns, and the string is jammed between the bottom edge of the saddle and the ring, the saddle being pressed down by an adjustable spring.

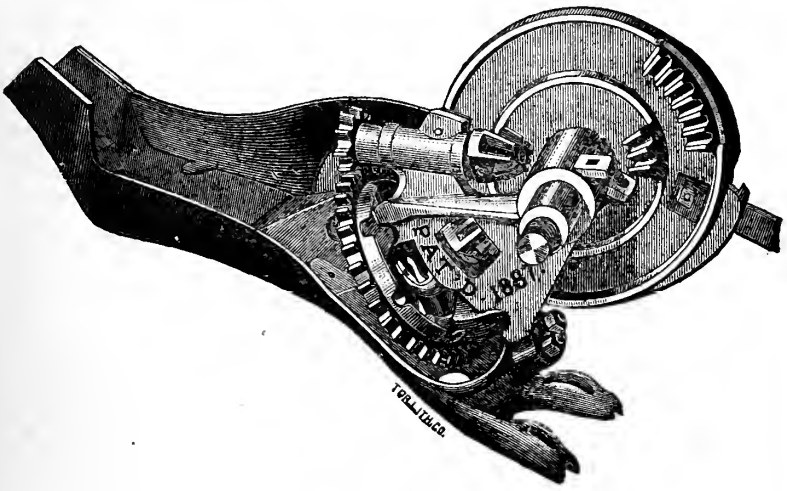


FIG. 2.—*The "Stark" Knotter.*

The knotter is placed in the middle of the annulus and is surrounded by it, but it is a little below its centre, and, when at rest, stands with the mandibles inclined a good deal downwards, so that with the aid of a fixed horn the pressure of the string is relieved from the mandibles, and, in taking off the knot, the pull is in the direction of the beak, so that the wear on the flat of the turning pinion is much reduced.

The knife lies just inside the saddle, and is actuated by a cam on the back of the disc, which communicates the intermittent movements to the knotter-body and the string-holder. The whole arrangement is compact, and has proved itself to be very efficient.

The whole of the binding mechanism can be moved to and

fro to suit the crop, by means of a lever under the driver's control.

The sheaf-carrier consists of an upper curved two-prong fork projecting from a wooden rocking-shaft hinged to the frame which carries the binding machinery; and of a lower part composed of six prongs, which are hinged to a hollow bar attached by brackets to the main frame of the machine, some 7 in. below the lower edge of the binder platform, and a little to the outside of it. Each prong is pivoted into a small rocking-lever and rests also in a guide. The outer ends of the rocking-levers are connected by a bar, which in its turn is connected by rods and cranks with a double foot-lever secured to the driver's footboard just in front of his seat. One lever raises the prongs and the other lowers them, but so that where they are lowered they are free to trail along the ground and so avoid catching in irregularities.

The whole of the details of this machine are thoroughly substantial and well made.

W. Anderson.

WATER IN RELATION TO HEALTH AND DISEASE.

Introduction

The world's stock of water exists in our seas and rivers on the one hand, and in the earth and air on the other. Its physical state is constantly undergoing change,—at one time it permeates the atmosphere as invisible vapour, and at another condenses into visible clouds, soon to assume the liquid state and fall to the earth as rain.

Reaching the ground in this form it either passes into the soil or over it—in the one case to emerge again in the course of springs, in the other to enter more directly into our rivers, and finally to reach the sea. Under the influence of heat it is again dissipated in vapour from land and sea, rising upward and falling anew as rain, or snow, or hail, or mist. In this way it maintains a constant circulation between earth and air—in the one suffering various degrees of organic and inorganic contamination, in the other reaching its highest form of natural purity. The purest of natural water is supplied in the form of rain, but even in this state it cannot be said to be altogether free from

foreign matters, inasmuch as it brings down with it in its fall various substances, solid and gaseous, living and dead, which the atmosphere holds in suspension. Of these some are desirable and useful additions, others are harmless, but some are distinctly hurtful. In regard to the solids thus acquired, they are necessarily of a miscellaneous character, and comprise dust in its many and varied forms, the ubiquitous germs of putrefaction, and too frequently, also, others out of which arise specific contagious disorders.

The quantity of solid matter contained in rain-water is estimated to be about two grains per gallon in rural districts, but in large towns, where traffic is heavy and manufacturing industries are carried on, it is much greater. The gaseous constituents of rain-water comprise oxygen, carbonic acid, nitrogen, and ammonia, and in the vicinity of factories where much coal is consumed, and the ore of metals is smelted, sulphurous acid and other injurious gases may also be present in greater or less amount. Of these it is computed that each gallon contains four cubic inches of nitrogen, two cubic inches of oxygen, and one cubic inch of carbonic acid, with a small fractional part of ammonia. Although regarded as impurities in a strictly chemical sense, they are not only harmless, but impart to water a coolness and freshness which it would not otherwise possess. Airless water is flat and insipid, and in other respects objectionable. In a biological as well as in a sanitary sense oxygen is indispensable to water. Without it aquatic animals could not live. Not only does it minister to respiration in the living, but it serves to oxidise dead organic matter and to confer upon our rivers a self-purifying power, by converting substances which would probably prove hurtful into harmless products of oxidation. In the case of rivers contaminated with the sewage of towns this action of dissolved oxygen is of great importance.

Sulphurous acid as ordinarily found in rain-water is in itself of little moment, but the action it exercises upon lead renders such water hurtful, and even poisonous, in passing through lead pipes, or over lead gutters, or when stored in lead tanks.

Besides impurities gathered from the air, others are also added to rain-water as it passes over the roofs of houses, stables, sheds, and other buildings. In places where pigeons are kept in large numbers such water becomes not only foul but actually poisonous, its effects being specially marked on young animals when supplied to them continuously for long periods. In two instances in the experience of the writer it has caused considerable mortality and sickness, and there is reason to believe that some of those mysterious outbreaks of putrid fever—

so-called "blood poisoning"—of which we occasionally hear have their origin in this kind of water contamination. It is a form of pollution against which stockowners would do well to guard themselves, and one which should be borne in mind in dealing with outbreaks of disease where water is under suspicion.

Decaying leaves and other parts of trees, as well as lime and other matters, are also washed from the roofs of buildings, and if they are less hurtful than pigeon excrement, they certainly render water unwholesome when existing in large amount. Moreover, when lead gutters or tanks are in use, decomposing vegetable matter favours solution of the metal, and induces lead contamination, out of which may arise lead colic and other animal ailments.

In the vicinity of white lead and other factories substances of a poisonous nature find their way to the roofs of buildings, and thence into the well or tank. One of our most recent experiences of horse poisoning arose from contamination of water in this way.

Pure as water may be when it falls to the ground, it soon suffers contamination to a more or less considerable extent. The nature of the polluting matters will depend in a large measure upon the description of soil and rocks with which the water is brought into contact, and through which, or over which, it passes. Whatever that may be, they invariably exist in one of two conditions, or in both. Either they undergo solution, or they are suspended. Dissolved matters may be derived from the surface, or from the subsoil, or from the underground formations which they traverse.

Cultivated soil and marsh land no doubt give up a considerable amount of animal and vegetable matter as well as the products of their decay. These latter present themselves in the form of ammonia, together with nitrates and nitrites. Certain phosphatic and other salts, derived from natural and artificial fertilisers, are also present. In its further passage through the earth a quantity of saline matter, the nature of which depends on the geological formation, also becomes dissolved in the water. Conspicuous among these saline bodies are chalk (calcium carbonate), gypsum (calcium sulphate), carbonate of magnesia (magnesium carbonate), besides others such as Glauber's salts (sodium sulphate), common salt (sodium chloride), Epsom salts (magnesian sulphate), &c.

A few analytical examples[1] will show how variable is the composition of different waters and the proportion of inorganic constituents they contain.

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[1] Wanklyn, *Water Analysis.*

At Woodall Spa, in Lincolnshire, a water said to possess valuable medicinal properties yields no less than 1542·2 grains of saline matter per gallon, as follows:—

	Grains per gallon
Chloride of sodium (common salt)	1330·0
Chloride of calcium	111·0
Chloride of magnesium	91·2
Carbonate of soda	10·0
Total	1542·2

This sample is remarkable, not only on account of the large total amount of inorganic matter, but also for the quantity of chloride of sodium, or common salt, it contains.

The next sample is drawn from wells in the Chalk at Croydon, and is noteworthy for the large amount of carbonate of lime it contains:—

	Grains per gallon
Silica	1·2
Carbonate of lime	17·8
Carbonate of magnesia	1·4
Chloride of sodium	2·0
Sulphate of soda	0·9
Total	23·3

This is a very hard water.

The sample which gave the following analysis is from Sudbrook Springs, under the Severn:—

	Grains per gallon
Carbonate of lime	13·6
Carbonate of magnesia	5·4
Sulphate of magnesia	3·2
Nitrate of magnesia	0·6
Chloride of magnesium	0·8
Chloride of sodium (with a little potash)	3·5
Total	27·1

Besides a considerable amount of chalk, this water is noticeable for the number and variety of the salts of magnesia it contains. It is therefore classed with the magnesian waters.

Water collected on gathering grounds where the geological formation is other than the igneous rocks is sometimes only slightly charged with mineral matter, to the extent, for example, of 4 or 5 grains per gallon, as is shown by the following analyses of the Woodland water supplied to Manchester, and the Holmfirth water in Yorkshire:—

MANCHESTER WATER.

	Grains per gallon
Silica	0·30
Carbonate of lime	1·70
Sulphate of magnesia	1·66
Chloride of sodium	0·91
Total	4·57

HOLMFIRTH WATER.

	Grains per gallon
Sulphate of lime	0·8
Sulphate of magnesia	0·6
Chloride of sodium	0·8
Nitrate of soda or potash	0·2
Total	2·4

In consequence of the small quantity of lime they contain these two waters are very soft.

In its passage through the earth, water not only dissolves out one or more of the saline constituents, but in passing through the deeper strata the suspended particles gathered from the surface and subsoils are filtered out of it and left behind, so that a process of exchange is continually going on between the soil water and the underground formation through which it percolates.

The water dissolves and carries away portions of the rocks, while they in return arrest and retain the solid particles, organic and mineral, which are suspended in it. This is the natural system of purification, but it does not end here. Porous strata, sand and gravel in particular, contain a considerable quantity of oxygen, which burns up all the organic filth, and converts it into harmless compounds. Purification is thus carried on and rendered complete, the more so the deeper the filtering bed through which the water has to pass. For this reason the water of deep wells and springs is much purer than that of shallow ones.

By the presence of such salts as appear in the above analyses some waters acquire important properties, and are rendered valuable by their medicinal action. In ordinary supplies, however, the chief saline constituents of interest are those of lime, especially the carbonate of lime (chalk), and sulphate of lime (gypsum). It is to these that water owes the quality of hardness. When salts of lime exist in considerable amount, health is liable to impairment in various ways. Among other things, horses drinking hard water suffer from derangement of the organs of digestion and from a liability to attacks of colic and other intestinal disorders. The skin of such animals loses its

polish and becomes dull and scurfy, the coat stares, and a general state of unthriftiness is induced. Stone in the bladder may, in some circumstances, result from the continued use of hard water. Goître, a disease marked by swelling of the glands of the neck, is also said by Professor Kendall to arise out of this cause, but our experience of the malady in lambs and horses does not enable us to confirm this view of its origin.

Physiology of Water.

The purposes which water serves in the economy of nature are many and various, and its importance in the maintenance of life is emphasised by the fact that it forms the chief inorganic constituent of all organised bodies; in fact animals and vegetables alike, from the highest to the lowest, may be regarded as more or less complex groups of cells of which water is the main constituent. In the higher animals, not only is water contained within the cells of every tissue, but there is a ceaseless current passing over and between them, into them and out of them, from which they are nourished and renovated. The tissues of the body indeed are constantly being irrigated and saturated with liquid nourishment which oozes through the walls of the minute blood vessels as so much flesh food in solution.

In the body of the higher animals water forms as much as 75 per cent. of the whole, while in the lower and simpler forms of life it reaches as much as 90 per cent. It is of course variously distributed through the different parts of the body, but it enters into all, from the soft juicy muscle to the hard ivory and enamel constituents of the teeth. The quantity contained in any particular organ will vary from time to time. It is no doubt most considerable during the period of greatest functional activity and diminishes in the periods of functional rest. It is more abundant in the organs of the young than in those of the aged; hence the more juicy nature of the tissues of the former as compared with the latter. The following table shows the quantity of water contained in 1,000 parts of different animal tissues and fluids:—

			Tissues.					
Kidneys	.	827	Brain	.	750	Fat	.	299
Heart	.	792	Skin	.	720	Bone	.	216
Nerve	.	780	Bone marrow	.	697	Ivory	.	100
Spleen	.	758	Liver	.	693	Enamel of tooth	.	2
Muscle	.	757	Cartilage	.	550			
			Fluids.					
Sweat	.	995	Gastric juice	.	973	Bile	.	864
Saliva	.	995	Milk	.	891	Blood	.	791
Tears	.	982						

Of the large amount of water contained in the organism of the higher animals nearly the whole enters by the mouth, either in a free liquid condition or in combination with the various foodstuffs. That a certain quantity is actually formed in the body itself is made clear by the fact that the total amount which passes out of it in the twenty-four hours is greater than that which passes into it. If the quantity exhaled by the skin and lungs be added to the still greater instalment excreted by the kidneys, bowels, and other organs, the sum of the whole exceeds the quantity ingested. How this additional amount of water is formed in the system may be understood by considering those changes which are constantly taking place as the result of the action of oxygen on the hydrocarbons of the food. In this connection it may be noticed that a process of slow combustion is constantly going on in the tissues of the body, during which the carbon of the food by uniting with the oxygen of the air produces carbonic acid, while the hydrogen which remains combines with other portions of oxygen to form the water referred to.

As we have just now seen, water enters largely into the composition of all the secretions and excretions of the body, and serves as a medium through which the active principles of the former are enabled to exercise their influence in the various functions of life, while it also serves to convey from the system the waste materials which naturally result from the wear and tear of the flesh, and which if retained would poison the blood, and sooner or later end in disease and death. Urine and bile are good examples of water bearing away effete matters of the kind referred to. All the organic constituents of food, whether they be carbohydrates, hydrocarbons, or albuminoids, as well as the various mineral salts, oxides, &c., must undergo solution or emulsification before they can be made use of in the nourishment of the tissues. The initial stage in the process of digestion, by which the food is broken down into a pulpy mass by the teeth, is dependent for its efficiency upon the moisture furnished by the saliva. Moreover the water contained in this secretion, aided by that taken into the stomach for alimentary purposes, serves to dissolve the food after it has undergone the necessary chemical changes which result from the action of the digestive juices. The digestive juices themselves are for the most part water. In 1,000 parts of gastric juice there are 973 parts of this fluid, in bile 864, and in saliva as much as 995.

The blood itself contains 791 parts of water in 1,000, and its power to circulate through the system, and to give out from

the vessels its store of flesh-food for the nourishment of the tissues which it traverses, is due to this fact. Water, however, is not only a means of conveying food into the body, and of distributing it in and about the tissues, but it also acts the part of scavenger by receiving and carrying out of the system the refuse matter or products of animal decay. Just as the fire dies down and is extinguished by the accumulation of ashes in the grate, so health is impaired and destroyed by the accumulation in the blood of the products of combustion, which are but the ashes of the fire of life. Practically it may be said that the water, which conveys sustenance from the blood to the flesh, also gathers together, in its round, the useless and poisonous waste, and carries it from the body. The organs through which this office is performed are the kidneys, skin, lungs, and liver. If the urine, which makes up one-half of the water passing from the body, be examined, it is found to contain various crystalline substances—organic and inorganic—resulting from the oxidation or burning of the muscles and other albuminoid constituents of the organism. These are secreted or separated from the blood by the kidneys, and carried out of the body in a large volume of superfluous water, which filters at the same time through the renal organs. The proportion of water to solids in urine is as 960 of the former to 40 of the latter.

As a means of cleansing the blood from impurities, water again claims attention in that form of excretion termed sweat. In this case it is found escaping through the minute pores of the skin. Sweat is not a simple fluid, but like urine is chiefly composed of water holding in solution waste material, of which the system requires to be freed. This refuse matter comprises a small amount of urea in addition to various other compounds, of which chloride of sodium or common salt is a conspicuous example.

Besides forming a vehicle for the conveyance of these noxious matters from the system, sweat, in passing away from the skin in the form of vapour or steam, carries off with it a certain amount of animal heat, and thus assists in lowering the temperature of the body. In this way the overheating influence of exertion is largely counteracted.

The function of water, however, as a means of freeing the body of effete or poisonous substances does not cease here, for we find it being constantly poured out from the lungs in the form of vapour, bearing with it large volumes of a deadly gas (carbonic acid) which, like urea, and some other urinary ingredients, is also a waste product resulting from the combustion or oxidation of the tissues.

Besides these special functions water also serves other purposes of a more general character in the animal economy; for instance, it imparts to the tissues a state of mobility, and of physical fitness for the exercise of their respective functions. It maintains in solution many salts and other matters essential to the vital processes of the economy, and it favours those nutritive exchanges upon which, as we have seen, the growth and reparation of the body depend.

Inasmuch as the body is constantly giving out water by the skin as sensible or insensible perspiration, through the lungs as vapour, and by the kidneys as urine, the stock of fluid upon which life so much depends would soon run out were no provision made for its renewal. This, however, is obviated by that peculiar sensation termed "thirst," which always arises when the fluids of the body fall below a certain point. Thirst, therefore, is not, what it might seem to be, a mere local dryness of the mouth and throat, but an expression of general deficiency of water in the blood and tissues of the entire organism. This is shown by the fact that it may be readily allayed by injecting water into the veins and without administering it by way of the mouth. If more water enters the blood than is necessary for the requirements of the system, the surplus is quickly thrown off by the kidneys, and with it, as we have seen, more or less refuse matter, to which reference has already been made.

The quantity of water requisite to maintain the body in health will vary in different animals, and in the same animal under different conditions. The circumstances specially influencing the amount required are food, temperature, and exertion. Animals subsisting on juicy roots and grass require but little to drink, while others partaking of dry food, such as hay, corn, cake, chaff, &c., need a liberal and regular supply. In hot weather and with animals occupying hot stables, when the skin is active and freely exhales moisture, the demand will be greater than in cold, and more will be required during work than at rest. Speaking generally, it may be said that horses doing ordinary work consume from seven to nine gallons per day, while six to eight gallons suffice to meet the requirements of oxen. Milch cows when housed may require a larger amount, especially deep milkers. Sheep and pigs will take from three quarts to a gallon per day. When suckling, a greater supply is needed by all of them.

In dealing with water in its relations to health, it has to be borne in mind that the standard of excellence is not, as might be considered, its purity, but its wholesomeness, i.e., the absence from it of matters prejudicial to health, and the presence in it

of such as render it agreeable and useful to the economy. Chemically pure water, i.e., water freed from all those substances which it derives from the soil and air, is not only impossible in nature, but it is at the same time most undesirable as an aliment. Many of the mineral substances commonly contained in water are when existing in large amount unquestionably hurtful; but some, and especially the salts of lime, potash, soda, and iron, when present in moderate quantity, serve, not only to render it cool, palatable, and refreshing, but also to supply the system with the requisite inorganic constituents of the flesh for the growth and renovation of the body.

Nothing can be said in defence of organic filth, which in the form of decomposing animal and vegetable remains so largely enters into the water supply of our farm animals. As to pollution from industrial sources, this is annually becoming greater and more serious as manufactures become more numerous and active on the banks of our great waterways. It is not claimed that a high standard of purity, such as would be insisted upon for human consumption, is absolutely necessary to a high standard of health in our lower animals. Their habits and instincts plainly and forcibly suggest an organisation capable of considerable resistance to organic and inorganic contamination of both food and water; but it will not be contended that water contamination is not a fruitful cause of disease and death in the live stock of the farm, for there can be no doubt that animal health like human health will rise or fall in proportion as the water supply is wholesome or unwholesome. The circumstances of animal life render it impossible to gauge even approximately the actual amount of sickness and mortality arising out of the use of impure water. The evidences of mischief from this cause do not always take the form of clearly defined disease, but too frequently of general unthriftiness and insidious impairment of health, which by diminishing the vital resistance of the system predisposes to more definite ailments. Moreover, the capability of the body to keep in check and overcome the ravages of "disease germs" may unquestionably be weakened by the degrading influence of impure water.

Experience teaches that the losses from water contamination in one form and another are very considerable, and it may be safely affirmed that thousands of animals perish every year from the poisons of putrescence, and from parasitic life which abounds in foul water, whilst thousands more suffer long-continued sickness and prostration from the ravages they produce. That animals may and do continue to drink water visibly impure for long periods without suffering from any clearly defined disease

is a fact we are obliged to admit, and it is this uncertainty in the effects of polluted water which renders it so hard to convince stockowners of the dangers which attach to it. If it acted with the certainty of strychnine, and the poisonous principle could be equally well detected by chemical analysis, conviction would be less difficult, and measures of prevention would be more scrupulously observed. But, as a matter of fact, we know comparatively little of the real poison which lurks in impure water, and "although the chemist may tell us with absolute certainty when water is safe, he cannot always tell us when it is actively noxious."

It is rarely the case that water is suspected of having any concern in the diseases of live stock, especially if from the same pump, or stream, or pond, the supply has been obtained—as it is often urged—for years without inducing violent sickness. Farmers are often heard to complain of their stock falling back in condition, and presenting an unthrifty appearance, notwithstanding an ample supply of wholesome food and the most healthy surroundings; but it is not until some fatal outbreak of enteric disease, or acute blood-poisoning, appears to emphasize the long-abiding mischief, and the veterinary expert enters upon an inquiry, that an explanation is forthcoming. The low standard of health, the lean and stunted growth, which perhaps for years have rendered stock-keeping vexatious and unremunerative, are now seen to have had their origin in the same polluted water which determined the more fatal attack.

The amount of danger attaching to the pollution of water with organic matter will depend upon—

1. Whether the organic matter is animal or vegetable.
2. The quantity of organic matter present.
3. The activity of the state of putrefaction.

Animal matter is more dangerous than vegetable, and, when in a state of decomposition, may develop putrefactive products as deadly as arsenic.

Mr. Wynter Blyth, in his "Dictionary of Hygiene and Public Health," says: "The bad effects of human sewage on cattle appear to be *nil*." Such a conclusion, however, is certainly not warranted by our experience. That cattle will, as he observes, "grow and fatten on the most sewage-trodden soil" is a fact in the experience of most practical men, but it is equally true that sewage under certain conditions, not only lowers the standard of health, but becomes distinctly poisonous. Moreover, the question has been recently brought forcibly before us as to whether human sewage may not be a means of spreading tuberculosis in our dairy herds.

We cannot draw general conclusions from individual cases, but when we find, as we have done, nine or ten dairy cows suffering from tubercular disease in the course of a year on a farm irrigated with sewage, the idea of sewage as a possible cause of the malady may be reasonably entertained as a starting-point for further inquiry. It would be perfectly true to say that grass grown under the influence of sewage may be, and is, fed to cows for long periods without occasioning impairment of health; but it is quite another thing to aver that human sewage has no ill effects on cattle.

Acute sewage poisoning sometimes proves rapidly fatal, and we have known cattle to die from its effects in a few hours. Where it assumes a chronic form, the disease runs a slow and protracted course, extending over weeks and months. In the former case, the malady develops many of the clinical characters of anthrax; in the latter it is marked by a continuous diarrhœa, often resulting in emaciation and fatal exhaustion.

Action of Animals and Plants.

It will be seen from what has been said of the disposition of water that, while in nature there is a constant tendency to contamination, there is also a never-ceasing process of cleansing going on, whereby it is purged more or less completely of its organic filth, and again fitted for consumption. Natural purification not only takes place in that portion of the water which enters the soil, but in that other moiety also which passes more directly from the surface into our ponds and rivers. The influence of animal and vegetable life on the purity of the latter is very considerable, but has hitherto received little attention. It may, however, be safely affirmed of it that much of the organic matter poured into, and produced in, our watercourses is consumed by birds, fish, and other living creatures, who feed upon it; and there can be no doubt that some forms of vegetation which abound in our rivers, ponds, and brooks also exercise a salutary influence on the medium in which they grow. It is not, perhaps, less true that certain low forms of plant life tend rather to vitiate than to purify, whilst others serve as an index of foulness and filth. In a short but interesting paper by Mr. A. W. Bennett on "Vegetable Growths as Evidence of the Purity and Impurity of Water" the vegetation of running streams is classified under four heads. These comprise—

1. Flowering Plants.
2. Fungi.
3. Algæ.
4. Characeæ.

The importance to be attached to the presence of flowering plants in our ponds and streams is centred in the facts that "the vital phenomena are the same for green water plants as for green land plants," and the process of assimilation is far more energetic in the daytime than that of respiration. They must constantly be giving off oxygen into the surrounding water, and their influence on its purity must be uniformly favourable. "Moreover," says Mr. Bennett, "none of this class of plants are able to withstand the injurious effects of a large amount of fæcal or other pathogenic organic impurities in the water; and their presence, if in a healthy, flourishing condition, must be regarded, not only as beneficial, but as a sign of comparative purity, of the water."

Quite the reverse are the indications of aquatic fungi. Excluding bacteria, the same author remarks:—"The number of aquatic fungi is small, and of these the only one which practically comes into consideration in relation to the purity of water supply is the so-called 'sewage fungus,' *Beggiatoa alba*. Since all fungi which are not parasitic are saprophytic, i.e., derive their nutriment from organic bodies in a state of decomposition, their occurrence is in itself sufficient evidence of the presence, in the water in which they grow, of putrid or decomposing organic substances; and since they do not assimilate in the proper sense of the term,—i.e., do not decompose carbon dioxide and produce carbohydrates or other similar compounds,—they can exercise no purifying influence on the water by the disengagement of oxygen. The appearance presented by the sewage fungus is that of a dirty-looking jelly-like layer, covering the bottom and sides of the watercourse in which it occurs. It is found plentifully in drains which carry off the effluent water of sewage-farms, and is especially abundant where the current is slow and the watercourse tortuous. Wherever it occurs it is "an unfailing sign of the presence in the water of a large quantity of deleterious decomposing organic compounds." Microscopically examined, it is found to consist of delicate soft filaments interlacing each other in all directions.

The algæ of our ponds and streams form a large and interesting group of aquatic plants, several of which would appear to exercise a marked influence on the purity or impurity of water, and by their presence to indicate in some degree the extent of its organic contamination. Algæ are best known to the ordinary observer in that form termed "blanket weed." This, however, is only one of numerous examples which abound in our rivers and ponds.

The higher algæ consist of closely packed masses of long

green mossy filaments, which form a broad sheet upon and beneath the surface of the water. Others are much simpler in their organisation, and very minute, so much so that the entire plant may consist of a single cell only, of microscopic dimensions. Between these two extremes of development there are intermediate forms of great variety. These plants Mr. Bennett classifies under the heads—1. Blue-green algæ. 2. Chloryphyll-green algæ. Of the former he remarks: "The amount of oxygen which they give off into the water is exceedingly small, and they can exercise no appreciable purifying influence; while in their decay they frequently give out noxious and fœtid gases, and the presence in the water of any considerable quantity should be regarded as rendering it unfit for domestic purposes. Of the chlorophyll-green algæ the family *Conjugatæ* are extremely sensitive to organic impurities of a putrescent character; they rapidly perish in water that is not well charged with oxygen, and when found in any quantity—or, at all events, if occurring in the reproductive condition—it may be taken as certain evidence that the water contains no considerable quantity of deleterious organic ingredients. They give off into the water an appreciable amount of oxygen, and thus contribute to purify it." A striking illustration of the purifying influence of plant life on water arose, quite accidentally, some years ago in India, when all aquatic plants were removed from the water tanks. As a consequence of this the water, which before was good and wholesome, became unfit for use. Other species of algæ, especially "blanket weed," also give out a considerable amount of oxygen to the water in which they grow; but when they exist in large amount, and undergo disintegration and decay, these algæ—harmless though they be during life—may prove a source of dangerous pollution after death.

In the experience of Mr. Rafter[1] the freshwater alga, *Volvox globator*, has "on more than one occasion appeared in enormous quantities in the reservoirs which supply Rochester, in the State of New York, with water, imparting to it a fishy taste and odour, and apparently causing sickness and death among the cattle which drank it."

The *Characeæ*, commonly known as "stoneworts" or "brittleworts," from the fact of their becoming coated over with an earthy deposit, when existing in large quantity give off a foul odour of sulphuretted hydrogen, and impart to the water deleterious properties.

Water has been known to acquire a peculiar nauseous odour

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[1] *Transactions of the American Society of Civil Engineers.*

and taste from a fresh-water sponge, *Spongilla fluviatilis*, and chemical examination resulted in showing it to contain a large percentage of albuminoid ammonia, and after standing a rapid increase of free ammonia was found to take place in it. When the plant was removed from the storage basins in which it grew the unwholesome condition of the water disappeared.

It is recorded by Mr. Francis, of Adelaide, that in 1878 the lakes which form the estuary of the Murray contained a Conferva in such quantities as to render the water poisonous to farm animals. He believed it to be the *Nodularis spumigera*, a plant allied to *Protococcus*. It forms a thick scum, like green paint, some two to six inches thick, and as pasty as porridge; it is swallowed by cattle when drinking, especially such as suck their drink from the surface like horses. On being ingested it acts poisonously, and rapidly causes death.

The symptoms caused by it were stupor and unconsciousness, the animals falling and remaining just as if asleep, unless touched, when convulsions came on, and the head and neck were drawn back by rigid spasm. Death took place in the case of sheep in from one to eight hours, in horses in from eight to twenty-four hours; dogs succumbed in from four to five hours, and pigs in from three to four. In a sheep to which thirty ounces of the fresh scum was given death resulted in fifteen hours. On a post-mortem examination being made, all the scum was found to have been absorbed. The abdominal cavity contained two pints of yellow serum. The heart was flabby, and had around it a considerable amount of effused serum. The lungs, liver, and substance of the brain were healthy, but the outer membrane of the brain (the *dura mater*) was congested. Blood throughout the veins and arteries, and in the cavities of the heart, was black and uncoagulable, neither did it become scarlet on exposure to the air. Many sheep that died on being opened presented the same appearances, all being without any signs of the plant in the stomach. This, says Mr. Francis, shows that it is rapidly absorbed into the circulation, where it must act as a ferment and cause disorganisation. When the scum is left in wet pools and puddles it rapidly decomposes, giving off a most horrid stench, like putrid urine or archil in process of manufacture; but previous to its getting into that state it emits the smell of butyric acid, like very rancid butter.

Pollution of Rivers.

Rivers, streams, and ponds are the receptacles into which water naturally finds its way, either from the surface on which

it falls or by first percolating through the soil, while the means adopted for its artificial storage usually take the form of reservoirs, wells, and tanks. From these it is distributed for use in various ways,—by open conduits, by covered drains, or by pipes of different kinds. In all these situations water is exposed to contamination, not only of an ordinary and harmless kind, but also of a hurtful and often of a poisonous character. The extension of our mining and manufacturing industries and of other works has added considerably to the demand for water as a power in recent years, and also as a means of washing and manipulating ores and textile and other materials. In mining districts of the West and manufacturing districts of the North the river banks have become crowded with mills, mines, and manufactories, and every year there has been a growing activity in the many and various industries which they represent. Having regard, however, to the immense amount of polluting matter which the streams and rivers of this country receive daily, and the many poisonous compounds used in manufacturing and other processes which pass into them, it must be confessed that the sickness and mortality resulting to live stock are from this cause, comparatively small, and there can be no doubt that the chemical and other methods which in recent years have been adopted to utilise what was formerly treated as "waste" have done much to render it so. Nevertheless, our rivers continue to suffer serious pollution, and the land adjoining some of them has not only been adversely influenced, but in some instances altogether unfitted for agricultural purposes. Much of the immense amount of refuse annually cast out of collieries and mines has for economical and other reasons been thrown into adjacent streams. As a result, the beds of rivers have silted up, and their holding capacity has been greatly diminished. This has caused flooding of land, and led to the deposit of large quantities of polluting refuse on the pastures. Injury to herbage and to animals eating it has necessarily resulted, and in this way pollution of rivers has occasioned serious losses to farmers and landowners. In the course of inquiry into rivers' pollution in 1874 it was shown that cattle frequently became sick, and not seldom died, after grazing upon meadows covered with mine refuse and colliery detritus, and instances were recorded in which as much as two pounds of coal dust was found in their stomachs after causing violent purging and fatal ulceration.

Nearly every mining and manufacturing process gives rise to an effluent refuse more or less deleterious to life. The existence of some of these forms of refuse is made known by the peculiar discoloration of the water into which they flow. Some rivers of

Yorkshire are turned blue and various other hues by the effluent refuse of cloth works; those of Cornwall are reddened by the copperas washings of the tin-plate manufactories, or turned white by impregnation with china clay; while in the coal-bearing districts they are blackened by the effluent from coal washing.

Outward and visible signs, however, are not always available to make known the presence of poisonous and deleterious substances which enter our waterways, and in such cases it is only by actual experience of their effects on living things that their presence becomes known to the farmer. The absence of fish where once they were abundant, the disappearance of aquatic plants from the river and its bank, are significant facts in river sanitation, if not absolute proof of dangerous pollution. Deadly such water may not always be to the live stock of the farm, but it is all the same deleterious to health. Under its use young stock fail to grow and to thrive, milk production is lessened, butter is diminished in quantity and impaired in quality, pregnant animals abort, and active disease and death not unfrequently result.

Notwithstanding all that has been done in recent years with the object of preventing the pollution of rivers and their tributaries, losses and depreciation of live stock from this cause still continue to arise, and too frequently to engage the attention of our law courts in the settlement of contentious claims.

As to sewage, its rapid and complete removal from our densely populated centres is an indispensable requirement of Public Health, and since for many and various reasons its application to the land for agricultural purposes is, under present circumstances, impracticable as a general system, our rivers and streams are the only receptacles into which it can be discharged with reasonable security. The great dilution which it undergoes in the former, the rapidity with which it is carried away, and the natural purifying influences to which it is exposed are sanitary requirements of the first order economically provided by our great trunk drains. It cannot be said that the pollution of rivers with common sewage is productive of any considerable amount of sickness or mortality in our live stock, and perhaps for the reasons we have given in regard to dilution and natural purification which it undergoes. The same cannot, however, be said of it in small tributaries and drains where it is permitted to stagnate, and to impregnate the water with products of putrescence.

The mines which have proved most injurious to live stock are those of lead, tin, copper, and arsenic. The polluting matter from these sources mostly exists in the form of small

suspended particles carried into the streams by effluent water used in washing the ores. It is only in exceptional cases that any of these substances are found to exist in dangerous proportions in a dissolved state. In times of flood the suspended matter, as we have already pointed out, is left on the grass as what is termed "scum." Injury arising from herbage contaminated with it is believed to have been much greater than that which has arisen from drinking polluted water, but in a large number of cases the poison has been derived both from the herbage and the water direct.

The Rivers Pollution Commission established the fact that, of all forms of industry, lead mining is the one which has most seriously affected animal health. In Cornwall and Wales, where it is most extensively carried on, not only were fish poisoned in the polluted streams, but many cases of disease and death in cattle and horses, as well as in poultry, were adduced by farmers whose stock were pastured on the river banks. Lead mines yield lead mostly as galena (sulphide of lead), mingled with large quantities of various kinds of rock. The operation of extracting the ore consists of crushing and washing it, when the rocky matters with more or less finely powdered ore are carried away into the rivers, leaving behind the greater part of the heavier sulphide. In the form of galena lead is not so destructive as when it exists as carbonate of lead. Small quantities of the latter are sometimes met with in mines, and as it cannot be profitably separated, it is allowed to escape with the washings, and is no doubt responsible for much of the injury resulting to stock from lead pollution of mining rivers. Disease resulting from the ingestion of this poison usually assumes a chronic form, and the symptoms it induces are very characteristic. Loss of condition and an unthrifty appearance are the first indications of ill health; then follow stiffness of the limbs, with a desire to lie down, and a dull, lowering expression. The bowels are constipated and the fæces black. Soon the joints or the sinews, or both, become swollen and painful, and lameness in one, two, or all the limbs appears, and the body becomes tucked up and the back arched and rigid. Paralysis more or less complete, colic, and—in acute cases—frenzy are sometimes present. In protracted cases the bones of the head and extremities are enlarged and soft. Pregnant animals abort, and cows and mares repeatedly miss service as the result of lead sickness.

Although disease from the other substances named is much less common than that arising from lead, all it need hardly be said are capable of impairing health and of causing fatal sickness. The danger arising in these as in other instances of

river pollution depends very much upon the size of the stream and the volume and velocity of the current in relation to the quantity of polluting matter it receives. Not only so, but owing to the irregularity in the discharge of refuse from mines the degree of pollution existing at different times will be found to vary; so that a stream whose water may be harmless to-day may, when mine water is being thrown out in large volumes, become dangerous to-morrow, and the danger will be materially increased if, as in dry seasons, the river water is low.

It is fortunately the case that cattle and horses, as a rule, refuse to drink from these discoloured and offensive streams, but in times of scarcity of water, and of neglect to provide a more wholesome supply, they are driven by an overpowering thirst to do so and to suffer.

Mr. Thomas Olver, veterinary surgeon of Truro, who has a large experience of the effects of polluted water on stock, says:—"Many of the streams of water in the mining districts of Cornwall are polluted with refuse from mines, principally with tin and more or less arsenic and other minerals. I have frequently seen cattle which, in my opinion, have suffered from drinking it. They lose flesh, get hide-bound, with peculiar dry, staring coat. They go off their food, which generally ends in diarrhœa and frequently death."

The refuse and waste products from mills, works, and manufactories which are discharged into our streams comprise a large and miscellaneous assortment of organic and inorganic compounds. Of the former, the waste from alcohol distilleries, many of which are to be found in the basin of the Tweed, possesses large and dangerous polluting properties, not so much in itself as in the products of putrefaction to which it gives rise. The polluting nature of the matter discharged from these places is best shown by reference to the following analysis, in which distillery waste is compared with London sewage:—

DISTILLERY DRAINAGE AND LONDON SEWAGE.[1]

Results of analysis expressed in parts per 100,000.

—	Dissolved Matters					Suspended Matters		
	Total solid matters	Organic Carbon	Organic Nitrogen	Ammonia	Nitrogen as Nitrates and Nitrites	Total combined nitrogen	Mineral	Organic
Distillery Waste	1300·6	381·173	108·503	2·550	—	110·603	5·10	114·00
Average London Sewage	64·5	4·386	2 484	5·557	—	7·06	24·2	20·5

[1] *Report of Rivers Pollution Commission.*

Discharged into a slowly running stream during a hot summer, when the volume of water is much reduced, this large amount of putrescible organic matter would occasion serious befoulment, and prove a cause of sickness in animals habitually consuming it.

In the process of sugar-refining rivers are dangerously contaminated with the washings of bags used in the filtration of sugar. The drainage which escapes from these works is said to be 100 times more potent than its own weight of sewage in rendering running water foul and useless. A single refinery, it has been affirmed, "must utterly ruin any stream of moderate dimensions into which its filter washings are allowed to flow in an unpurified condition." The befouling effect of this matter is strikingly evidenced by the vast quantity of "stinking, stringy, fungoid growth" which covers the beds of the streams into which it is discharged.

Linen and jute works also contribute to befoul in a dangerous degree some rivers of the North. The waste liquor resulting from the boiling processes resorted to in the preparation of flax contains a considerable amount of putrescible organic matter.

Starch factories also give rise to dangerous organic pollution of the streams beside which they are situated. The refuse discharged from them is said by competent authorities to have a polluting power ten times as great as ordinary town sewage.

The outpourings from clothworks, tanneries, paper factories, and other mills and works where organic matter is dealt with, add considerably to the deterioration of our streams as sources of water for the live stock of the farm.

While we write we are consulted in reference to sickness and mortality in a stud of horses in Herts. In this case it had been found necessary to hold the water up in the river Colne above a drinking place, in order to allow of drains being put under its bed. Two breweries and a fellmonger threw their refuse into the stream above, where it had for some time been allowed to stagnate, and on being let off, not only were "cartloads" of fish destroyed, but several horses suffered severe diarrhœa, and one died.

Pollution of Drains.

The possibility of injurious contamination becomes much greater in small streams and stagnant ditches than in the waters of free-moving rivers, and especially in such as pass through, or in proximity with, towns or villages. In the latter it is frequently the case that they receive the excreta, refuse, and

slops from many or all the dwellings, and all the drains from the streets and roadsides pour their contents into them, until they become practically sewers of the worst and filthiest description. Moreover, refuse from the premises of the carcass butcher and the knackerman, one or both of which are to be found in every parish, also adds considerably to the dangers of simple and specific organic pollution. From these two sources there is periodically discharged blood, excrement, and offal laden with the most deadly of both human and animal contagia—anthrax, swine plague, and tuberculosis—besides the ordinary organic filth incidental to such establishments. It is needless to say that the refuse from a single case of anthrax may, if local circumstances co-operate, exert a terribly infective power on considerable volumes of water, and prove a centre of widespread destruction.

Little or no attention has hitherto been given to these rural plague-spots, from which infection is openly scattered, not only by water, but also by manure, and by the distribution of infected flesh to kennels, and to wholesale horse-meat establishments in our large commercial centres. Examples of the danger of these places are repeatedly brought under our notice. So recently as March last twelve bags of anthrax flesh were despatched from a small Midland town to London. This had been previously conveyed over the highways in the neighbourhood from which it was sent, and could hardly fail to leave in its track the virus of the disease.

The capability of anthrax organisms to live in our watercourses, and still retain their virulence, has been established as a scientific certainty by Deatroptoff.[1] This observer succeeded in demonstrating the existence of anthrax bacilli in the mud taken from the bottom of a well near Odessa. It appears that an epizootic of anthrax broke out on land where numerous flocks of sheep were pastured; several of the dead sheep were buried, and the others removed to another pen some kilometres distant, having a special watering pond. The infected pen was carefully disinfected, and the walls being washed with sublimate, the earth was raised to a depth of 25 centimetres, and replaced by fresh soil. On their return to the disinfected pen the sheep, which had been perfectly well in the second pen, again began to be attacked by anthrax. A new change, with a second disinfection, was followed by a recurrence of the disease on the return of the sheep to the former pen. The proprietor at last noticed that the epizootic only recommenced when the water of this well was used—water avoided by the farm people on account of its brack-

[1] *Medical Times and Gazette.*

ish taste. When the well was filled up the epidemic ceased. The bacteriological examination of the water itself and the inoculation of mice therewith gave negative results. The author sent for some of the soil of the pen, and of the mud at the bottom of the well from which the suspected water had been taken. No anthrax bacilli were found in the soil of the pen, but from the mud of the well bacilli were obtained which killed rabbits and mice, their bodies presenting the post-mortem appearances of anthrax.

Moreover, cultures made from their blood left no doubt as to the nature of these bacilli. Not only are these organisms capable of living in the mud of our watercourses and receptacles, but they are also able to retain their vitality for weeks in farmyard manure. This latter fact has been demonstrated again and again in our own experience, and never more clearly than in the outbreak of anthrax recorded by the writer in the Society's Journal, 1874.[1] The disease in this case broke out on a farm in the occupation of Mr. Darby, of Stoke-under-Ham. It first appeared in some sheep, which led to the infection of a pasture adjoining the farmstead. A horse turned into this enclosure became sick and died, and was opened in the crew-yard, the manure of which became saturated with blood from the infected animal. This event was succeeded by several weeks of dry weather, during which no extension of the disease took place; but the next heavy rainfall had the effect of washing out the virus from the manure into an adjoining pond, with the result that eight horses, after drinking water therefrom, succumbed to anthrax. As manure heaps are frequently deposited near to drains bounding enclosures, it is not difficult to understand how infection may be conveyed from the farmstead to distant watercourses to start new centres of disease, the origin of which is seldom suspected.

It is a well-known fact that since the difficulties of disposing of sewage have brought "sewage farms" into existence, the pernicious effects of foul water have frequently been demonstrated in our courts of law. In a case in which we were engaged some time ago it was shown that, owing to the disproportion between the amount of sewage to be disposed of and the area of the farm over which it was distributed, the soil often became supersaturated. As a consequence filtration was not only incomplete, and the effluent water highly charged with organic matter, but a large amount of crude sewage drained off the surface into an adjoining watercourse, with the result that the cows on the next farm aborted, milk became unwholesome,

[1] *Report on the Health of Animals of the Farm.* Journal, 2nd Series, Vol. X, 1874, p. 559.

and farm stock pined and died. All vegetation in the course of the stream for some distance was destroyed, as were also the fish, and the bottom and sides were thickly covered with a black foul-smelling mud and a dark slimy mass of "sewage fungus." If the pernicious effects of sewage have been most strikingly emphasised in connection with ill-conditioned sewage farms, they cannot be said to have been restricted to them. Nearly every village has its watercourse, and every farm its pond, fouled with excremental and other filth, from which farm stock obtain their supply; and if in these instances the effects produced are not so deadly, they are nevertheless highly prejudicial to animal health.

In connection with the pollution of streams it is interesting to notice that water may be poisonous in one part of a stream and not in another, as when sewage contaminated water moving from the source of pollution becomes diluted by fresh influxes of water from land drains and other sources. In these cases the outbreak of disease is localised at a point immediately below the intake of the polluting matter. Although the influx of sewage or other hurtful matters may continue the same, the danger to live stock will vary very considerably from time to time. This will depend upon the volume and rapidity of the current. In wet seasons, when the former is considerable, the offensive matter is carried away by the flood, and becomes much less potent for evil than in hot dry weather when water is low, the current slow in its movement, and putrefaction is actively going on.

Further, the course of a stream influences considerably the danger arising out of pollution. Where it is winding or tortuous the current becomes slower, and the organic and other matters in suspension are allowed to subside and accumulate to a larger extent than is permitted in a more direct channel. This settling down of the polluting matter would be in some respects an advantage, were it not that animals invariably disturb the bed of the stream with their feet, and diffuse the sediment through the water each time they drink. It is this habit of entering the stream or pond, with its disturbing influence, which aggravates the dangers of pollution to live stock.

Where water has been affirmed to be the cause of disease it has frequently been urged, to the contrary, that the sickness was confined to particular periods, or particular parts of the stream, while the water had been in constant use by large numbers of animals in the whole tract of the watercourse, and had nowhere else shown hurtful properties. To such objections as these the above considerations appear to furnish a sufficient explanation.

Pollution of Ponds.

Ponds, like streams, afford immense advantages to owners of stock, and, like them also, they sometimes prove a source of serious loss.

Very few indeed realise the evil consequences resulting from these generally ill-conditioned stores of water, and when this knowledge is brought home to the farmer by bitter experience it cannot be said to exercise any far-reaching influence in the cause of sanitation. The importance of the lesson irresistibly forced upon the sufferer seldom evokes more than a passing recognition from the less interested neighbour.

These places, although indispensable, are often little better than plague-spots, and thousands of young animals in particular die every year from parasitic infection incurred by drinking from them.

It has fallen to our lot to witness many valuable studs and flocks crippled and curtailed from this cause, and, by acting upon our knowledge of parasitic life, to prevent a recurrence of the disease.

The larvæ or young of some of the most destructive parasites take up their abode in the mud and organic filth in which ill-kept ponds abound.

The blood-sucking *Strongylus contortus*, a parasite which causes immense losses in our lamb flocks, as well as other nematode worms, revel in the dirt of our ponds, in slow-running streams, and swampy places.

How they get there will be understood when it is remembered that our farm animals frequently deposit their excrement, and with it the eggs or embryos of various parasites, in and about the water from which they drink. That these organisms subsequently find their way into the bodies of other animals is in a great measure due to the fact that stock are usually permitted to walk into ponds for some distance to procure their water, and in doing so the mud and such parasites as it contains are stirred up and swallowed in the act of drinking.

The remedies against parasitic infection of pond water can never in all cases be complete, but by providing a proper slope and laying brick earth or some other such matter at their entrance, and fencing them across so as to prevent stock from going into them, some degree of security might thus be insured. Where these provisions are not obtainable, thorough cleansing at every favourable opportunity should be resorted to. This leads us to remark that mud removed from ponds should not be used for dressing pasture land immediately, but should

be thoroughly mixed with lime and allowed to stand in a heap for two or three months, when it may be used for arable land or high-land dressing, but on no account should it be applied to damp or swampy meadows. It is only recently that we were consulted as to a serious outbreak of parasitic disease among lambs, following upon the dressing of some park land with mud removed from an adjoining pond.

Ponds in proximity to farmsteads are not only a source of danger in this respect, but they are also liable to serious befoulment in other ways. Dead fowls, not infrequently affected with tuberculosis, and also dead cats, and portions of the carcasses of other animals are often put out of sight by being cast into the horse-pond, where, besides being out of sight, they soon become out of mind, and seldom receive consideration in estimating the possible causes of any prevailing disease. Trees overhanging ponds are a source of organic pollution which should as far as possible be done away with.

Pollution of Tanks and Troughs.

Where water is stored in tanks it should be guarded against pollution by a well-fitting cover. In stables and farmsteads rats and mice are seldom absent, and it is no uncommon thing to find their decomposing remains in unprotected tanks. Moreover in large towns, where glanders prevails, suspicion of spreading the disease has on several occasions fallen upon water exposed to contamination in infected stables.

It will readily be granted that no notice of water pollution in connection with farm animals would be complete without reference to water-troughs. Water-troughs in yards, especially where they are set low, frequently become charged with animal excrement, besides containing an occasional rat or chicken, or some other animal remains. It does not follow that any perceptible sickness may arise as the result of taking water from such a source so long as the putrid mass remains undisturbed, and a plentiful supply of water is kept in the tank. Serious and fatal sickness, however, results from time to time where this order is reversed, and especially if, by long fasting, young stock are tempted to drink freely of the putrid deposit.

J. Wortley Axe.

PEAT AND ITS PRODUCTS.

THE deposits of peat which exist in Great Britain and Ireland are too numerous and too extensive to permit of their being disregarded as potential sources of wealth. It has been my endeavour in the preparation of this paper to construct, at least for England and Wales, a geographical list of the chief beds of peat, together with details as to their area, depth, and general characteristics. As a matter of fact, however, the necessary data are not available. Being a surface deposit, peat found no recognised place in the maps of the "solid geology" of the country when these were prepared by the Geological Survey. This omission will, no doubt, be to some extent made good in the drift maps which are now in course of construction, but it is impossible to say when this series of charts—so important from an agricultural point of view—will be completed. Where both the "solid" map and the drift map are available for a given locality, they will serve to throw considerable light upon the abundance or otherwise of peat in the district.

Much has been written about peat, and in the course of these pages reference will be made to the bibliography of the subject. The circumstance that inquiries have recently been instituted, on behalf of the British Government, in various peat-producing countries of Europe, as to the utilisation of peat, is sufficient to show that the matter continues to be one of high practical interest. The results of the inquiries referred to will, in due course, come under notice, but some general introduction would seem to be desirable.

Peat is concisely defined by Sir Archibald Geikie, F.R.S.,[1] as follows:—

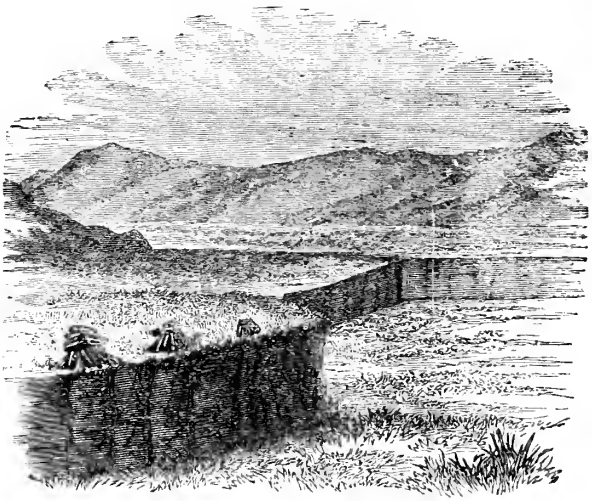
> Vegetable matter more or less decomposed and chemically altered, found throughout temperate climates in boggy places where marshy plants grow and decay. It varies from a pale yellow or brown fibrous substance, like turf or compressed hay, in which the plant-remains are abundant and conspicuous, to a compact dark-brown or black material, resembling black clay when wet, and some varieties of lignite when dried. The nature and proportions of the constituent elements of peat, after being dried at 100° C., are illustrated by the analysis of an Irish specimen, which gave—carbon, 60·48; hydrogen, 6·10; oxygen, 32·55; nitrogen, 0·88, while the ash was 3·30.
>
> There is always a large proportion of water which cannot be driven off even by drying the peat. In the manufacture of compressed peat for fuel this constituent, which of course lessens the value of the peat as compared

[1] *Text-book of Geology*, 1882, p. 170.

with an equal weight of coal, is driven off to a great extent by chopping the peat into fine pieces, and thereby exposing a large surface to evaporation. The ash varies in amount from less than 1·00 to more than 65 per cent., and consists of sand, clay, ferric oxide, sulphuric acid, and minute proportions of lime, soda, potash, and magnesia.

Professor T. Rupert Jones, F.R.S., classifies peat[1] as (1) peat bogs and turf moors on such levels as flat mountain tops and wide hill moors, (2) peat bogs of valleys.

1. Examples of this group are afforded in the Scotch Highlands, where the general "turf" of the higher surfaces passes into "peat" in the hollows.



View of Scottish peat moss opened for digging fuel.[2]

Another case is that of the Bog of Allen, occupying an area of 238,500 acres, with an average depth of 25 feet, in the hollows of the great limestone flats in the middle of Ireland, in which country "turf" (peat) is said to cover 2,830,000 acres, or nearly one-seventh of the entire area.

2. Valley peat is met with in various kinds of localities:—(1) At the heads of valleys, as illustrated by Chatmoss, on a northern affluent of the Mersey, in Lancashire; the peaty lake near Kildale, in Yorkshire; (2) at the salient angles within river-curves, and in deserted beds of rivers; (3) in plains and lakes of expanded valleys; (4) in river deltas, as the peat deposit near West Hartlepool, and the alluvial flats in Sussex; (5) maritime peat marshes, where certain valleys and plains (which are but broad valleys) open to the sea, as illustrated by the Fenlands of England, especially the

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[1] *On the Nature and Origin of Peat and Peat Bogs.* Proceedings of the Geologists' Association. Vol. VI, No. 5, January, 1880.

[2] This illustration is reproduced by permission of the publishers, Messrs. Macmillan & Co., from Sir Archibald Geikie's *Text-book of Geology*, p. 459.

"Levels"[1] in Cambridgeshire and adjoining counties; also by the low grounds of the ancient gulf of Poitou, the filled-up estuary of Flanders, the largest part of Holland, and of German and Danish Friesland.

The chief characteristics exhibited by a section of a workable peat moss are thus referred to[2] by Professor James Geikie, F.R.S.:—

The best *peats* are cast towards the bottom of a peat moss. They show a somewhat close and compact texture, so much so as occasionally to resemble coal. Above this the peat begins to lose its more compact structure, and vegetable fibres may be detected, which on a closer inspection are recognisable as those of a moss. Towards the upper portions of the section this appearance becomes still more conspicuous, and the peat seems to consist almost entirely of mossy fibres. Throughout the section long grasses may be seen, sparingly in the lower portions, and becoming more abundant as we near the top, where twigs of heather begin to mingle with them. The upper surface or crust of the peat moss (a foot more or less in thickness) seems to be made up chiefly of heather and grasses, and such plants as *Polytrichum*. When peat moss wants this crust, it generally shows a treacherous surface covered with moss, into which the unwary pedestrian may sink deeper than he might have expected. Small areas of this nature are not uncommon, but they may be considered as exceptional cases. Most peat mosses are provided with a crust of heath and grass. This *crust* is termed "heather," and sometimes "hill peat," from its common occurrence on the slopes and summits of hills, where it does not necessarily overlie true moss peat. It seldom exceeds a foot or two in thickness, and ought properly to be considered as *turf* rather than *peat*.

Referring to the present aspect of the peat mosses, the same observer states that the formation has not only ceased in most cases, but is gradually disappearing. The moisture which in former times afforded it nourishment and support is now its chief enemy. Every shower of rain, every frost, gives fresh impetus to the decay; and, leaving altogether out of account the operations of agriculture, there can be no doubt that natural causes alone would, in time, suffice to strip the last vestige of black peat from hill and valley.

The surface of peat which has ceased to grow is usually covered with short scrubby heath and rusty grasses, but often so sparsely that every here and there the black peaty mould peers through. In many cases, indeed, the decomposing peat lies exposed and bare, with not a tuft of heather or blade of grass to be seen. Peat mosses of this description are not con-

[1] 1, "North Level"; 2, "Middle Level"; 3, "South Level"; and 4, "Bedford Level." The sluice at St. Germains, draining the "Middle Level," broke in 1862, and inundated upwards of 1,000 acres of the "Marshland" between that and the sea. The "Marshland" was enclosed before the "Middle Level," which was drained about 60 years ago.

[2] *On the Buried Forests and Peat Mosses of Scotland, and the Changes of Climate which they indicate.* By James Geikie. Transactions of the Royal Society of Edinburgh. Vol. XXIV. 1867.

fined to any particular locality or situation ; they occur generally throughout the country, and may be found on hilltops, on hillsides, and in valleys.

Taking a general view of our peat mosses, Professor James Geikie remarks :—

As we proceed from north to south, we find that the peat has not only suffered a longer amount of denudation, but its substance has been pulverised or "consumed" in a greater degree. Thus, the peat of England, especially in the southern districts, is more consumed or decomposed than that of the Scottish mosses. In other words, a longer time has elapsed since the English peat ceased to grow, so that having been exposed during this period to the power of the atmosphere, it exhibits stronger marks of waste than the peat of Scotland. The French peat is said to be still more consumed than that of England ; and, indeed, it may be remarked generally of the peat of southern latitudes, that it has crumbled away to a much greater extent than that of more northern countries.

An instructive chapter on peat is included in Mr. Skertchly's well-known memoir[1] on the Fenland. With reference to local terms this author says :—

It may be mentioned that the word *peat* is quite unknown among the agricultural population of the fens. The substance is called *turf*, and where thin, or so weathered as to be unfit for fuel, the term *moor* is applied. It is usual to speak of "moory land," "black land," or "fen" where the soil is peaty. The word "fen" has, however, come to be used merely in contradistinction to "highland," but it is an unsafe term to use in speaking to the labourers, for though among themselves they talk of "down the fen," it seems to be tacitly understood that to outsiders or inquirers "there are no fens now."

The shrinkage of the peat is dwelt upon in the same chapter, from which the following remarks are taken :—

The decay of the peat is largely facilitated by the abstraction of water by drainage. The peat beds are like so many huge sponges which, when relieved of the water they contain, shrink into much smaller bulk.

Over the Lincolnshire fens it is a matter of common observation that the clay, which thirty years ago was covered with from six to eight feet of peat, is now reached in dykes at depths of from three to five feet, and has hence become available for "claying." The opinion of the farmers is that "the clay grows," by which they understand (?) that in some mysterious manner the peat becomes converted into "buttery clay." The simple explanation is that the operations of husbandry and drainage cause a diminution of volume, which becomes very appreciable in the course of a generation.

Around Croyland old ague-stricken feumen can still be found whose lustreless, opium-bleared eyes light up as they tell you of the glorious times of seventy years ago, when they could run a pole ten feet into the moor without touching clay.

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[1] *Geology of the Fenland.* By Sydney B. J. Skertchly, F.G.S. Memoirs of the Geological Survey of England and Wales. 1877.

See also *The Fenland, Past and Present.* By S. H. Miller and S. B. J. Skertchly. 1878.

Whilst my thanks are due to my friend Mr. Topley, F.R.S., of the Geological Survey, for his kindness in placing the drift maps of England and Wales at my disposal, the fact that these maps are still incomplete deterred me from attempting what would have been at best only a partial account of the geographical distribution of our peat bogs. Resort has therefore been made to Mr. Woodward's familiar volume,[1] from which most of the following localities are derived:—

At Glazebrook Moss, Lancashire, a deposit of peaty beds about eighteen feet in thickness, resting on boulder clay. The drainage of this area caused the Moss to sink about eight feet.

Peat beds occur also at Halsall, Sefton, Pilling, and Chat Mosses, in South-West Lancashire.[2]

In Cheshire there are peat beds in Blake Mere and other mere basins in the Drift Sand, and there is the inferior or lower peat and forest bed on the coast near Hoylake. The Danes' Moss is a large peat bog near Macclesfield.

In Derbyshire peat occurs at Kinder Scout and other localities in the Peak district.

Peat deposits, with tree stumps *in situ*, are seen on both sides of the river Tees, at Redcar, Kildale, and West Hartlepool, and these in places become submerged forests. On the high grounds of Yorkshire there is much peat, twenty feet thick on Egton High Moor and other moors in East Yorkshire. It occurs also in Wensleydale, and near Ingleborough in West Yorkshire.[3]

Peat bogs or curraghs occur in some parts of the Isle of Man.

Sections of peat, alternating with estuarine clay, were cut through at the Swansea Docks. Turf pits have been worked at Newcastle-in-Emlyn, Caermarthen, and peat beds occur in many other parts of Wales.

Peat is very largely dug in the moorlands of Somerset, near Edington and Shapwick, between Glastonbury and Highbridge. Some of these beds have been worked for fuel from the time of the Romans, and probably earlier. The peat moors or "turbary lands" have an irregular distribution; and the peat, which in places is fourteen or fifteen feet thick, is due largely to the growth of the common sedge (*Carex*), whence Sedgemoor derives its name. Mr. Alfred Gillett states that the following plants have aided in the formation of the peat in this district:—Cotton grass (*Eriophorum*), Club rush (*Scirpus lacustris*), Willow herb (*Epilobium angustifolium*), Sedge (*Carex*), Bog moss (*Sphagnum palustre*), Heath (*Erica*), Bog myrtle (*Myrica gale*), Grass wrack (*Zostera marina*), and, amongst the ferns, *Osmunda regalis*, *Lastrea thelypteris*, and *Pteris aquilina*. At Shapwick, where the pits are opened to a depth of about five feet, the peat is light on top, and darker, denser, and better below. Beneath this there are about three feet of soft peaty earth, with stools of trees, and below is a pale grey buttery clay. Peat has also been observed on Blackdown (Mendip Hills), and near East Harptree. Evidences of a submerged forest exist at Stolford, near the mouth of the Parret, and this may be connected with the peat beds of the Somerset Levels.

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[1] *The Geology of England and Wales.* By Horace B. Woodward, F.G.S. Second edition. 1887.

[2] De Rance, *Superficial Geology of South-West Lancashire*, p. 69.

[3] Phillips, *Rivers, &c., of Yorkshire*, p. 38.

In Devonshire, the Torbay submerged forest comprises peat beds that have yielded Roman remains, and that rest on clay or estuarine mud. On Dartmoor, near Tavistock, &c., there is peat in places thirty feet thick, and a peat naphtha company was established at Princetown.[1]

At Poole Harbour (Dorset) a submarine forest has been observed, and peat has been dug at Knighton Bottom, near Bournemouth.

Peat occurs in the Forest of Wolmer and in the New Forest (Hants), and in the Lewes and Arundel Levels (Sussex). Near Newbury (Berks) the peat, ten feet thick in places, has been dug for fuel, &c.

There is a submerged peat bed at Bawdsley, Suffolk, and peat beds occur in the alluvium of the Orwell Valley.

In Cambridgeshire, peat has been dug near Chatteris, at Coveney and Burwell Fen; and in Lincolnshire, at Billinghay, between Sleaford and Tattershall.

In Holderness, Yorkshire, peaty beds occupy small lacustrine areas which were formerly meres.

These preliminary observations would not be complete without some reference to the far-reaching effects of the drainage of peat-covered areas:—

Whatever may be the results of under-draining cultivated land, there is no doubt of the effect of trenching the upland pastures, moors, and peat-bogs, amongst which most of the northern rivers take their rise. Peat acts like a sponge in absorbing the rainfall; the surface of some bogs often rises very considerably when distended by water, and at times, when overstrained, the surface bursts and considerable damage ensues. But this is only the case with what are termed "flows" or shaking bogs, which generally occur at low levels; and it rarely happens with the peat bogs of hill districts.

These high peat bogs are reservoirs of water, which they collect in winter and yield gradually in summer. They generally lie at too high a level to be cultivated for grass or corn, but they are capable of some improvement as rough upland pasture. This improvement is often secured by deeply trenching the bogs in various directions; the water then drains off, the soil becomes drier and affords feed for sheep. This process is largely going on, and, if continued, will, in the course of only a few years, make its results seriously felt on the summer and autumn flow of the rivers in the north-east of England. Such results will be less felt, indeed may be comparatively unimportant, in most rivers on the western side of the great central watershed of England; for there the rainfall is much greater, and the periods of drought are shorter. But on the eastern side of the watershed it is simply equivalent to destroying a large number of "compensation reservoirs," which at present serve to diminish the winter floods and to augment the summer flow. The additional value conferred on the uninhabited upland moors is but small; the loss to the populous cultivated lowlands is immense.[2]

In July 1892 a circular was sent from the Foreign Office, by the Marquis of Salisbury, to Her Majesty's representatives at The Hague, St. Petersburg, Stockholm, Copenhagen, Berlin, and Paris, requesting such information as might be procurable

[1] R. N. Worth, *Transactions of the Devon Association*. VII., 229.

[2] *Water Supply and Public Health*. By W. Topley. Pop. Sci. Rev., vol. xv. Jan. 1876, p. 33. See also remarks by the same author in *Proc. Inst. Civ. Eng.*, vol. xlv. 1876, p. 89.

with regard to the manufacture of fuel, moss litter, and other products of peat. In due course reports were received from Denmark, France, Germany, the Netherlands, Russia, Sweden and Norway. These [1] were presented to both Houses of Parliament in March 1893, and from them the information now to be submitted is chiefly derived.

GERMANY.—The area covered by peat bogs ("Torfmoore") in Germany is very extensive, especially in the northern provinces of Prussia and the Grand Duchy of Oldenburg, but no statistics of any sort are available as to the actual acreage and production. Almost all these moors are worked locally for fuel peat, and the manufacture of moss litter is also very widely spread. The peat bogs belonging to State domains in Prussia, of which a large number exist, are generally worked by the Government Forest Department; many of them, however, are let for a term of years to private individuals, the lease being usually made out for thirty years or more, and the tenant having the right, and in some cases assuming the obligation, of removing all the peat during that time, thus preparing the land for agricultural development.

The principal products obtained from peat in Germany are:—(1) Fuel, including turf coal and turf coke. (2) Moss litter. (3) Peat dust ("Torfmull"), for disinfecting purposes, &c. (4) Coarse textile fabrics, paper, and various chemical products.

Peat Fuel.—The use of peat as fuel is universal in the neighbourhood of the moors, but is generally local. It cannot compete with coal for cheapness in any districts near the seaports, or near towns which have railway communication. Peat for fuel cannot pay railway freight for more than 20 miles from the place where it is cut, and very little is ever conveyed by rail. The rate charged is about 9*s.* per load of 9,600 sods of peat for 10 miles.

There are no available statistics, either in Prussia or the other peat-producing German States, as to the amount consumed, but considering the wide distribution of peat bogs throughout the country, it is probably very great. It is estimated, for instance, that in the Grand Duchy of Oldenburg alone about 150,000 tons of peat are burnt per annum, chiefly for household purposes, but also in baking-ovens, brick-kilns, &c.

The method of obtaining peat for fuel at Carolinenhorst,

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[1] *Reports from Her Majesty's Representatives on the Manufacture of Fuel, Moss Litter, and other Products of Peat in European Countries.* [C.—6913.]

near Stettin, may be taken as a fair example of the system generally employed. It is described as follows :—

The turf is cut by gangs of four men; one man cutting from the top with a sharp-cutting spade, square-ended. The second cuts from the side, following the first man, and at the same time dividing the turf into lengths as he goes on. This is usually done with a round-ended spade, in the shape of a turf-cutter or whale-spade, but sometimes, though rarely, a three-sided square-ended spade is used, somewhat in the shape of a brick mould without the fourth side. The third man follows the second, and takes the sods out with a four-pronged fork the handle of which is bent upwards to an angle of 45°, and lays them in rows on the moor behind the cutting.

The peat is cut to a depth of 3 to 5 yards. The whole of this stratum is good, with the exception of 2 or 3 inches of the upper soil, which is thrown into the cuttings already made, and forms useful agricultural soil when the moor has been exhausted of peat. The cost of production does not appear to be sensibly reduced by machine-cutting.

The best peat for burning is generally that which lies undermost, the upper layer, to a depth of 4 ft. 6 in., being used (where it is of suitable quality) for moss litter, and all beneath that depth for burning.

At Carolinenhorst the peat is always dried in the open air, all other methods having proved too expensive. An attempt was made at Gifhorn, in the province of Hanover, to dry the peat artificially in an apparatus invented by Herr Rottbarth, but, as the system was abandoned after a very short trial, it appears not to have been a success.

The peat dries best in the spring and early summer, and when once dry it is not much injured by rain, which runs off. The drying occupies on an average four months, but much of course depends upon the weather. The cutting is commenced at the end of March and continues until the middle of May—six to eight weeks. The drying lasts from the middle of May to the beginning of August—ten to twelve weeks.

The stacking is carried out in the following manner :—

One cubic metre (= about 1·4 cubic yards) of turf yields 400 sods of peat, which, as they are cut, are laid in rows as before described. Then the women employed for stacking take the wet sods from the rows and stack them in pyramids 6 feet long by 3 feet broad and 6 feet high, each pyramid representing 3 cubic metres of peat, or 1,200 sods. The sods in these stacks are not laid close together, but with a space between each of the first layer, which space is covered by the succeeding layer, and so on.

The peat when dry is sold in these stacks or pyramids from the beginning of August to the middle of September, according to the weather. The pyramids are called "Klafter," and are classed for sale in the following manner :—

The first class is the dark peat, approaching to coal, which is usually cut from the lowest stratum, and is heaviest. It shrinks most in the process of drying, a fresh sod when cut measuring 13 inches in length by 10 inches high and broad. This class of peat burns slowly, and when fifteen sods are burned in a closed stove, they will leave about a large wineglass full of white ash.

The second class is lighter in colour and weight, and is a more recent formation.

The third class is the top stratum, and is of least value, except in those cases where it is suitable for the manufacture of moss litter. These lower classes of peat leave more ash in burning. In some places, these differences in the quality of peat taken from the top or the bottom of the stratum do not occur, the moss being uniform throughout.

The peat is sold by auction at Carolinenhorst, and fetches, as a rule, 1st class 14*s*., 2nd class 10*s*., and 3rd class 8*s*. per "Klafter" of 1,200 sods.

The moor at Carolinenhorst employs about 500 men and women for cutting and stacking peat, chiefly for fuel. The average amount earned by a man at this work is from 4*s*. to 4*s*. 6*d*. per day, the payment being according to the quantity cut. The women are paid about 3½*d*. for every cubic metre stacked.

Moss Litter.—It is probable that in districts where peat was used as fuel the refuse of the turf was employed long ago as litter, and for manuring purposes. This presumption is sustained by writings which were published in Germany at the beginning of this century upon the uses of peat.

The most primitive method of obtaining moss litter, practised on the higher moors of North-Western Germany for many years, consists in ploughing up and harrowing the soil immediately underlying a surface covered with moss turf, after burning off the heather. This is begun in the late autumn; in the spring the surface is again harrowed, and, when thoroughly dry, is thrown into heaps, the process being repeated as often as the weather will admit of each addition to the heap becoming thoroughly dry. This method is simple and inexpensive, but the product is not of sufficiently good quality, and contains too great an admixture of earth and dust to be marketable. It can only be used on the spot.

These disadvantages were removed by a process invented by M. Hollmann, of Zappenburg, near Gifhorn, in the year 1878, which process (described on p. 761) proved so successful that he established a moss-litter manufactory at Gifhorn in 1879–80, and others in Oldenburg, Hanover, and Holland a year or two later. The deficiency of straw in the harvest of 1881 gave a great impetus to the manufacture of moss litter, and as M. Hollmann had not been able to obtain a patent for his process, a number

of enterprises for developing the new trade were started, mostly in Hanover, and some even in England.

According to an Official Report of the Hanoverian and Oldenburg Railway Administration, about 21,878 tons of moss litter were sent from stations on that railway during the year 1882. A large portion, if not the greater part, of this production, was exported to England and America, where the advantages of moss litter for city stabling were appreciated much sooner than was the case in Germany.

Over-production, however, soon set in, and this, together with good straw harvests, and a prejudice against moss litter, induced by the inferior quality of the product supplied by some of the new manufactories, produced a reaction from which the trade hardly appears to have recovered even at the present day. With regard to the Grand Duchy of Oldenburg, for instance, it is estimated that during the earlier part of the last decade the quantity of moss litter manufactured reached 15,000 to 20,000 tons per annum, but the output has been decreasing year by year, and now barely attains 5,000 tons, of which about one-quarter is said to be exported to the United Kingdom.

The subjoined table shows the quantity and value of moss litter exported from Germany to the United Kingdom from 1885 to 1891 :—

Year	Tons	Value	Year	Tons	Value
		£			£
1885	9,182	12,650	1889	4,678	6,100
1886	10,155	11,400	1890	Not mentioned	
1887	9,484	10,700	1891	3,076	—
1888	9,245	10,400			

A great difficulty is encountered in the wet summers which are not infrequent in the North of Germany. The loose, stringy moss turf takes some time to dry thoroughly, and, unlike black peat, absorbs on damp days a great deal of moisture, so that in some years it proved almost impossible to obtain a sufficiently dry material for the manufacture of moss litter without applying artificial heat, which, again, is much too dear. Hence, imperfectly dried moss litter was sometimes placed on the market, and damaged the reputation which the article had already attained.

The best material for the production of moss litter is formed by the upper strata of the high bogs ("Hochmoore"), which cover considerable areas in Hanover, Oldenburg, East and West Prussia, and Pomerania. The natural vegetation of these bogs consists of moss, together with various grasses and heather

(*Eriophorum* or cotton sedge, *Calluna vulgaris* or ling, *Erica tetralix* or cross-leaved heather, *Andromeda*, *Ledum*, *Empetrum* or crowberry, *Vaccinium* or whortleberry, and *Sphagnum cymbifolium* or bog moss). The decomposed remains of these plants form a dark soil overlying the yellowish-brown layers of moss peat, which often attain a thickness of several yards, and in their turn overlie the older and darker peat which is used as fuel.

It is characteristic of the strata suitable for the production of moss litter that in them the process of decomposition is incomplete, and that they form an extremely porous and elastic substance, which is capable of absorbing water like a sponge. In the process of drying this material contracts very little, and consequently remains soft and elastic.

It has been found that an ordinary peat sod which has been exposed to severe frost does not contract to the same extent in drying, and remains comparatively soft and elastic. Hence an inferior quality of litter may be produced, even from peat strata which would not otherwise be suitable, by allowing them to freeze through before drying. The resulting product cannot compete, however, with real moss litter.

The success of the moss-litter industry in North-Western Germany induced the owners of peat bogs in other parts of the country to attempt the manufacture of a similar product from strata which appeared suitable, even if not composed of moss peat. Among others the Royal Forest authorities at Schussenried, in the kingdom of Wurtemberg, found in the extensive bog near that place a layer of only partially decomposed remains of a reed bed, underlying black peat. This was manufactured into litter by Hollmann's process, and although the product did not quite possess the softness and elasticity of moss litter, yet it was undoubtedly superior to many materials which are commonly used in stables.

The outlines of Hollmann's system of manufacturing moss litter are briefly as follow :—

The moss peat is cut out of the bog in sods, in precisely the same manner as fuel peat. The autumn and early winter are chosen for this work, so as to allow the moss peat to freeze before drying (for the reason above stated). It is dried in stacks in the open air. At Carolinenhorst about 6½ acres, 58 inches deep, are cut each season, and yield about 3,000 tons of moss litter.

The sods, when dry, are taken to the factory, placed in elevators, and carried to a machine called the "Wolf," which tears them into small fragments. The mass thus produced is passed over sieves, to separate the peat dust ("mull") from the fibrous substance which forms the litter. It is then brought into a press which (at Carolinenhorst) is 10 feet high by 2½ feet

square. The pressure employed is about 4 horse-power, and 6 cubic feet of the loose material are pressed into a space of 2 cubic feet, being then baled with six to ten laths of wood and bound round with iron wire. It is now ready for the market, and is valued at 1*s.* per cwt. at the railway station.

The moss-litter factory on the Carolinenhorst moor employs fourteen to sixteen hands, of which one-third are women, the working day being ten hours. An adult workman is paid about $2\frac{1}{2}d.$ per hour, a young man $2d.$, and a woman $1\frac{1}{2}d.$

One of the most important points to be observed in working a moor for moss litter is that *it should be drained*, as well as circumstances will permit, before the cutting is commenced. If this is not done properly the amount of labour required is very considerably increased, as with every sod of peat a quantity of water exceeding its own weight is raised to the surface. The drains cannot, in wet bogs, be cut down to their full projected depth at once, but must be deepened at intervals of time as the superior strata become drier and harder. If this precaution be not observed, the banks of the drains are liable to give way, and rifts and flaws are formed in the peat which render the subsequent working much more difficult.

The method of cutting moss peat is exactly the same as that already described for peat fuel. As, however, the moss peat is more difficult to dry, having a greater power of absorbing moisture, it is not stacked at the edge of the cutting, but is carted to a suitable drying-ground. For this a well-drained and naturally dry spot is chosen, so that the peat may not absorb moisture from the ground. The construction of absolutely dry stacking grounds, with wooden floors or planking, has been found much too expensive; and attempts to dry the sods artificially, or at least in covered sheds, have also failed for the same reason.

Hot-air chambers or ovens for drying moss peat have been tried by Herr Rottbarth at Gifhorn, by the Britannia Moss Litter Company at Doncaster, and by Herr Coyet at Römeholm, in Sweden; but in all three cases the attempt has been abandoned.

The first machine for tearing up the sods of moss peat ("Reisswolf") was constructed by M. Hollmann, and consisted of a plain wooden cylinder set with nails, and revolving at the bottom of a feeding box shaped like an inverted pyramid.

An improved apparatus of this kind is manufactured by the firm of J. Haye & Etzhorn, in Oldenburg, and consists of a cylindrical drum about 18 inches in diameter, and 2 feet to 2 feet 6 inches in length, set with sharp and pointed pins, which pass close to an iron rail fixed on one side of the box as the drum revolves. This machine is constructed so as to manipu-

late up to 30 tons of moss peat per day. The smallest machine made will work 150 cwt. in a day, requiring one horse-power to drive and two men to serve it. The price of the latter machine is about 8*l.*

Further improvements in machines of this kind have been made; some of them combining with the "Wolf" a sieve for separating the dust from the fibre. The sieves generally used for this purpose are made of wire netting with meshes of from $\frac{1}{8}$ to $\frac{1}{4}$ of an inch. They are either stretched on a frame which is shaken by a horizontal motion, or are made in a cylindrical form, and revolve as the moss peat is pushed through them. The latter system requires less expenditure of force, but does not separate the peat dust so effectually.

The pressing of moss litter into the smallest possible compass and the most convenient shape is an important condition of its transportation to distant markets. In Oldenburg and Hanover simple lever presses are used, but these have been made so powerful that an ordinary large railway truck (as used on the Prussian lines) will now take 10 tons of pressed litter. This, however, can only be attained by the use of steam-power.

The vertical presses made by the firm of R. Dolberg, in Rostock, will produce with hand labour about forty bales of 3 cwt. each per day, or with steam-power sixty to ninety bales of 3 cwt. each. The price of the hand-press is 25*l.*, and of the steam-press 70*l.*

It is claimed for moss litter:—

1. That it affords drier and healthier bedding for horses and cattle than any other material.
2. That in consequence of its great power of absorbing moisture it binds the valuable portion of the animal excrements, and, consequently, yields the best manure.
3. That it acts as a disinfectant, and improves the air of the stable.
4. That a smaller quantity of it is required than would be needed if straw were used.

The published results of experiments and longer experience in the use of moss litter are not entirely consistent. In general, however, they are favourable, especially where horses and horned cattle are concerned; and cases of sickness consequent upon its use can be traced, as a rule, either to negligence or to the employment of damp litter.

The following is an extract from a Report, dated Hanover, April 1883, on the use of moss litter in the stables of the Prussian Regiment of Uhlans (Lancers) No. 14, which seems decidedly favourable:—

The regiment has used moss litter as a substitute for straw with the object of obtaining better and drier beds for the horses, and reserving the

fresh straw for food. This object was attained with complete success. For experimental reasons the horses were not all placed on moss litter at once.

In October one-third were placed on moss litter, in November two-thirds were placed on moss litter, and in December nearly all were placed on moss litter.

The following advantages were observed:—Dry beds, and dry fresh air free from ammonia. The ceilings, walls, and leather trappings remained free from moisture and mould. Moss litter absorbs eight times its own weight of urine, whereas straw absorbs only three times its own weight. The short and broken nature of the moss fibre allows of the easy removal of the wet portions. Care must be taken not to neglect to turn and shake up the litter every day, and to fork it from one part of the stall to another.

If these precautions are observed the animals find a dry bed, the horses remain clean, and their skin maintains its activity. If properly treated, moss litter is far more elastic than straw, and affords more comfortable bedding. The harness and saddles, as well as the boots of our soldiers, are better preserved.

From a veterinary point of view, further advantages are observed. Catarrhs of the nose and eyes, generally the result of bad air in the stables, are less frequent; wounds on the legs heal more quickly; inflammation of the glands very seldom occurs, and rotting of the frog is almost entirely prevented. In cases of contagious disease moss litter is of great value, and surpasses all other disinfectants.

Cases of colic occurred as follow:—

October 1881 . . .	$\frac{1}{3}$ of horses on moss	1	$\frac{2}{3}$ on straw . .	14
November 1881 . .	$\frac{2}{3}$ „ „	0	$\frac{1}{3}$ „ . .	21
December 1881 . .	Nearly all „	1	A few on straw .	1
January and February 1882 . . .	All „	0		
	On moss .	2	On straw .	36

The consumption of moss litter per month and per squadron of 135 horses amounted to 180 cwt., against 280 cwt. of straw formerly required.

Up to this date, in all a period of eighteen months, the regiment had used moss litter to its perfect satisfaction.

Herr Vibrans, of Wendhausen, has published in several periodicals his experience of *moss litter as a preventive of foot and mouth disease*. For this purpose he uses moss litter and "mull" mixed with superphosphate, and has obtained the most satisfactory results. He reports that the disease did not appear at all among his cattle, while on all the neighbouring farms it spread to an alarming extent. He therefore recommends its use in railway cattle trucks.

Peat Dust, or "Mull."—The smaller particles, which are separated from moss peat when it passes through the "Wolf" and the sieves used in the manufacture of moss litter, are collected and reduced to a powder known as "Torfmull." This product has obtained a market for various purposes, and sells at about 1*s.* 3*d.* per cwt. No statistics of any kind are available,

however, as to the amount which is produced and brought to market, nor is any mention made of it in the Government statistics of foreign trade.

Peat dust, or "mull," has an extraordinary power of deodorising foul-smelling substances, and this, combined with its great capacity for absorbing liquids, suggested its use as a disinfectant. The application of peat refuse for disinfecting purposes was strongly recommended by Dr. Scharlau, of Stettin, as early as 1850, and a similar practice was known in Norway more than thirty years ago, being even made compulsory in the town of Christiania. Experiments made in the hospitals at Kiel with peat dust for antiseptic[1] bandages produced good results. These bandages were applied in a large number of cases of slight wounds, cuts, and sores. Mull was also used in more serious operations with complete success.

It is held that, although peat dust does not actually destroy pathogenic (*i.e.* disease-producing) germs, it has the property of retarding the multiplication of lower organisms, and this has led to its extensive use in many German towns for earth closets, public latrines, slaughter-houses, &c.

In sugar factories peat mull has been found of great use for the purpose of absorbing the lye resulting from the treatment of the molasses with strontia. It is forbidden to drain this liquid into the rivers, and it consequently presented a difficulty until mull was employed, when it was found that 25 parts of mull would absorb 100 parts of lye, and yield a valuable and easily portable manure.

Mull is further employed in association with salts used in powder as chemical manure, for the purpose of preventing their hardening into lumps. An addition of $2\frac{1}{2}$ per cent. of mull to the salt is found sufficient for this purpose. In the salt works ("Kalisalzwerke") at Stassfurth, 4 lb. of mull are mixed with each sack of 2 cwt. of the salt.

Moss peat and mull are also used with excellent results as

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[1] From the treacherous nature of their surface, peat mosses have frequently been the receptacles for bodies of men and animals that ventured upon them. As peat *possesses great antiseptic power*, these remains are usually in a state of excellent preservation. In Ireland the remains of the extinct large Irish elk (*Megaceros Hibernicus*) have been dug up from many of the bogs. Human weapons, tools, and ornaments have been recovered abundantly from peat mosses; likewise crannoges, or pile dwellings (constructed in the original lakes that preceded the mosses), and canoes hollowed out of single trees.—*Text-book of Geology*. By Sir Archibald Geikie, LL.D., F.R.S., p. 460.

Wild animals venturing on the more treacherous watery parts of peat bogs are sometimes engulfed or "laired." The *antiseptic qualities of the peat* preserve their remains from decay. Hence from European peat mosses numerous remains of deer and oxen have been exhumed. *Ibid.* p. 605.

packing materials for breakable objects; for packing and preserving perishable goods, such as fruit, vegetables, butter, eggs, &c. Fresh fish has been sent in summer from Trieste to Copenhagen packed in mull, and arrived in good condition. In addition, moss peat and mull are utilised as non-conductors of heat in ice cellars, and between the floors and ceilings of houses, &c.

Other Peat Products.—Apart from the use of peat as fuel and in the shape of moss litter, its employment as a raw material in other branches of industrial enterprise is only in its infancy. Amongst the attempts which are being made in this direction, the following may be mentioned :—

A substance consisting of a mixture of peat dust, india-rubber, and sulphur is found to be an excellent material for insulating subterranean electric cables.

Good porous bricks are manufactured at small expense by mixing the clay with peat dust. This plan has been tried, and is recommended, by a civil engineer in Copenhagen.

Pure moss-peat mull, free from admixtures of grass peat or particles of sand, has been used for some time in the manufacture of gunpowder to replace charcoal. The powder made in this manner is almost smokeless, but has the disadvantage of easily becoming damp.

Companies formed in the North of Germany (especially in Oldenburg) and in Sweden are beginning to use the elastic fibres of moss peat, carefully freed from dust, as a material for carpets and other coarse textile fabrics. A considerable amount of capital is said to have been invested in these enterprises.

Peat fibre is also used as raw material in some paper-mills and manufactories of celluloid.

The chemical industries are likewise attempting to make use of this promising material, and gas for lighting purposes, tar, paraffin, solar oil, photogen, &c., have been manufactured from it.

An Austrian industrial paper recently mentioned that matches had been made of peat fibre instead of wood, by Herr Rosenkötter, of Gröningen. These peat matches have the advantage of greater cheapness, and burn better and more slowly than wooden matches, besides being tougher and less liable to break.

The information that can be obtained with regard to these minor uses of peat is, however, extremely scanty and unreliable, and it appears to be too early to judge whether any of them have proved commercially successful.

Netherlands.—Turf moors in the Netherlands are principally met with in the provinces of Friesland, Gröningen, Drenthe, Overyssel, North Brabant, and Limburg, and are distinguished as low- and high-level moors, the latter only existing in North Brabant and Limburg, whilst the former are found in the four northern provinces. Low-level turf is so called from its lying below the normal level of the water, whilst high-level turf is

that which lies above it. The uninitiated are prone to consider turf moors and heath moors as identical, but for centuries the former have afforded a livelihood to a large proportion of the population, and at the present time they likewise do so to tens of thousands of people.

The *low-level moors* produce the so-called short or dredged turf. This is obtained by dredging with a kind of scoop, when a soft black substance is brought forth, which is spread out to a depth of 5 to 6 inches on a flooring of boards, and is then trodden down by labourers with specially-adapted wooden shoes, with the object of obtaining one adhesive mass. This is subsequently cut through crosswise with a spade, each portion having the form of a turf, and the whole mass is then left exposed to wind and weather until the turfs have become sufficiently dry and hard to allow of their being handled, when they are stacked in long rows to a height of 2 to 3 feet. The exposure to the sun and wind results in their drying entirely, and attaining the necessary hardness. They are then collected and stacked in large heaps, with a covering of reeds, and are subsequently brought to market. This kind of turf is exclusively used for domestic purposes. Numbers of skippers with their barges proceed throughout the year to the moors in the northern provinces, where they buy the turf for subsequent retail sale in the towns and villages.

The *high-level moors* are associated with four widely divergent industries:—(1) The cultivation of buckwheat. (2) The production of peat moss, which has been carried on for only about ten years, and which in no other country has assumed such dimensions as in the Netherlands. (3) The manufacture of black or factory turf. (4) Cultivation for agricultural purposes.

As regards these moors, the Netherlands are much more favourably situated than any other country in Europe, as the grounds can easily be intersected by channels communicating with the rivers and the leading canals, without involving large outlays for sluices, which, but for the configuration of the country, would otherwise be necessary. The importance of this fact is very patent, considering the bulky nature of turf and its comparatively low value. The cost of transit represents a large proportion of the selling price. In order, therefore, to be able to sell at the lowest price, it is obvious that the means of transport must be cheap, and in this respect carriage by water claims first rank.

In order to open up a high-level moor of, say, 1,000 hectares (=2,470 acres), it is in the first place necessary to drain it

properly, and for this purpose ditches are dug at a distance of about 11 yards from each other, all running into a larger ditch communicating with a leading waterway. The direction of these ditches, and the cost of making them, depend upon the situation, and consequently they differ for each moor.

Together with the attention required in the drainage process, due care has to be bestowed upon the digging of the canal, through which subsequently the produce will have to be conveyed. In addition to selecting for this canal the shortest route to the neighbouring chief waterway, it is necessary also that the direction be such as to allow of the removal of the largest quantity of turf and the smallest of sand, as the latter does not repay the cost of labour, whilst the former represents a saleable article. This canal is the leading one, and intersects the whole moor, whilst, in proportion to the extent of the excavations, branch ditches are dug parallel to each other at distances of about 219 yards, so that no portion of the moor is at a greater distance from the canal than about 109 yards.

(1) *Cultivation of Buckwheat.*—Upon completion of these preliminaries the cultivation of buckwheat is commenced, and for this purpose the upper crust of ground is first broken, and when in the spring it has somewhat dried up the whole surface is burnt by the following process:—

A few bits of dry turf are placed in an iron basket at the end of a long pole, and then lighted. This basket is held on high, and, through the action of the wind, the small bits of smouldering turf are blown over the ground and thus set fire to it. As soon as the basket is nearly empty it is refilled, and the same process repeated. With a fairly good breeze, the whole field is soon a smouldering mass, occasioning the irritating smoke which covers most of the country in the spring, and is known as "turf fire." The smouldering mass extinguishes itself, as the ground is covered with only a thin crust, beneath which the soil is very wet; but a small layer of ashes is left behind, which serves as manure for the buckwheat about to be sown.

The sowing of the buckwheat and harvesting of the crop do not differ from the processes adopted upon sandy soils, excepting that, in the carrying, due attention must be given to the softness of the ground, and, with this view, the carts are provided with broad-tired wheels, and the horses have broad bits of wood attached to their feet. This process of cultivation can be carried on for six consecutive years, the ground being annually burned; but after this period, the humus being exhausted, it would not pay to raise any further crop. It is then that preparations are made for the digging up of what is called the "grey turf," the leading feature of the peat-moss industry.

(2) *Production of Peat Moss.*—The high-level moors in

Holland consist of an upper layer of grey and a lower layer of black soil. The thickness varies considerably, but on an average the grey is one yard deep, and the black from two to three yards.

In connection with this fact, it should be mentioned that the additional function of the ditches referred to in the cultivation of buckwheat is to "settle" the subsoil. The intersection of the latter by ditches at distances of about 11 yards forms separate parts, which, through their own weight and the oozing of the water into the ditches, are caused to settle down and to become more compact. In new moors, therefore, the layer of turf is thicker than in those already under cultivation, although the quantity of soil may be the same.

By means of spades and other implements the grey soil is now shaped into turfs, which are placed on a barrow in a dripping state, for they often contain 500 or 600 per cent. of water. They are then placed end-on against each other in the open, to be dried by the wind and sun. When they have acquired sufficient hardness to allow of their being manipulated without breaking, they are arranged horizontally in rows on and near each other to a height of about 3 feet, in the same way as the short or dredged turf; this process is termed stacking in pyramids. The object is to dry them thoroughly, and hence, after some time, they are re-stacked in this form, the lower turfs coming uppermost, and the upper ones down below. When sufficiently dry they are stacked in large heaps.

The fundamental substance of the moss litter is now ready for further treatment, and is carried in barges to the factory, where it is broken up into small bits by means of a "devil" disintegrator. The product is then passed through a sieve, and thus two kinds of litter are obtained, the coarse and the fine.

To reduce the volume of the material, and thus to make its transport feasible on a large scale, the litter is pressed into bales weighing about 300 lb. each, and bound with wire and laths of wood, when it is ready for market.

The coarse litter is used in stables, and principally for horses. The "fine" litter is used for mixing with sewage, and a mixture of equal quantities produces a dry, dark, earthy substance, which can be turned over with a spade, and is entirely inodorous. As a manure, this product is quite as valuable as the stable moss litter; but whilst the latter in its original state is extensively used in all European countries, and also in America, the mixing of "fine" peat with sewage is but little known, although in some cities, such as Bremen, Brunswick, and Oldenburg, the product is largely used by the authorities. At Gothenburg, in Sweden, the "fine" peat has been utilised for

a number of years, whilst in Belgium a company has been formed for the purpose of collecting the sewage of the several towns and mixing it with moss litter, thereby producing a merchantable article.

Although the advantages attaching to the mixture of litter and sewage appear to be little recognised as yet, it seems probable that through this industry the grey-turf moors may have a great future before them. In 1889, the value of 1 hectare of this kind of moor was 100*l.* (= 41*l.* per acre), whilst only ten years previously the grey turf, being considered valueless, was recklessly cut up and thrown away, the only object being to get at the substratum of black turf.

The moss-litter industry, which, as already mentioned, has taken a start in the Netherlands superior to that in any other European country, owes its flourishing condition to the favourable situations of the moors, whilst in this respect the provinces of North Brabant and Limburg have a great advantage over the northern districts. The importance of locality is further emphasised by the fact that whereas 50 per cent. of the selling price of the northern moss litter represents freight, the latter item amounts to only 20 per cent. of the price of the southern product.

(3) *Manufacture of Black or Factory Turf.*—Black turf is usually called by the trade factory turf, from its being almost exclusively used in the brick-kilns along the Rivers Maas, Waal, Linge, Lek, and Yssel. This turf is dug up in the same manner as the grey, but care has to be taken to dig only when there is no fear of frost, and also to stop digging in time to allow the turf to be quite dry before the frost sets in. The period for digging the black turf lasts, therefore, only from March 15 to June 15, whilst the grey can be worked throughout the whole year, except when the soil is too hard through frost. If black turf gets frozen before having dried it loses its heating power, and consequently its value as a merchantable article, and then it is sold at a very low price for domestic purposes.

The importance of the trade in this article may be gathered from the fact that in the Netherlands about 280,000 tons are annually consumed in the manufacture of bricks, of a value of 133,000*l.*, of which 100,000*l.* represent the cost of labour and freight. The value of 1 hectare of good and favourably situated black peat may safely be taken at 170*l.* (= 68*l.* per acre).

(4) *Cultivation for Agricultural Purposes.*—After the removal of the black peat the sandy soil is met with, and this is specially adapted for cultivation, though immense quantities of manure are required. But if the cultivation has kept pace with the gradual removal of the turf, the moors offer great facilities for

the carriage of manure, as the latter can easily and at only a small cost be conveyed from the towns in the same barges that carry the turf thither.

In the "Peel" district, which embraces the turf moors bordering North Brabant and Limburg, it has been proved that these sandy soils, having been well manured, are capable of producing all kinds of crops. Oats, rye, tobacco, and flax are grown there, and kitchen-gardening has also been successfully prosecuted, as is proved by the asparagus, gherkins, grapes, melons, &c., which can compete with the best of these products grown in other districts. At the same time, it is scarcely possible for cultivation to keep pace with the digging of the turf, more especially in the case of kitchen-gardening.

Whilst it cannot be denied that cultivation demands a lot of capital, yet, if not carried out, the certain result is the creation of a big wilderness, with a large population having neither work nor means of subsistence. This is being experienced in Friesland, where (October, 1892) the workpeople are reduced to the greatest poverty, and on whose behalf public charity is invoked.

As an instance of the cultivation of turf moors in olden times the province of Gröningen may be mentioned. For centuries the moors there have been opened up, and all manure and sewage from the city of Gröningen were carried thither by the existing canals.

Other details[1] bearing upon the peat industry of Holland will be found in the Journal, 2nd Series, Vol. XVII., 1881, pp. 440–456.

Sweden.—The peat bogs of Sweden cover an immense area, amounting to many millions of acres. They are not confined to any one part of the kingdom, though the largest of them are either in the extreme northern provinces, or in the provinces of Dalecarlia, Vermland, Småland, Halland, and North Scania. In Upper Noorland and in Lapland there are peat bogs hundreds of square miles in size, and consisting of turf of excellent quality. The depth of the turf varies from 3 to 37 feet, and even more.

It is an old custom in the southern provinces to burn turf as fuel in private dwellings; especially is this the case in the provinces along the coast, where there is no wood to spare for burning. To a certain moderate extent bogs were also formerly

[1] *On the Reclamation of Peat-land in the Netherlands.* By H. M. Jenkins, F.G.S.

used for raising crops. But for the last thirty or forty years increasing attention has been paid to the profits derivable from peat bogs, both as regards their cultivation and as regards the fuel to be obtained from them for use in dwellings and in manufactories. During the last ten years increasing interest has also been evinced in the supply of peat litter.

To show the possibilities of their amelioration, it is mentioned that over 600,000 acres of bog have been brought into cultivation in the southern and central provinces during recent years. In these same provinces, turf for burning is now cut out in enormous quantities every year by most of the ironworks and other industrial establishments situated inland, and possessing bogs of their own.

There are numerous ways of treating the turf by machinery, different machines being employed for disintegrating, rolling, and pressing it, and making it hard after drying. The actual drying generally takes place on a levelled area of the bog itself, either by spreading the peat out or by putting it up on frames. Besides this air-drying of the turf, several ironworks have of late years established ovens of various sorts for the further desiccation of the product, and these have in general given very good results. They are heated by the surplus heat of the furnaces, which thus costs nothing, and yet the turf gains from 25 to 30 per cent. in value from the process.

The ordinary turf for burning in dwelling-houses in the southern provinces, where wood is scarce, is chiefly cut brick-shape by spades made for the purpose, and then dried at the place where it is cut, by simply spreading it out in small heaps. It costs very little to cut, but is rather loose, owing to its being treated in so primitive a fashion. Such turf as is intended for industrial purposes is always worked up or disintegrated in one way or another, so as to be hard and solid when dried, and thus give more heat when burnt.

In the case of ironworks turf is used in the furnaces either by itself, or else mixed with coal and fir cones. At wood-pulp factories it is used for drying the pulp. Turf is also burnt in glass-works, brick-works, and as fuel for steam-engines.

It is only in the south of Sweden, and even there in but few cases, that factories exist for the preparation of turf for sale as fuel. No exact figures are obtainable as to the amount of prepared turf yearly produced in Sweden for burning. Its use, however, is increasing year by year, owing to its being a cheaper fuel than coal. About 25,000 to 30,000 tons a year may be said to be employed in metallurgical works of different kinds.

The cost of producing well-made turf for fuel is given as

from 4*s.* 4*d.* to 5*s.* 5*d.* per ton, according to the price of labour in different places. Good turf for fuel is expected to contain from 30 to 40 per cent. of heating material, and not above 7 to 10 per cent. of ash, and there is a vast quantity of such turf in Sweden.

Of late years large quantities of peat litter have been prepared in Southern and Central Sweden, partly by twenty peat-litter factories which produce it for sale, and partly by private owners of peat bogs who take it for their own use. It is of the very best quality, far excelling that produced in other countries. This peat litter is made from pure sphagnum, or immature moss turf, unmixed with other sorts of moss.

Each peat-litter factory makes from 15,000 to 30,000 bales (200 lb. each), sold in Sweden at about 1*s.* 8*d.* per bale. A much finer quality (called "Torfmull") sells at from 1*s.* 11*d.* to 2*s.* 2*d.* per bale.

The subjoined details are taken from a lecture on turf litter by Herr L. F. Nilson :—

Herr Samuelson, of Marieberg, in Vermland, has for many years past found it a good plan to cut out the turf in the autumn or winter, or in the spring before the night frosts have ceased. Not only is the work done at a comparatively idle time of the year, but the turf—having once been frozen—afterwards, when the warm weather comes, dries much more quickly and thoroughly than it would do if it had not been frozen.

Peat litter keeps cows cleaner than straw litter does, and the same is the case with pigs, but not with sheep, as the fine dust gets into their wool. Even if straw be preferred for the stalls, it is recommended that peat litter be used in the drain behind the animals.

Owing to the retention of heat by peat litter, and to its acting as a check upon putrefaction, as well as to its property of retaining moisture, it is excellent for propagating-beds, whether for seedlings of vegetables, for mushrooms, or for many hothouse plants.

Experiments were made near Stockholm, from 1887 to 1890, as to the comparative excellence of turf poudrette and other manures, the turf poudrette being prepared at the municipal works. Barley, clover, potatoes, and mixed seeds (for green fodder) were planted on plots of clay soil of from 250 to 350 square yards each. The mixed seeds were barley, oats, and vetches.

The values of the manures used were per acre, 2*l.* 2*s.* in 1887 and 1888; 1*l.* 16*s.* in 1889; and 3*l.* 4*s.* in 1890.

Farmyard manure was reckoned as worth 3*d.* per 100 quarts (say 1*d.* per bushel), turf poudrette as worth 7½*d.* per 100 quarts (2½*d.* per bushel), and Peruvian guano and fish guano at the market prices of the day.

Out of many experiments the following table gives the result in five cases. The figures showing the number of kilogrammes (1 kilog. = 2·2 lb.) produced per hectare (2½ acres) are only given to illustrate the comparative results of the different manures in competition with each other, so that no advantage would arise from rendering them into their English equivalents ;—

—	1887		1888	1888	1889		1890	
	Barley		Green Clover	Potatoes	Mixed seeds		Mixed seeds	
	Ear	Straw			Ear	Straw	Ear	Straw
	Kilog.	Kilog.	Kilog.	Kilog.	Kilog.	Kilog.	Kilog.	Kilog.
Unmanured . . .	1,900	2,340	9,050	6,665	1,960	2,950	3,250	3,220
Turf poudrette (*a*)	3,170	3,410	11,475	—	—	—	—	—
„ (*b*)	3,130	3,410	12,075	11,750	3,200	4,500	4,050	5,630
Farmyard manure.	1,970	2,690	12,075	—	2,000	4,130	3,700	4,800
Dissolved Peruvian guano	3,470	3,790	10,880	12,750	2,230	3,520	3,500	5,090
Fish guano . . .	2,540	4,350	8,675	11,260	2,390	2,950	3,450	4,310

One of the most ingenious machines for making poudrette is the "Concentrator" of Herr Levander. This engineer has placed his machine near the municipal works of Gothenburg, whence he buys the solid or dry drainage, mixed with peat litter, and burns it in great rotating vessels, the gas issuing during combustion being simultaneously burnt by a small fire. His poudrette sells well, and not the slightest noxious gas is perceived in the neighbourhood. The old practice of mixing lime with the solid refuse is gradually being abandoned at Gothenburg, and peat litter is being substituted. It is impossible to stay even for five minutes in the sheds where the lime mixture is kept. Those used for the peat-litter mixture are not markedly disagreeable. It is only fair to add, however, that lime kills all microbes in a way not equalled by peat litter.

A factory has been opened at Stigen for the manufacture of mattresses, bedding, and surgical bandages from the white moss, and, if successful, it may lead to the establishment of a new branch of industry.

Swedish moss litter is made almost exclusively for home consumption, and does not appear as yet to enter into competition abroad with that produced by Germany, although the supply in Sweden of the raw material is much more extensive.

The precautions now taken against cholera have increased the demand for peat mould ("Torfmull"), which, as a strong antiseptic, is much used for rendering innocuous the emanations from cesspools and for covering fæcal matter, which in Swedish towns is carted away solid, and seldom carried off through drains.

Denmark.—In the province of Jutland, where the peat moors occupy some 90 English square miles, or one twenty-fifth of the area of the province, efforts have been made to turn the produce to profitable account. All the different modes invented during the last forty years for the treatment of peat have been tried in Denmark, and have been given up as impracticable, unprofitable, or both. Costly experiments have been carried out at Silkeborg and Moseland within recent years, but with no appreciable results. In fact, peat may be said to be used merely for fuel, the people cutting sufficient for their own consumption.

Moss litter has been most effectively tried at the stables of the Copenhagen Milk Supply Company. The system under which it is there used is the following:—

Each stall is constructed with a hollow lined with cement 3 inches deep below the level of the floor paving. This is filled with the litter. About an inch in depth is removed daily from the surface, the fresh supply being laid at the manger end, while the supply of the day before is raked from the head to the hinder end. The litter so removed forms most excellent manure.

The peat-moss litter is delivered in compressed bales of 150 lb. each, and care has to be taken that it is almost free from moisture, in order that it may be able better to absorb all moisture when in use.

The Company referred to keep fifty horses. Though it is customary in Denmark to bestow but little trouble upon grooming horses and keeping stables clean, and though there is no drain whatever in the stable in question, no trace of ammonia and hardly any unpleasant smell can be detected.

The manager states that the litter for the fifty horses costs the Company 100*l.* a year, or 2*l.* per horse per annum.

Sir Francis Denys adds that the value of moss litter for sanitary and economical purposes, in large towns and for cavalry barracks, cannot be over-estimated, and since the same quality of peat exists in Great Britain, this industry should certainly be capable of great development at home. The peat used is that lying immediately between the sod and the black peat employed as fuel.

France.—The Bordeaux Tramway Company, which tried the experiment of peat moss for litter, has now abandoned the use of it, partly because of the difficulty of disposing of the manure, and partly because the litter, which was sold to them by weight, was frequently supplied in a damp condition, which considerably reduced its utility.

In Paris there are four or five firms which supply peat for fuel. There is, in addition, an important enterprise, the Company known as "La Béraudine," founded by M. Béraud for working his patents, and manufacturing a number of articles from peat fibre.

This Company supplies about eight different articles to the French Government, chiefly mattresses, blankets, saddle-cloths, &c., but the number of articles manufactured from the fibre obtained by M. Béraud's process is very great, and comprises nearly all those in which felt has hitherto been used, with this important difference, that the articles are made from a woven fabric, and not from a brittle substance like felt.

The Company is about to set up a factory for utilising the refuse material in the production of peat fuel or charcoal, which, it is stated, can be produced at about 50 per cent. less cost than the "briquettes" now in use made from coal-dust, &c.

The finer quality of the peat fibre is used for mattresses for the Government barracks, hospitals, &c.; the coarser is chiefly used for stuffing-boxes, coffer-dams, &c.

It may be useful to supplement this record of Continental experiences with a few details from a paper, published in 1889, by Dr. Bernard Dyer upon "Peat Moss Litter." wherein are given the following analyses of peat-moss litter and wheat-straw chaff:—

	Peat moss	Straw
Moisture	12·46	10·33
Organic matter	86·16	82·07
Phosphoric acid	·02	·11
Lime	·15	·29
Potash	·01	·99
Magnesia, &c.	·48	·47
Silica	·72	5·74
	100·00	100·00
Nitrogen	·81	·62
Equal to ammonia	·98	·75

It is probable that the chief value of straw itself as an ingredient in farm or stable manure lies in its potash, of which peat moss contains scarcely any; and its nitrogen is also more valuable than that in peat moss. But the value of the dung made with either material rests mainly on the excrementitious matters absorbed, and as peat moss can absorb and retain more, it is capable of making better manure. Its value, however, is clearly dependent upon the extent to which it has been saturated—in other words, the length of time it has been under the animals.

The subjoined analyses of samples of dung made with peat-moss litter and with straw respectively are placed side by side to facilitate comparison:—

	Stable Manure made with Peat-moss Litter Average of two samples		Stable Manure made with Straw Average of three samples	
	Natural state	Calculated dry	Natural state	Calculated dry
Water	77·84	—	70·03	—
Organic matter	18 02	81·12	24·33	82·36
Phosphoric acid	·37	1·69	·43	1·38
(Equal to phosphate of lime)	(·80)	(3·69)	(·94)	(3 01)
Lime	·33	1·50	·70	2·26
Potash	1·02	4·50	·59	2·09
Magnesia, &c.	1 08	5·20	1·30	3·86
Siliceous matter	1·34	5·99	2 62	8·05
	100 00	100·00	100·00	100·00
Organic nitrogen	·37	1·67	·42	1·48
Ammoniacal and nitric nitrogen	·51	2·26	·19	·66
Total nitrogen	·88	3·96	·61	2·14
Equal to ammonia	1·07	4·80	·74	2·60

If these analyses be compared, and allowance made for the fact that dry straw contains in itself, calculated dry, 0·7 per cent. of nitrogen, and dry peat moss 0·9, it will be easily seen that a given quantity of peat has taken up in the form of excrementitious matters, solid and liquid, twice as much nitrogen as a like quantity of straw. If, however, without regarding this—which bears mainly on the economy of the two articles as litter—we regard the analyses of the wet manures merely from a purchaser's point of view, we see that in the peat dung there is about the same quantity of organic nitrogen as in the straw dung, and two and a half times as much ammoniacal and nitric nitrogen—the total nitrogen reckoned as ammonia being 1·07 per cent. in the peat dung, against ·74 per cent. in the straw dung. The quantity of phosphoric acid is about the same in each, but the peat manure contains nearly twice as much potash, notwithstanding that straw itself is rich in potash compared with peat moss. The peat dung is roughly worth somewhere about 25 per cent. more than the straw manure.

BIBLIOGRAPHY.—In addition to the references which have been incidentally made to the bibliography of peat, the following publications deserve to be noticed:—

General View of the Agriculture in the County of Cambridge. By C. Vancouver. 4to. London. 1794.

Essays on the Natural History and Origin of Peat Moss: the peculiar qualities of the substance; the means of improving it as a soil; the methods of converting it into a manure; and the other economical purposes to which it may be made subservient. By the Rev. R. Rennie, D.D. 8vo. Edinburgh. 1810. "This work contains much local and general information about peat, which was then better known as 'moss' (from the Celtic *Mos*), whilst the word 'peat' referred only to the piece dug out for fuel."

A Treatise on the Origin, Qualities, and Cultivation of Moss-earth, with directions for converting it into manure. By William Airton, Writer (lawyer), Strathaven, Lanarkshire. 8vo. Ayr. 1811. Classifies the different sorts found in Britain as:—(1) Hill-moss; on hilltops and hilly acclivities, where heather and such mosses as *Hypnum*, *Bryum*, *Polytrichum*, and *Sphagnum* form a kind of thin half-peat. (2) Bent-moss, much thicker, on the sides and skirts of hills, and composed largely of the coarse grasses (bent, &c.) mixed with the usual bog-forming mosses. (3) Flow moss, or quaking bog, composed chiefly of *Sphagnum*, filling old lakes, and covering overthrown forests.

Natural and Agricultural History of Peat Moss or Turf Bog, to which are annexed corroborative writings, correspondence, and observations on the qualities of peat or fen earth as a soil and manure, and on the methods used in Scotland for converting moss soils into arable and pasture grounds, plantation of trees, &c. By Andrew Steele, Esq. 8vo. Edinburgh. 1826. Contains many references to other writers and practical observers, and also Professor Robert Jameson's Observations on Peat.

On the Turf of the Cambridge Fens. By the Rev. L. Jenyns. Report of the British Association, 1846. P. 75.

On the Formation of Peat in the North of Europe. Lesquereux. 1847. Quart. Journ. Geol. Soc., vol. iv., Miscel., p. 29. Reference is made to the formation of (1) *Immersed* or *Submerged Peat*, (2) *Emerged* or *Superficial Peat*, (3) *Superficial Peat* sinking to form *Bottom Peat*.

Fen Sketches: being a description of the alluvial district known as the Great Level of the Fens, with a brief history of its progressive improve-

ments in drainage and agriculture. By J. A. Clarke. Sm. 8vo. London. 1851.

Facts about Peat as an Article of Fuel, with remarks upon its origin and composition, the localities in which it is found, the methods of preparation and manufacture, and the various uses to which it is applicable; together with many other matters of practical and scientific interest. To which is added a chapter on the Utilisation of Coal Dust with Peat for the production of an excellent fuel at moderate cost, specially adapted for steam service. By T. H. Leavitt. 3rd edition. Boston: Lea & Shepard. 1867.

On the Economical Production of Peat and Peat Charcoal, with incidental reference to the processes pursued at the Redmoss Works (Peat-engineering and Sewage-filtration Company, Limited), Horwich, near Bolton, Lancashire. 8vo., pp. 24. Liverpool. 1871.

Report on the Utilisation of Peat and Peat Lands. By F. A. Paget. Reports on the Vienna Universal Exhibition of 1873. Part ii., pp. 269–346. 1875.

Transactions of the Newbury District Field Club, vol. ii., 1878; Dr. S. Palmer on the Antiquities found in the Peat of Newbury, pp. 123, &c., and Appendix by Professor T. Rupert Jones, F.R.S.; reprints of Dr. Collet's and Dean Buckland's descriptions of the Peat Formation in the Valley of the Kennet, and various notes on the Newbury Peat, pp. 135, 138, 141, &c.

For previous references to the subject of Peat in this Journal the reader should consult the General Index to the First Series (1865), p. 139, and the General Index to the Second Series (1890), p. 156.

The value of straw as food, particularly in trying winters, furnishes a strong argument in favour of utilising good straw in the feeding-trough, rather than of permitting it to find its way, in the form of litter, to the muck-heap. The relative merits of straw and peat moss for purposes of litter must, however, be settled in the long run, partly by local considerations, and partly, no doubt, by cost to the consumer.

W. Fream.

Official Reports.

REPORT OF THE COUNCIL

TO THE

HALF-YEARLY GENERAL MEETING OF GOVERNORS AND MEMBERS

HELD AT THE SOCIETY'S HOUSE,

12 *Hanover Square, W.*,

ON THURSDAY, DECEMBER 7, 1893,

The DUKE of DEVONSHIRE, K.G. (President), in the Chair.

THE Council have to report that the List of Governors and Members has undergone the following changes during the half-year which has elapsed since the Anniversary General Meeting on May 29 last :—1 new Governor and 341 Members have joined the Society, 4 have been reinstated as Members under Bye-Law 12, and 1 Member has qualified as a Governor; whilst the deaths of 1 Honorary Member, 6 Governors, 23 Life-Members, and 80 Annual Members have been reported. A total of 11 Members have been struck off the books under Bye-Law 10, owing to absence of addresses; 44 under Bye-Law 11, for arrears of subscriptions; and 89 have resigned.

2. Amongst other Governors and Members whose loss by death the Society has had to deplore since the Anniversary Meeting in May last are :—the Earl of Warwick (a Governor since 1859); Viscount Stormont; Lord Calthorpe; the Hon. and Rev. C. J. Vernon; Sir Arnold W. White; Mr. John D. Allcroft; Mr. James S. Bult, of Taunton (a Member since 1842); Mr. Spencer Chadwick (who had given the Society much valuable assistance in connection with the purchase of Harewood House); Mr. J. Cabourne Simonds (a Member since 1841); Mr. George Culley, C.B. (Commissioner of Woods and Forests); Mr. J. Bailey Denton, C.E. (the author of numerous papers in the Society's Journal, and of standard works on rural economy); Mr. R. H. Ellman (a Foundation Life Governor, elected in 1839); Mr. Robertson Gladstone, of Court Hey, Liverpool; Mr. Charles Hobbs, of Maisey Hampton; Major-General C. V. Jenkins; Colonel H. A. F. Luttrell, of Axbridge (a subscriber since 1869); Mr. C. W. Townley, of Fulbourn, Cambridge; and Dr. Henry J. Webb, B.Sc., Principal of the Aspatria Agricultural College.

3. The death of Monsieur Edouard Michel Lecouteux, on October 24th last, has deprived the Society of one of its most distinguished Honorary Members. M. Lecouteux was elected to the Honorary Membership of the Society in April 1869, on the occasion of the

establishment—on the model of the Royal Agricultural Society of England—of the *Société des Agriculteurs de France*, of which he was one of the chief founders and the first Secretary. The Council have elected, as an Honorary Member of the Society, Professor Auguste Chauveau, M.D., LL.D., Inspector-General of the Veterinary Department of the French Government, in recognition of his distinguished services to veterinary science as applied to agriculture.

4. These and other changes bring the total number of Governors and Members now on the Register to 11,219, divided as follows :—

24 Foundation Life Governors (Members elected before the granting of the Charter on March 26, 1840) ;
73 Governors paying an annual subscription of 5*l.* ;
79 Life Governors ;
7,223 Members paying an annual subscription of 1*l.* ;
3,705 Life Members ;
94 Life Members by Examination ;
21 Honorary Members.

11,219 Total number of Governors and Members ;
or a net increase of 160 Members since the same period last year.

5. In the report of the Council to the General Meeting held in May last, reference was made to the acquisition, as the future permanent home of the Society, of the adjoining property, Harewood House, which had been made possible by the generous action of the Duke of Westminster and Sir Walter Gilbey in taking upon themselves the responsibility of the purchase of the entire site (including the stables and the Oxford Street frontage). The Council beg now to report the completion of the purchase of the site of the mansion of Harewood House, with an additional strip of land at the side, for the inclusive sum of 37,000*l.* ; and the issue of an equal amount of Harewood House Three per Cent. Debenture Stock, secured upon the property. This 37,000*l.* Stock has been subscribed for by 122 Members and their friends, and its issue has enabled the Society to keep intact its General Reserve Fund of 30,000*l.*

6. The Society is indebted to the following noblemen and gentlemen for donations towards the acquisition of the property :—

The Duke of Northumberland, K.G.	£500
Lord Leconfield	400
Sir Wm. Cunliffe Brooks, Bart.	300
The Marquis of Ripon, K.G.	200
Mr. W. W. Astor	200
Lord Burton	100
Lord Tollemache	100
Mr. Alex. Gordon	100
Mr. Charles Whitehead	100
Sir John Ramsden, Bart.	50
Hon. W. F. D. Smith, M.P.	25
Mr. H. Cosmo Bonsor, M.P.	25
	£2,100

These donations have been invested in the names of the three Trustees of the Harewood House Debenture Stock, and will, with the interest thereon, form the nucleus of a sinking fund for the eventual redemption of the Stock.

7. As already reported, it was originally proposed that on the site purchased by the Society a wholly new building should be erected, at a further cost estimated at 25,000*l.*, in which building there would have been some spare rooms capable of being sub-let. On consideration, however, of the proposed schemes for new buildings, difficulties presented themselves which were not, of course, insurmountable, but which would have greatly delayed the completion of the purchase, and would have involved a somewhat considerable financial outlay and responsibility for the Society. The existing Harewood House is an exceedingly well-built and solid structure of the Adam period, and is not difficult of adaptation for the Society's requirements. The fabric itself was not considered as comprised in the original arrangement with the Duke of Westminster and Sir Walter Gilbey; but, on learning that the House Committee were considering the question of adaptation as against rebuilding, the Duke and Sir Walter not only expressed their willingness to regard the house itself as included in the purchase, but also to make themselves responsible for the considerable expense of adapting it so as to meet the Society's requirements. Under these circumstances, the House Committee had no hesitation in recommending that the munificent proposals of the Duke of Westminster and Sir Walter Gilbey be accepted, and that the cordial thanks of the Society be tendered to them for their public-spirited action in the matter. By its acceptance of this generous offer, the Society has not only been placed in possession of a very commodious and handsome freehold house, where it can make its permanent home, but it has acquired the important power—should in future this prove to be needed—of extending its accommodation by the building of additional floors without disarranging the existing rooms. The alterations are now in progress, and Harewood House will shortly be ready for occupation. By the transference of the Society's administrative offices to Harewood House, its present premises at 12 Hanover Square will be available for the accommodation of such other Societies as may desire to obtain offices adjacent to those of the Royal Agricultural Society.

8. It is gratifying to report that the Society's Fifty-fourth Annual Country Meeting, held at Chester last June, proved a great success, towards which the willing co-operation of the Local Committee very materially contributed. In a district like Cheshire it was natural that special prominence should be given to the exhibition of dairy products; and, indeed, the display of Cheshire Cheese was the great feature of the Show. The attendance of visitors was all that could be desired on the first four days, but a heavy and persistent downpour of rain—so welcome in other respects in the midst of the prolonged drought—had a deterrent effect upon the numbers attending

on the last day of the Show. The financial result of the Meeting is a net profit of 2,400*l.*, which is eminently satisfactory in view of the fact that the Society offered some 800*l.* more in prizes at Chester than at Warwick in the previous year, and that the entries were considerably larger, thus involving increased expenses for showyard works, administration, judges, forage, &c.

9. From the years 1870 to 1892 Farm Prize Competitions were annually held within the district of the Country Meeting, and the Reports upon the several competitions printed in the Journal form a valuable collection of information respecting the distinctive features of English agriculture. As the period of twenty-two years, over which these competitions extended, had brought practically the whole of the country under review, it was considered that the system of competitions might be usefully succeeded by the inspection of selected farms in the district of the Meeting, each inspection to be undertaken by a special Commissioner, whose Report should be published in the Journal. The Council, accordingly, entrusted the first inspection of the kind to one of their own body, Mr. J. Bowen-Jones, and the Society is much indebted to him for a most minute and painstaking investigation of the farming of Cheshire and North Wales, and for a very able Report thereon in the last number of the Journal.

10. The Council have decided that the Cambridge Meeting shall open on Monday, June 25, 1894, and close on the following Friday evening. The Implement Yard and the Dairy will be open to members of the Society and the public on the previous Saturday, June 23. The last day for making entries in the Implement Department will be Saturday, March 31 ; but post-entries of agricultural implements only will be received up to Saturday, April 7. For Stock, Poultry, and Produce the entries will close on Tuesday, May 1, with post-entries at double fees up to Saturday, May 12. The entries, however, for Preserved Butter to be delivered on February 1, 1894, close on Monday, January 1, 1894.

11. It has been found necessary to revise the Entry-fees for stock and produce at the Society's Country Meetings, and the following, therefore, will be the fees payable for the several descriptions of exhibits by members of the Royal Agricultural Society and by non-members, respectively, at the Cambridge Meeting of 1894 :—

	By Members.	By Non-Members.
HORSES, CATTLE, SHEEP, OR PIGS—		
For the first Entry in any one Class, received on or before the 1st May, 1894.	5/-	£1
For a second Entry in the same Class, received on or before the 1st May, 1894.	10/-	£2
For any Post Entry	15/-	£3
POULTRY (except Table Poultry) AND PRODUCE—		
For each Entry received on or before the 1st May, 1894.	2/6	5/-
For any Post Entry of Poultry or Produce	5/-	10/-
[TABLE POULTRY will be admitted at 1*s.* per entry.	Post Entry, 2*s.*]	

Regulations have also been framed providing that no Exhibitor may make more than *two* entries in any one Class of Horses, Cattle, Sheep, Pigs, or Poultry, or more than *one* entry in any one Class of Produce, and that, in order to be entitled to make entries at Members' rates, an exhibitor must have paid at least two annual subscriptions to the Society, including that for the current year, or (if a new Member) his subscription for the current year and for a year in advance.

12. The Council have already reported their decision to offer in connection with the Cambridge Meeting prizes amounting in all to 150*l.* for fixed and portable Explosive Oil Engines. Prizes for Hand-power Churns will also be offered in two classes as follows :—

	First Prize	Second Prize	Third Prize
Class VI.—Churns capable of dealing with 10 quarts and upwards of cream	10*l.*	6*l.*	4*l.*
Class VII.—Churns capable of dealing with from 5 quarts to 10 quarts of cream	5*l.*	3*l.*	2*l.*

In both classes the churns must not exceed one-man power (*i.e.*, worked by one man).

Two prizes of 10*l.* each will be offered respectively for the best horse-power machine for distributing *Bouillie Bordelaise* upon Potatoes, and for the best machine for distributing Insecticides and Fungicides upon fruit trees and bushes. A prize of 5*l.* will be offered for the best Sheep-dipping apparatus.

13. The Regulations as to the taking of space for the exhibition of Implements, &c., have been thoroughly revised and re-arranged. In view of the restricted area available at Cambridge for the purposes of the Showyard, the Council have decided to limit the maximum space that can be taken by an exhibitor at next year's meeting to 100 feet (instead of 150 feet) run.

14. The Prize-sheet for Stock, Poultry, and Produce has now been definitely settled, and will be issued immediately. The prizes offered in all departments (exclusive of Champion Prizes and Medals offered by various Breed Societies) amount in all to 5,865*l.*, of which 1,022*l.* is provided by the Cambridge Local Committee.

15. The special Prizes offered by the Cambridge Local Committee for Live Stock include two classes for Hunter Mares and Geldings, five for Hackneys, two for Harness Horses and Ponies, four for Shires, four for Suffolk Horses, and two for Agricultural Horses ; two for Shorthorn Calves, and two for Kerry and Dexter Kerry Heifers ; and six classes for Ewe Lambs of the Lincoln, Oxford Down, Shropshire, Southdown, Hampshire Down, and Suffolk Breeds. The Local Committee also offer three prizes in four classes for Double Cottenham, Cream (Victoria), Curd and Cream (York and Double York) Cheeses, and they provide prizes amounting to 16*l.* for a competition of local Dairymaids and others. In addition to Champion Prizes in the Hackney, Shire, and Suffolk Horse Classes, the Local

Committee have also undertaken to provide three Gold Medals, value 10*l.* each, or 10*l.* in money at the option of the owner, for thoroughbred Stallions being winners of the Queen's Premiums for 1894 in District A, on condition that such stallions are exhibited in the Cambridge Showyard, but not for competition, from June 25 to 27 inclusive.

16. The classes for Horses offered by the Society itself will include Hunters, Cleveland Bays and Coach Horses, Hackneys, Ponies, Shires, Clydesdales, and Suffolks. In the Cattle Classes, prizes will be offered by the Society for the Shorthorn, Hereford, Devon, Sussex, Welsh, Red Polled, Aberdeen Angus, Galloway, Ayrshire, Jersey, Guernsey, Kerry, and Dexter Kerry breeds, as well as two Classes for Dairy Cows yielding the largest quantity of milk, and the greatest weight of butter fat. The classes for Sheep will include Leicesters, Cotswolds, Lincolns, Oxford Downs, Shropshires, Southdowns, Hampshire Downs, Suffolks, Wensleydales, Border Leicesters, Somerset and Dorset Horned, Kentish or Romney Marsh, Cheviots, Black-faced Mountain, Lonks, Herdwicks and Welsh Mountain. Those for Pigs will include the Large White, Middle White, Small White, Berkshire, Black, and Tamworth breeds. Prizes will also be given for useful descriptions of Poultry, including Table Fowls and Ducks; for Fresh and Preserved Butter; for Cheeses of 1894 make; for Cider and Perry; and for Jams and Preserved Fruits made in 1893. The British Beekeepers' Association will continue their Prizes for Hives, Honey, and Bee Appliances.

17. Butter-making Competitions will be continued at Cambridge in four classes, including the class offered by the Local Committee, with a Champion class for the Society's Silver Medal and a prize of 5*l.* There will also be a competition of Shoeing Smiths practising in the district of the Show, comprising the counties of Bedford, Buckingham, Cambridge, Essex, Hertford, Huntingdon, London, Middlesex, Norfolk, Oxford, and Suffolk. The competition will be in two classes, viz. for Roadsters and Agricultural Horses, and five Prizes will be offered in each class. The Worshipful Company of Farriers have generously offered, as before, to provide the First Prize in each of these two classes, and to bestow the Freedom of their Guild upon the two first-prize winners. The Registration Committee of the Farriers' Company will also admit all the winners of prizes in these Competitions to the Official Register of Farriers or Shoeing Smiths free of charge, and will give facilities for the examination of competitors who desire to be admitted to such Register.

18. Memorials have been received from the Corporation and local authorities of Darlington and district inviting the Society to hold its Country Meeting of 1895 at Darlington. The customary Committee of Inspection has been appointed to report on the sites and other accommodation offered, and a final decision as to the acceptance of the invitation will be made by the Council in February next.

19. The efforts of the Board of Agriculture to stamp out pleuro-pneumonia have during the present year again been successful; there have been eight outbreaks, as compared with thirty-five last year and 192 in 1891. In reference to foot and mouth disease, only two outbreaks have occurred this year—one in North London in January, in which the whole of the nine cows on the premises were slaughtered by the Board of Agriculture; and the other at Guestling in Sussex—both of which were referred to in the previous report of the Council. There appears to have been a very decided increase in the number of outbreaks of anthrax this year as compared with previous years. There is reason to believe, however, that in some instances the deaths of animals attributed to anthrax were due to vegetable poisoning on account of the scarcity of ordinary keep during the severe drought of the past summer. By the Contagious Diseases (Animals) Act of 1893, swine fever has been placed in the same category as pleuro-pneumonia, so that in future the slaughter of infected swine will be directed by the Central Authority, and compensation be paid out of the Imperial Exchequer. This policy is quite in accordance with the views of the Council.

20. At the Royal Veterinary College, to which an annual grant is made by the Society towards the study of Comparative Pathology and Bacteriology, various experiments have proved the great value of tuberculin as an aid to the diagnosis of tuberculosis in cattle, and of mallein as an almost infallible agent for the detection of glanders in horses, even in its early stages. During the past summer several investigations have been made in regard to numerous deaths of cattle from vegetable poisoning, as mentioned above. Inquiries into the causes of louping-ill in sheep, and the life-history of the vegetable parasites which are the cause of ringworm, are now proceeding.

21. The passing of the Fertilisers and Feeding Stuffs Act, 1893, introduced into Parliament by the President of the Board of Agriculture, will, it may be hoped, help importantly in the repression of the adulteration of feeding-stuffs and manures, in which the Chemical Committee of the Society has given such valuable assistance in the past. In the absence of legislative provisions as to the purity of fertilisers or feeding-stuffs, the Society has from time to time published in its Journal, for the protection and guidance of members, the names of manufacturers who have supplied impure or adulterated articles, or who have given to their customers misleading descriptions of goods sold. For the future, the buyer will have the remedy against fraud largely in his own hands, for the new Act requires an invoice giving particulars of the article sold to be delivered by the vendor to the purchaser,—such invoice to have the effect of a warranty that the article is of the quality stated; and the Act imposes heavy fines for false descriptions, and for the sale of articles deleterious to live stock. A copy of the Act, with the observations of the Chemical Committee thereon, will be printed in the next number of the Journal for the information of members of the Society [see p. 795].

22. In the Chemical Department the members of the Society have sent 675 samples to the Laboratory for analysis during the past seven months. This shows an increase of 128 samples over the number sent during the same period of last year; but it should be mentioned that about one-half of this increase is due to samples sent by a member in connection with an extensive series of field and other experiments which he is conducting at his own expense. A larger number than usual of water analyses have been made this season, probably in consequence of the severe drought.

23. The exceptionally dry season experienced this year told with considerable severity on the light sandy land of the Woburn Experimental Farm. The results of the trial plots have been much affected in consequence, more especially in the case of the Permanent Wheat plots, the influence of heavy top-dressings of nitrogenous salts being but little shown, on account of the absence of sufficient rain to wash them in. Similarly, the hay and root crops have greatly suffered. Experiments were continued at the Farm on the prevention of "Potato Disease" by the use of the *Bouillie Bordelaise* mixture, but there was an almost total absence of disease on all the plots this year, whether treated or untreated. The Farm has again been visited by agricultural students from Bedfordshire, Cambridge University, and elsewhere. During the forthcoming winter experiments will be conducted on the feeding of bullocks and of sheep; the main object in the former case being to endeavour to show how straw may be best utilised in the absence of roots.

24. The Norfolk Chamber of Agriculture, the Essex Agricultural Society, and the Royal Manchester, Liverpool, and North Lancashire Agricultural Society, continue to carry on the work of field experiments in association with the Royal Agricultural Society. The stations have been visited by the Consulting Chemist during the year. An especially interesting series is that now in progress on Lord Egerton of Tatton's Home Park, on the improvement of pasture by manuring in different ways.

25. During the past year 325 applications have been received by the Consulting Botanist from members of the Society, an increase over recent years. The grass seeds examined have been pure and clean. No samples of fescue were adulterated with rye-grass; but the samples of rye-grass had more impurities than any others examined, some containing over 10 per cent. of Yorkshire fog. The tall fescues had a considerable quantity of ergot. The clovers were singularly free from dodder. Many inquiries have been received as to laying down land for pasture, the treatment of weeds, the diseases affecting cereals, root crops, and fruit and forest trees.

26. During the autumn an inquiry has been proceeding into the nature and means of prevention of the disease known as "anbury" or "finger-and-toe" in turnips, and a report upon the results of the inquiry will shortly appear in the Society's Journal. The informa-

tion so far elicited points to the application of lime, chalk, marl, or gas-lime as the most beneficial of suggested remedies, though these do not prove by any means universally successful. Experiments have been instituted by the Consulting Botanist, with the view of determining the influence of mineral and other additions to the soil upon the fungus causing the disease.

27. The applications received by the Zoologist during the past season have related to about 30 different animal pests, chiefly included among the parasitic worms and the insects. The disease of "Gapes" in poultry-yards and pheasantries has been the subject of some investigation. Of the customary noxious insects, various aphides, "surface caterpillars," and the "gout-fly" (*Chlorops tæniopus*), which infests barley, have been the subjects of most frequent inquiry. The last-named pest would appear to have been especially prevalent throughout a great part of England, applications with regard to it having been received from Yorkshire, Lincolnshire, Northamptonshire, Essex, Wiltshire, Gloucestershire, and Somerset. A good deal of attention has been devoted to the flour-moth, which continues to be a source of great annoyance and loss to corn millers.

28. The Annual Examination for the Society's ten Junior Scholarships of 20*l.* each took place on November 7 and 8, when thirty-two candidates competed. Of these, sixteen passed in all four subjects (Agriculture, Chemistry, Mechanics, and Land Surveying), and obtained the number of marks necessary to qualify them for the Society's Scholarships and Certificates, in the event of their complying, during the forthcoming year, with the conditions of the Examination. Two other boys passed in each of the four subjects, but, not having obtained the minimum aggregate of marks, are ineligible for Certificates. Of the fourteen other unsuccessful candidates, ten failed in one subject, and four in two subjects. There were five failures in Agriculture, seven in Chemistry, four in Mechanics, and two in Land Surveying. Of the sixteen successful candidates, the first ten in the following list will receive Scholarships upon complying with the Society's regulations, and the remainder will receive Certificates :—

1. George Elmhirst Duckering, Sedgebrook School, near Grantham.
2. George Hurley, Aspatria Agricultural College.
3. Samuel Wilson, Maybole Public School, N.B.
4. { Horace George Hill, Northampton Grammar School.
   { Harry Fowell Oldman, Aspatria Agricultural College.
6. James Milroy, Maybole Public School, N.B.
7. George Skinner, Ashburton Grammar School.
8. Fred Wakerley, Sedgebrook School, near Grantham.
9. William George Kemp, Sedgebrook School, near Grantham.
10. Alfred Mortimer, Ashburton Grammar School.
11. Edward Sawdye, Ashburton Grammar School.

12. Joseph Henry Thomas, Sexey's Trade School, Bruton, Somerset.
13. Philip Peebles, Castle College, Guildford.
14. William Hodges Crook Hicks, Cheltenham Grammar School.
15. George Gray Parkin, Northampton Grammar School.
16. William Cook Brakenridge, Aspatria Agricultural College.

29. The Council have decided that the next Examination for the Society's Senior Certificates shall be held from the 8th to the 12th of May, 1894. The Life Membership of the Society will be conferred upon the five winners of first-class certificates who obtain the highest number of marks, money prizes of 25*l.*, 15*l.*, 10*l.*, and 5*l.* respectively being also given to the first four candidates.

30. Under schemes prepared by the Charity Commissioners, and approved by Her Majesty, the Council have appointed Mr. Charles Whitehead upon the South-Eastern College and School Foundation at Wye (Kent), and Mr. Alfred Ashworth upon the Sandbach School (Cheshire) Foundation, as Governors representing the Society.

31. On July 29 last was celebrated the Jubilee of the Rothamsted Agricultural Experiments, which have been carried on since the year 1843 by Sir John Lawes and Dr. (now Sir Henry) Gilbert, and which have had such remarkable results in extending the science and improving the practice of agriculture. The Council gladly took the opportunity of identifying the Society with the movement for the celebration of the Jubilee. H.R.H. the Prince of Wales presided over the Meeting at 12 Hanover Square, at which the Rothamsted Jubilee Fund originated; the Duke of Westminster, as the then President of the Society, acted as Chairman of the Executive Committee; and Addresses from the Society to Sir John Lawes and Dr. Gilbert were presented on July 29 by the Duke of Devonshire, who had meanwhile succeeded to the Presidency.

32. The present acute agricultural crisis, which has been accentuated by the prolonged drought of the last summer, is now under the consideration of a Royal Commission, whose conclusions and recommendations will be awaited with general interest by agriculturists.

By Order of the Council,

ERNEST CLARKE,
Secretary.

December 6, 1893.

QUARTERLY REPORT OF THE CHEMICAL COMMITTEE.

December 1893.

In presenting their usual Quarterly Report to the Council, the Chemical Committee are glad to be able to record that under the provisions of an Act of Parliament passed during the present year their labours for the repression of the adulteration of manures and feeding stuffs will in the future be materially lightened. In the absence of any legislative provisions as to the purity of fertilisers or feeding stuffs, it has been necessary for the Committee to publish from time to time, for the protection of Members of the Society, the names of manufacturers and vendors who have supplied impure and adulterated articles, or who have given to their customers inaccurate descriptions of goods sold. The action of the Society in this regard has undoubtedly been of high value to Members and to the farming community at large, as warning them against unscrupulous traders and against articles sold under misleading names.

II. For the future the buyer will have the remedy against fraud largely in his own hands, for the Fertilisers and Feeding Stuffs Bill, of 1893, introduced into the House of Commons by the President of the Board of Agriculture, and passed into law on September 22, 1893, as the 56 & 57 Vict. ch. 56, requires the vendor to give the purchaser an invoice stating the nature of the article sold, such invoice to have the effect of a warranty that the article is of the quality stated. A copy of the Act is printed as an Appendix to this Report for the information of Members; but it may be convenient to state here its general purport, as set out in a circular issued by the Board of Agriculture, from which the following extracts are taken :—

Warranty to be implied on the Sale of a Fertiliser or Feeding Stuff.

Every person who sells for use as a fertiliser of the soil any article which has been manufactured or subjected to any artificial process in the United Kingdom, or imported from abroad, is required to give to the purchaser an invoice stating the name of the article and whether it is an artificially compounded article or not, and what is at least the percentage of the nitrogen, phosphates soluble and insoluble (*i.e.* in water), and potash, if any, contained in the article, and this invoice is to have effect as a warranty by the seller of the statements contained therein [section 1 (1)]. This provision does not apply to a sale where the whole amount sold at the same time weighs less than half a hundredweight [section 1 (3)].

Every person who sells for use as food for cattle any article which has been artificially prepared is required to give to the purchaser an invoice, stating the name of the article, and whether it has been prepared from one substance or seed, or from more than one substance or seed, and this invoice

is to have effect as a warranty by the seller of the statements contained therein [section 2 (1)].

Where any article sold for use as food for cattle is sold under a name or description implying that it is prepared from any particular substance, or from any two or more particular substances, or is the product of any particular seed, or of any two or more particular seeds, and without any indication that it is mixed or compounded with any other substance or seed, there is to be implied a warranty by the seller that it is pure, *i.e.* is prepared from that substance or those substances only, or is a product of that seed or those seeds only [section 2 (2)].

On the sale of any article for use as food for cattle, there is to be implied a warranty by the seller that the article is suitable for feeding purposes [section 2 (3)].

Any statement by the seller of the percentages of nutritive and other ingredients contained in any article sold for use as food for cattle, made after the commencement of the Act in an invoice of such article, or in any circular or advertisement descriptive of such article, is to have effect as a warranty by the seller [section 2 (4)].

For the purposes of the Act the expression "cattle" means bulls, cows, oxen, heifers, calves, sheep, goats, swine, and horses [section 8 (1)].

Offences, Penalties, and Legal Proceedings.

If any person who sells any article for use as a fertiliser of the soil or as food for cattle commits any of the following offences, namely:—

(*a*) Fails without reasonable excuse to give, on or before or as soon as possible after the delivery of the article, the invoice required by the Act; or

(*b*) Causes or permits any invoice or description of the article sold by him to be false in any material particular, to the prejudice of the purchaser; or

(*c*) Sells for use as food for cattle any article which contains any ingredient deleterious to cattle, or to which has been added any ingredient worthless for feeding purposes and not disclosed at the time of the sale,

he will, without prejudice to any civil liability, be liable, on summary conviction, for a first offence to a fine not exceeding 20*l.*, and for any subsequent offence to a fine not exceeding 50*l.* [section 3 (1)].

In any proceeding for an offence under this section it will be no defence to allege that the buyer, having bought only for analysis, was not prejudiced by the sale [section 3 (2)].

A person alleged to have committed an offence under section 3 in respect of an article sold by him will be entitled to the same rights and remedies, civil or criminal, against the person from whom he bought the article as are available to the person who bought the article from him, and any damages recovered by him may, if the circumstances justify it, include the amount of any fine and costs paid by him on conviction under section 3, and the costs of and incidental to his defence on such conviction [section 3 (3)].

Section 7 of the Act provides that a prosecution may be instituted either by the person aggrieved, or by the council of a county or borough, or by any body or association authorised in that behalf by the Board of Agriculture; but that in the case of an offence under section 3, no prosecution shall be instituted by the person aggrieved or by any body or association except on a certificate by the Board that there is reasonable ground for the prosecution.

It also provides that any person aggrieved by a summary conviction under the Act may appeal to a court of quarter sessions.

III. For the further assistance of farmers who may desire to have analyses made of fertilisers or feeding stuffs (and who presumably are not connected with organisations already existing—like the Royal Agricultural Society—which provide for their Members analyses at low rates) the Act requires each County Council to appoint a "district agricultural analyst," and empowers it to remunerate such officer, charging the sender of the sample such fee as the County Council may appoint (sections 4 and 5). As the Act does not come into force until January 1, 1894, it is as yet too early to forecast whether this provision will make in the future any considerable difference in the number of samples that will be sent to the Society's Consulting Chemist for analysis; but, desiring that Dr. Voelcker's great experience in these matters should be made available as widely as possible under the Act, the Council have already, on the recommendation of this Committee, given him permission to accept any appointments under the Act which may be offered to him by County Councils.

IV. In view of the new Act, the Committee are now considering what revision is necessary in the "Guide to the Purchase of Feeding Stuffs and Manures" and in the "Instructions for Selecting and Sending Samples" issued by the Society to its Members;[1] but looking to the fact that on and after January 1, 1894, buyers will have legislative protection which they did not possess before, it does not appear to the Committee that any substantial advantage would accrue from their now recording in detail the numerous cases of adulteration and misrepresentation which have been brought to their notice during the past quarter.

V. The following facts arising out of these cases may, however, still be of service, as indicating some of the safeguards necessary to be taken by Members when purchasing manures and feeding stuffs in the future:—

Pure Dissolved Bones.—Two cases reported to the Committee give ground for the belief that under the description "Pure Dissolved Bones" or "Pure Dissolved Bones, made under a new process," is sold an article which, inasmuch as it has not been dissolved at all with oil of vitriol, has no right to be called "Dissolved Bones." Although a guaranteed analysis is given with it, this analysis is not that of dissolved bones (for it includes no "soluble phosphate" as understood in the trade), but is closely like that of boiled or steamed bones. Farmers, it is believed, purchase this manure under the impression that they are receiving dissolved bones, *i.e.* "raw bone treated with oil of vitriol." In both the cases above mentioned the vendor made an allowance.

Nitrogenous Bone Manure.—A sample of manure was invoiced to a member as "Nitro Bone Manure," a guaranteed analysis being

[1] For copy of the revised Suggestions as to the Purchase of Fertilisers and Feeding-Stuffs, &c., see pages ccv.–ccviii. of Appendix.

given along with it. Three tons had been purchased at 6*l.* 10*s.* per ton. Dr. Voelcker's analysis showed that, though the results were equal to the figures guaranteed, yet the manure was not bone manure at all, but a mixture of shoddy and mineral superphosphate, and that hence the description given was an incorrect one. The manufacturers ultimately agreed to take 4*l.* per ton nett for the manure, instead of the 6*l.* 10*s.* per ton originally charged.

Slag.—A word of warning was given in the Journal of June 30, 1893 (Vol. IV. Part II. page 364), cautioning farmers against purchasing, under the name of *slag*, an article worthless for manurial purposes, in the belief that they were being supplied at a low price with *basic* slag, a material possessing intrinsic value. That the sale of this article continues is shown by another case in which a Member who intended to purchase 60 tons for his grass land, at 30*s.* a ton, sent a sample to Dr. Voelcker for analysis. Dr. Voelcker reported that "it was not basic slag at all, but an almost worthless material containing but a trace of phosphoric acid, whereas basic slag should have about 17 per cent." As a consequence of this report no purchase was made by the Member.

Horn Dust.—A sample of what was called "Pure Horn Dust," and the price of which was 2*l.* 10*s.* per ton, was reported upon by Dr. Voelcker as containing very little horn dust at all, the greater part being vegetable ivory with some small amount of bone, and the price asked being much beyond its value. It was subsequently ascertained that a sample had been received from a man who professed to buy horn dust at the Sheffield workshops and to retail it amongst farmers. In consequence of the analysis no purchase was made.

Linseed Cake adulterated with Rice Oil.—The following case is important as bringing to light a new form of adulteration practised, and one which may, unless care be exercised by the analyst, readily escape detection. It exemplifies also the risk of accepting the term *oil cake* in place of that of *linseed* cake, and of the buyer being content with any guarantee of oil which does not stipulate that the oil shall be *linseed* oil or, what is synonymous with this, that the cake shall be *pure linseed cake*.

It is believed that linseed meal, from which the oil had been in great measure removed, had in this instance been mixed up with *rice* oil, so that the figures of analysis, though apparently reading well and showing a cake rich in oil, represented hardly any *linseed* oil at all, but only the greatly inferior *rice* oil.

A Member sent a sample of cake, 4 tons of which he had purchased at 7*l.* 15*s.* per ton. The circular sent by the vendors contained under the general heading of *Linseed Cakes* the following item:—

"Bombay (very fine), guaranteed 13 to 16 per cent. oil."

When, however, the invoice was received, the cake was merely

described as "Bombay Oil Cake," and not as "Linseed Cake." Dr. Voelcker examined the cake and reported as follows :—

"This is not genuine linseed cake, and the oil is not pure linseed oil."

After sending this report, Dr. Voelcker made further investigations, and, as the result of these, ascertained that though the cake was free from any admixture of foreign *seeds*, and was to all outward appearance a pure one, the *oil* contained in it was almost entirely *rice* oil. Of the 18·5 per cent. of oil shown in the analysis, less than $1\frac{1}{2}$ per cent. was linseed oil, and the remainder rice oil. On the purchaser complaining to the merchants, the latter said that they never represented the cake to be linseed cake at all, and that at the price charged it could not possibly be perfectly pure linseed cake.

Oil Cake supplied when Linseed Cake ordered.—The two following cases are mentioned as illustrating the necessity of taking care not only to order linseed cake, but to see that the delivery is invoiced accordingly, and that the subterfuge of invoicing the cake as *oil cake* is not adopted, in order to avoid responsibility.

A member of a firm of London solicitors gave an order to a firm of cake merchants for 2 tons of linseed cake. When, however, this was delivered, the invoice described the cake, not as *linseed* cake, but as *oil* cake. A sample being sent to Dr. Voelcker, he reported as follows :—

	July 26, 1893.	
Moisture	12·07	
Oil	7·97	
[1] Albuminous compounds (flesh-forming matters)	26·19	100 00
Mucilage, sugar, and digestible fibre	37·25	
Woody fibre (cellulose)	8·43	
[2] Mineral matter (ash)	8 09	
[1] containing nitrogen	4·19	
[2] including sand	3 19	

A cake not only low in quality, when judged by the analytical results, but containing nearly as much impurities, I should judge, as there is linseed. Rape is present in large quantities, also cockle seed, spurrey, polygonum, mustard, and quite a collection of other weed seeds, in addition to over 3 per cent. of sand. Surely such a cake was never offered as *linseed*-cake.

Upon the purchaser complaining, the merchants said that they would write to the makers of the cake at Hull, and in the end they admitted that they did not invoice the cake as "Linseed Cake," in order to "avoid liability in case the crusher used impure linseed."

In another case of the same kind a sample of linseed cake was sent, the price of which was 8*l.* 17*s.* 6*d.* per ton delivered. Five tons of the cake had been purchased.

Dr. Voeleker's report on the cake was :—

	September 8, 1893.	
Moisture	10·58	
Oil	10·13	
[1] Albuminous compounds (flesh-forming matters)	21·87	100·00
Mucilage, sugar, and digestible fibre	37·65	
Woody fibre (cellulose)	11·43	
[2] Mineral matter (ash)	8·34	
[1] containing nitrogen	3·50	
[2] including sand	3·79	

A cake which is full of impurities. Among these figure rape, spurrey, cockle, earthnut, mustard, rice, &c., and there is nearly 4 per cent. of sand as well.

In reply to further inquiries it was found that the invoice only described the eake as *oil* cake, and that the order given for *linseed* cake was merely a verbal one.

Refuse Meal from Tinplate Works.—A Member sent for analysis a sample which he described as "bran." Dr. Voelcker reported that it was "not bran at all, but an inferior mixture of flour and some fibrous material. The ash, moreover, is composed largely of sulphate of lime, and with this the meal is adulterated."

The purchaser subsequently wrote that the "bran" was what had been used in local tinworks for cleaning tinplates, and that during the process it got saturated with palm oil of the best quality and was sold at 2*l.* 10*s.* per ton as "Best Bran saturated with Palm Oil." Dr. Voelcker pointed out that while a farmer could not expect to get genuine feeding bran for 2*l.* 10*s.* per ton, still less bran enriched with palm oil, his own analysis showed that there was very little oil at all in the sample, and that to such material as that used the name "bran" had no right to be applied.

Poisoning of Cattle by Castor-oil Bean occurring in Decorticated Cotton-cake Meal.—Three different Members of the Society resident in Shropshire sent for analysis to Dr. Voelcker samples of decorticated cotton-cake meal. The first one wrote that he fancied there was something wrong with the meal, as it purged his cattle very much, and he had had several very unwell since using it. The second stated that out of 150 cattle which had been feeding upon the meal nearly half had suddenly taken to scour. The third said that on the very first time of giving the meal to twenty-eight feeding heifers, every one of them became ill with violent purging, and one died from the effects. A veterinary surgeon who was consulted reported as follows :—"I have made a post-mortem examination of the heifer you sent to-day, and found the cause of death was inflammation of the bowels caused by irritant poison in the food."

After careful analytical and microscopical examination Dr. Voelcker found in each of the three cases that the husk of castor-oil bean was present in the meal. This led to further inquiries, and it was elicited that, while the vendors did not deny their liability, the

matter was forming the basis of legal proceedings between Liverpool brokers and the importers of the meal, this latter having been shipped from America.

In the end substantial compensation was made to each purchaser for the loss or injury done to his cattle.

VI. With reference to the case of linseed cake supplied to Mr. C. E. Galbraith, and reported on page 753 of Part IV. of Vol. III. of the Journal (December 31, 1892), the Committee have now ascertained from Mr. M. D. Penney that the copy certificate of analysis purporting to have been signed by Mr. Penney, enclosed in Messrs. George Meek and Son's letter to Mr. Galbraith, was not a copy of a certificate made by Mr. Penney for or given by him to Messrs. Meek and Son, but that it was (with the exception of the date and the heading, "Copy of Analysis of Samples of G. M. 95 per cent. Linseed Cakes") a copy of a certificate given by Mr. Penney on July 30, 1892, to Messrs. J. Ehlers and Co., of Hull, in respect of a sample of cake which bore no stamp or brand; and the Committee have no reason to doubt that Mr. Penney's analysis thereof was strictly correct.

It appears that on July 30, 1892, Messrs. J. Ehlers and Co. sold or contracted to sell to Messrs. George Meek and Son 30 tons of 'G. M. 95 per cent. Linseed Cakes" at 7*l.* 15*s.* per ton. Messrs. Meek and Son state that Mr. Penney's analysis was given to them by Messrs. Ehlers and Co., who manufactured the cake for them, and represented it was a recent analysis of their (Messrs. Meek and Son's) branded cake. They also state that Messrs. Ehlers and Co. made them the allowance of 10*s.* per ton which they (Messrs. Meek and Son) made to Mr. Galbraith.

Mr. Penney represents to the Committee that some persons reading the former Report have been led by it to believe that the sample of impure cake analysed by the Society's Consulting Chemist for Mr. Galbraith was a sample of the same cake as that analysed by Mr. Penney. The Committee therefore feel that in justice to Mr. Penney this explanation should be made, and that the whole of the facts as now known should receive the same publicity as the previous Report.

R. A. Warren,
Chairman.

December 5, 1893.

APPENDIX

THE FERTILISERS AND FEEDING STUFFS ACT, 1893
(56 & 57 Vict. ch. 56)

An Act to amend the Law with respect to the sale of Agricultural Fertilisers and Feeding Stuffs. [22*nd September* 1893.]

Be it enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

Warranty on sale of fertiliser.

1.—(1.) Every person who sells for use as a fertiliser of the soil any article manufactured in the United Kingdom or imported from abroad shall give to the purchaser an invoice stating the name of the article and whether it is an artificially compounded article or not, and what is at least the percentage of the nitrogen, soluble and insoluble phosphates, and potash, if any, contained in the article, and this invoice shall have effect as a warranty by the seller of the statements contained therein.

(2.) For the purposes of this section an article shall be deemed to be manufactured if it has been subjected to any artificial process.

(3.) This section shall not apply to a sale where the whole amount sold at the same time weighs less than half a hundredweight.

Warranty on sale of feeding stuff.

2.—(1.) Every person who sells for use as food for cattle any article which has been artificially prepared shall give to the purchaser an invoice stating the name of the article and whether it has been prepared from one substance or seed, or from more than one substance or seed, and this invoice shall have effect as a warranty by the seller of the statements contained therein.

(2.) Where any article sold for use as food for cattle is sold under a name or description implying that it is prepared from any particular substance, or from any two or more particular substances, or is the product of any particular seed, or of any two or more particular seeds, and without any indication that it is mixed or compounded with any other substance or seed, there shall be implied a warranty by the seller that it is pure, that is to say, is prepared from that substance or those substances only, or is a product of that seed or those seeds only.

(3.) On the sale of any article for use as food for cattle there shall be implied a warranty by the seller that the article is suitable for feeding purposes.

(4.) Any statement by the seller of the percentages of nutritive and other ingredients contained in any article sold for use as food for cattle, made after the commencement of this Act in an invoice of such article or in any circular or advertisement descriptive of such article, shall have effect as a warranty by the seller.

Penalties for breach of duty by seller.

3.—(1.) If any person who sells any article for use as a fertiliser of the soil or as food for cattle commits any of the following offences, namely:—

(*a*) Fails without reasonable excuse to give, on or before or as soon as possible after the delivery of the article, the invoice required by this Act; or

(*b*) Causes or permits any invoice or description of the article sold by him to be false in any material particular to the prejudice of the purchaser; or

(*c*) Sells for use as food for cattle any article which contains any ingredient deleterious to cattle, or to which has been added any ingredient worthless for feeding purposes and not disclosed at the time of the sale,

he shall, without prejudice to any civil liability, be liable, on summary conviction, for a first offence to a fine not exceeding twenty pounds, and for any subsequent offence to a fine not exceeding fifty pounds.

(2.) In any proceeding for an offence under this section it shall be no defence to allege that the buyer, having bought only for analysis, was not prejudiced by the sale.

(3.) A person alleged to have committed an offence under this section in respect of an article sold by him shall be entitled to the same rights and remedies, civil or criminal, against the person from whom he bought the article as are available to the person who bought the article from him, and any damages recovered by him may, if the circumstances justify it, include the amount of any fine and costs paid by him on conviction under this section, and the costs of and incidental to his defence on such conviction.

Power to appoint analysts.

4.—(1.) The Board of Agriculture shall appoint a chief agricultural analyst (hereafter referred to as the chief analyst), who shall have such remuneration out of moneys provided by Parliament as the Treasury may assign. The chief analyst shall not while holding his office engage in private practice.

(2.) Every county council shall, and the council of any county borough may, appoint or concur with another council or other councils in appointing for the purposes of this Act a district agricultural analyst (hereafter referred to as a district analyst) for its county or borough, or a district comprising the counties or boroughs of the councils so concurring. The remuneration of any such district analyst shall be provided by the council, or in the case of a joint appointment by the respective councils in such proportions as they may agree, and shall be paid, in the case of a county, as general expenses, and, in the case of a county borough, out of the borough fund or borough rate. The appointment shall be subject to the approval of the Board of Agriculture. Provided that no person shall while holding the office of district analyst engage in any trade, manufacture, or business connected with the sale or importation of articles used for fertilising the soil or as food for cattle.

Power for purchaser to have fertiliser or feeding stuff analysed.

5.—(1.) Every buyer of any article used for fertilising the soil or as food for cattle shall, on payment to a district analyst of a fee sanctioned by the body who appointed the analyst, be entitled, within ten days after delivery of the article to the buyer or receipt of the invoice by the buyer, whichever is later, to have the article analysed by the analyst, and to receive from him a certificate of the result of his analysis.

(2.) Where a buyer of an article desires to have the article analysed in pursuance of this section, he shall, in accordance with regulations made by the Board of Agriculture, take three samples of the article, and shall in accordance with the said regulations cause each sample to be marked, sealed, and fastened up, and shall deliver or send by post one sample with the invoice or a copy thereof to the district analyst, and shall give another sample to the seller, and shall retain the third sample for future comparison: Provided that a district analyst, or some person authorised by him in that behalf with the approval of the body who appointed the analyst, shall, on request either by the buyer or by the seller, and on payment of a fee sanctioned by the said body, take the samples on behalf of the buyer.

(3.) The certificate of the district analyst shall be in such form and contain such particulars as the Board of Agriculture direct, and every district analyst shall report to the Board as they direct the result of any analysis made by him in pursuance of this Act.

(4.) If the seller or the buyer objects to the certificate of the district

analyst, one of the samples selected, or another sample selected in like manner, may, at the request of the seller, or, as the case may be, the buyer, be submitted with the invoice or a copy thereof to the chief analyst, and the seller, or, as the case may be, the buyer, shall, on payment of a fee sanctioned by the Treasury, be entitled to have the sample analysed by the chief analyst, and to receive from him a certificate of the result of his analysis.

(5.) At the hearing of any civil or criminal proceeding with respect to any article analysed in pursuance of this section, the production of a certificate of the district analyst, or, if a sample has been submitted to the chief analyst, then of the chief analyst, shall be sufficient evidence of the facts therein stated, unless the defendant or person charged requires that the analyst be called as a witness.

(6.) The costs of and incidental to the obtaining of any analysis in pursuance of this section shall be borne by the seller or the buyer in accordance with the results of the analysis, and shall be recoverable as a simple contract debt.

Penalty for tampering.

6. If any person knowingly and fraudulently—

(*a*) tampers with any parcel of fertiliser or feeding stuff so as to procure that any sample of it taken in pursuance of this Act does not correctly represent the contents of the parcel; or

(*b*) tampers with any sample taken under this Act;

he shall be liable on summary conviction to a fine not exceeding twenty pounds, or to imprisonment for a term not exceeding six months.

Prosecutions and appeals.

7.—(1.) A prosecution for an offence under this Act may be instituted either by the person aggrieved, or by the council of a county or borough, or by any body or association authorised in that behalf by the Board of Agriculture, but in the case of an offence under section three shall not be instituted by the person aggrieved or by any body or association except on a certificate by the Board of Agriculture that there is reasonable ground for the prosecution.

(2.) Any person aggrieved by a summary conviction under this Act may appeal to a court of quarter sessions.

Construction and application.

8.—(1.) For the purposes of this Act the expression "cattle" shall mean bulls, cows, oxen, heifers, calves, sheep, goats, swine, and horses; and the expressions "soluble" and "insoluble" shall respectively mean soluble and insoluble in water.

(2.) This Act shall apply to wholesale as well as retail sales.

Application to Scotland.

9. In the application of this Act to Scotland—

(1.) The expression "council of any county borough" shall mean the magistrates and town council of a burgh, and the duties and powers of councils of counties and county burghs shall be performed and be exerciseable in a county by the county councils or district committees thereof, and in a burgh by the magistrates and town council, and the remuneration of district analysts appointed under this Act shall be paid in the case of a county out of the consolidated rate, and in the case of a burgh out of the police or burgh general assessment.

(2.) The expression "burgh" means a burgh which returns or contributes to return a member to Parliament, not being a burgh to which section fourteen of the Local Government (Scotland) Act, 1889 (52 & 53 Vict. c. 50), applies.

(3.) Penalties for offences under this Act may be recovered summarily before the sheriff in manner provided by the Summary Jurisdiction Acts, and any person aggrieved by a summary conviction may appeal therefrom in accordance with the provisions of those Acts.

Application to Ireland.

10. For the purposes of the execution of this Act in Ireland, inclusive of the appointment of a chief agricultural analyst, the Lord Lieutenant acting by the advice of the Privy Council shall be substituted for the Board of Agriculture, and the district analysts shall be the analysts appointed for counties and boroughs in Ireland under the Sale of Food and Drugs Act, 1875 (38 & 39 Vict. c. 63), and the additional remuneration of such analysts for their duties under this Act shall be provided in manner directed by the said Act of 1875 and any Act amending the same.

Commencement of Act.

11. This Act shall come into operation on the first day of January, one thousand eight hundred and ninety-four.

Short title.

12. This Act may be cited as the Fertilisers and Feeding Stuffs Act, 1893.

REPORT OF THE EDUCATION COMMITTEE

On the Results of the Junior Examination of November 1893.

The Committee have to report that the Examination for the Society's ten Junior Scholarships of 20*l.* each, for boys between the ages of 14 and 18, took place on November 7 and 8, 1893. Thirty-two candidates competed from the following eleven schools:—

The Aspatria Agricultural College; the Ashburton, Cheltenham, Kidderminster, and Northampton Grammar Schools; the Castle College, Guildford; Little Massingham Rectory, Norfolk; the Maybole Public School, Ayrshire; the Sedgebrook School, Grantham; Sexey's Trade School, Bruton, Somerset; and the Swanley Horticultural College.

2. Of the thirty-two competitors, sixteen have passed in all four subjects (Agriculture, Chemistry, Mechanics, and Land Surveying) and have obtained the number of marks necessary to qualify them for the Society's Scholarships and Certificates. These will, in accordance with the regulations, be retained until the winners of the Scholarships shall have spent the ensuing year at school or college, or with a practical agriculturist upon a farm. Two candidates (one

from the Ashburton Grammar School and one from the Aspatria Agricultural College) passed in all four subjects, but failed to obtain the minimum total marks necessary to qualify for Certificates. Of the fourteen other unsuccessful competitors, ten failed in one subject and four in two subjects. There were five failures in Agriculture, seven in Chemistry, four in Mechanics, and two in Land Surveying.

3. The names of the successful candidates, with the number of marks gained by each, are given in subjoined the Table.

No. in order of merit	Candidate	Age	School or College	Agriculture, 400; pass, 160	Chemistry, 200; pass, 75	Mechanics, 200; pass, 75	Land Surveying, 100; pass, 40	Total, 900; pass, 450
1	Duckering, G. E.	17	Sedgebrook, Grantham	335	150	137	71	693
2	Hurley, G.	16	Aspatria Agricultural College	265	148	151	88	652
3	Wilson, S.	16	Maybole Public School, N.B.	245	131	161	84	621
4	Hill, H. G.	17	Northampton Grammar School	290	157	98	61	606
	Oldman, H. F.	16	Aspatria Agricultural College	310	96	130	70	606
6	Milroy, J.	17	Maybole Public School, N.B.	250	129	109	85	573
7	Skinner, G.	15	Ashburton Grammar School	260	106	110	95	571
8	Wakerley, F.	16	Sedgebrook, Grantham	285	122	103	54	564
9	Kemp, W. G.	16	Sedgebrook, Grantham	275	130	108	50	563
10	Mortimer, A.	15	Ashburton Grammar School	215	104	123	85	527
11	Sawdye, E.	16	Ashburton Grammar School	250	131	78	63	522
12	Thomas, J. H.	14	Sexey's Trade School, Bruton	200	107	112	70	489
13	Peebles, P.	17	Castle College, Guildford	235	116	90	47	488
14	Hicks, W. H. C.	16	Cheltenham Grammar School	225	139	76	47	487
15	Parkin, G. G.	17	Northampton Grammar School	210	75	99	78	462
16	Brakenridge, W. C.	17	Aspatria Agricultural College	205	96	95	57	453

4. The Examiner in Agriculture (Mr. Primrose McConnell, B.Sc.) reports that "on comparing the marks with last year, I find that the standard of the two examinations is just about equal, both as regards the proportion of the marks earned and the proportion of failures. The general quality of the papers kept on improving up till last year, and it is very satisfactory to note that the high standard then attained has been again reached. This is gratifying in view of the fact that the candidates have no selection of questions, and must have a pretty wide acquaintance with actual farm management."

5. Upon the whole, the results of the Examination are satisfactory. In two of the eleven schools the subject of Agriculture appears to be a weak point; but, taken altogether, the large proportion of successes is an indication of the practical nature of the instruction given. A noticeable feature this year is the small number of failures in the subjects of Mechanics and Land Surveying, upon which the Examiner (the Rev. Professor Twisden, M.A.) reports favourably.

MORETON,
Chairman.

December 5, 1893.

EXAMINATION IN AGRICULTURE.

MAXIMUM NUMBER OF MARKS, 400. PASS NUMBER, 150.

Tuesday, November 7, 1893.

(*Three hours allowed.*)

1. Write a short paper on the question of cubic air-space and ventilation of cow-houses.
2. What are the advantages derived from the use of a "digging" plough?
3. Describe some economical system of feeding milk-cows during this coming winter, when both roots and fodder will be scarce.
4. Make up a prescription for a mixture of artificial manures suitable for turnips on a loamy soil where no farmyard manure is used.
5. Discuss the question of autumn versus spring manuring for root-crops.
6. Given a field of run-out inferior pasture on a clay soil, state what you would do to improve it.
7. Describe the work connected with the folding of sheep on turnips in winter, giving the quantities of each kind of food allowed per head per day.
8. Explain what is meant by "pedigreed" seed. Describe how it has been developed, and what its value is to farmers.
9. Describe the points of any one breed of pigs with which you are acquainted.
10. Work out the average cost of a day's work of a man and pair of horses.

EXAMINATION IN ELEMENTARY CHEMISTRY.

MAXIMUM NUMBER OF MARKS, 200. PASS NUMBER, 75.

Tuesday, November 7, 1893.

(*Three hours allowed.*)

1. What is meant by *quantivalence* of the elements? Illustrate your reply by examples.
2. What is *oxidation*? Give instances of its action and the changes produced by it.
3. Name the chief properties of *sulphuretted hydrogen* gas. How may it occur in nature, and what are its principal uses in the laboratory?
4. Which are the principal compounds of *magnesium*? Name their chief properties.
5. Which salts are most generally met with in *drinking-waters*, and how may the presence of any of these, in large or small proportion respectively, affect the nature of the water?
6. How many different phosphates does *sodium* form with tribasic phosphoric acid (H_3PO_4)? How can these be severally formed?
7. Define in chemical terms the following: *Fluorspar, heavy spar, alabaster, borax, galena, vermilion.*

EXAMINATION IN MECHANICS AND NATURAL PHILOSOPHY.

MAXIMUM NUMBER OF MARKS, 200. PASS NUMBER, 75.

Wednesday, November 8, 1893.

(*Three hours allowed.*)

1. If a body rests on a horizontal plane under the action of gravity, what are the conditions of equilibrium?

Suppose a body is placed on a horizontal plane in such a position that the conditions of equilibrium are fulfilled, what other condition has to be fulfilled if the body, left to itself, is to stay in that position? Illustrate your answer by the case of a ball so loaded that the centre of gravity is not at the middle point.

2. If a body rests against a smooth point, in what direction is the reaction of the point against the body exerted?

Draw a line AB, and suppose that it is inclined downward from A at an angle of 30° to the horizon; take in it a point C, such that CB is a fourth of AB; suppose that AB is a uniform rod supported by a smooth hinge at A and resting against a smooth point at C; show in a diagram the forces that keep the rod at rest, and show, by construction or calculation, that the pressure of the rod on the fixed point at C is very nearly six-tenths of the weight.

3. Draw a diagram of the first system of pulleys (in which each pulley hangs by a separate rope) with four pulleys, one fixed and three movable. If the weight is raised one foot, how many feet must the power descend? What is the least length of rope that must be used if the weight is to be raised one foot?

4. What is meant when it is said that the coefficient of friction between two substances is 0·3?

At what points is friction exerted in the case of a cart-wheel? Explain why it is easier to draw a car along a tramway than along an ordinary road.

5. If a force of three absolute units (poundals) acts on a mass of 10 lb., what velocity does it impart in 1 second? What velocity does it impart if it continues to act for 7 seconds?

6. What is the kinetic energy of a particle whose mass is 12 lb., and which moves at the rate of 15 ft. a second? If the motion of the particle is resisted by a force of 9 absolute units (poundals), what will be its velocity when it has described 20 ft.?

7. A glass ball weighs 10 oz.; it is found to weigh 6 oz. when it is in a liquid A, and 5 oz. when it is in a liquid B; what ratio does the specific gravity of A bear to that of B?

8. Put a piece of ice into an open tin pot and let it half melt; then put the pot over a flame; of course, in time the water will boil and be evaporated. At what stages of the proceeding will the temperature of the water be constant, and at what will it be continuously increasing?

What difference would there be if the process, instead of taking place near the level of the sea, took place at the top of a high mountain?

9. What is the relation between the volume, pressure, and temperature of a given quantity of air?

What is meant when the coefficient of expansion for 1° C. is given as 0·003665?

If the volume of a given quantity of air is 10 cubic ft. when the temperature is 20° C., what will be its volume when the temperature is raised to 21° C., without change of pressure?

10. A fly-wheel weighs 20 tons, and we can suppose the mass to be distributed along the circumference of a circle 30 ft. in diameter; if it turns at the rate of 40 times a minute, what is its kinetic energy in foot-pounds? ($g = 32$, $\pi^2 = 10$).

If it had to give up 800,000 foot-pounds of its energy, by how many turns a minute would its velocity be reduced?

EXAMINATION IN MENSURATION AND LAND SURVEYING.

MAXIMUM NUMBER OF MARKS, 100. PASS NUMBER, 40.

Wednesday, November 8, 1893.

(*Two hours allowed.*)

1. The sides of a quadrilateral figure, taken in order, are 310, 196, 283, 415 ft. respectively; the angle between the first and fourth sides is 72°; draw the figure to a scale of 1 in. equal to 65 ft., and note the number of degrees in the angle opposite to the given angle, and the number of feet in the diagonal passing through the given angle.

2. The dimensions of a brick set in mortar are 9 in. by $4\frac{1}{2}$ in. by 3 in.; find how many bricks are required to build a mass of brickwork 10 ft. by 8 ft. by $4\frac{1}{2}$ ft.

3. A cylindrical tank is 12 ft. high, and the diameter of its base is 9 ft.; given that 25 gallons equal 4 cubic feet, find the number of gallons that the tank will contain.

4. Briefly explain the principle of the vernier.

Draw a line 3 in. long, and divide it into inches and tenths of an inch, and mark the inches 0, 1, 2, 3; draw a vernier by which the scale can be read to one-hundredth of an inch, and draw the vernier against the scale in the position it would occupy when the reading is 1·37 in.

5. Along a line AB beginning from A, distances 0, 105, 220, 350, 410, 480, 575, 750 are measured; the offsets at the points respectively are 0, 80, 60, 40, 0 to the right, and 70, 90, 50 to the left, all being in links. Arrange these measurements in the form in which they would be entered in a field-book, and plot the boundary to a scale 1 in. equal to 1 chain.

6. A, B, C, are three points on the ground, not in the same straight line. A level is placed between A and B, and the readings are 2·35 back-sight to A, and 6·60 fore-sight to B; it is then placed between B and C, and the readings are 4·71 back-sight to B, and 7·58 fore-sight to C; if the level is now placed between C and A, and the fore-sight to A is 3·17, what should the back-sight to C be?

ANNUAL REPORT FOR 1893 OF THE CONSULTING CHEMIST.

DURING the twelve months ended November 30, 1893, the number of samples submitted to me for analysis in the ordinary course by Members of the Society has been 1,363, this being 152 in excess of the number sent during the previous year, 1891–2. In addition, there have been a number of samples analysed in connection with the Society's Experimental Farm at Woburn, others in connection with the Country Meeting of the Society at Chester, and yet others relating to various matters of agricultural investigation—making altogether a total of 1,500 samples for the year. A list of the various heads under which the analyses have been grouped is given at the end of this report.

The increase, while due in some measure to the larger exercise by Members of their privileges, is also due to the examination of some 80 samples on behalf of a Member who is carrying out various

field and other experiments on his own account. This gentleman, Mr. James Mason, of Eynsham Hall, Witney, Oxon, is engaged in putting into actual practice the latest discoveries of agricultural science, more especially in reference to the question of the utilisation by leguminous plants of the nitrogen derived from the atmosphere,[1] and considerable interest attaches to the pursuit of his inquiries, following, as they do, in a practical way, the more strictly scientific work of Lawes and Gilbert in this country.

Mr. Mason is endeavouring to ascertain to what extent the soil is enriched by the growth of leguminous crops, and, by analysis of the soil, of the crops removed, and of the drainage water that flows away, he is setting out a debtor and creditor account for his land in respect of the nitrogen accumulated or removed from the soil.

Investigations have also been pursued in the laboratory with reference to the use and composition of preservative mixtures for milk and cream, into the means of marking foreign meat, the composition and nature of certain Australian wheat soils, and of soils affected with "finger and toe."

As regards the ordinary samples sent for analysis, there is a falling off in feeding stuffs, an increase in manures generally, and a very considerable increase in the number of waters, no less than 228 of these having been examined. Without doubt the exceptional and prolonged dry season experienced this year was in great measure the cause of this latter increase, producing, as it did, a shortness of water-supply in many parts, and the utilisation of fresh sources or of those of doubtful purity. In a large number of cases the necessity for care in this respect was clearly proved, as many of the samples submitted showed manifest signs of pollution having taken place.

The Quarterly Reports issued by the Chemical Committee have, as usual, brought to light many cases of adulteration and misrepresentation, and have proved of much benefit to farmers in apprising them of the principal, and especially of new, forms of adulteration practised.

The passing of the Fertilisers and Feeding Stuffs Act, following on the report of the Departmental Committee on this subject, has been one of the most prominent features of the year, and, if properly carried out, it is almost sure to be of considerable value to the farming community. It is not too much to say that the continued efforts of the Royal Agricultural Society to afford security for their Members when purchasing manures and feeding stuffs, as well as the prominence which they have given by their Quarterly Reports to cases of adulteration brought under their notice, have to no small degree contributed to the framing of the new Act, and to the providing of remedies by legislation in cases of fraud and misrepresentation. One of the chief advantages that a farmer will gain by this legislation is, that it will henceforth be incumbent on every vendor of a manure or feeding stuff to give the purchaser an invoice,

[1] See *Field Experiments on the Fixation of Free Nitrogen.* By James Mason. Journal, 3rd series, Vol. III., 1892, pp. 651–657.

setting out clearly the nature of the material sold, and, in the case of a fertiliser, its guaranteed analysis as well. Moreover, as regards feeding cakes, &c., it will be necessary in future for a vendor to declare that a cake called by a name such as linseed cake, cotton cake, &c., shall be made only with the seed denominated by the name used, and shall, when described by the name of the seed, be taken to be "pure," i.e., unmixed with any other seed or seeds. Hence, "linseed cake" will in future mean "pure linseed cake," and not be taken, as it often is now, as synonymous with *oil cake*.

In justice to high-class trading firms it must be said that they will welcome rather than oppose such legislation, and it will undoubtedly give the farmer greater facilities for obtaining that for which he has contracted. It is, I am convinced, more amongst the small traders and those who keep up running accounts with the farmers, on long credit, that the greatest scope exists for the practice of adulteration. And, though legislation has been introduced, it will need as much vigilance as ever to ensure that the right article is purchased and that it is correctly described on the invoice now obliged to be given with the purchase.

The past year has not been remarkable for any great fluctuations in the prices of either manures or feeding stuffs, nor have any specially fresh articles been introduced; but it has once more to be chronicled that, amid the many causes of complaint which he has, the farmer cannot well find fault with either the prices or the quality of what he has been able to buy from high-class firms.

The most prominent new forms of adulteration, or of misrepresentation, brought to the notice of the Chemical Committee have been as follows:—

The sale of a material called "slag" to farmers, they thinking that they are thereby purchasing "*basic* slag"; the sale, under the description of "Dissolved Bones," or "Dissolved Bones made under a new process," of a manure not dissolved at all, but akin to boiled or steamed bones; the adulteration of linseed cake with rice oil; and the occurrence of sand in some quantity in undecorticated cotton cakes.

These will be severally noted when considering the respective heads under which the materials in the following summary are grouped.

Linseed Cakes.

Purity of Cakes.—Little or no difficulty has been experienced in respect of adjudicating on the question of "purity" in these cakes, the definition of a pure cake as laid down in the Journal, Vol. XXIV. (1888), pp. 300, 301, having worked admirably, and having given rise to no real dispute whatever, or to any conflict of opinion between chemists.

The difficulty, however, has been to get farmers to insist on having cake invoiced to them as *linseed* cake, and too often the misleading name *oil* cake has been substituted on the invoice, even when linseed cake has been specifically ordered.

The new Act introduced this year will, it is hoped, put an end to this form of misrepresentation.

Hard-pressed cakes.—Several cakes, chiefly of American manufacture, came under my notice which were very hard-pressed and consequently very poor in oil.

The following analyses illustrate this :—

	A	B	C	D
Moisture	8·77	10·65	11·57	12·67
Oil	4·95	6·31	6·32	5·91
[1] Albuminous compounds (flesh-forming matters) . . .	37·37	37·12	31·06	29·69
Mucilage, sugar, and digestible fibre	36·81	32·19	34·87	34·33
Woody fibre (cellulose) . .	6·88	8·16	8 84	10·77
[2] Mineral matter (ash) . . .	5·22	5·57	7·34	6·63
	100·00	100·00	100·00	100·00
[1] containing nitrogen . .	5·98	5·94	4·97	4·75
[2] including sand . . .	·09	·14	1·79	1·34

A cost 7*l.* 15*s.* per ton delivered.
B ,, 7*l.* 10*s.* ,, ,,
C ,, 8*l.* 15*s.* ,, ,,

Linseed Cake adulterated with Rice Oil.—A new form of adulteration was brought to light in the case of a cake sent to me lately, and which, while I found it to be free from admixture of foreign seeds and to contain 18·5 per cent. of oil, gave, on extraction of the oil, one of a very acid nature and quite different to linseed oil. This led to further examination, and ultimately I found that the cake did not contain more than 1½ per cent. of genuine linseed oil, and that the remainder was rice oil.

I have little doubt that "extracted" linseed-meal (i.e., linseed-meal from which the oil had been removed) was compounded with rice oil, and the whole pressed again into cake. The price charged was 7*l.* 15*s.* per ton. This exemplifies the necessity of stipulating for pure linseed cake, and of not being content with a mere guarantee of percentage of *oil* ; but of insisting that the oil be *linseed* oil, inasmuch as the feeding value of rice oil is relatively very small.

Cotton Cakes.

Sand in Cotton Cakes.—During this year several instances of undecorticated cotton cakes have been met with which showed that an impure and imperfectly cleaned seed had been used. Not only has there been considerable trouble, owing to the presence on the market of a number of "woolly" cakes, i.e., those in which there has been a quantity of cotton-wool left adhering to the seed ; but a new feature has come to the fore in the presence of a not inconsiderable amount of sand. Previously this very seldom occurred, and about ·25 per cent. of sand was all that was, as a rule, to be found.

The following instances will show the increase that has from time to time taken place, and it is one that should be guarded against.

Sand in Undecorticated Cotton Cake:—

	A	B	C	D
Mineral matter (ash) . . .	6·97	6·57	7·87	8·16
including sand . . .	1·69	1·59	2·12	2·78

Hair and Wool in Cotton Cakes.—As exemplifying the danger attending the use of cotton cakes containing wool or hair attaching to the seed or to the cakes, the following instance may be cited :—

A Member of the Society sent me last winter a sample drawn from several cakes, writing as follows :—

"I have had several sheep die during the last week, and on opening them found a ball of some substance in the stomach. I commenced to give them cotton cake about a week before they began to fall amiss. I enclose a sample of cake, and the substance taken out of the stomach of one of the sheep, similar to that found in the others."

On examining the cakes I found that they contained a good deal of hairy material attaching to the exterior, and that this substance was the same as that composing the lumps which were found in the stomach of the sheep that died.

I ascertained, further, that these lumps did not contain wool such as might be licked off from the backs of other sheep, and that the sheep that died did not have access to any sacking or hairy material except that which was taken along with the cake.

Miscellaneous Feeding Stuffs.

Rape Cakes (for feeding).—A few rape cakes used for feeding purposes have been sent for examination. These, while showing some improvement over the generality of former samples, and being free, moreover, from mustard, had still more sand than they should have had.

In three cases the results were :—

	A	B	C
Mineral matter (ash) . . .	7·90	10·28	7·78
including sand	2·60	4·59	2·64

Dried Grains.—This material, the largely extended use of which might have been expected in consequence of the shortness of the hay crop, has been so much raised in price that it is doubtful whether it can still be considered an economical food.

A Member of the Society sent me two samples, one of English, and the other of American manufacture.

The respective prices were—

English grains, 6*l.* per ton delivered.
American grains, 7*l.* 10*s.* per ton delivered.

It was claimed that the American sample was worth the extra price. The analysis shows that, while the American sample was rather the better, the difference was nothing like that represented by the respective prices.

	A English	B American
Moisture	12·33	10·14
Oil	7·18	7·57
[1] Albuminous compounds (flesh-forming matters)	18·37	21·87
Mucilage, sugar, and digestible fibre	41·53	41·38
Woody fibre (cellulose)	16·31	15·55
[2] Mineral matter (ash)	4·28	3·49
	100·00	100·00
[1] containing nitrogen	2·94	3·50
[2] including sand	2·14	2·24

"*Buffalo Gluten Feed.*"—A new feeding material called "Buffalo Gluten Feed," and composed principally of the external portions of the maize grain, and imported probably from Buffalo (U.S.A.), gave the following excellent analysis :—

Moisture	8·48
Oil	13·53
[1] Albuminous compounds (flesh-forming matters)	24·31
Starch, digestible fibre, &c.	44·89
Woody fibre (cellulose)	7·05
Mineral matter (ash)	1·74
	100·00
[1] containing nitrogen	3·89

The price was 5*l.* 15*s.* per ton, free on rail at Hull, and it was a perfectly sweet and nice food, and must be reckoned by no means dear.

Niger-Cake.—A sample of this, offered to a Member, gave this analysis :—

Moisture	10·11
Oil	6·61
[1] Albuminous compounds (flesh-forming matters)	35·13
Mucilage, sugar, and digestible fibre	23·21
Woody fibre (cellulose)	17·03
Mineral matter (ash)	7·91
	100·00
[1] containing nitrogen	5·62

The price was 5*l.* 15*s.* per ton delivered, and, from the analysis, the cake should be fully equal to common cotton cake. It is largely used in India for feeding purposes, and might well be more utilised in this country.

Acorns.—A good deal of attention has been drawn of late to the

use of acorns as a feeding material, and also to the risk attending the giving of them to stock. The following is an analysis of the *whole* acorns, without removal of the husk :—

Moisture	37·18
Oil	1·46
[1] Albuminous compounds (flesh-forming matters)	4·81
Starch, digestible fibre, &c.	49·02
Woody fibre (cellulose)	6·14
Mineral matter (ash)	1·39
	100·00
[1] containing nitrogen	·77

It will be seen that the whole acorns contain but little oil or nitrogenous bodies, and that the chief elements of feeding value are the starchy matters. From this it may follow that acorns are, perhaps, best utilised for the purpose of feeding pigs.

Swedes.

Yellow- and White-fleshed Swedes compared.—A Member sent me carefully selected specimens (six roots of each) of two kinds of swedes that had been grown upon the same field on light sandy land high up on the Cotswold Hills. The seed had been mixed and planted together, the roots being separated only at gathering. Analyses of these two kinds gave the following results, and showed the superiority of the white-fleshed swede :—

	White Swedes	Yellow Swedes
Water	89·20	89·45
[1] Albuminous compounds	1·02	1·17
Grape sugar (glucose)	5·88	4·94
Cane sugar	·31	·21
Digestible fibre, &c.	2·26	2·81
Woody fibre	·86	·94
Ash	·47	·48
	100·00	100·00
[1] containing nitrogen	·16	·19
Spec. grav. of juice	1·040	1·040
	lb. oz.	lb. oz.
6 roots weighed	17 11¾	17 9

Poisoning by Castor-oil Bean.

Three cases of suspected poisoning of cattle by decorticated cotton-cake meal were brought to my notice within a few days of one another. It proved that all three cases were connected with one and the same delivery of decorticated cotton-cake meal imported by a Liverpool house from America. On examining the suspected meal I found the husk of castor-oil bean present in each instance.

One farmer had several cattle taken very unwell when the meal was first used; a second had fully half of a herd of 150 cattle taken suddenly ill, and the third farmer lost one out of 28 heifers, the rest becoming ill, with violent purging.

Manures.

It has been pointed out that the price of manures has, as a rule, been much in the farmer's favour—and though there are still many worthless or nearly worthless materials sold, there has not been so much adulteration of standard manures, such as Bone-meal, Dissolved Bones, &c.

The following are instances of good and cheap manures offered to farmers :—

Boiled Bones.

Moisture	8·32
[1] Organic matter	25·08
Phosphate of lime	57·78
Carbonate of lime, &c.	8·23
Insoluble siliceous matter	·59
	100·00
[1] containing nitrogen	1·74
equal to ammonia	2·11

This was bought in the neighbourhood of Manchester, and cost only 4*l.* per ton delivered.

Dissolved Bones.—This manure has also, in many instances, been procurable at very low rates, as the following table will show :—

	A	B
Moisture	11·99	11·11
[1] Organic matter and water of combination	33·48	34·19
Monobasic phosphate of lime	10·94	11·11
Equal to tribasic phosphate of lime (bone phosphate) rendered soluble by acid	(17·13)	(17·41)
Insoluble phosphates	20·62	17·39
Sulphate of lime, alkaline salts, &c.	20·78	25·06
Insoluble siliceous matter	2·19	1·14
	100·00	100·00
[1] containing nitrogen	3·47	3·10
equal to ammonia	4·21	3 76

A cost5*l.* 12*s.* 6*d.* per ton delivered.
B cost 4*l.* 15*s.* at mill.

Both were genuine samples.

Although, as instanced above, genuine Dissolved Bones has been purchasable at low prices, two cases have occurred in which, under the description "Pure Dissolved Bones," or "Pure Dissolved Bones made under a new process," has been sold a manure not different in

character nor giving a different analysis from that of Boiled Bones. The manure has contained no "soluble phosphate," and has not been dissolved at all with oil of vitriol, as Pure Dissolved Bones should be. Yet, by offering it under the misleading name of "Dissolved Bones" farmers are led to believe that they are buying a quickly-acting manure instead of a slowly-acting one.

The following are analyses of two such samples :—

Moisture	10·17	11·96
[1] Organic matter	12·52	13·83
Phosphate of lime	61·25	60·87
Carbonate of lime, &c.	15·21	12·49
Sand	·85	·85
	100·00	100·00
[1] containing nitrogen	1·78	1·77
equal to ammonia	2·16	2·14

Basic Slag.—This material, as is known, varies considerably in quality according to the district in which it is manufactured, and also in fineness of grinding. The following results will exemplify these variations :—

	A	B	C	D
[1] Phosphoric acid	20·18	17·35	12·73	10·79
Lime	37 91	37·66	40·41	38·37
Oxide of iron and alumina	32·14	33·48	33·78	39·69
Insoluble siliceous matter	9·77	11·51	13·08	11·15
	100·00	100·00	100·00	100·00
[1] equal to tribasic phosphate of lime	44·05	37·88	27·79	23·55
percentage of fineness	96	73	39	74

A cost 37*s.* 6*d.* per ton delivered.
B cost 45*s.* per ton delivered.
C cost 40*s.* per ton delivered.
D cost 43*s.* 6*d.* per ton delivered and was a Scotch basic slag.

Slag.—It is well here to repeat the warning given in the Quarterly Reports, and to point out that a material having no manurial properties and only fit for road-making has been offered to farmers, as a manure, at the price of 25*s.* to 30*s.* per ton. Farmers have in some instances bought it, thinking that they were purchasing "Basic" Slag.

The following are analyses of this material, which has had, it seems, some sale in the West of England :—

	A	B
Water and loss on heating	9·10	19·62
Oxide of iron, alumina, &c.	8·05	18·51
Lime	none	4·20
Phosphoric acid	none	·32
Insoluble siliceous matter	82·85	57·35
	100·00	100·00

A was an utterly worthless material as a manure, and B nearly so, and neither was basic slag at all, a substance which should contain about 17 per cent. of phosphoric acid.

Nitrate of Soda.—An adulterated sample of this manure was sent me, which analysed as follows :—

Moisture	6·59
Chloride of sodium (common salt)	14·46
Sulphate of soda	11·20
Nitrate of soda	67·75
	100·00

This was accordingly adulterated to the extent of one quarter (25 per cent.) with common salt and sulphate of soda.

Pigeon Manure.—An analysis of a sample sent me gave the following :—

Moisture	18·60
[1] Organic matter	58·55
Phosphate of lime	5·39
Alkalies, &c.	4·46
Sand	13·00
	100·00
[1] containing nitrogen	3·49
equal to ammonia	4·24

This manure could, I was told, be obtained at a cost of about 70*s.* per ton delivered, but this would appear to be rather above its value, though it was dry and in good condition.

Refuse Materials.—Worthless or nearly worthless materials continue, as before, to be foisted on the farmer. The following are instances :—

	A	B
Moisture	23·42	17·26
[1] Organic matter	22·73	14·57
Phosphate of lime	2·87	2·02
Carbonate of lime, oxide of iron, &c.	23 73	11·04
Sand	27·25	55·11
	100·00	100·00
[1] containing nitrogen	·77	·71
equal to ammonia	·93	·86

A was called "fish manure" and cost 3*l.* per ton; it was not worth paying carriage upon.

B also cost 3*l.* per ton, and was still worse.

I append the list of analyses made in the Society's Laboratory during the past year.

List of Analyses made for Members of the Society from December 1, 1892, *to November* 30, 1893.

Linseed cakes	199
Undecorticated cotton cakes	73
Decorticated cotton cakes	39
Compound feeding cakes and meals	78
Rice meals	15
Cereals	11
Dried grains	9
Silage and hay	5
Butter, milk, and cream	10
Waters	228
Superphosphates	139
Dissolved bones and compound artificial manures	119
Bones and bone-meals	120
Peruvian guano	14
Fish guano	28
Shoddy	23
Soot	4
Basic slag	53
Sulphate of ammonia	12
Nitrate of soda	35
Potash salts	9
Lime	6
Refuse materials	41
Soils	78
Miscellaneous	15
	1,363
Analyses in connection with the Annual Country Meeting	53
Analyses in connection with the Woburn experiments and other agricultural investigations	84
Total	1,500

J. Augustus Voelcker.

ANNUAL REPORT FOR 1893 OF THE CONSULTING BOTANIST.

There has been during the past year an increase of applications from the Members of the Society. The total number amounts to 825.

The pasture grass-seeds were on the whole satisfactory, both as regards purity and germination. The rye-grass had the largest proportion of weeds present. Samples of perennial rye-grass had 10 and 12 per cent. of weeds, and a sample of Italian rye-grass had 11 per cent. Several samples of cocksfoot contained smaller quantities of weeds. Ergot was found in both tall fescue and

timothy, nearly half of the samples of tall fescue examined being badly ergoted. Very low germinations were observed in several grasses, due no doubt to carrying forward old seeds. One sample of smooth-stalked meadow-grass failed altogether, and another gave only 18 per cent. of growing seeds; a sample of cocksfoot yielded only 24 per cent. of germinating seeds, one of rye-grass 27 per cent., two samples of hard fescue gave only 28 and 36 per cent., and dogstail gave 34 per cent. in one sample.

Excluding these cases the germination of the grains has been very good, the averages being, for—

	per cent.		per cent.
Cocksfoot	88	Rough-stalked meadow-grass	83
Meadow fescue	91	Smooth-stalked meadow-grass	76
Tall fescue	82	Wood meadow-grass	50
Sheep's fescue	85	Timothy	93
Hard fescue	86	Yellow oat grass	53
Red fescue	86	Dogstail	90
Meadow foxtail	74	Perennial rye grass	94
Sweet vernal	76	Italian rye grass	92

The clovers showed a larger amount of weeds than the grasses, but they had a high germination. In white clover no less than 30 per cent. contained more or less weeds, in some cases reaching 10, 12, and even 15 per cent.; the principal impurity being the seeds of sorrel. More than a third of the samples of red clover contained weeds, some having as many as 12 and 14 per cent.: dodder was detected in only 6 per cent. of the samples. Alsike was quite free from dodder, and fairly free from weeds. Trefoil and lucerne were also free from weeds. The average germination was as follows:—

	per cent.		per cent.
White clover	91	Trefoil	91
Red clover	94	Lucerne	96
Alsike	89		

Samples of yarrow were pure and clean: they germinated on an average 78 per cent.; sheep's parsley grew 83 per cent.

Very good samples of timothy and lucerne from Canada have been analysed and reported on.

Several plants causing injury to animals have been determined. Horses and bullocks have died from eating yew. The applicant, under the impression that one sex of the yew was harmless, was anxious that the sex of the plant causing the injury should be determined. Pheasants found dead under a yew tree had been eating the leaves, the fragments being found in quantity in their intestinal canal. The seeds of laburnum caused the death of several fowls.

Among the injuries affecting plants that have been investigated there have been attacks of minute fungi on oats, turnips, apples, and on forest trees. An account of the parasite causing finger-and-toe in turnip was prepared for the Journal and published in the

current volume (pp. 334–9); and experiments are being carried on with the view of determining whether anything can be applied, at a moderate cost, to the land where this disease has prevailed which would kill the spores of the plant that causes it.

A visit was paid to Newton-le-Willows, Lancashire, to study the experiments in cross-breeding cereals which have been carried on for several years by Messrs. Garton, and a paper on cross-breeding has been prepared for the Journal. [See p. 684.]

W. Carruthers.

ANNUAL REPORT FOR 1893 OF THE ZOOLOGIST.

Introduction.

During the past year the advice of the Zoologist has been sought with regard to about thirty different animal pests, belonging chiefly to the classes of Vermes, Myriapoda, Arachnida, and Insecta. The year 1893 would appear, from the applications received, to be characterised by the remarkably early appearance of the customary noxious insects, and the special prevalence of various Aphides, of Red Spider, of Surface Caterpillars, and of Gout-fly in barley. These characteristics are no doubt due to the exceptionally dry spring, in view of which it has been a matter of surprise that the Turnip-fly, which usually revels in dry weather, has not been the subject of a single inquiry. The number of applications received may, however, be no safe indication of the extent to which root crops have suffered from a pest which is so thoroughly familiar to British farmers.

"Gapes" in Fowls.

Applications have been received with regard to the disease known as "Gapes," which is the cause of serious annual loss to the breeders of poultry and pheasants. The symptoms of attack are a peculiar whistling cough, accompanied by a spasmodic stretching of the neck and opening of the beak—a characteristic which has given rise to the popular name of the disease. Appetite fails, the feathers assume a ruffled appearance, and the bird ultimately dies from suffocation or exhaustion. The cause of the disease is the presence in the windpipe of a parasitic Nematode worm of the family Strongylidæ—*Syngamus trachealis*. The windpipe, or *trachea*, divides at the base of the neck into two tubes, known as the *bronchi*, which proceed to the lungs. In all these tubes, and especially at their junction, the parasites congregate, and cause distress, and frequently death, by the irritation they set up, or by the actual blocking of the air passages.

The female of *Syngamus trachealis*, when full grown, is a cylindrical worm, about one inch in length, and one-sixteenth of an inch in thickness. It has a powerful suctorial mouth at the anterior end,

by which it firmly attaches itself to the inner wall of the trachea or bronchus. The male is about one-third of the length of the female, to which it becomes firmly fixed—a peculiarity which in some districts has gained for the parasite the name of the "forked worm."

Life-history.—Soon after this permanent union is established the body of the female becomes more or less distended with eggs. These are not laid, and only escape by the rupture of the body of the parent, or its death and decay. The diseased bird sometimes ejects them by coughing, and other fowls may contract the disease by devouring the ejected ova or worms. It has also been proved that the eggs can pass without injury through the alimentary canal of the earthworm, and it is probable that these creatures are sometimes the means of conveying the parasites into the crops of birds, whence they readily migrate into the breathing-tubes.

Treatment.—On the first indication of attack the affected birds should be immediately isolated. They will otherwise cough up worms, which will be devoured by their companions, and the disease will quickly spread throughout the poultry yard or pheasantry. If the disease has not been brought in by imported birds, it has been acquired from foul water or mud-pools on the spot, and the possi-

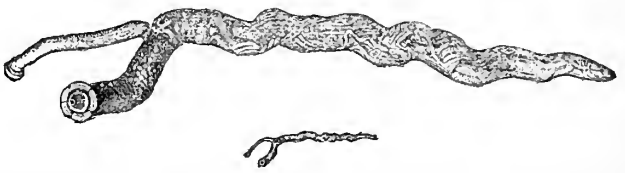


FIG. 1.—*Syngamus tracheolis*, natural size and enlarged, with small male permanently attached to the female. From nature.

bility of further harm from such sources should be immediately prevented. The yard should be disinfected by sprinkling a weak solution (1 per cent.) of sulphuric or salicylic acid. The dead bodies of affected birds should be at once buried deeply, or effectually destroyed.

The above measures will serve to arrest the spread of the disease. If the cure of birds already attacked be attempted, the object of the treatment is to induce the worms to loose their hold in the windpipe. This is to some extent effected by such drugs as asafœtida or garlic, the volatile principles of which are given off by the lungs and affect the air passages. Montagu supplied the fowls with an infusion of rue and garlic instead of water to drink. Théguin obtained satisfactory results by feeding his birds on cakes containing powdered gentian and asafœtida. There are various specifics in the market which are based upon the same principle.

Recourse may also be had to the more direct methods of fumigation or of actual operation, but these, though frequently successful, are not unattended with danger. The diseased birds are placed in a box and cautiously fumigated with sulphur or tobacco smoke, care being taken to stop the experiment short of suffocation. Or a

feather, from which the barbules have been removed except at the tip, may be introduced into the windpipe, and the worms dislodged.

The scrupulous cleanliness of the poultry yard or pheasantry and the strict isolation of birds which exhibit symptoms of attack are the points most worthy of attention in the treatment of this disease. Under the head of "Syngamosis" Neumann gives an interesting account of this infestation in his work [1] on *Parasites and Parasitic Diseases of the Domesticated Animals*, which has recently been translated by Dr. Fleming. From this source most of the above suggestions are derived. Young birds are most subject to attack, and spontaneous recovery is unusual.

The Mediterranean Flour Moth.

Ephestia Kühniella, Zeller.

Reference to this increasingly troublesome pest will be found in several of the Annual Reports of the late Consulting Entomologist of the Royal Agricultural Society. Those who suffer from its ravages are particularly referred to the Report for 1891, which contains an interesting account of the moth and the nuisance it creates, together with such measures for combating it as have hitherto been most successful in this country. M. J. Danysz has recently published an important monograph on this pest, and some of his suggestions with regard to it may prove valuable to the miller.

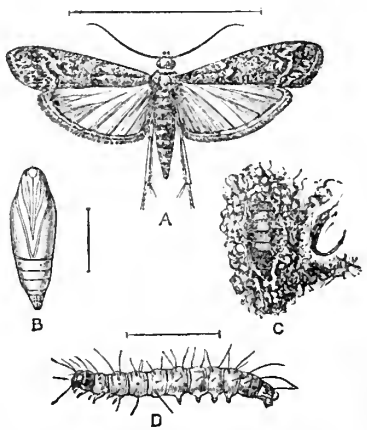


Fig. 2.—*Ephestia Kühniella*.—A, imago; B, pupa; C, pupæ *in situ*; D, larva. A and C, from nature; B and D, after Riley.

The fact that the flour moth has become so much more formidable of late years is due to the higher and more equable temperature of modern mills, which favours the development of the insect to such an extent that its reproductive powers are at least doubled.

It is not unusual for mills to work day and night, and in the consequent warmth of the building the moth, which would normally produce perhaps three broods during the year, produces six or more.

Perhaps the most valuable portion of M. Danysz's report relates to the structure of the machinery used in flour-mills. He remarks:

"The machines which are most difficult to clean are at the same time those which are most infested. Thus, in infested mills,

[1] A review of this work appeared in the Journal, 3rd Series, Vol. III., 1892 (Part II.), pp. 397-403.—Ed.

the bolting-reels and elevators are almost always full of the webs, and, by rendering the cleansing of these machines more easy and convenient, the formation of webs in them will be checked, and the rapidity of multiplication diminished."

To this end he recommends the abandonment of the old bolting-reel of hexagonal section in favour of the more easily cleaned round form, in which he recommends that an automatically-working brush should be fixed. Similarly, a square brush fixed to the elevator band would keep that very favourite breeding-place free from the pest. Conveyors fitted with a worm or screw are with difficulty cleaned, and should, if possible, be discarded for some other contrivance.

One side of the various elevator spouts should be readily removable to permit of access to the interior. This will entail some leakage, and consequent dust in the mill, but it is absolutely necessary to be able to get at the moth if it should obtain a foothold in so very secure a position.

M. Danysz rejects the various methods of fumigation to destroy the mature moth, and proposes instead the distribution of fine clouds of Pyrethrum or Persian insect-powder. He claims that whereas sulphur fumes are liable to affect permanently stored corn, and necessitate the use of fire, which is always more or less dangerous in mills, the powder can be used with safety, and is effectual in quantities so small as not to perceptibly affect the flour or grain upon which it may perchance alight, besides being non-poisonous as far as man is concerned. His instructions are to close all possible apertures of the room, and then, with the aid of a "soufflet" or bellows to blow into the machinery a fine cloud of the "compound powder" (Pyrethrum powder with nicotine added). The bolting-reels should then be put gently in motion, to prevent the dust from alighting too rapidly.

My own experiments have not confirmed the efficacy of this treatment—possibly on account of the difficulty of obtaining the Pyrethrum in a sufficiently pure state. The moths did not show any signs of succumbing so readily. Their tenacity of life is amusingly illustrated by the fact that a female which a miller had decapitated was still unconcernedly laying eggs twenty-four hours after the operation.

Measures which will destroy the moth will leave the eggs and larvæ untouched. These M. Danysz attacks with a wash composed of an alcoholic solution of nicotine with quassia and caustic potash added. The potash dissolves the egg shells, the nicotine kills the larvæ, and the quassia warns off other larvæ from the spot. The machinery is stopped and the wash brushed into all infested crannies. Work must not be resumed until the application has become dry.

In view of the remarkably destructive effect of even a small trace of carbolic acid upon insect life, I suggested its use, if compatible with safety, in an infested mill. The miller reports:

"We finally gave the walls a good dressing with lime and car-

bolic (the latter put in very strong), and it appears to have cleared off a very large number."

The moth is known to lay its eggs upon the sacks, and it is considered that these are a frequent medium for the introduction of the pest into mills which have hitherto escaped infestation.

Various methods of disinfection have been advocated. Baking the sacks or subjecting them to steam is not, I believe, practicable, as those in general use are of a nature to be greatly injured by such a process. M. Danysz subjects them to a sulphur fumigation in a closed box.

Such measures are perhaps desirable, but, seeing that a very few eggs or larvæ are sufficient to set up infestation in a mill, it seems almost hopeless to guard against the possibility of its introduction in some way or other, and attention should be chiefly directed towards such cleanliness and freedom from litter as shall make it difficult for the insect to gain a foothold.

It is most important that in the building and installation of new mills this pest should be reckoned with, and the machinery designed with a view to its possible appearance.

Root Flies.

During June and July complaints were received of the ravages of root-fly maggots.

These are the larvæ of various species of the genus *Anthomyia*, the most common being :

Anthomyia brassicæ, Bouché, the cabbage root-fly.

Anthomyia radicum, Linn., injurious to cabbage and turnip roots.

The species are so similar in appearance and mode of life that a separate description is unnecessary. The larvæ are white or yellowish and legless, and when full-grown are not quite half an inch in length. They infest the roots of cabbages and turnips, and, when full fed, pupate in the surrounding earth, the sober-coloured grey fly emerging in about three weeks. Successive generations appear throughout the summer.

Treatment.—It should be remembered that the attack is fostered by—

1. The use of maggot-infested farm-yard manure.

If the manure is suspected of containing the maggots, it should be rendered harmless by the admixture of gas-lime before use.

2. The too frequent growth of similar crops.

Where cabbages are grown for many years in succession the pest is liable to become firmly established, and change of crop is imperative.

Gas-lime, applied with the necessary caution, is the dressing which has proved most efficacious against root-maggots. Good results have been obtained by dipping roots, at the time of thinning, in some

mixture likely to prove objectionable to the fly. Soot and water, cow-dung and earth, oil, and other substances have been used for this purpose. When a crop shows signs of failure from this cause, and especially if there be any prospect of rain, a nitrate of soda dressing will often have a highly beneficial effect.

Mangel-Leaf Maggot.

Larva of Anthomyia betæ, Curtis.

This pest, which strongly resembles the foregoing, except in its habit of attacking leaves and not roots, was reported from Renfrewshire at the end of May. Mr. Alexander Cross has since written with regard to it: "I dressed the mangel with nitrate of soda, and they were fortunate in receiving rain at the proper time, and immediately afterwards they threw off the disease and have grown into an excellent crop."

Sheep Bot-fly.

Œstrus ovis, Linn.

In April complaints were received with regard to this pest from Somersetshire, where it was the cause of the loss of numerous sheep.

Life-history.—The moderate-sized grey fly is found throughout the summer. It shelters at night and on dull days in the crannies of walls. In hot weather the female seeks the sheep and endeavours to deposit its eggs, or perhaps its already-hatched larvæ, upon the nostrils. As if aware of its intention, the sheep manifest great uneasiness, and rub their noses in the dust, often so violently as to cause abrasion. The fly usually succeeds in its attempt while its victims are ruminating. The larvæ pass into the nasal cavities, whence they sometimes migrate into the sinuses of the forehead or jaws, where they remain, living upon the products of the irritation they set up, for about ten months.

The larva is then fully grown, and, loosing its hold, it causes the sheep to snort violently and eject it from the nostrils. It immediately pupates, and the mature fly emerges in five or six weeks.

Symptoms.—Sheep are often slightly infested without showing signs of experiencing any great inconvenience; when more severely attacked, they frequently throw up and shake the head. There is a running at the nose, accompanied by vigorous snorting. Badly infested sheep appear to walk with difficulty, and are often attacked with giddiness. They do not turn round, however, as in the case of "gid" caused by "bladder-worm" (the cystic phase of the tape-worm (*Cœnurus cerebralis*), which is an entirely different pest. Their appetite fails; they lose flesh, and frequently die in convulsions.

Prevention.—Larvæ found in the heads of dead sheep, or seen to escape from infested animals, should be carefully destroyed. Places where sheep are housed should be limewashed, and may be fumi-

gated with advantage during the absence of the sheep. Dr. Fleming suggests the smearing of the muzzles of sheep with fish-oil or tar to keep away the fly, and recommends that this should be accomplished automatically by supplying the sheep with a box of salt to which they can only obtain access through holes, about two inches in diameter, the borders of which have been well smeared with the preparation. A farmer who was asked to try this plan reports, however, that "the sheep soon tired of the salt, and consequently did not smear their own noses effectually."

It is well to avoid, if possible, grazing the sheep during hot weather on pastures bordered by underwood, where the flies are often to be found in great numbers. When only a few animals begin to show symptoms of attack, they should be immediately singled out and slaughtered.

Remedies.—If the cure of a badly infested sheep be attempted at all, the aid of a veterinary surgeon will probably be found necessary. No very beneficial results appear to ensue from the injection of snuff or other irritants into the nostrils, nor from fumigating the sheep with sulphur in a closed room. These measures are sometimes instrumental in ridding the animals of a certain number of the maggots, but if the violent snorting caused by their presence does not suffice to dislodge them, it is hardly to be expected that other irritants should prove more effectual.

A good account of this pest is to be found in Neumann's *Parasites*, translated by Dr. Fleming.

Gout-fly.

Chlorops tæniopus, Meigen.

This well-known barley pest has been exceedingly prevalent during the year, and complaints of its ravages have been received from Yorkshire, Lincolnshire, Northamptonshire, Essex, Wiltshire, Gloucestershire, and Somersetshire.

The fly and the injury caused by it have frequently been described in the Society's Entomological Reports, so that a very brief account will here be sufficient.

Infested barley heads present a very characteristic appearance. The sheath leaves become spirally twisted at the tip, tightly enclosing the withered ear. On removing the sheath, the ear and stalk as far as the first knot are seen to be channelled by the gout-fly maggot, and in this channel either the white larva or the brownish yellow pupa will be found.

There is no remedy in case of advanced infestation, for the ears are irremediably destroyed. If the attack be observed at a very early stage, and the spirally twisted sheath-leaves are noticeable when the ear is beginning to form, there is little doubt that a forcing manure, such as nitrate of soda, would increase the yield, by enabling some of the damaged ears to survive the attack.

Prevention.—Attention to the following points will lessen the probability of future infestation.

1. Sow as early as possible. Late-sown barley suffers most from the fly.

2. Where attack is feared, dress with guano and superphosphate at the time of sowing, or with nitrate of soda and salt when the braird is up.

3. After infestation scarify or cultivate the stubble as soon as possible after harvest.

4. Destroy chaff and screenings, and if the barley-straw in autumn seems full of the fly, use it at once for litter.

5. Keep down self-sown corn, and be careful not to grow rye or winter barley in the neighbourhood of infested fields. These crops are subject to attack, and perpetuate the pest.[1]

Red Spider.

Tetranychus telarius, Linn.

This often-described and too familiar pest has been particularly busy during the past dry season, and has done much damage, especially in hop gardens. Even such insecticides as are effective against the mite itself are powerless to destroy its eggs, which are well protected with a chitinous covering, so that frequent washings are necessary to combat successive broods, and great expense is thereby incurred.

Of the various washes used, those of which I have received the most favourable reports are "Chiswick soap" and the "Stott" insecticide known as "Killmright."

A distinct improvement has been noticed upon hops treated with the former compound. Of the latter, Mr. Duncombe-Eden's bailiff at Cheveney Farm, Hunton, reports that it was "much the most effective of the washes tried for red spider," but he considered it too expensive for general use. Good results were also obtained by Mr. McDougal's wash.

A curious case of the infestation of a house with "red spider" was reported from Leamington. The windows, the brickwork, and the red sandstone string courses of a newly built house were swarming with these creatures, which were kept in check with the greatest difficulty. A sulphur wash was recommended, and the form in which it was applied was that suggested by Miss Ormerod. Four ounces of sulphuret of lime are well mixed with two ounces of soft soap, and a gallon of hot water added, and the mixture is

[1] In the middle of September last one of the rooms in the Physiological Laboratory at Cambridge was suddenly visited with a plague of innumerable small flies which, on examination, proved to be *Chlorops tæniopus*. None of the flies were to be found in the adjoining rooms. It was impossible to account for their appearance, certainly in hundreds of thousands, by any introduction into the room of infested straw. It can only be conjectured that they entered the room in a swarm through an open window.

allowed to cool before application. This wash was more effective against the plague than any other. The mites no doubt besieged the house for warmth and shelter, and not in search of food, so that ordinary insect-powders, such as "Keating's" were quite ineffectual. Mr. Roney Dougal writes: "If they find themselves in a small heap of 'Keating's Insect Powder,' they double themselves up and roll out with admirable presence of mind, and then make off with perfect dignity in an opposite direction."

The Black Currant Gall-mite.

Phytoptus ribis.

Many acres of black currants have been devastated during the year by this microscopic creature, which infests the flower-buds and causes them to assume an abnormally swollen appearance, at the same time tinging them with a characteristic golden hue.

In the case of so minute and so well-concealed a pest eradication by means of washes is scarcely to be hoped for; but in view of its rapid increase of late years it behoves the intending grower to take the utmost precautions with regard to it, and to make very sure that the bushes he obtains for planting, and the cuttings taken in the autumn, are entirely free from infestation.

Infested bushes should be very severely pruned, and all the cuttings removed and carefully destroyed.

Though washes are not likely to penetrate the buds and kill the mites in their breeding quarters, they are useful in destroying such as are in the act of migrating, and in restricting the spread of the attack. They are best applied after the leaves have fallen, and the following, which are recommended by Mr. Whitehead, will probably be found the most effectual.

1. One ounce of Paris green and two ounces of soft soap to twelve gallons of water.

2. Five pounds of soft soap and eight pounds of quassia chips (or, if preferred, three quarts of carbolic acid) to a hundred gallons of water.

The Cockchafer.

Melolontha vulgaris.

In South Wales and in Surrey meadow land was reported to be suffering much damage from grubs which on examination proved to be the larvæ of the cockchafer. The grub was not recognised by any of those who applied for advice with regard to it, and it does not seem to be so well known as it might be. It has been already well described and figured [1] in the Journal, and its appearance is so characteristic that when once seen it is not likely to be confounded with anything except the larvæ of the Lucanidæ or stag-beetle group. The grubs

[1] See Journal (3rd Series), Vol. II., 1891, p. 169.

are whitish, fleshy, and of clumsy appearance, on account of the thickness of the posterior end, which usually appears somewhat darker, the contents of the intestine being partially visible through its walls. The head is hard, of a dark yellow colour, and furnished with powerful jaws. There are three pairs of rather long, jointed legs, immediately behind the head. The body is much wrinkled across, and is generally more or less curled up.

There are obvious difficulties in the way of dealing with this pest in meadow land, where no great amount of disturbance of the ground is admissible. Nor are surface dressings likely to be very effective in the case of a pest which can burrow out of harm's way. The cockchafer larvæ are somewhat slow movers, however, and it is probable that a dressing of alkali waste, which is very obnoxious to them, applied when rain is expected, would destroy considerable numbers of the grubs.

In a case of this kind the farmer's best hope is in the crows and other birds which will certainly be at work on the field, and which should be encouraged, regardless of the amount of grass they pluck up. Probably moles would soon clear the field of the grubs, but many farmers would regard the cure as worse than the disease.

If the infested land has in its neighbourhood plantations of oak or other trees upon the leaves of which the mature cockchafer feeds, it may be worth while to make war upon the pest in this stage during the summer months.

Surface Caterpillars.

These creatures, which are the larvæ of various Noctuæ, or night-flying moths, have wrought much damage to turnips, mangel, and other crops during the year. The caterpillars operate chiefly at night, and for the most part underground. The injury done is obvious, but the cause is easily overlooked, and it is therefore not surprising that various quite innocent insects are constantly sent by applicants for advice, and that the true culprits are not found until they are desired to search in the ground surrounding the roots. Thus the very useful larvæ of the lady-bird have been often suspected of causing the damage. No doubt a considerable amount of "green-fly" was present in the crop, and *they* were the object of the lady-bird's attentions.

Most of the "surface-caterpillars"—or "cut-worms," as the Americans call them—which were forwarded for examination proved to be the larvæ of the "Heart and Dart Moth" (*Agrotis exclamationis*), though it is not always easy to distinguish this species with certainty from *A. segetum*, the "Turnip Moth."

Treatment.—Correspondence with farmers who have suffered from this pest has elicited nothing very new with regard to the best mode of treatment.

With the exception of hand-picking, as to the expediency of which there is much difference of opinion, there is little that can

be done beyond forcing the crop on by suitable manures, and encouraging, as far as possible, the birds which prey upon the caterpillars.

Mr. W. J. Birch-Reynardson writes: "I am inclined to think that an extra dose of manure is about the best remedy, but in a year of drought like this there was no rain to convey the manure to the plants, and this remedy was of little use. . . . The rooks were my best friends, and, I believe, saved what roots I have. It was a curious sight to see the rooks feeding in a regular line across the field, the rear rank flying over the heads of the front rank every few minutes to get fair play. The caterpillars did most damage to mangel, and no damage to kale, and they were more injurious on very stiff land at the bottom of a bank than on poorer land at the top."

It would be interesting to know whether kale is always declined by this pest, as in that case it would be a useful crop for ground known to be infested. Plovers were noticed to be greedily devouring these caterpillars upon a Shropshire farm.

With regard to hand-picking, reports, as usual, are at variance. Mr. A. J. Sparke writes: "Some of my neighbours had their men picking them for days, but they only have half a crop. And Mr. Birch-Reynardson considers that his crop never would have paid for the labour of digging up the caterpillars." On the other hand, Mr. Joseph Kidner writes:—"The means I adopted was to carefully search the ground around the plants each time they were hoed, and kill every caterpillar found. It was a tedious process, but the only one that appeared likely to be successful."

Homopterous Pests.

Complaints have been received of the ravages of Cabbage Aphis, American Blight, and various homopterous insects attacking conifers, *Chermes abietis*, *Chermes laricis*, and *Lachnus pini*.

With regard to the green-fly tribe, I have nothing to add to the exhaustive treatment of previous reports, except that, among new insecticides, that manufactured by the Stott Company seems likely to prove useful. Of the Larch Chermes Mr. H. J. Elwes writes: "It seems to me that none of the measures proposed can be adopted economically, except on a very small scale, in ornamental plantations or by nurserymen. My own opinion is that the only way in which this disease can be checked is by the most careful selection of the seed from the Tyrol and, if possible, North Russia, where the larch are far healthier than in England."

One correspondent alluded to the interesting case of the eradication of the orange scale (*Icerya purchasi*) in America by the introduction of its special enemy, the *Vedalia cardinalis*, from Australia, and suggested a similar remedy in this country for the Homoptera which infest fir trees. That case, however, was quite exceptional. The *Icerya*, when introduced, had none of its

natural enemies to contend with, and flourished accordingly. The *Vedalia*, on reaching that country, found itself in a similar position, and quickly destroyed the scale insect. The well known fir pests have been so long established in this country that their natural enemies are always to be found associated with them, though they often fail to keep them in check. It is possible, however, that on the appearance of these injurious insects in a new plantation something might be done by the introduction of Coccinellidæ from other districts.

The Pine Beetle.

Myelophilus (*Hylurgus*, *Hylesinus*) *piniperda.*

This beetle was reported to be doing much harm to the young shoots of pine trees during October in county Cork.

Life-history.—The female beetle tunnels under the bark of weak or decaying trees in April or May, and deposits her eggs. The resultant larvæ burrow between the bark and wood until full-fed, when they pupate, and, on assuming the imago form, bore their way out through the bark at the end of July or the beginning of August. Since only sickly or decaying trees are selected for breeding purposes, no great harm is done during this portion of their existence. The beetles, however, during the autumn, enter the young shoots, feeding upon the marrow and securing a shelter for the winter, and the shoots are thus destroyed to a serious extent.

Treatment.—This mode of life indicates certain very obvious preventive measures, such as the following :

1. Fallen shoots, and as many infested shoots as possible, should be removed in the autumn. Miss Ormerod recommends that this should be done in *bags*, not baskets, or the beetles, which are very wary, will escape and slip to the ground.

2. Thinnings and rubbish should be immediately removed and burnt.

3. Bark must not be dressed from the thinnings *within the plantation*, otherwise large numbers of the larvæ will be left behind in the bark, and will mature in due course.

4. Heaps of thinnings may, however, be left with propriety as traps for the beetle, which will select them as a breeding-ground. They must be removed and burnt in May.

Millepedes.

Julus spp.

Many authorities maintain that these creatures in reality do little harm, since they only attack vegetation which is already in the first stage of decay. There are numerous instances which seem to prove, however, that they injure the tender rootlets of healthy plants.

They are usually regarded as a pest in hop gardens, where the measures adopted against wire-worms are generally successful against the millepede.

A case in which millepedes were believed to be doing much injury to seakale and asparagus was reported in May last from Lancashire. Specimens which were forwarded proved to be the common *Julus terrestris*. All the usual remedies proved unavailing. It had been noticed, however, that the roots bought for planting were already infested; so that the grower has decided to remove the surface earth and replant with fresh roots from quite a different source.

In view of this experience, it behoves all growers of seakale to examine for this pest the roots which they intend planting.

Miscellaneous Notes.

In some roots of charlock sent to me by Professor Potter, of Newcastle-on-Tyne, there were numerous galls which contained weevil maggots, indistinguishable from those of the cabbage-gall weevil. I was unable to rear any of the insects, but if they are the true cabbage pest, they furnish a further reason for exterminating as far as possible this weed, upon which many noxious insects are known to feed.

There appears to be among shepherds an almost unanimous belief that there is a *beetle* which "blows" sheep, and various points are alleged in which its attack differs from that of the fly. I have long desired to see the beetle which was suspected of this offence, and in June last Mr. A. C. Elliott was good enough to send me a specimen which a shepherd believed he had taken in the act. It proved to be the very common *Pterostichus madidus*, an insect quite incapable of the misdeeds attributed to it. No doubt it had become accidentally entangled in the wool of the sheep.

Some other pests with regard to which applications have been received are wire-worms, crane-fly, frit-fly, carrot-fly, wood-wasps, gooseberry saw-fly, ants, cabbage-butterfly, and winter-moth. No new facts, however, have been elicited which require notice in this Report.

Cecil Warburton.

Notes, Communications, and Reviews.

THE CONSERVATION OF FARM-YARD MANURE.

In the sixth volume of his Agricultural Studies (*Études Agronomiques*) Monsieur L. Grandeau, the distinguished Inspector-General of French Agricultural Stations, has included an interesting dissertation on "French Agriculture and Farm-yard Manure"—if *fumier de ferme* may be thus translated. Literally, *fumier de ferme*, or "farm manure," is wider in its meaning than "farm-yard manure," inasmuch as it includes the excreta of grazing animals. But the real subject of M. Grandeau's paper is the "muck-heap"—its importance, its value, its weight, and its waste—especially its waste. Since Agricultural Chemistry began to be preached to farmers, one of the most prolific themes of its ministers has been the preservation of farm-yard manure. As soon as chemistry recognised that the most valuable properties of dung resided in its more soluble and more volatile constituents, it became obvious that a vast annual national loss occurred through the free exposure of dung-heaps and the running to waste of their rich brown juices. Some of the earliest papers of the late Dr. Voelcker record careful and minute investigations into the nature, causes, and extent of the losses to which farm-yard manure is subject during the period between its production and its burial in the soil; and nearly every agricultural teacher in this country has made use of his facts and figures to illustrate the indisputable assertion that much of our national wealth is yearly annihilated by the running into drains and ditches (and hence away into underground waters, streams, and rivers) of concentrated ammoniacal drainage from our ill-managed farm-yards—to say nothing of the evaporation into the air of ammonia, much of which might be conserved.

The fact of the vast economic loss borne by the nation in the waste of the sewage of large cities is, for the present, regarded with some approach to equanimity by the more thoughtful, in the light of the circumstance that, so far, we have no means of avoiding it; that is to say, that the cost of recovering the fertilising matter in the sewage of large cities, by any process consistent with the maintenance

of a high standard of public health, appears to be, so far, greater than the value of the recovered products. But no such counter-considerations arise to stifle the sigh that goes forth from a true agricultural economist, as he leans on the gate of the average farm-yard, and looks at the slowly trickling, rich brown stream that drains away into the too convenient ditch, the very essence of the carelessly piled dung; nay, even the actual liquid excreta before they have undergone the preliminary process of being temporarily absorbed by the litter, or incorporated into the form of soon-to-be-rain-soddened "manure." That this is still the state of things on only too many farms most of our readers will be in a position to admit; and it is doubtful whether of late years we have made as much progress in the direction of national reformation of our muck-wasting sins as we did when chemistry and its revelations were newer—and, consequently, more shocking. This is, no doubt, in some degree due to the fact that we are less dependent than of old time on home-made manure. At any rate, it has grown to be our custom to enrich it by the consumption of purchased food, and hence much of the waste which must necessarily have tended to impoverish our soils is partially counterbalanced by the increased richness of the portion that is saved and applied.

Furthermore we can, and do, purchase large quantities of artificial manure supplying both nitrogen and phosphates, and so are less dependent than we were on the quality of our dung; while the merely physical and mechanical effects on the soil, for which dung is largely to be valued, are ultimately much the same whether the manure has or has not been impoverished by bad preservation. We may still grant that it is inexcusable to waste the essence of our dung, but we do not, nowadays, detect so simply and so readily as once we could the practical advantages to be derived from its prevention; and even if we could, it is easy—as an excuse for non-reformation—to point to the fact that nitrogen and phosphates can be purchased for less than half the money that they cost in the days when the apostles of agricultural science went forth to preach the salvation that lay in a better care of the natural manurial resources of the land.

Not only have such half-admitted arguments as this tended to the perpetuation of carelessness, but the mind of the practical man has often revolted from the extravagant unreasonableness of too enthusiastic preachers. To take a well-remembered example, the late Mr. Mechi, whose genial modes of propagating popular agricultural science resulted in much real good, set to work to make a model farm—many readers of this Journal remember every corner of it—and part of his model system showed how farm-yard manure should be dealt with. The liquid-manure tanks were made to communicate by pipes with the outlying parts of the farm, so that the liquid drainage from the feeding-boxes, &c., could be pumped into the field in which it might be required. This was charming—on a model farm; but the expense of the plant necessary to carry out the idea was obviously out of all proportion to its utility. The

practical farmer who is uninstructed in chemistry is quite sufficiently instructed in arithmetic to see that a proposition involving such costly plant works out to an absurdity, and, for a time at least, he wants no more "agricultural science." Even to-day, when remarkably little encouragement exists for increasing the capital invested in the land, teachers alienate from them the sympathies of earnest, sensible, practical men, by telling tenant-farmers who can scarcely exist, and whose landlords think themselves lucky to get even a largely reduced rent, that the means of removing agricultural depression consists in the erection of model buildings, and covered yards to economise the manurial resources of the farm. Covered farm-yards are desirable, no doubt ; but the small farmer, who has them not, should be taught how he can best take care of his manure in their absence.

Without doubt, however, we have, of late years, whether the suggested causes be right or wrong, grown somewhat apathetic on the subject of the waste of farm-yard manure ; while on the Continent a good deal of attention has continued to be directed to the systematic study of this product.

Some of the results of this study, and their expansion into a form indicative of their economical and national importance, constitute the backbone of M. Grandeau's essay ; and, although it is an essay addressed primarily to French agriculturists, there is plenty of matter in it that appeals to the attention of all stock-keeping farmers, of whatever nationality, and therefore some account of it may find a fitting place in our own Journal.

M. Grandeau makes vigorous war on the school of agricultural advisers who minimise the importance of dung, and look for its efficacious replacement by chemical fertilisers. The production and utilisation of dung are an essential part of the process of meat-production, and if we are to replace dung by chemical equivalents, then, says M. Grandeau, we should, to be logical, learn how to replace the beef-steak and the leg of mutton by some equivalent chemical concoctions. Not that he underrates the immense importance of chemical fertilisers as an adjunct to the more natural manuring. He merely maintains that their functions are to complete the work and supplement the deficiencies of dung, and not to take its place. He looks, in fact, to an increased head of stock, and consequently a greater production than ever of dung, as the goal for which farmers should make. As part and parcel of the attempt to bring this about, M. Grandeau says, with emphasis, that every effort to popularise the use of artificial phosphates, potash salts, and nitrates, must be made and encouraged. "But to proscribe, on that account, farm-yard manure, or to tolerate it as an evil that cannot very well be done away with, is quite different. It is, on the contrary, towards showing the value of this precious product of the land, towards teaching the most efficacious means of preserving its properties by good methods of preparation, and by treatment still insufficiently employed on most farms, that the efforts of sound and sensible persons should tend, without regard to such spurious popularity as may be left to the

enjoyment of charlatans. . . . Agriculture in general, and French agriculture in particular, has made immense progress in the last century, progress which has been accomplished almost wholly with dung as a fertiliser. The production of wheat in France in 1789 was not more than 31,000,000 hectolitres, while now, in a medium season her soil grows three times as much, and four times as much in a good one."

The manure annually produced on the farms of France represents, in nitrogen, phosphates, and potash, a value which M. Grandeau calculates at nearly 1,650,000,000 francs. In English money this represents a sum of 66,000,000*l.* sterling, and it is interesting to see how the author arrives at it. He starts with the last decennial "Agricultural Returns" of France, which show, for all live stock, a total live-weight of nearly 6¼ million *tonnes*, which may for convenience' sake be directly taken by the English reader as "tons"—the difference between the English ton and the French *tonne* of 1,000 kilog. being comparatively small. The official calculations, given in these returns, put the manure produced by these 6,250,000 tons of live stock at 84,000,000 tons, but this estimate M. Grandeau considers to be too low. He discusses the experimentally ascertained yield of manure per ton of live weight from horses, mules, asses, horned stock, sheep, and pigs, quoting, among other authorities, M. E. Lecouteux and M. A. Girardin, who concur, from experimental evidence, in putting the annual production of dung per ton of live weight—taking a fair average of all animals of various ages—at some 25 tons of fresh manure (excreta and litter combined); or, say, 19 tons after resting for an average duration of time in the dung-heap. Applying the separate "coefficients" for calculating manure production from live weight in the different classes of animals enumerated in the French Goverment Statistics of 1882, it would appear that the quantity of fresh dung produced should be 165,000,000 tons. The average figures adopted by MM. Lecouteux and Girardin give an estimate of 156,000,000 tons. Even adopting this lower figure, we get nearly 119,000,000 tons of half-rotten dung. The estimates of the local commissions, therefore, are, he argues, too low. It must be pointed out here, however, that M. Grandeau appears to assume that all live stock consume litter, which forms the bulk of "dung," leaving out of sight the existence of animals that spend half or all of their lives in the field. Possibly this may throw some light on the difference between the 165,000,000 tons of fresh or 119,000,000 tons of half-rotten dung estimated by M. Grandeau, and the much less quantity of 84,000,000 tons estimated in the reports of the local commissions as representing the dung production of France.

In arriving at his estimate of the money value of what may well be called "this enormous mass of dung," M. Grandeau adopts an average figure of rather more than 10 francs (say 8*s.*) a ton—a figure which in this country, at all events, we should probably consider too high. It is, in fact, based on the assumption that the nitrogen contained in the dung is worth 1·50*f.* per kilog., or rather

less than 7*d.* per lb. ; that its phosphoric acid is worth 0·40*f.* per kilog., or nearly 2*d.* per lb. ; and its potash, 0·30*f.* per kilog., or rather less than 1½*d.* per lb. Seeing that in the most concentrated and available forms nitrogen may now be bought at less than 6*d.* per lb., and phosphoric acid for 2½*d.*, and that in less rapidly efficacious forms they may be obtained at even much lower rates, it seems that M. Grandeau's valuation is a somewhat extravagant one. The fact is, however, that the valuation of dung—which, except within easy reach of the stables of large towns, is not a purchasable commodity—is always an exceedingly difficult problem. Its value does not depend merely on its richness in what are sometimes spoken of as the "elements of fertility," but also, and this very largely, upon its general physical effects on the soil.

The practical value of the properties which cause dung to produce these effects must vary with the soil to which it is to be applied, and it might perhaps be said with reason, that a ton of dung on one farm is worth twice as much as a precisely similar ton of dung upon another farm, differently cultivated, differently constituted, or differently circumstanced. But if its chemical composition be taken as the basis of valuation, it appears to be an error to put it at such high figures as M. Grandeau adopts, though the error does not affect the principle, or the importance, of the lessons which he places before us. Taking his own valuations, however, and regarding only the nitrogen, phosphates, and potash, the manure yielded yearly by the live stock of France works out at nearly 1,650,000,000*f.*, or 66,000,000*l.* sterling. What proportion of this value, he asks, is lost? And how might its loss be prevented?

To answer these questions the experiments and observations of various chemists, from the early work of Voelcker down to the recent work of Holdefleiss, are quoted and reviewed.

As a general deduction, M. Grandeau calculates that if the whole of the manure were kept, as is too often the case, without any precautions for saving and utilising the drainage that flows from it during its making and storage, French agriculture would suffer in an annual loss of 193,000 tons of nitrogen. Even supposing that every dung-heap were placed above a liquid-manure tank, and watered diligently with the drainings that escape from it, there would still be a loss of over 112,000 tons of nitrogen. Without taking into account any other loss, we have here (at a trifle under 7*d.* per lb. for nitrogen) a loss of from 168,000,000 to 289,000,000*f.*, *i.e.* from 6,700,000*l.* to 11,500,000*l.* sterling. How is this loss to be diminished, even if it cannot be avoided? Several approved methods are enumerated and examined.

In the first place, M. Grandeau commends the production of the dung in deep stalls or feeding-boxes.

The use of deep feeding-boxes in which the manure can accumulate and become consolidated under the feet of the animals producing it, is one in the economy and advantage of which most farmers who have experience of the method will agree. M. Grandeau prefers loose boxes, in which animals can wander at liberty, to

close stalls; though he admits some practical difficulty arising from the horns when cattle are too closely packed in a loose box. The danger of accidents from this source he believes, however, to be overrated, and he points out that a light operation on young stock will prevent the horns from sprouting (*empêche les cornes de pousser*). The loss of organic substance undergone by dung after a long accumulation in such boxes does not exceed 12 or 15 per cent.—a very much smaller loss than is found in dung-heaps. "On the whole the system of deep boxes seems, then, the most advantageous; but for various reasons it is not applicable on all holdings, and more frequently the farmer is obliged to mix together the dung of the stall and the stable in the farm-yard, and to leave it to rest there for a longer or shorter period. Under these conditions it undergoes very notable losses." These losses may be obviated by direct cartage on to the land; but even if this were always practicable, it involves, argues M. Grandeau, the loss of the advantages of ready availability, &c., to be derived from fermentation in the heap. In fact, the problem is, how to gain the advantages of fermentation in the heap, and at the same time to minimise the losses incidental thereto.

To effect this, when we have to deal with yard manure, made into the ordinary dung-heap, we must use preservative agents (*agents de conservation*). "These preservative agents for dung may act," says M. Grandeau, "in two essentially different ways. First, they may allow the dung to undergo normal fermentation (which results in rendering the half-rotten manure more valuable than the fresh dung), but at the same time may prevent the loss of the products of decomposition by fixing them in the heap. Secondly, they may hinder this fermentation, and retain the dung in its fresh condition.

"Preservative agents, properly so called, belong to the latter class; those, on the other hand, which belong to the former class ought rather to be called 'absorbing' agents. . . . These (absorbing agents) ought to be much preferred by farmers to real 'preservative' agents.

"This observation eliminates at once all antiseptic methods of treatment, which do not result in any improvement of the manure.'

Then follows in detail the examination of the action of various absorbing agents as investigated in the excellent researches of Holdefleiss, Director of the Agricultural Institute at Proskau, which are well worth the attention of every practical farmer, and for the popularisation of which in France the paper under review has been mainly written.

The first method investigated is the somewhat time-honoured one of preservation by means of earth.

"Six tons of dung, produced during one week by oxen, were removed from the feeding boxes and heaped, in the ordinary way, on a water-tight floor in a mass (roughly) 3 yards long and $1\frac{3}{4}$ yards wide. . . . The heap was covered with earth (some two or three tons) on June 12. On January 6 following, *i.e.*, after twenty-nine weeks, the earth was removed, the mass was weighed and a complete analysis made of the half-rotten dung."

This analysis, as compared with that of the fresh dung, shows that, while the total weight of the heap had sunk from 6 tons to about $4\frac{1}{3}$ tons, and the included dry matter from nearly $1\frac{1}{2}$ ton to little more than 1 ton, the total nitrogen had decreased only from $57\frac{1}{2}$ lb. to $56\frac{1}{3}$ lb., notwithstanding considerable nitrification. Expressed centesimally, although 27·9 per cent. of the total weight had disappeared, including 26·2 per cent. of the dry matter present, only 2 per cent. of the nitrogen was lost.

In a dung-heap similarly made, and left without any earth-covering for six months, the loss of nitrogen was 23·4 per cent., or nearly one-fourth of the total quantity.

"The simple process of preservation with earth not only reduced the total loss of nitrogen to 2 per cent., but it also favoured the transformation of the nitrogen into the form of nitrates, to the extent of 18 per cent. of the nitrogen, while mere exposure to the air only resulted in the transformation into nitrates of 1·7 per cent. of the total."

The next method reviewed is that of the use of gypsum and of "phosphatic gypsum," the latter being the residue from the process of making rich superphosphate, or "solid" phosphoric acid. Four or five pounds of ordinary gypsum a day for each head of stock, sprinkled on the litter, are sufficient to fix the ammoniacal nitrogen; but this is less economical than the use of "phosphatic gypsum," or of superphosphate of low quality. The phosphatic gypsum recommended by Holdefleiss contains from 4 to $9\frac{1}{2}$ per cent. of phosphoric acid, partly "soluble," partly "insoluble," and partly "precipitated," and 70 to 80 per cent. of sulphate of lime. So well does this material preserve and even gather ammoniacal nitrogen, that, in one experiment, 6 tons of dung, treated with it, and exposed for six months in the open air in the neighbourhood of sheep-pens, not only failed to lose nitrogen, but even gained 2 per cent., doubtless from the ammoniacal vapours arising from the sheep-pens.

If cheap superphosphate is substituted for phosphatic gypsum, about 1 lb. to $1\frac{1}{4}$ lb. per day per head of stock should be sprinkled in the litter.

Basic slag or cinder, having been recommended for the same purpose, has also been experimented with, with a view to seeing whether it economised or wasted nitrogen. Its use for sprinkling in the boxes was found to be without effect either way on box-manure during two months that it remained beneath the animals. But in subsequent "heaping" out of doors for $3\frac{1}{2}$ months, dung unmixed with cinder lost somewhat more nitrogen than that which had been treated with cinder; though the difference was so small that it is clearly (as would be expected from its chemical composition) not worth while to use this material as a "preservative."

The use of potash salts as an ammonia absorbent, recommended by Franck as long ago as 1868, has also formed the subject of experiment by Holdefleiss; and M. Grandeau considers his researches in this direction to be of much value—being the first that have been methodically carried out on a large scale.

Of the various potash salts available, kainit is best, on account of its composition as well as of its cheapness. About 2 lb. per head of stock should be daily sprinkled on the litter.

In one experiment (made in the same way as those described with earth and gypsum) 6 tons of dung into which, by daily additions, about 5 cwt. of kainit had been introduced, lost, in six months' fermentation in the heaps, absolutely no nitrogen, though 12 per cent. of the total dry matter had disappeared. A similar result was found in a like trial in which the dung was enriched by the addition of liquid manure. It is to be noted, however, that in the case of preservation with kainit the dung does not rot down in the same way as it does when preserved with earth, or with gypsum or superphosphate. The straw remains almost intact—showing that the kainit has considerable antiseptic action, as well as a merely absorbing one.

What considerations should guide the farmer in choosing which method to adopt? The answer is:

"If he wishes—for manuring strong, moisture-retaining soil—to prepare a manure very prompt and energetic in its action, but one which, on the other hand, will be the less rich in humus-forming, organic matter, he will give the preference to preservation by a layer of earth.

"If he seeks—simultaneously with having prompt manurial action—to introduce into the soil the greatest possible quantity of organic matter (as in the case of strong clays poor in humus), it is dung treated with phosphatic gypsum or superphosphate that will most completely comply with these conditions.

"But he may have to deal with light and very open soils, in which dung that had already undergone great alteration would too soon be consumed. He may wish to apply a manure, the decomposition of which shall be slow, and which, at the same time, shall introduce as much as possible of the organic matter that is so important for this class of soils. In this case the treatment of dung by potash salts is to be preferred to the previous methods.

"It is to be observed that strong lands (*terres fortes*) generally lack phosphates, and are nearly always sufficiently rich in potash; while, on the other hand, this base is frequently deficient in light, calcareous, or sandy soils. From this point of view, of supplying to the soil additions of phosphoric acid or potash, the suggestions (*indications*) of Holdefleiss appear to be well justified."

So far M. Grandeau has quoted from the analytical investigations of Holdefleiss, which, seeing the scale on which the experiments were made, should be sufficiently convincing.

But more than analytical evidence is forthcoming. We have two series of field-experiments with dung variously treated, and not treated. These are sufficiently interesting to bear uncurtailed translation of M. Grandeau's description of them:

"In order to complete these interesting studies, the Director of the Institute of Proskau has carried out two series of experiments, of which I will briefly show the main results.

"Plots of 9 ares (between $\frac{1}{4}$ and $\frac{1}{5}$ of an acre) each were set

apart for these trials, which were carried out with potatoes and wheat. The dung was applied at the rate of 40,000 kilos. per hectare (about 16 tons per acre).

"The first series consists in a comparative trial of the action of various manures on strong clay land, planted in the first year with potatoes, and in the following year with wheat, without any fresh addition of dung. The soil was naturally a rich one. The second series was carried out on light land, undunged for four years, and therefore poor in available elements of fertility.

"The *excess of weight* of the crops grown with the various dungs, over and above the yield of three plots left unmanured for the sake of comparison, was as follows, expressed in percentage of excess (the unmanured plots being taken as 100) :—

First Series—Clay Soil.

In excess of 100 on unmanured land	Kept without addition	Feeding-box manure: Treated with earth	Feeding-box manure: Treated with phosphatic gypsum	Feeding-box manure: Treated with potash salts
Potatoes (tubers) .	8·1	27·8	33·6	16
Grain	28·1	28·1	21·1	14·9
Straw and chaff . .	6·2	13·1	1·1	11·7

"The untreated dung thus gave, on this clay soil, in the second season only, an excess of crop equal to that which the dung preserved with earth had produced in the first crop—confirming the opinion previously expressed by Holdefleiss on the favourable influence of the partial nitrification undergone by dung when it is covered with earth for six months."

Second Series—Light, Open Soil.

"The soil on which these experiments were made is very free ; the surface or arable soil having a depth of 14 in. to 16 in. The field had borne barley as the previous crop ; it had received no manure for four years. Plots of 8·5 ares ($\frac{1}{5}$ acre) were manured with the various dungs at the rate of 40,000 kilos. per hectare (about 16 tons per acre) ; three plots being left unmanured for the sake of comparison :—

In excess of 100 on unmanured land	Without addition	Feeding-box manure: Treated with earth	Feeding-box manure: Treated with phosphatic gypsum	Feeding-box manure: Treated with potash salts
Grain	42	74	103	118
Straw and chaff . .	27	66	50	69

"Here the results are even more appreciable than in the first series, as they should be, on account both of the poverty of the soil and of its mechanical condition, which allowed, in the first year, a more rapid decomposition of the dung. The best result was obtained by the use of the potash-treated dung, the crop from which more than doubled the grain yielded by the unmanured soil. Next to this comes the phosphated dung. The earth-treated dung occupies only

the third place, leaving well behind it the dung that received no special treatment for its preservation. A comparison of the results of the two sets of experiments seems, then, to confirm the previously expressed views of Holdefleiss on the choice that should be made in the treatment of the manure according to the nature of the soil to which it is to be applied.

"It need scarcely be said that we have no wish to lay down absolute rules on the subject, but it appears to be useful to bring to the knowledge of the farmer the facts that are brought to light in so methodically conceived a study of farm-yard manure as that made by the Director of the Institute of Proskau. It is for each one, having regard to his own local circumstances, to draw from these data the directions best adapted to the nature of his farming."

M. Grandeau having thus dwelt on the losses arising from the bad treatment of farm-yard manure, and on the best modes of meeting them, passes on to a consideration of the reasons which render farm-yard manure, even when properly made and kept, insufficient, in itself, to maintain the fertility of the land.

The agricultural area of France is 48,000,000 hectares, of which rather more than one-half, viz., 24,340,000 hectares (roughly, 60,000,000 English acres), is given up to ordinary agriculture, *i.e.*, to cereal crops, forage crops, and "industrial" crops. If the 165,000,000 tons per annum of (fresh) dung estimated to be produced by the live stock of France were spread equally over this area, the available quantity would be only about $2\frac{3}{4}$ tons of dung per acre per annum. But such an application is far from being realised. There is, from a variety of causes, such as those already dealt with, an enormous waste in the production, storage, and application of this dung; in addition to which consideration it is to be borne in mind that, over and above these 60,000,000 acres under ordinary farm cultivation, there is an immense area of market-gardens and vine-yards, which absorb a considerable quantity of manure. Correcting the estimate of manure available for actual farm use in the light of these considerations, the probable application is not more than about 2 tons per acre per annum. In a three-course rotation, if the manure were applied once in three years instead of annually, the average dressing, thus estimated, would be only 6 tons per acre triennially—a quantity, as M. Grandeau justly observes, altogether insufficient to raise satisfactory crops.

"It follows that it is absolutely necessary to have recourse to commercial fertilisers, nitrogenous or phosphatic, as a complement to the dung. But the insufficiency of dung is not confined to its mere quantity; by bad management there is a loss of 14 to 24 per cent. of the fertilising value of the already too small quantity of dung which can be distributed on the land."

Having, in the course of his essay, clearly indicated the simple means by which these losses may be minimised, M. Grandeau ends by vigorously urging the necessity of making them widely known, and of persuading landowners and farmers that the construction of liquid-manure tanks, and the observance of such simple and

easy precautions in storing their dung, should take a primary place in farm management. He is of opinion that a portion of the grants accorded by the Minister of Agriculture to agricultural societies could not be better spent than in giving prizes to farmers for the construction of liquid-manure tanks, and for good arrangements for storing dung after removal from the stalls or boxes.

"Less than 2,000,000*f.* (80,000*l.* sterling) devoted to this 'protection' of the farmer against his own ignorance or carelessness, would suffice to bring about, in a few years, a revolution in all our communes as regards the utilization of farm-yard manure. . . . . In ten years, or less, such a reform would be brought about; and agriculture, if she recovered but one-fourth of her annual losses through the carelessness of farmers, would find herself enriched to the extent of 40,000,000*f.* to 50,000,000*f.* (1,600,000*l.* to 2,000,000*l.* sterling) per annum."

"It would seem that no investment of State subsidies could be more remunerative."

"Would," he concludes, "that the friends of agriculture, so numerous in Parliament, would lend their aid to the bringing about of some measure of the kind proposed, and so earn the gratitude of the farmer."

The official Agricultural Returns issued in our own country do not contain estimates of the farm-yard manure annually produced. They afford information, it is true, as to the numbers of live-stock in the kingdom, and from this may be obtained some idea as to the total live-weight, from which a calculation similar to that of M. Grandeau might be made. But there would obviously be little information derivable as to the farm-yard manure produced, since our sheep either roam at large or are folded on the land, and only under occasional or exceptional circumstances add to the dung-heap, although they contribute a large quantity of manure to the soil. In the same way a large proportion of our horned stock are grazed except in the winter—and, when grazing, make no farmyard manure.

Probably the best estimate that we in this country could make of our farm-yard manure would be one based on our production of straw.

In 1892—and I select that year in preference to the entirely exceptional one of 1893—there were, in the United Kingdom, 2,298,607 acres of wheat, 2,220,243 acres of barley, and 4,238,036 acres of oats. If we assume that the wheat yielded $1\frac{1}{2}$ ton of straw per acre, barley 1 ton, and oats $1\frac{1}{4}$ ton, we have a total of 10,965,698 tons of straw—say, in round numbers, 11,000,000 tons. Possibly the estimate is a little liberal, but we are leaving out of account 61,392 acres of rye, and over 500,000 acres of beans and peas, and also the fact that we imported in 1892 "for agricultural purposes" 19,556 tons of straw. No doubt a tangible quantity is sold into the towns, but a great deal of this is returned to the country as dung. The quantity used for manufactures and that consumed as chaff would

not altogether be very heavy, and would be partly, if not altogether, counterbalanced by the increasing consumption of peat-moss litter. Altogether, as a rough estimate in round figures, we should probably be fairly justified in assuming that we made at least 10,000,000 tons of straw into manure. On an average 1 ton of straw makes 4 tons of fresh dung, so that our estimate would work out to at least 40,000,000 tons as the annual production of farm-yard manure in the United Kingdom. At M. Grandeau's valuation—an average of over 8*s.* per ton—this would be worth 16,000,000*l.* sterling. Even at the more moderate estimate of 5*s.* per ton, which would perhaps commend itself preferably to English farmers, the value would be as much as 10,000,000*l.* sterling. Dung on an average would probably contain nearly 0·5 per cent. of nitrogen, and if it lost from one-fourth to one-fifth of this (as M. Grandeau calculates to be the case) from the average ill-treatment to which it is subjected in production and storage, the loss would amount to between 2 lb. and 3 lb. of nitrogen per ton, or a total of from 35,714 tons to 53,571 tons of nitrogen. This would be as much nitrogen as would be contained in from about 230,000 tons to 340,000 tons per annum of nitrate of soda, costing, at 10*l.* per ton, 2,300,000*l.* to 3,400,000*l.* sterling. This is from twice to three times the quantity of nitrate of soda at present used as manure in the United Kingdom.

As the small and thrifty French farmer is scarcely likely to be less careful of his manure than the average English farmer, there appears to be no reason to regard this estimate as an excessive one.

On the advantages of deep feeding-boxes and covered yards it is unnecessary to add to what has been already said. Those who possess them are possessed of distinct advantages over and above such as relate to the conservation of their farm-yard manure. But even those who have not may diminish their losses by the means already indicated.

It should perhaps be pointed out that the "phosphatic gypsum" used for preservation in the experiments of Holdefleiss, although an article to be readily and cheaply obtained abroad, is not largely produced in this country. The present writer only knows of one factory from which it can be procured in England. In this country, therefore, its place would naturally be taken by the alternative material, viz. ordinary mineral superphosphate, which can be obtained now at a very low price through any manure merchant. M. Holdefleiss recommends, as already stated, 1 lb. to 1½ lb. of cheap superphosphate per day per head of stock, sprinkled on the litter. As the superphosphate ordinarily sold in England is probably richer than that referred to, it would perhaps be desirable to mix with it some ordinary gypsum, costing about 1*s.* per cwt. A mixture might be made of, say, 1 cwt. of ordinary superphosphate and 1 cwt. of gypsum, and 1½ to 2 lb. used per day for the litter of each animal. Thus, in a feeding-box containing ten beasts, 15 lb. to 20 lb. of the mixture would be used in a day. If gypsum could not be readily and cheaply obtained, an equal quantity of sifted earth might be mixed with the superphosphate.

Of potash salts, the cheapest and most suitable, as Holdefleiss observes, is kainit, which can, like superphosphate, be bought of any manure merchant, costing, generally, about 2*s.* 6*d.* per cwt.

But on a large proportion of our English farms, viz., those on fairly strong and well-tilled clay lands, the cheapest agent for preventing loss from the muck-heap is the one to which preference would be given, and that is ordinary earth. Let the manure be stored on a good bed of dry earth, and protected from the weather by a good roofing layer of the same simple material.

BERNARD DYER.

YEW POISONING.

SOMETIME between the evening of Saturday, November 18, 1893, and the early morning of November 19 some eight or nine yearling Shorthorn cattle belonging to me here (Sarsden House, Chipping Norton, Oxon,) got into a garden containing yew-bushes. Before daybreak they were turned out. Unfortunately the man who evicted them, not thinking about the chances of poisoning, said nothing about the matter till the evening of the 19th.

At 2.30 P.M. a man, passing the field in which the animals were, saw one of them fall down dead. Before that time they had been seen both by my bailiff and by myself, and appeared to be perfectly well. Between 7 and 8 o'clock on the morning of November 20 a second animal died. On the following morning it was found that two more had died in the night.

By mistake the first animal was buried without a *post-mortem* examination. On opening the second we found that the animal had eaten yew and box. An examination of the garden showed that a considerable quantity of yew had been eaten, also some box, and two little bits of *Cupressus Lawsoniana*. In all the cases that had previously come within the experience of my bailiff and myself a much shorter time elapsed between the poison being taken and death. I am unable to say when the yew was eaten in this case, but it must have been before 7 A.M. on November 19. The first animal died 7½ hours after, the second died 25 hours after, and the third and fourth after a much longer lapse of time. Two others were ill, but recovered.

The plants are not very old, perhaps about 20 years. It is curious that in the field adjoining the garden are three very old yew-trees. These I have always looked upon as sources of danger, but in the three years I have been farming here they have done no harm, nor does inquiry show that they ever have done any. I have often wondered whether soil has any effect on the poisoning power of the yew; the present case seems to disprove this idea. I am unable to state the sex of the bushes that did the mischief. As there were five or six, probably they were of both sexes, though, of course, it is quite possible that only one sex did the deadly work. In the churchyard

of a neighbouring parish a yew-tree spreads its branches over the adjacent field. The cattle have grazed on these till they look as if they had been trimmed with shears. Another tree was eaten by some farm horses in this parish; but in neither case has any harm been done.

MORETON.

FARM ACCOUNTS.[1]

My experience is that the intense competition that has been created by free importation of all agricultural produce has completely altered the conditions upon which farming operations now require to be carried on. Farming has become a most difficult business to follow profitably, and it cannot be done without very accurate accounts, which have been found to be necessary in competitive businesses of other kinds. In order to keep such accounts where cattle-feeding is part of the work of a farm, it is necessary to ascertain the live weight of the animals as a basis of calculation. Without it it is impossible to arrive at a fact, as the present method of guessing at the yield of carcass contained in a fat animal is not a fact; it is a mere speculative opinion, and is not capable of being represented by a figure. The quality and condition of all commodities, which determine their value, are matters of judgment, and must always remain so; but they have nothing to do with the quantity of the commodities, which must be determined by the scales. In order to arrive at the simplest and most accurate form of farm accounts it will be necessary that a cash-book of the ordinary kind should be kept, properly balanced every week or month, to ensure that there have been no omissions. This would contain a true history of all cash transactions, from which a correct balance-sheet, of such a form as is presented on pp. 842–3, would be easily made. It is important that these balance-sheets should be made out on one uniform method, so that results in different parts of the country could be compared, if thought desirable. A balance-sheet of this kind would be easily verified by an auditor or accountant, as he would only have to refer to the cash-book in the case of any figures he might think it necessary to check. An account of this nature would show *where* gains or losses occur. If such an account is kept over a series of years, I think it will be found that the profits arising from the business of agriculture are so small at the present time that it will not bear to be carried on upon borrowed capital, which would absorb the profit.

[1] A former note on this subject, by the same writer, appeared in the Journal, 3rd series, vol. ii., 1891, pp. 422–5. The subject is of perennial interest, and the fact may be recalled that the Society's Judges of Book-keeping made a report thereon in the Journal, 2nd series, vol. xix., 1883, pp. 693–701, and prepared a series of forms, which are published by E. Forster Groom, 16 Charing Cross, London, S.W., as follow:—No. I. Dairy, price 4*s.* 6*d.*; No. II. Receipts, Payments, and Balance Sheet, price 6*s.* 6*d.*—ED.

Payments.

	£ s. d.	£ s. d.
VALUE OF TENANT RIGHT BROUGHT FORWARD FROM 1890:—		
Value of Tenant Right		105 12 6
VALUATION, MAY 12, 1890, IN HAND:—		
200 Ewes and Double Lambs at 80*s.* each	800 0 0	
163 Ewes and Single Lambs at 60*s.* each	489 0 0	
20 Eild Ewes at 60*s.* each	60 0 0	
200 Feeding Hoggs at 51*s.* each	510 0 0	
172 Ewe Hoggs at 54*s.* each	464 8 0	
Wool from those already clipped	70 0 0	
6 Tups at 5*l.* each	30 0 0	
25 Feeding Cattle at 18*l.* 10*s.* each	462 10 0	
24 Stores about two years old	306 10 0	
1 Cow	17 0 0	
Pigs	45 10 0	
Poultry	10 0 0	
19 Horses, less 5 per cent. for Depreciation	591 0 0	
Two-year-old Filly	25 0 0	
Foal, 5*l.*; Pony, 8*l.*	13 0 0	
Implements, less 5 per cent.	492 0 0	
Threshing Machine	190 0 0	
Harness, less 5 per cent.	54 0 0	
300 Bolls Barley at 16*s.*	240 0 0	
60 Bolls Oats at 22*s.*	66 0 0	
15 tons of Hay at 3*l.* per ton	45 0 0	
		4,980 18 0
LIVE STOCK BOUGHT:—		
82 Cattle bought	963 15 0	
2 Horses bought	63 0 0	
Wool bought, December 20, 1890	11 13 6	
		1,038 8 6
FEEDING STUFFS:—		
Cake	93 3 0	
Stuffs, Corn and Bran	114 10 2	
		207 13 2
MANURES:—		
Artificial		138 12 3
RENT:—		
820½ acres at 35*s.* an acre, including Land Tax and Tithes	1,431 8 0	
Rates and Taxes	63 12 8	
Interest on Capital, 5,000*l.* at 4 per cent.	200 0 0	
Insurance	5 11 10	
		1,700 12 6
LABOUR:—		
Farm Labour paid in Wages	734 7 8	
Farm Labour paid in Kind	251 18 0	
Manager's Salary paid in Kind	10 12 6	
(262*l.* 10*s.* 6*d.*)		
Manager's Salary paid in Wages	75 0 0	
Bonus paid to Servants for year ending May 12, 1891	76 0 11	
		1,147 19 1
EXPENDITURE DURING THE YEAR:—		
Implements, &c., bought and repaired	74 14 0	
Seeds bought	79 8 11	
Sundries	65 15 6	
		219 18 5
Debts owing by Farm		85 0 0
Profit on the year's transactions after paying Bonus to Labourers, 76*l.* 0*s.* 11*d.*; and Interest on Capital, 200*l.*		115 13 2
		£9,740 7 7

Receipts.

	£ s. d.	£ s. d.
LIVE STOCK SOLD:—		
79 Cattle sold	1,458 5 9	
548 Sheep sold	1,279 13 1	
Wool sold	276 0 0	
8 Pigs sold	7 17 6	
		3,021 16 4
CORN SOLD:—		1,278 3 4
FARM PRODUCE:—		
Farm Produce, including value of Houses occupied by Labourers		262 10 6
SUNDRIES:—		
Sundries sold		161 15 11
VALUATION, MAY 12, 1891:—		
200 Ewes and Double Lambs at 80*s.* each	800 0 0	
185 Ewes and Single Lambs at 60*s.* each	555 0 0	
166 Ewe Hoggs at 54*s.* each	448 4 0	
6 Young Tups at 70*s.* each	21 0 0	
230 Feeding Hoggs at 45*s.* each	517 10 0	
7 Old Tups at 70*s.* each	24 10 0	
4 Eild Ewes at 45*s.* each	9 0 0	
8 Fat Cattle	153 0 0	
12 Stores at 13*l.* each	156 0 0	
5 Stores at 12*l.* 5*s.* each	61 5 0	
10 Stores at 11*l.* each	110 0 0	
16 Stores at 10*l.* 10*s.* each	168 0 0	
1 Bull	13 0 0	
1 Cow	17 0 0	
27 Pigs, 4 Sows, 1 Boar	30 0 0	
Poultry	10 0 0	
20 Horses, less 5 per cent.	595 0 0	
1 Yearling, 15*l.*; 2 Ponies, 35*l.*	50 0 0	
Threshing Machine	188 0 0	
Implements at May, 1890, less 5 per cent.	472 0 0	
Harness at May, 1890, less 5 per cent.	51 0 0	
300 Bolls Oats at 18*s.*	270 0 0	
10 Bolls Barley at 21*s.*	10 10 0	
60 tons of Hay at 3*l.* per ton	180 0 0	
		4,910 9 0
VALUATION OF TENANT RIGHT CARRIED FORWARD TO 1891:—		
Value of Tenant Right		105 12 6
Debts owing to Farm		— — —
		£9,740 7 7

Number of acres	820½.
Rent, including Land Tax and Tithes	1*l.* 15*s.* an acre.
Labour, including Manager's Salary, Bonus and extra Labour in harvest	1*l.* 7*s.* 11¾*d.* an acre.
Profit, including Interest on Capital, after paying Bonus to Servants	7*s.* 8½*d.* an acre.
Returns per acre	5*l.* 13*s.* 6*d.* an acre.
Capital per acre	6*l.* 1*s.* 11*d.* an acre.

Net profit, 115*l.* 13*s.* 2*d.*, is 2·31 per cent. of capital invested, 5,000*l.*
Interest on capital, 200*l.* 0*s.* 0*d.*, is 4·00 per cent. of capital invested, 5,000*l.*

6·31 per cent.

I consider that a private agreement between landlord and tenant would be better than trusting to the Agricultural Holdings Act, or any other Act of Parliament.

Every farmer understands his own business best, and nobody knows what he wants so well as he does himself. He ought to be insured against his rent being raised upon his own improvements, or he will not improve the land. I do not, of course, wish farmers to be compelled to weigh their cattle or to keep accounts; if they prefer to conduct their business on the present plan, they will be at perfect liberty to do so. Everyone must be at liberty to conduct his business in the way he finds it most advantageous to himself, and in the way he can make most money. If he does not like the trouble of keeping accounts, and prefers to do without them, he should not complain if he does not make money.

All farm produce consumed and services rendered in the house should be paid for, and should appear on the credit side of the account; but other food and household expenses not supplied by the farm, such as grocery, clothing, professional advice, amusements, should not come into these farm books at all. The net profit on making up the books shows the interest made on the capital embarked.

It is impossible that keeping accounts can do farmers any harm; they may show them or not as they like.

WESTLEY RICHARDS.

THE "CHURN TEST" AND THE "CHEMICAL TEST" FOR BUTTER PRODUCTION.

(*A Comparison of the Results obtained in the Class for Dairy Cows at the Chester Meeting*, 1893, *by the "Churn Test" and by Chemical Analysis respectively.*)

THE previous number of the current volume of the Journal contained on pages 525–527 the results of the competition held at Chester in June last between the cows entered in Class 116, in respect of their butter-producing powers, as decided by the practical test of the churn.

By direction of the Dairy Committee I took, at each time of milking, samples from the milk yielded by the several cows, and I submitted these to chemical analysis in the Society's laboratory.

The samples taken were from the identical lots of milk which were subsequently used for separating and churning for the purposes of the actual competition.

It will be of interest to compare the results obtained by the two methods, and to see how nearly these agreed, and how far the awards would have been affected had the chemical test been adopted as the basis, instead of the churn test

The process of chemical analysis employed by me for the estimation of the butter-fat was in most cases the areometric method of Soxhlet, supplemented and checked, when necessary, by direct extraction of the butter-fat from the solid residue, employing the ordinary Soxhlet process of extraction by ether, or that of the Adams' coil. The results of my analyses were, I should say, handed by me to the Steward of Dairying quite independently, and without previous knowledge of the results yielded by the churn test.

The table on p. 846 gives, *firstly*, the respective yields of milk; *secondly*, the percentages of total solids and fat contained on each occasion of milking; *thirdly*, the weight of butter-fat as calculated from the chemical analysis and from the weight of milk obtained at each milking; *fourthly*, the weight of butter actually obtained by the test of the churn; and *fifthly*, the respective awards according to the two methods of testing.

Division A.—From the table it will be seen that the three prizes would have been awarded in precisely the same way by the chemical test as by the churn test.

The only change throughout would have been in the relative positions of cows Nos. 1191 and 1192. As to this I would observe that, seeing the much larger quantity of milk which No. 1192 gave on the second day, and the fact that it was quite as rich in quality as that of No. 1191, I consider there are strong grounds for supporting my result in this instance in preference to that obtained by the churn test.

The relative positions of the cows in this division were :—

By the Churn Test . . .	1	2	3	4	5	6
By the Chemical Test . . .	*1*	*2*	*3*	*5*	*4*	*6*

Division B.—In this section, had the awards been given by the chemical test the three prizes and also the reserve number would have been divided amongst the same four animals which gained them in the actual contest decided by the churn test.

There would have been, however, a variation in the position of the leading prize-winners, inasmuch as the first prize would have gone to cow No. 1211 instead of to No. 1205, while Nos. 1205 and 1184 would have been bracketed equal. The reserve number would have gone in each case to the same animal, No. 1182.

Also the fifth, sixth, seventh, and eighth places would have been the same according to either test.

There was, altogether, a great similarity in the placing of the whole of the competing cows; this is shown by the following comparative table :—

Position according to Churn Test	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Position according to Chemical Test	*2*	*1*	*3*	*4*	*5*	*6*	*7*	*8*	*10*	*9*	*11*	*12*	*15*	*17*	*14*	*13*	*16*	*18*

In considering these results, it will be noticed that in the actual competition the first prize went to cow No. 1205, whose milk yielded

No. in Catalogue	Weight of milk			Analysis of milk				Weight of butter-fat in two milkings by chemical test	Weight of butter in two milkings by practical test of churn	Award by chemical test	Award by churn test
	Monday evening	Tuesday morning	Total yield	Monday evening		Tuesday morning					
				Fat	Solids	Fat	Solids				
Division A	lb. oz.	lb. oz.	lb. oz.	per cent.	per cent.	per cent.	per cent.	oz.	lb. oz.		
1190	19 10	27 5	46 15	2·13	11·03	3·41	12·05	21·6	1 $3\frac{1}{2}$	3rd	3rd
1191	15 3	17 11	32 14	2·72	11·92	3·09	12·03	15·3	0 $15\frac{3}{4}$		R.N.
1192	11 7	30 7	41 14	2·06	11·36	3·16	12·40	19·2	0 $15\frac{1}{4}$	R.N.	
1197	16 12	19 3	35 15	2·04	11·34	2·96	12·00	14·5	0 $15\frac{1}{4}$		
1200	16 15	14 15	31 14	3·74	12·80	4·71	13·85	22·4	1 $5\frac{3}{4}$	2nd	2nd
1201	22 10	21 15	44 9	3·39	12·15	4·04	13·14	26·4	1 $10\frac{1}{2}$	1st	1st
Division B											
1179	21 6	19 15	41 5	4·01	12·87	4·40	13·34	27·7	1 $11\frac{1}{4}$		
1180	18 5	18 1	36 6	3·71	12·77	4·03	13·19	22·5	1 $7\frac{1}{2}$		
1181	19 12	16 10	36 6	4·93	13·81	4·88	13·92	28·5	1 15		
1182	16 2	16 15	33 1	5·38	14·88	6·15	15·58	30·5	2 2	R.N.	R.N.
1183	19 13	20 14	40 11	4·23	13·33	4·92	14·06	29·8	2 0		
1184	19 2	19 9	38 11	5·03	14·53	5·47	14·67	32·5	2 3	equal 2nd	3rd
1186	14 3	15 13	30 0	4·79	14·59	5·32	14·63	24·2	1 $10\frac{1}{4}$		
1189	25 2	24 11	49 13	3·08	11·56	3·06	11·68	24·4	1 11		
1195	18 12	17 14	36 10	3·82	12·48	3·65	12·19	22·0	1 $5\frac{1}{4}$		
1198	13 1	12 13	25 14	5·18	14·03	6·24	14·98	23·6	1 11		
1199	15 4	15 2	30 6	4·26	13·35	3·78	12·67	19·5	1 3		
1202	7 15	absent	7 15	3·28	12·24	—	—	—	Disqualified		
1204	25 10	16 10	42 4	3·68	11·88	3·01	11·30	23·0	1 10		
1205	12 13	16 10	29 7	5·19	14·14	8·20	16·79	32·4	2 $4\frac{3}{4}$	equal 2nd	1st
1206	8 2	8 7	16 9	5·11	14·17	5·04	13·96	13·4	0 $13\frac{1}{2}$		
1207	12 7	12 13	25 4	3·91	12·94	5·04	14·66	18·1	1 $6\frac{1}{4}$		
1208	15 8	17 2	32 10	4·16	13·22	4·50	13·44	22·6	1 $4\frac{3}{4}$		
1209	12 6	13 14	26 4	4·63	14·22	4·86	14·08	19·9	1 $6\frac{1}{2}$		
1211	19 2	21 10	40 12	4·16	13·64	6·11	15·15	33·8	2 $3\frac{1}{2}$	1st	2nd

only $1\frac{1}{4}$ oz. more butter than did that of No. 1211. On the other hand, the second prize winner gave 40 lb. 12 oz. of milk against the 29 lb. 7 oz. of No. 1205, and it was only the exceptional richness of the milk of No. 1205 on one occasion (the fat percentage being as much as 8·20) that gave to it the first prize. The fat percentages, 5·19 and 8·20, of No. 1205 do not show such consistency as do the 4·16 and 6·11 respectively of No. 1211. Nor, when the total yields of milk are severally compared, do the 12 lb. 13 oz. and the 16 lb. 10 oz. of No. 1205 show anything like the weight or regularity instanced by the 19 lb. 2 oz. and 21 lb. 10 oz. of No. 1211. No. 1184, also, shows great consistency both in the yield of milk and the richness of quality.

Taking these points together, I feel I am justified in saying that it was probably only due to an exceptional circumstance, or possibly to some irregularity of manipulation in the working of the churn test, that gave the first prize to No. 1205, and that the chemical test in all likelihood more accurately represented the true position of the competing animals. At all events, it will be conceded that it more clearly indicated which was the best animal of the whole number on the occasion of the trial.

However, there was a marked similarity all through, and the trial showed that both methods, when properly worked, are capable of giving comparative results not differing widely from one another, and that the chemical test can, in competent hands, be absolutely depended upon for ascertaining the value of cows competing with one another as butter-producers. It is very certain, however, that had it not been for the extreme care exercised, and the minute precautions taken beforehand by the assistant-steward, the Hon. A. E. Parker, to avoid as far as possible any cause of failure, the churn test could not have been carried out to the successful issue attained. The details of the arrangements are recorded in the Journal, September 1893, pp. 525, 526. Mr. Parker took great pains to eliminate, as much as he could, those causes of variation which I touch upon later in this note, and was careful to use the same separator throughout, to employ the same temperature for separation, to have the same kind of churn, and to conduct all the operations under like conditions and temperature. Had all this not been done, or had any accidental loss by spilling of milk or cream occurred, or any unevenness of working of separator or churn been experienced, it is certain that the test would have turned out very differently from what it did; and I am sure that, unless put in the hands of men of experience and aptitude, its actual working will be found to be very far from an easy task, while, even with such men directing it, it must always be, until completed, a matter of considerable anxiety. Like most tests of the kind, its worth depends in chief measure upon the kind of men who are entrusted with its working.

Having shown that results not widely differing can be obtained by the two methods when properly worked, it remains to consider the relative accuracy and general *adaptability* of the methods.

On the one hand, the churn test has the advantage (if advantage

it can be called) from a "show-yard" point of view—that the actual butter produced can be exhibited, and this appeals to the senses in a way that the intricacies of chemical analysis and figures do not. On the other hand there are, it seems to me, disadvantages which do not appear in the case of the chemical test.

Could one be sure that the butter exhibited as the yield of a cow by the churn test was *all* that could be obtained by the best separation and by the most skilful management, or could one be sure that it was *all* butter with no undue excess of water, of curd, &c., and with no *unevenness* in these respects between competing samples, then the churn test would need little more than the exercise of care in seeing that none of the material was lost during manufacture.

But, as is recognised by the fact that we have our "competitions of separators," our "contests of churns," and our "butter-making competitions," it must be apparent that quite a number of elements are introduced, all or any of which must exercise a disturbing influence, small though it may be, on the results.

And it comes about, therefore, that the butter produced is not the absolute quantity which the milk of a competing cow *can* produce, but it is that which is yielded by the working of a particular separator, by the use of a particular churn, and by the method of procedure adopted by a particular operator.

Everyone knows that one separator does not work equally as well as another, and that even the same separator will remove different amounts of fat at one time to another, according to the temperature of the milk, the speed at which and the way in which the separator is worked; also that the mere *weight* of butter produced will be largely affected by the perfection or otherwise of the removal from it of the butter-milk, or by the more or less skill with which water has been incorporated with it.

Given precisely the same kind and the same amount of cream, the same implements, and the same conditions, two persons, even if equally skilled, will not produce the same weight of butter—else why do we have our butter-making competitions? Nor, again, would the same person twice following produce exactly the same weight of butter.

The *personal equation* is bound to come in, whether it lie in the machine or in the operator; and the same operator will not turn the separator or churn equally well after making, say, half a dozen lots of butter, as he did at the beginning.

Yet again, the churn test does not provide for what many experienced butter-makers hold to be essential to the production of the largest weight and best quality of butter—viz., the proper "souring" of the cream.

On the general ground of adaptability there are considerable risks, which make the test a matter of no small anxiety to those engaged in carrying it out. Not only must care be taken to keep the different lots of milk and cream separate, and to avoid any mixing up of them—a not altogether easy matter when many cows are

entered in a competition, and when more than one milking has to be churned—but there is the certainty that if any of the milk or any of the cream be lost in the numerous manipulations which they undergo, the whole competition may be spoiled, for there is no possibility of replacing the milk, or of taking a fresh sample, or of allowing for the loss. Thus, for the whole of the time, and until the finished product is obtained, there must be risk of disturbing elements coming in, any of which may affect the result, or even vitiate the test.

Compare with this the ease of manipulation, the certainty of the scientific processes involved, the readiness with which results can be checked or repeated in the case of the chemical test, and it must be clear that, after deducting the "show-yard argument," the chemical test possesses most distinct advantages in every respect.

The butter-fat shown by the chemical analysis of the milk is the *whole* of the real *butter-making* material, and nothing else—no varying quantity of curd, of water, of salt, &c.; it is independent of the "souring" or not of the cream, and it is independent of the varying efficiency of separator, churn, or operator, or of circumstances of temperature, outside surroundings, &c.

The chemical test, in brief, is the determination of what each cow has yielded that *is capable of* being transformed into butter, and not what *may*, under certain conditions, be turned into butter.

As regards adaptability there can be no comparison.

After the milk has been weighed, samples are at once drawn; and, this done, absolutely the only risk run is in the transmission of the sample—in case it has to be sent to a distance—and this risk is avoided entirely by the taking of duplicate samples.

After the samples have been drawn, it does not matter what happens to the milk, nor whether any is lost in separating, in churning, or otherwise.

The analysis can be repeated a dozen times if needed, and the accuracy of the determinations admits, in competent hands, of no question whatever.

I regard the chemical test, therefore, as at once the simpler and the more accurate method.

J. Augustus Voelcker.

THE GREAT DROUGHT OF 1893.[1]

At an ordinary meeting of the Royal Meteorological Society, held on November 15, a paper was read by the writer on "The Great Drought of 1893 and its attendant Meteorological Phenomena." Inquiry showed that, although an unusual amount of

[1] This communication may be regarded as supplementary of the paper by Mr. G. J. Symons, F.R.S., on *The Spring Drought of* 1893, printed in the current volume of the Journal, pp. 339–354.—Ed.

fine weather was experienced over England during the greater part of 1893, the drought itself was confined to the spring and early summer months. The finest and driest weather of all occurred in the ten weeks commencing with the beginning of March and ending with the middle of May, but a great deficiency of rain continued in most districts until the end of June, and the period selected for investigation therefore included the whole of the four months, March, April, May, and June.

A partial solution of the causes which led to so severe a drought lay in the fact that during the period in question our islands and the neighbouring parts of the Continent were exposed to an almost constant prevalence of anticyclonic systems, or areas of high barometrical pressure. These systems are usually attended, as their name would imply, by weather of a precisely opposite character to that which accompanies cyclones. The anticyclone may, in fact, be briefly styled the fine-weather system, while the cyclone is the system which in its more intense forms brings us our winter gales, and in its less violent moods the unsettled showery weather which is confined, as we are all aware, to no particular season of the year. Apart from the pressure conditions of the four months, which were eminently favourable for dry weather, there was throughout the entire period a remarkable tendency in favour of sunshine and drought, so that on many occasions, when a falling barometer and a cyclonic distribution of pressure would have led the wisest of the weather-wise to anticipate a change, the rain either held off entirely or fell in so partial and scanty a fashion as to be of little or no value to the parched soil. The existence of such tendencies has long been recognised by the meteorologist, but at present no one has offered anything like a satisfactory solution of their origin, and until such an explanation is forthcoming it would be impossible to adequately account for such a drought as that of 1893, or to venture upon weather predictions for any long period in advance. The continued presence of anticyclones in the period under review had of course a very marked effect upon the mean height of the barometer, which was above the average in each of the four months, and especially so in April—a month in which the barometer is usually lower than at any other time of the year. At the Kew Observatory the mean barometric pressure for the entire four months was the highest registered during a similar period of the year since 1870.

The effect of the high-pressure systems upon temperature was shown in abnormally high day readings, but in low night readings, both features being especially noticeable over the inland parts of the country, where the daily range was exceedingly large. In the Midland counties and at most of the inland stations in the east and south of England the mean daily range, or difference between the highest day and the lowest night temperatures, amounted for the entire four months to between 20° and 27° F. On the coast the range did not exceed 10° or 15°.

A far more striking effect of the anticyclonic pressure distribution was evident in the amount of bright sunshine recorded over the

United Kingdom. Taking the four months as a whole, the inquiry showed that over the northern parts of England, and also in the south and east of Ireland, there was, generally speaking, between 40 and 50 per cent. of the possible amount. In nearly all the more southern parts of England and Wales the percentage was above 50, the only exceptions being Greenwich and Margate; at the former station there was only 44 per cent., and at the latter 48 per cent. On the south and south-west coasts of England the values ranged between 50 and 60, the latter figure being reached at Falmouth. This very high percentage was, however, considerably exceeded in the Channel Islands, the value both at Guernsey and Jersey being no less than 67 per cent. To grasp the full significance of these facts it must be borne in mind that if the sun shines during a whole month for more than half the time it is above the horizon, the record is considered a remarkably good one, a percentage of 60 or more for such a period being very unusual in these islands. During the period under discussion there was at a large number of stations on our south and south-west coasts a percentage very little under 60 for a period extending over four months, while in the Channel Islands the sun actually shone during this lengthy interval for more than two-thirds of the time it was above the horizon. A careful examination of the records since the year 1881 shows no such spell of fine weather, the only approach to it being in the splendid summer of 1887, when the percentage at Jersey for the three months, June, July, and August was over 60. The value, however, for that period was lower than it was this year, and if, to make the comparison complete, we add as a fourth month either May or September to the 1887 record, we get a very much smaller percentage than that given in the period under discussion. As regards the daily proportion of sunshine, it appears that during the four months there were more than 7 hours per day in the Midland counties, about $7\frac{1}{2}$ hours in England east, and between 8 and $8\frac{1}{2}$ hours on our south and south-west coasts, while in the Channel Islands the daily proportion for the entire period was no less than $9\frac{1}{2}$ hours. The smallest number of sunless days in the four months was two at Southampton, Torquay, and Guernsey, and three at Rothamsted, Dublin, and Jersey, but many other stations over the southern parts of the kingdom reported only four or five such occasions. In the Channel Islands, and also at Torquay and Plymouth, there was not one sunless day during the whole of April, May, and June.

The particulars relating to the rainfall of the four months were considered under two heads, the first relating to the distribution of the rain which actually occurred, and the second giving interesting data respecting the periods in which it was altogether wanting, or was too scanty in amount to be of any real service. With regard to the first of these questions, it appeared that over a very considerable portion of England there was a deficiency in each of the months. In *March* the total amount was less than one-quarter of the average in most of the English districts as well as in the south of Ireland. Over a large part of our eastern, central, and southern counties there

was no rain at all after the middle of the month. In *April* the deficiency was far more striking than in March, less than one-tenth of the average being registered over nearly the whole of our eastern, southern, and south-western counties, as well as in the more southern parts of the Midlands. The driest region of all was undoubtedly the extreme south ; at Hastings the month's rainfall amounted to only 0·02 inch, and at Dungeness to 0·01 inch, while at Hurst Castle and the North Foreland there was none at all. *May* was less dry than either March or April, an actual excess of rain being reported at several stations situated in central and northern England. In the eastern and southern counties, however, there was again a large deficiency, less than half the average being reported in many places. In *June* the deficiency was more general than in May, the total fall being considerably below the normal over the whole of England, and less than half the normal at the majority of stations in the central and southern districts. Taking the period of four months as a whole, the aggregate rainfall amounted to less than half the average over the entire southern and eastern half of England, as well as in certain portions of Durham and Northumberland. Over a considerable portion of our southern counties, as well as in Cornwall and South Wales, the fall amounted to less than one-third of the average, the only southern localities in which this proportion was exceeded being some of the more central parts of Devonshire. In London and at Oxford there was exactly one-quarter of the average quantity, while at Pembroke there was very little more than one-quarter. The driest localities of all were, however, those situated in the extreme south-east and south-west of England. At Scilly and Falmouth the total fall amounted to only 21 per cent. of the average, while at Dungeness the percentage value was as low as 14, the rainfall for the whole four months at the last-named station being less than one-seventh of the usual quantity.

In order to test the truth of the general impression regarding the very exceptional character of the period, recourse was had to the records made over a long series of years in London and at Oxford.

The London record for more than 80 years past failed to show any period of four months at any time of the year with so small a rainfall as that of the present year. In the period under discussion the total for the four months in London was only 1·83 inch, the nearest approach to it being in the months of October 1879 to January 1880, when the total was 2·17 inches. The Oxford record for 42 years past also contains no such an amount as that recorded in the few months under review. The nearest approach to it was in the months of January to April 1892, when the total was 2·50 inches ; after which came, as in London, the four months October 1879 to January 1880, with a total of 2·54 inches. This year the fall was only 1·85 inch. It seems not a little singular that one of the driest periods on record should have occurred in 1879, a year which was remarkable for bad weather, and in which the rainfall for the entire twelve months was largely in excess of the average.

The drought statistics given in the paper were drawn up on the

basis of the definitions laid down by Mr. Symons in the volume of *British Rainfall* for 1887. These definitions are as follow :—

1. *Absolute Drought.* Periods of more than 14 consecutive days without any measurable quantity of rain.
2. *Partial Drought.* Periods of more than 28 consecutive days the aggregate rainfall of which does not exceed 0·01 inch *per diem*.

In addition to these an *Engineer's Drought* was defined as a period of three or more consecutive months the aggregate rainfall of which is less than one-half the average.

The figures clearly showed that an engineer's drought prevailed to a greater or less extent in all the more southern parts of England, as well as at some stations situated in the south of Ireland and the west of Scotland. In many places the three-months limit might indeed have been multiplied by 2. In London and at Oxford, for example, the deficiency of rain was prolonged over seven months, the total fall between March and September being only slightly over 48 per cent. of the average at Oxford, and rather less than 46 per cent. in the Metropolis. At many other stations in the south of England the rainfall of July was sufficiently heavy to terminate the long drought.

From a general review of the statistics it appeared that the only portions of the United Kingdom altogether unaffected by the drought were certain districts in the west of Scotland and the majority of the stations situated in the northern and south-western parts of Ireland, or, broadly speaking, the extreme western and north-western parts of our islands.

In the north-west of England three stations out of seven had an *absolute* drought lasting for 15 days, while at another station (Blackpool) there was one *absolute* period of 29 days, and another of 18 days. The *partial* drought in England N.W. varied greatly in duration in different places ; at Stonyhurst and Manchester there were only 30 days, but at Newton Reigny (near Penrith) there were as many as 61, while at Blackpool there was one period of 69 days, followed after a week's interval by another of 32 days. Similarly, large variations were reported in the north-east of England, for while four stations out of the six escaped an *absolute* drought, one other station had 19 days without rain, and another station as many as 29 days. All parts of the district reported a *partial* drought, the number of days ranging from 45 at Alnwick Castle, and 46 at York, to 79 at Spurn Head, and to 75, followed by another 30-days period, at Shields.

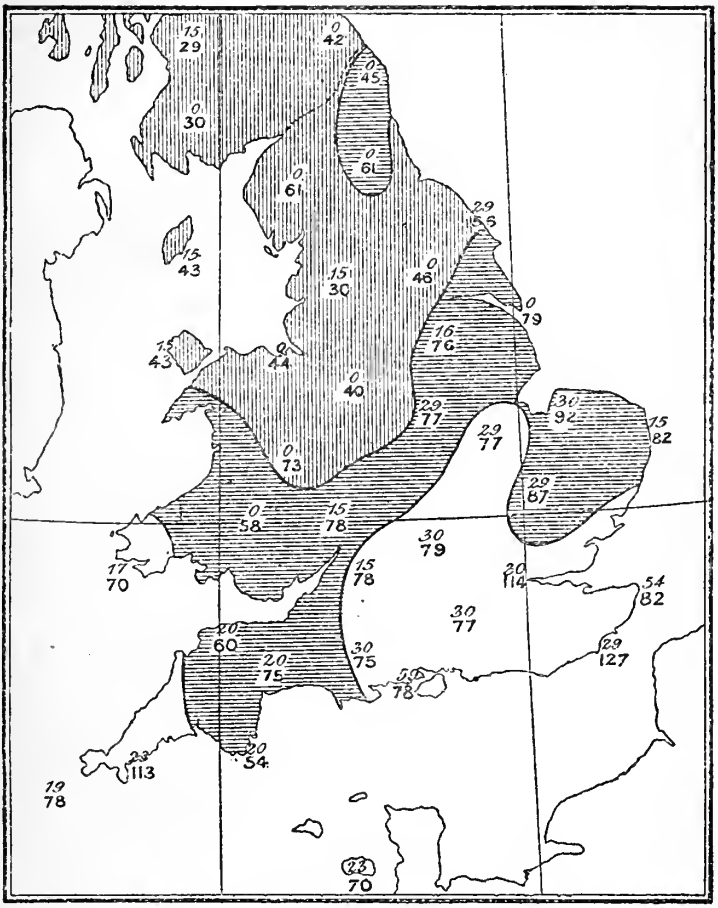
In the Midland counties, six stations out of eight experienced an *absolute* drought, the number of days ranging from 15 at Hereford and Cirencester to 30 at Oxford. At Loughborough there was one period of 29 days between March and April, and another period of 17 days in June. The *partial* drought lasted in most places from 75 to 79 days, while at Loughborough and Churchstoke this very long period was supplemented by a shorter one, which continued respectively for 32 and 29 days. In the east of England all stations

were affected, both in an *absolute* and also in a *partial* degree. At Yarmouth the length of the *absolute* drought was only 15 days, but at all other stations it exceeded 20 days, and at Hillington, in Norfolk, it reached 30 days. At Rothamsted there was one long period of 24 days, followed by a shorter one of 15 days. The *partial* drought in the eastern counties lasted for over 80 days at four out of the five stations, the longest spell being at Hillington, where it extended over 92 days. In the South-western counties of England the drought, though less continuous than in the eastern districts, was upon the whole rather more severe. In place of one long period of intensely dry weather, there were in most cases two or three, each lasting for 15 or 20 days. At Falmouth there was one *absolute* drought of 15 days in March, followed by another of 23 days in April, and by a third of 20 days between May and June. The *partial* drought was also divided by intervals of copious rainfall, excepting at Falmouth, where it lasted continuously over a period of 113 days. In most of the cases there was one long drought lasting between 50 and 70 days in the early part of the period, followed by a shorter one of about 35 days between the months of May and June.

The district most seriously affected was, however, undoubtedly the south of England, or rather that portion of it bounded by Dorsetshire in the west, Wiltshire, Berkshire, and Middlesex in the north, and Kent in the east. In an *absolute* degree the severity of the drought varied in different localities, some places being exposed to one long period of rainless weather, while others experienced two or even three spells of a shorter duration. The longest *absolute* period was at Hurst Castle, where there were 59 consecutive days without rain, next to which comes the North Foreland with 54. At Dungeness and Hastings the *absolute* drought would have lasted as long as at Hurst Castle had it not been for some showers which fell on April 16 ; at the former station these only yielded 0·01 inch, and at Hastings 0·02 inch, but they were sufficient to interrupt the rainless periods, which would otherwise have lasted respectively for 59 and 58 days. In London, and also at Strathfield Turgiss and Stowell, the longest period of rainless weather lasted for 30 days, but in the Metropolis it was followed in June by another spell of 15 days. The period of *partial* drought was also interrupted in many cases by some copious rains which fell during the latter part of May. At four stations out of the eight given in the district there was one long period ranging between 77 and 82 days, followed by a shorter one ranging between 29 and 36 days. At another station, Stowell in Dorsetshire, the longer period was alone experienced, while at the three remaining stations there was one very long period exceeding in duration anything experienced in other parts of the district. At Hastings the *partial* drought continued for 95 days, while in London it lasted for as many as 114 days. The longest spell of all was, however, at Dungeness, where the number of days amounted to no fewer than 127, the period commencing with February 27 and ending with July 3.

The general state of affairs relating to the rainfall and drought

Map showing Rainfall experienced over England during the four months March, April, May, and June 1893.



Districts in which the total rainfall amounted to less than one-third of average shown thus

Districts in which the total rainfall amounted to less than one-half of average shown thus

Districts in which the total rainfall amounted to more than one-half of average shown thus

The upper figures in *italic* type show for certain selected stations the number of days' duration of the longest *absolute* drought.

The lower figures in ordinary type show for certain selected stations the number of days' duration of the longest *partial* drought,

of the entire four months is graphically shown in the accompanying map, which gives, first, in various degrees of shading, the deficiency in the amount of rain over England, and secondly, by figures, the duration of the drought at certain selected stations. To avoid overcrowding the map we have, in cases where two or more droughts prevailed, chosen only the longest. The information is therefore somewhat less complete than that given in the tables of statistics which accompanied the paper.

In order to obtain some further idea of the abnormal character of the weather, a list was prepared giving the duration of all the droughts experienced in London since the year 1865. From this it appeared that, both in its absolute and in its partial sense, the drought of 1893 was considerably longer than any other recorded in the course of the past 29 years. The nearest approach to the period of 30 rainless days experienced this year was in June 1865, when a drought extended to 26 days. Next to this came 1887 with a period in June and July extending to 25 days, and March 1880 with a drought of 23 days. The partial drought of 114 days recorded this year was nearly twice as long as any other in the 29 years, the nearest approach to it being 58 days between October and December 1871. Next to this, but a long way behind it, came April and May 1880, and June and July 1887, each with a partial drought of 41 days, and afterwards June and July 1869, with a period of 40 days.

FREDERICK J. BRODIE.

PUBLICATIONS OF INTEREST TO AGRICULTURISTS.

I. THE IMPROVEMENT OF INDIAN AGRICULTURE.[1]

A. Τοῖς πᾶσιν ἀνθρώποισιν Εἰρήνης φίλης
πιστὴ τροφός, ταμία, συνεργός, ἐπίτροπος,
θυγάτηρ ἀδελφή, πάντα ταῦτ' ἐχρῆτό μοι.
B. Σοὶ δ' ὄνομα δὴ τί ἐστιν; A. Ὅτι; ΓΕΩΡΓΙΑ.

Fragment from the lost "Farmers" (Γεωργοί) of Aristophanes.

THE passing year will always be memorable in popular tradition for the formal inauguration, during a summer of unprecedented splendour, of the Imperial Institute as a centre of research, or, as Bacon would have called it, a College of Inquiry, into the whole reproductive resources of the United Kingdom, and its Colonies and Dependencies;

[1] *Report on the Improvement of Indian Agriculture.* By JOHN AUGUSTUS VOELCKER, Ph.D., B.A., B.Sc., &c., Consulting Chemist to the Royal Agricultural Society of England. Printed by Messrs. Eyre & Spottiswoode. 1893.

the noblest monument that could have been raised to a beloved Queen, honoured from the heart by dear children and by her people,[1] and whose long and beneficent reign has been appreciably contributory to the marvellous expansion and prosperity of the great commercial Empire of Britain during the past sixty years. But for the serious students of national progress the year has been rendered equally remarkable by the publication of four notable works, of the highest utility and interest, on India; these being Sir W. Wilson Hunter's enlarged third edition of his *Indian Empire*, the three concluding volumes of Dr. George Watt's monumental *Dictionary of the Economic Products of India*, Mr. J. A. Baines's *General Report on the Census of India*, 1891, and Dr. John Augustus Voelcker's *Report on the Improvement of Indian Agriculture*.

The first is a masterly and brilliantly-written summary of the political and administrative history of Ancient or Hindu, Mediæval or Mahomedan, and Modern or British India, that is a record, at once condensed, accurate, comprehensive, and philosophical, of the past of India; the second, an encyclopedic account of the nature and uses of every Indian mineral, vegetable, and animal production, crude or manufactured, known in the international trade of the world; the third, a scientific, scholarly, and most fascinating exposition of the statistics of the whole present material and moral condition of India; while the fourth, Dr. Voelcker's *Report*, is a revelation, as clear as such revelations can be made in the present, of the future of India; of the incalculable development of wealth in agriculture, and the arts dependent on agriculture, that must take place in India through the operation of equal laws and the diffusion of technical education, secured by the continuance of the "pax Britannica." It is a most important and significant series of works on India to have appeared in one and the same year, and should be in the hands of not only every student of industry, commerce, political economy, and history, but of every English statesman and publicist.

The volumes enumerated, together with the *Moral and Material Progress Report*, published by the India Office every year, and the *Statistical Abstract*, published by the same office every quarter, provide all the information regarding India that need be required for ordinary manufacturing, mercantile, journalistic, and parliamentary purposes; purely local details, topographical, economic, historical, statistical, and executive, being supplied by Sir W. Wilson Hunter's *Imperial Gazetteer of India* and the *Administrative Reports* published every year by the various Local Governments and Native States in India. All these books ought to be placed in the free libraries and political clubs of every manufacturing and commercial centre in this country interested in the trade with the

[1] Homer, of Arete, *Odyssey*, vii. 69–71:—

> Ὡς κείνη περὶ κῆρι τετίμηταί τε καὶ ἐστίν
> ἔκ τε φίλων παίδων, ...
> καὶ λαῶν.

East; thus leaving no excuse for that amazing ignorance of India now so painfully prevalent among influential party politicians of the familiar advertising sort, which, even more than the demoralisation of political principles and the degradation of manners everywhere introduced by them into public life, is one of the signs of the times, ominous of the inveteracy of the decline and coming downfall of the old manufacturing and mercantile supremacy of the United Kingdom.

Nothing could be more admirable than the manner in which Dr. Voelcker has produced his *Report*. The body of it is divided into 20 chapters, extending over 410 closely, but clearly printed, tall 8vo pages. Each chapter is devoted to a special subject, the divisions of each subject being marginally noted, and his conclusions and recommendations on each subject consecutively treated being given in wider-spaced, specially headed, paragraphs at the end of its chapter. Besides the table of contents, outlines of chapters, and maps, the *Report* is preceded by an abstract of the same, chapter by chapter, of nineteen pages, and is succeeded by appendices consisting of fourteen analyses of soils, dungs, waters, oil-cake refuse, fodder, &c., and a diary of Dr. Voelcker's three tours in India between December 10, 1889, and January 10, 1891. The whole is concluded with a full index, in which I have failed to detect a single clerical or typographical error. It is one of the most thoroughly schemed and executed official reports I ever had in my hands, its scope and purport being apprehended at, as it were, a glance; while, as a closer inspection proves, not a particular of any pertinence has been overlooked, and years of study would not exhaust the value of its lucidly and logically marshalled facts, or the interest of its vivid actuality.

The subjects treated in the *Report* are, the history of the Indian Agricultural Departments, the possibility of improving Indian agriculture, the Indian cultivator, climate, soil, water, manure, the Indian forests and fuel and wood reserves, grass, fodder crops and hedges, live stock and dairying, implements, crops and cultivation, agricultural industries and exports, economical and political conditions, practical agricultural inquiry, scientific agricultural inquiry, experimental farms, agricultural education, and the future organisation of the Indian Agricultural Departments. It is impossible to here follow Dr. Voelcker's "conclusions" and "recommendations" under these twenty headings, but they are all generalised in his second chapter, "On the Possibility of Improving Indian Agriculture," wherein he states that the diversities met with in India, alike in its physicial features, the people themselves, and their varying surroundings of life, altogether prevent one from speaking generally on the condition of their agriculture; that the problem of its improvement thus being an exceedingly difficult one, requires to be dealt with in the most circumspect, tentative, experimental, and patient manner; that, as a whole, the agriculture of India is not backward, as many ignorantly pretend; that in many parts there is little or nothing that can be improved in it, so completely have its Aryan cultivators adapted themselves to the soil which has been

"their Father and their God" for upwards of five thousand years; that where agriculture is manifestly inferior it is more the result of the absence of natural facilities which exist in better cultivated districts than from inherent bad systems of cultivation; and that the improvement in Indian agriculture will be best promoted, first, by the introduction of superior indigenous methods of cultivation from provinces and districts where they are practised to others where they are not, secondly, by the spread of technical education, particularly in agriculture and the rural arts generally, thirdly, by the establishment of systematic agricultural inquiry and record, and fourthly, by the systematic promotion and encouragement of water, wood, fuel, and manure supplies.

In almost every chapter Dr. Voelcker reiterates his advocacy of widely extended elementary technical education, which is really one of the greatest problems pressing on the attention of the Government of India.

The populated area of continental India, Mr. Baines shows, is 1,560,160 square miles, the number of its population being not less than 287,223,431, of which only 27,251,176, or 9·4 per cent., is urban, the rest being all rural, that is, engaged in pastoral or agricultural occupations; and even a large proportion of the so-called urban population is engrossed in industries and callings dependent on agriculture. In other words, India represents the largest continuous area of tropical and sub-tropical soil, with the densest and widest diffused agricultural population in the whole world. This is the economic force of India, the force that has really supported the civilisation of the Old World, through the commerce of which India has been the perennial head-spring from before the beginnings of authentic history. Indeed, this force has made in succession the history of ancient Egypt, Mesopotamia, Greece, Italy, of mediæval Egypt, and Genoa, and Venice, of Portugal, Holland, England, and once again of modern Greece, Italy, and Egypt. Yet this force is still for the greater part latent, and that after 150 years of the supremacy of British rule throughout the length and breadth of the vast extended, fertile continent, for it is that rather than a peninsula, with its teeming millions of the most industrious and patient agriculturists ever evolved by any known division of the great Aryan race, and blessed with a civilisation, with an unbroken tradition of 5,000 years, essentially identical with that of Ancient Greece and Rome; and which is yet destined to be the means of relinking the chain of the intellectual development of modern and ancient Europe at the point where its continuity was broken by the disruption of the Empire of the Cæsars, and the closing of the schools of Greek philosophy at Athens, and of Greek science at Alexandria. And the simple explanation of this otherwise inexplicable lateney of the economic force of India is the false, because foreign, ill-considered, impractical, and fruitless education we have enforced through our political ascendeney on the people of India. We have given them an English education, and that not a practical, but a scholastic

English education; with the result that, of every thousand educated natives in India, only four have received any form of technical instruction.

Dr. Voelcker's *Report* will gradually change all this, and the people of India are ripe for the change. They are beginning to take an extraordinary interest in their own industrial development, the only solid foundation for their national regeneration, and the only guarantee for the continuity of their historical individuality and idiosyncratic civilisation; the destruction of which would be the greatest crime Great Britain could commit against humanity. Our Anglicising system of education has only had the effect of creating a semi-denationalised literary class for whom no adequate livelihood can be found in India; but the system of education insisted on by Dr. Voelcker, based on the study of the methods of native industries, side by side with the study of the improved scientific processes of Europe and America, would afford a provision in life for every educated Hindu and Mussulman in Bengal, Madras, and Bombay for a full millennium to come; and within a generation render India independent of nearly every one of the manufactured articles now imported into the country, at so great an economic sacrifice, from abroad. So true are the epithets Aristophanes applies to agriculture: "The bringer of peace to men, and their faithful nurse, housewife, helper, guardian, daughter, and beloved sister." That Dr. Voelcker has seen this so clearly in relation to the future of India is, among the many aspects of his *Report* commanding attention, its highest claim to the consideration of English statesmen, and to their abiding recognition and gratitude.

GEORGE BIRDWOOD.

II. AGRARIAN TENURES.[1]

WE have recently heard less of Reform of the Land Laws in this country than we did some years ago, probably in part because other more burning political questions have come to the front, and also because what are known as Lord Cairns's Acts have unostentatiously done good work in the direction of simplifying the transfer of land and bestowing freedom of sale upon owners of settled land. On the other hand, since the enfranchisement of the agricultural labourer the desirability of enabling labourers to obtain allotments in cases where they have not already got them, and of increasing the number of small holdings of agricultural land throughout the country, has occupied the attention of men of all parties, and resulted in legislative enactments. The book before us, therefore, coming as it does from the present First Commissioner of Works and Chairman of the Royal Commission on Agricultural Depression, and professing to deal

[1] *Agrarian Tenures.* A Survey of the Laws and Customs relating to the Holding of Land in England, Ireland, and Scotland, and of the Reforms therein during recent Years. By the Right Hon. G. SHAW LEFEVRE, M.P. London: Cassell & Co., Ltd. 1893.

with the past, present, and future of agrarian legislation in the United Kingdom, cannot fail to be of interest at this time.

The work is for the most part historical, that is to say, the greater part of it is occupied with tracing the history of land ownership, including a more detailed view of the efforts of Parliament in the last twenty-five years to reform or reconstitute the relations to one another of the various classes of the agricultural communities in the United Kingdom.

So far as it is historical, it offers a useful and on the whole accurate *résumé* of recent land legislation. After describing the earlier characteristics of land ownership in England, Mr. Shaw Lefevre proceeds as follows :—

> Great changes have taken place in the conditions of rural England in the course of the last 200 years. The two classes of yeomen farmers and peasant proprietors have all but completely disappeared in every part of the country. A few yeomen farmers, indeed, still exist in the mountainous parts of Wales and in Cumberland, Westmoreland, and Devonshire. A few peasant owners or smaller yeomen are to be found in districts where there still remain large areas of common lands, as in the New Forest, Ashdown Forest, Dartmoor, and the Welsh and Cumberland Moors. There are also a few communities of small peasant owners in Lincolnshire, especially in the district known as the Island of Axholme, where a colony of Dutchmen many years ago introduced the system of small ownerships. But these cases are exceptional.

The causes for this almost total extinction of small owners he considers to be the prestige and amenities incidental to land ownership on a large scale, which have tended to the aggregation of large properties, the enclosure of common lands, and also what he calls economic causes—i.e. the temptations offered to yeomen farmers to sell and invest the proceeds of their land in more profitable speculations. He does not, perhaps, sufficiently dwell upon what it is submitted has been the most potent cause of the phenomenon under consideration—namely, the difficulty under the altered conditions of agriculture, and having regard to the ever-increasing imports of foreign agricultural produce, of making a living at all out of the cultivation of a small quantity of land—though he has not altogether lost sight of this fact. The difficulty we refer to and its results are illustrated by the instance the author gives of the parish in which he himself resides :—

> In the Kentish parish where the writer lives, consisting of about 2,400 acres, where the land is fairly distributed and is purely rural, and where from the growth of fruit it might be expected that small ownerships would be cultivated to advantage, there is not a single case of a peasant owner making a living out of his land. There are eight or ten cases of village tradesmen owning small holdings of land from one acre to ten acres and cultivating them for profit, but not making a living out of them. There are a few cases of retired tradesmen who have bought land of from two acres up to twenty in the parish, and who cultivate it partly for profit, partly for amusement, but who do not make their living out of it. These two last classes are of great

value in the social and economic condition of the parish, but they are not yeomen or peasant owners in the true sense of the terms. If this be the condition of a rural parish in Kent, a county once renowned for the number and wealth of its yeomen, what must it be in other parts of the country where large properties prevail?

Further on, referring to the same parish, he says :—

Several cases have occurred in the same parish in which men attempting to make a living out of small holdings have failed, and have been compelled to fall back into the ranks of labourers.

In considering the results of the present system, he admits that they are in many cases excellent, both as regards the farmer and the labourers, and says :—

Under this system of comparatively large farms and large ownerships, English agriculture has undoubtedly attained a high excellence, and has developed an industry of farming on a large scale of great economic importance.

He considers, however, that the system is antagonistic to the "democratic principles of modern times," which demand a greater approach to independence and equality and the opportunity of rising in the social scale, and that it is among the most important causes of the exodus of the better class of labouring men from the rural districts.

As regards this latter point, it must be remembered that the absorption of the country population in towns is a phenomenon of modern life not peculiar to this country, but one which has been shown to be taking place in countries where the system of land tenure is far removed from that of England, and that, therefore, it is by no means clear that it is in any way due to the land tenure which prevails here. The extension of small holdings, which would certainly cause a lessened demand for hired labour, is more likely to increase than to check the exodus of labourers from the country.

In considering the effect of recent land reforms, Mr. Shaw Lefevre has rather under-estimated the results of the Settled Land Act. It is certainly not the case that "the sales of settled land have not been numerous as yet." The contrary is shown by the very considerable number of cases which have arisen under the Act and been dealt with by the Chancery Division. The cases so dealt with are those only in which a legal difficulty has arisen, and form a very small proportion of the instances in which the Act has been made use of ; and we venture to say that there are but few settled estates throughout the country in which more or less land has not been sold under the provisions of this most useful piece of legislation.

With regard to allotments, Mr. Shaw Lefevre freely admits the considerable increase in the number of such holdings which has taken place since the passing in 1887 of the Allotments Act by the late Conservative Government, though he rather regrets that they

have been usually granted by landlords to the labourers, and not acquired by local authorities under the powers conferred upon them by the Act.

After dealing with land legislation in England and Wales, he devotes some chapters to the same subject as it affects Scotland, Ireland, the Channel Islands, and the Isle of Man, and returns in Chapters X. and XI. to the consideration of the future of agrarian reforms in England. In his conclusions we find much with which we are compelled to differ, but we thoroughly agree with him when he sums up what has gone before, previously to starting upon his errand of reform :—

> It will be admitted that these various efforts of Parliament almost exhaust the possible methods of legislation, that it will be very difficult to discover any new scheme, and that whatever further is done must be in the direction of extending, or improving, or making more effective some or all of them.

He is not in favour of an extension of Irish land legislation to England, so as to give English farmers fixity of tenure and the right of appealing to an independent tribunal for the determination of their rents. As he truly says :—

> In England generally it may be asserted that, during the last few years, the tenants have not been at the mercy of landlords so far as rent is concerned. The landlords have been even more anxious to retain their tenants than the tenants have been desirous of remaining on their farms, and have submitted to very great reductions and abatements of rent.

And he recognises the fact that it pays a farmer who has a certain amount of capital at his command better to hire a farm and devote all his capital to its cultivation, than to sink a portion in the purchase of land.

Mr. Shaw Lefevre's chief aim in the matter of English land is the increase of small ownerships or small tenancies of some kind or other, but he recognises the improbability of this taking place to any considerable extent under the Small Holdings Act of 1892. To show the lack of inducement to the acquisition of a small holding by purchase, he takes the case of a thirty-acre farm at an agricultural rental of 1*l.* an acre. He estimates that the price of this, after the erection by the County Council of farm buildings, and other expenses, would be 1,120*l.* Supposing a purchaser comes forward and pays down one-fifth of the purchase-money (224*l.*), by the terms of the Act he would still, under the most favourable conditions, have to make an annual payment of 34*l.* for the permanent rent-charge, representing one-fourth of the purchase money, and the interest on and instalments of the remainder spread over a period of fifty years. To this annual payment should be added the interest on the 224*l.* already paid, which Mr. Shaw Lefevre has omitted to take into consideration, and which, at 4 per cent., would amount to about 9*l.* a year, thus bringing the annual cost of the holding up to 43*l.*, without reckoning tithe and land-tax—no inconsiderable amount to pay for

a thirty-acre holding of an annual rental value of 30*l.* The buyer would also require at least 6*l.* an acre for farming capital, so that, including the 224*l.* already mentioned, he must be provided with about 400*l.* capital. We sympathise with the effort which has been made to increase the number of small holdings in this country; but we agree with Mr. Shaw Lefevre that the terms, when examined, are not sufficiently favourable to make it probable that many would-be cultivators will take advantage of the Act, and that as to labourers it is altogether out of the question. It must be remembered, too, when the creation of small holdings is under consideration, that the lot of a cultivator of such a holding is not an altogether happy one, for it "necessitates the most minute attention to details, the most laborious devotion to the land, the co-operation of the wife and children, and an industry beyond that of ordinary farm labourers working for a weekly wage."

If proof were wanted of the difficulty—we might almost say, the impossibility—of re-creating a class of small peasant proprietors in this country, it is furnished by the evidence of Lord Wantage as Chairman of the Small Farms and Labourers' Land Company, showing the failure of the company to resell their land in small plots, though they offered very favourable terms. In the way of the creation of small tenancies there do not seem to be so many difficulties. But the paramount difficulty of all has to be surmounted—namely, that under present circumstances it is extremely difficult to make the cultivation of a small holding of land pay, whatever may have been the case in former times. Under exceptional circumstances, and in exceptional localities, instances will still be found of the profitable cultivation of small holdings, as in parts of Worcestershire near Evesham and Pershore, where many cultivators make a living out of five or six acres of garden ground. The land in this part is, however, especially suited to the cultivation of garden vegetables and fruit, there is ready and easy access to the railway, and a good market to be found in the Midland manufacturing towns.

Small grass holdings of fifteen to thirty acres in size used for dairying may also prove profitable where there is a good local demand for dairy produce. Many of such holdings will be found scattered throughout the country; but, obviously, they cannot be multiplied to an indefinite extent. Small holdings of arable land can, it is submitted, seldom be cultivated profitably.

The fact is, we believe, that small holdings may perhaps be increased in number to some extent under favourable conditions, and more amongst people of the class of village tradesmen and the like than amongst agricultural labourers, but that much of the land of this country is totally unsuited for such a mode of cultivation in the present day. To expect that any considerable amount of land can be artificially forced into the hands of small proprietors or small tenants is hopeless in the face of the present economic situation, and from the agricultural point of view—that is, that the land should be cultivated to the best account—the movement in this direction is a step backwards rather than forwards.

Now let us see what Mr. Shaw Lefevre's conclusion on the whole matter is. After all that has preceded, it seems somewhat impotent. It is that the powers of the authorities under the Small Holdings Act should be extended so as to enable them *compulsorily* to purchase land and let the same with fixity of tenure in small holdings of from one to five acres each, suitable for cultivation by labourers. It is to be noted that the power of letting in holdings of this size already exists under sect. 4, subsect. 2, of this Act, and that Mr. Shaw Lefevre's only proposed addition to the present state of the law is the word *compulsorily*. The reason he urges for it is, that it is essential that such holdings should be conveniently near to the villages where the labourers and others live; but he frankly states that in the case of the Allotments Act, for the purposes of which proximity is at least as essential, in one case only have the compulsory powers of the Act been made use of, though he surmises that the indirect effect of compulsory powers in inducing landowners voluntarily to set apart land for allotments has been very considerable. We are inclined to doubt this latter surmise, and to suggest that it will be time enough to apply for compulsory powers when it is shown that there is a demand under the Act of 1892 for small tenancies of the kind recommended, which, owing to the absence of compulsory powers, it has been impossible to satisfy. We believe, however, that compulsory powers to hire land for the purpose of sub-letting it for allotments are intended to be conferred upon Parish Councils by the Parish Councils Bill now before Parliament.

The usefulness of holdings of from two to five acres is, we think, open to great question. Much may be said in favour of allotments, and much in favour of small holdings or farms of twenty to fifty acres in size, but the holding of two to five acres is neither one thing nor the other, for it is too large for an allotment, too small for a farm. It is quite clear, on the one hand, that it would be impossible on ordinary land and under ordinary circumstances to make a living solely out of two to five acres, and on the other that no labourer in regular work could cultivate so much land with the spade. Probably half an acre to an acre is the most land which a labourer in fairly regular work can manage. If he holds more than this, he must either neglect his allotment or his other work. Mr. Shaw Lefevre is perhaps wisely silent as to the mode in which he would suggest that small holdings of the kind which he advocates should be cultivated, or as to what he considers the best mode of turning them to profitable account.

In Chapter XI. the subject of Reform of the Land Laws is dealt with, but we cannot say that Mr. Shaw Lefevre has anything very original or particularly attractive to offer under this head. He proposes that land owned by the Crown, the Church, Universities, Colleges, Hospitals, and Charities, should be treated as a *corpus vile*, on which the land reformer should make his experiments. He is also in favour of compulsory registration of title and the abolition of primogeniture and entail, matters which have been much discussed

elsewhere, and which do not call for consideration here. He recommends, further, a policy of the reversal of State influences favouring the aggregation of land, which would include the increase of death duties on land and the abandonment of the practice of conferring peerages upon large landowners and county magistracies upon small ones; a policy that will not, we think, particularly recommend itself to the agriculturist, whether owner or occupier. He says nothing in favour of easing land of its excessive burthens of imperial and local taxation, or of the protection of the English cultivator from the injury caused to him by the dishonest sale of foreign meat, milk, and other products, as if they were English.

In his last chapter Mr. Shaw Lefevre considers nationalisation and municipalisation of land, and concludes in favour of individual ownership. We fancy that there are not many who have any practical experience of land ownership or land cultivation who will be disposed to disagree with him in this conclusion.

S. B. L. Druce.

WHEAT AND SHEEP IN ENGLAND IN 1893.

Some remarkable changes are brought into view from a detailed examination of the Agricultural Returns issued by the Board of Agriculture for the year 1893, summary tables of which, for Great Britain and for the United Kingdom, are given on pp. 883 and 884. The dates for comparison are June 5, 1893, and June 4, 1892.

The acreage of wheat has undergone a diminution in all divisions of the United Kingdom, but the shrinkage is proceeding at even a more rapid rate outside England than in England itself. From the records of past and present years it is calculated that England—

In 1871–75	had	87·89	per cent.	of the wheat acreage	of the United Kingdom.	
„ 1876–80	„	89·76	„	„	„	„
„ 1882	„	89·43	„	„	„	„
„ 1892	„	91·49	„	„	„	„
„ 1893	„	92·00	„	„	„	„

This year then, 92 per cent. of the wheat acreage of the United Kingdom was in England alone. But an inspection of Table I., on the oppsite page, will show that the proportion of the cultivated land of England which is devoted to wheat is steadily diminishing, and that in 1893 it amounted to very little more than half the corresponding area of 1870. Hence, in a period of less than twenty-five years, England has lost nearly half of its acreage of wheat, the actual decline from 1870 to 1893 amounting to 1,449,104 acres.

TABLE I.—*Actual and Proportionate Areas under Wheat in England in* 1870, 1880, 1890, 1892, and 1893.

Year	Acres	Proportion per 100 acres of cultivated land
1870	3,247,973	13·9
1880	2,745,733	11·2
1890	2,255,694	9·0
1892	2,102,969	8·4
1893	1,798,869	7·2

Table II. shows that, whilst all counties of the United Kingdom suffered a loss of wheat acreage in 1893, the absolute diminution—amounting to 304,100 acres—in England entirely eclipses the losses in Wales, Scotland, and Ireland. A question of high practical

TABLE II.—*The Areas of Wheat in the United Kingdom.*

—	1893	1892	1893 compared with 1892	
			Increase	Decrease
	acres	acres	acres	acres
England	1,798,869	2,102,969	—	304,100
Wales	54,562	55,278	—	716
England and Wales	1,853,431	2,158,247	—	304,816
Scotland	44,093	61,592	—	17,499
Great Britain	1,897,524	2,219,839	—	322,315
Ireland	54,988	75,344	—	20,356
United Kingdom (including Isle of Man and Channel Islands)	1,955,213	2,298,607	—	343,394

interest arises as to whether this loss was local or general,—whether the decline in the wheat area was characteristic of certain only of the English counties, or of all of them.

Table III. (p. 868) answers this inquiry with an eloquence which mere words cannot command. It shows,[1] at a glance, that in 1893 every county in England had a less acreage of wheat than in 1892. The total area of each county is given in order to convey some idea of the relative extent to which wheat is cultivated within its borders. Taking the absolute decreases, it is seen that the counties which suffered the most severely were Lincoln, Norfolk, and Essex, each of which lost between 20,000 and 30,000 acres, and Suffolk, Kent, York (East Riding), Cambridge, and Hants, each of which lost between 10,000 and 20,000 acres.

[1] The total of the decreases in Table III. will be found to differ slightly from the 304,100 acres recorded in Table II., because this year the figures for the administrative County of London are, for the first time, tabulated separately in the official Returns. As last year's figures are not available for purposes of comparison, the figures relating to the County of London are left out of all the full-page Tables.

TABLE III.—*Acreage of Wheat in each County of England.*

County	Total area	Area of wheat, 1893	Area of wheat, 1892	1893 compared with 1892	
				Increase	Decrease
	acres	acres	acres	acres	acres
Bedford	298,494	35,858	41,485	—	5,627
Berks	462,503	38,496	44,517	—	6,021
Buckingham	475,694	35,647	39,703	—	4,056
Cambridge	549,749	98,441	109,639	—	11,198
Chester	657,122	10,150	13,660	—	3,510
Cornwall	868,208	27,259	29,363	—	2,104
Cumberland	970,161	4,008	5,305	—	1,297
Derby	658,874	13,280	14,380	—	1,100
Devon	1,667,097	62,177	70,717	—	8,540
Dorset	632,272	22,731	27,662	—	4,931
Durham	647,486	13,337	18,844	—	5,507
Essex	987,031	118,187	141,288	—	23,101
Gloucester	796,734	50,569	57,266	—	6,697
Hants	1,037,765	65,983	76,257	—	10,274
Hereford	537,363	28,422	30,854	—	2,432
Hertford	406,160	48,683	56,904	—	8,221
Huntingdon	234,218	30,495	35,806	—	5,311
Kent	995,390	53,026	67,885	—	14,859
Lancaster	1,187,404	14,676	17,096	—	2,420
Leicester	527,119	22,596	24,220	—	1,624
Lincoln	1,693,547	180,894	210,227	—	29,333
Middlesex	181,301	3,940	4,802	—	862
Monmouth	341,687	7,706	7,799	—	93
Norfolk	1,312,954	143,008	166,425	—	23,417
Northampton	641,991	44,459	51,988	—	7,529
Northumberland	1,283,264	6,564	12,103	—	5,539
Notts	539,754	39,524	45,023	—	5,499
Oxford	483,617	35,840	42,880	—	7,040
Rutland	97,273	5,101	5,606	—	505
Salop	859,516	37,511	42,931	—	5,420
Somerset	1,042,488	32,504	40,539	—	8,035
Stafford	749,671	21,986	26,460	—	4,474
Suffolk	948,826	110,934	129,796	—	18,862
Surrey	485,128	23,058	26,539	—	3,481
Sussex	933,269	59,473	67,462	—	7,989
Warwick	577,466	35,500	41,729	—	6,229
Westmorland	500,905	236	353	—	117
Wilts	880,249	59,082	65,045	—	5,963
Worcestershire	480,491	33,882	38,279	—	4,397
York (E. Riding)	749,436	56,962	69,999	—	13,037
York (N. Riding)	1,363,644	22,521	31,825	—	9,304
York (W. Riding)	1,766,001	43,776	52,308	—	8,532

What has become of the 304,100 acres which, in the space of one year, have been taken away from the wheat crop in the counties of England? Doubtless some of this great area has gone to augment the extent of "bare fallow, or uncropped arable land," which in England alone increased by 59,248 acres, as is seen in Table IV. A more thorough inquiry, however, as indicated in Table V. (p. 870), serves to demonstrate that there was no uniformity in the increase of bare fallow, whilst as many as seventeen counties returned a decrease under this head, though in no one case did it amount to as much as 1,000 acres. On the other hand, thirteen counties increased their areas of bare fallow by more than 1,000 acres each, and, in the cases of Essex, Kent, Lincoln, Cambridge, and Norfolk, by more than

TABLE IV.—*The Areas of Bare Fallow, or Uncropped Arable Land, in the United Kingdom.*

—	1893	1892	1893 compared with 1892	
			Increase	Decrease
	acres	acres	acres	acres
England . . .	498,427	439,179	59,248	—
Wales . . .	8,221	9,399	—	1,178
England and Wales	506,648	448,578	58,070	—
Scotland . . .	7,910	8,584	—	674
Great Britain .	514,558	457,162	57,396	—
Ireland . . .	22,038	26,936	—	4,898
United Kingdom (including Isle of Man and Channel Islands)	536,908	484,434	52,474	—

5,000 acres each. This year the area of bare fallow in England went up to a higher figure than any which has been recorded since 1886.

A direction to which one might naturally turn to find some of the land lost to wheat is that of "permanent pasture, or grass not broken up in rotation." Table VI. (p. 871) indicates that whilst there is a total increase of 167,055 acres under this head in the United Kingdom, England alone contributes 91,407 acres thereto. The detailed Table VII. (p. 872) shows, moreover, that only four counties diminished their areas of permanent pasture in 1893, whereas the counties of Sussex, Essex, Wilts, Cornwall, Northumberland, and Gloucester each increased the area by more than 5,000 acres.

Adding the increase of bare fallow to the increase of permanent pasture in England in 1893 we get 150,655 acres, an area which falls considerably short of the 304,100 acres which represent the decline in England's wheat area this year. But, looking more closely into the figures for permanent pasture, it is seen (p. 883) that the official returns are "for hay" and "not for hay" respectively. During the recent autumn the writer has had favourable opportu-

TABLE V.—*Acreage of Bare Fallow, or Uncropped Arable Land, in each County of England.*

County	1893	1892	1893 compared with 1892	
			Increase	Decrease
	acres	acres	acres	acres
Bedford	13,080	12,294	786	—
Berks	11,008	8,712	2,296	—
Buckingham	9,886	8,786	1,100	—
Cambridge	23,597	15,933	7,664	—
Chester	383	486	—	103
Cornwall	5,383	5,071	312	—
Cumberland	1,110	1,290	—	180
Derby	3,125	3,653	—	528
Devon	9,578	10,341	—	763
Dorset	4,189	3,689	500	—
Durham	10,623	11,136	—	513
Essex	60,421	48,583	11,838	—
Gloucester	7,698	8,002	—	304
Hants	21,254	20,659	595	—
Hereford	4,216	4,731	—	515
Hertford	17,097	14,096	3,001	—
Huntingdon	13,365	12,140	1,225	—
Kent	20,180	11,143	9,037	—
Lancaster	1,564	1,270	294	—
Leicester	7,011	7,432	—	421
Lincoln	36,031	28,083	7,948	—
Middlesex	1,408	868	540	—
Monmouth	1,464	1,790	—	326
Norfolk	15,166	9,486	5,680	—
Northampton	13,362	13,357	5	—
Northumberland	6,219	7,110	—	891
Notts	11,686	12,539	—	853
Oxford	8,172	6,691	1,481	—
Rutland	1,548	1,485	63	—
Salop	3,806	4,415	—	609
Somerset	5,638	4,023	1,615	—
Stafford	2,958	3,697	—	739
Suffolk	35,393	30,931	4,462	—
Surrey	10,404	9,411	993	—
Sussex	22,496	17,785	4,711	—
Warwick	8,988	8,382	606	—
Westmorland	103	134	—	31
Wilts	11,723	11,841	—	118
Worcester	8,720	8,507	213	—
York (E. Riding)	16,377	16,099	278	—
York (N. Riding)	20,618	21,352	—	734
York (W. Riding)	11,019	11,746	—	727

nities of inspecting in England considerable areas of land which are described as "out of cultivation." In many cases such land is occupied by old "seeds" (sometimes old sainfoin layers) which it has not been considered profitable to break up, which cannot any longer yield a crop to the mowing-machine, and which is only occasionally utilised—if at all—as a sheep-run, or as affording rough grazing for cattle. It seems not at all improbable that much of the land which, in happier circumstances, might this year have been under wheat is to be found amongst the abandoned acres to which reference is here made. It was this idea that led to an examination of the figures relating to permanent pasture "not for hay," a summary of which for the United Kingdom is given in Table VIII. (p. 873). The increase of 319,412 acres under this head, as there shown for England alone, is greater than the diminution of 304,100 acres which simultaneously occurred in the wheat area of England. The detailed

TABLE VI.—*The Areas of Permanent Pasture, or Grass not Broken up in Rotation (Exclusive of Mountain and Heath Land), in the United Kingdom.*

	1893	1892	1893 compared with 1892	
			Increase	Decrease
	acres	acres	acres	acres
England . . .	13,128,378	13,036,971	91,407	—
Wales . . .	1,998,406	1,982,930	15,476	—
England and Wales	15,126,784	15,019,901	106,883	—
Scotland . . .	1,365,783	1,338,249	27,534	—
Great Britain .	16,492,567	16,358,150	134,417	—
Ireland . . .	11,175,844	11,142,287	33,557	—
United Kingdom (including Isle of Man and Channel Islands)	27,700,381	27,533,326	167,055	—

figures (Table IX. p. 874) show that only in eight English counties is there a decrease of permanent pasture "not for hay," whilst the increases are often large and significant. Somerset heads the list in absolute area, with an increase of as much as 32,202 acres; Essex follows with an increment of 27,458 acres, and Sussex with an accession of 24,217 acres. As many as ten other counties exhibit an increase ranging between 10,000 and 20,000 acres; these are Wilts, Hants, Kent, Gloucester, Dorset, Lincoln, Berks, Oxford, Buckingham, and Cornwall.

The area lost to wheat in England cannot be accounted for by increased areas of barley and oats. In 1893 England returned 42,015 acres more barley and 148,910 acres more oats than in 1892, but these together make only 190,925 acres, as against the simultaneous loss of 304,100 acres in the wheat area. The figures for oats are sufficiently interesting to be set forth by themselves in Table X. (p. 875).

TABLE VII.—*Acreage of Permanent Pasture, or Grass not Broken up in Rotation (Exclusive of Mountain and Heath Land), in each County of England.*

County	1893	1892	1893 compared with 1892	
			Increase	Decrease
	acres	acres	acres	acres
Bedford	97,242	96,525	717	—
Berks	159,407	158,633	774	—
Buckingham	233,708	230,997	2,711	—
Cambridge	110,358	108,862	1,496	—
Chester	361,952	360,046	1,906	—
Cornwall	243,420	237,913	5,507	—
Cumberland	331,155	333,987	—	2,832
Derby	410,926	412,586	—	1,660
Devon	632,547	630,135	2,412	—
Dorset	296,726	295,256	1,470	—
Durham	272,204	270,474	1,730	—
Essex	251,564	243,906	7,658	—
Gloucester	383,226	378,146	5,080	—
Hants	261,478	256,763	4,715	—
Hereford	284,877	283,544	1,333	—
Hertford	116,302	115,634	668	—
Huntingdon	81,762	80,113	1,649	—
Kent	374,920	374,915	5	—
Lancaster	589,559	586,450	3,109	—
Leicester	350,359	349,324	1,035	—
Lincoln	498,107	494,866	3,241	—
Middlesex	78,286	79,883	—	1,597
Monmouth	194,215	192,579	1,636	—
Norfolk	290,480	290,326	154	—
Northampton	338,952	338,268	684	—
Northumberland	471,896	466,493	5,403	—
Notts	207,833	206,969	864	—
Oxford	183,036	179,743	3,293	—
Rutland	51,231	50,786	445	—
Salop	452,091	449,164	2,927	—
Somerset	651,187	649,092	2,095	—
Stafford	425,754	423,331	2,423	—
Suffolk	183,648	182,460	1,188	—
Surrey	148,439	150,908	—	2,469
Sussex	372,722	364,605	8,117	—
Warwick	323,742	321,780	1,962	—
Westmorland	205,635	205,290	345	—
Wilts	415,511	408,672	6,839	—
Worcester	247,204	245,557	1,647	—
York (E. Riding)	203,302	202,490	812	—
York (N. Riding)	507,145	506,023	1,122	—
York (W. Riding)	824,088	823,477	611	—

Sheep husbandry is so intimately bound up with the fortunes of English agriculture that it seems almost an obvious transition to pass from the figures which demonstrate the decline in wheat cultivation to those which tell only too graphically of the diminution in the sheep population. It will first be useful to show, as in Table XI. (p. 875), that whilst England has lost 1,188,476 head of sheep, the other parts of the United Kingdom have suffered a decrease amounting to 679,508 head, bringing the total up to 1,867,984 sheep of all ages. When it is asked in what part of England the loss of sheep has been experienced, the detailed figures in Table XII. (p. 876) show that there has been a decline in the number of sheep in every English county. In only three cases does this decline amount to less than 10,000 sheep per county. At the other extreme there are as many as six counties, each of which registers a loss on the year of over 50,000 sheep. These, with their respective losses, are seen to be—Devon, 76,735; Hants,

TABLE VIII.—*The Areas of Permanent Pasture, Not for Hay, in the United Kingdom.*

—	1893	1892	1893 compared with 1892	
			Increase	Decrease
	acres	acres	acres	acres
England . . .	9,521,460	9,202,048	319,412	—
Wales . . .	1,499,397	1,491,067	8,330	—
England and Wales	11,020,857	10,693,115	327,742	—
Scotland . . .	1,201,230	1,175,409	25,821	—
Great Britain .	12,222,087	11,868,524	353,563	—
Ireland . . .	9,650,736	9,621,917	28,819	—
United Kingdom (including Isle of Man and Channel Islands)	21,897,370	21,515,018	382,352	—

70,716; Lincoln, 67,356; Somerset, 62,736; Kent, 51,731; and Cumberland, 51,525. As to the enormous decrease of 1,188,476 in the sheep population of England alone, some idea of what it means may be conveyed by stating that, if all the flocks in the premier sheep county of Lincoln were suddenly swept away, the loss in numbers would very little exceed that which English flockmasters suffered in the interval between June 1892 and June 1893.

As the five Eastern Counties, which may claim to be regarded as constituting the "wheat-belt" of England, have collectively lost 105,911 acres of wheat on the year,—a quantity representing more than one-third of the total diminution in England—it may be of interest to present a view of other changes which have simultaneously been in progress in the same counties, and with this object Table XIII. (p. 877) is introduced.

It can hardly be doubted that the farmers who suffered most

TABLE IX.—*Acreage of Permanent Pasture, Not for Hay, in each County of England.*

County	1893	1892	1893 compared with 1892	
			Increase	Decrease
	acres	acres	acres	acres
Bedford	71,933	65,792	6,141	—
Berks	101,244	88,866	12,378	—
Buckingham	155,529	145,094	10,435	—
Cambridge	78,993	73,080	5,913	—
Chester	254,919	253,529	1,390	—
Cornwall	208,707	198,427	10,280	—
Cumberland	259,763	263,462	—	3,699
Derby	279,084	280,388	—	1,304
Devon	517,342	510,098	7,244	—
Dorset	219,304	204,723	14,581	—
Durham	178,655	180,846	—	2,191
Essex	167,519	140,061	27,458	—
Gloucester	252,831	237,417	15,414	—
Hants	185,355	168,249	17,106	—
Hereford	207,295	207,959	—	664
Hertford	68,833	61,130	7,703	—
Huntingdon	60,475	55,460	5,015	—
Kent	287,987	271,403	16,584	—
Lancaster	378,848	378,315	533	—
Leicester	268,727	262,441	6,286	—
Lincoln	402,863	389,492	13,371	—
Middlesex	32,271	28,681	3,590	—
Monmouth	129,268	129,556	—	288
Norfolk	233,286	229,972	3,314	—
Northampton	268,674	260,227	8,447	—
Northumberland	402,943	399,097	3,846	—
Notts	144,088	140,702	3,386	—
Oxford	125,146	112,934	12,212	—
Rutland	42,123	40,106	2,017	—
Salop	352,523	348,400	4,123	—
Somerset	458,706	426,504	32,202	—
Stafford	304,933	304,536	397	—
Suffolk	127,881	118,788	9,093	—
Surrey	85,762	76,898	8,864	—
Sussex	263,768	239,551	24,217	—
Warwick	237,203	229,620	7,583	—
Westmorland	151,282	151,623	—	341
Wilts	294,362	276,476	17,886	—
Worcester	165,426	159,949	5,477	—
York (E. Riding)	165,315	164,101	1,214	—
York (N. Riding)	368,001	368,144	—	143
York (W. Riding)	556,096	559,951	—	3,855

during the recent disastrous season were those who are chiefly dependent upon wheat and sheep. More especially must this have been the case with those whose farms were situated within the drought-stricken area, embracing the Southern, Eastern, and most of

TABLE X.—*The Areas of Oats in the United Kingdom.*

—	1893	1892	1893 compared with 1892	
			Increase	Decrease
	acres	acres	acres	acres
England . . .	1,914,373	1,765,463	148,910	—
Wales . . .	240,865	233,399	7,466	—
England and Wales	2,155,238	1,998,862	156,376	—
Scotland . . .	1,016,518	998,683	17,835	—
Great Britain .	3,171,756	2,997,545	174,211	—
Ireland . . .	1,248,360	1,226,307	22,053	—
United Kingdom (including Isle of Man and Channel Islands)	4,435,944	4,238,036	197,908	—

the Midland counties of England. What may be the future of wheat cultivation in this country is too large an inquiry to enter upon at this stage. But, with regard to the sheep-breeding industry, Table XIV. (p. 877) has been constructed to show the sheep population of England at June 4 in each of the last ten years. It further indi-

TABLE XI.—*The Number of Sheep of all Ages in the United Kingdom.*

—	1893	1892	1893 compared with 1892	
			Increase	Decrease
England . . .	16,805,280	17,993,756	—	1,188,476
Wales . . .	3,101,890	3,197,501	—	95,611
England and Wales	19,907,170	21,191,257	—	1,284,087
Scotland . . .	7,373,164	7,543,447	—	170,283
Great Britain .	27,280,334	28,734,704	—	1,454,370
Ireland . . .	4,421,593	4,827,702	—	406,109
United Kingdom (including Isle of Man and Channel Islands)	31,774,824	33,642,808	—	1,867,984

cates that the loss recorded this year more than cancels the aggregate gains of the two preceding years. It is seen that both in 1890 and in 1891 there were great additions to the flocks of England, but in neither case was the number so large as that which

TABLE XII.—*The Number of Sheep of all Ages in each County of England.*

County	1893	1892	1893 compared with 1892	
			Increase	Decrease
Bedford	119,575	130,851	—	11,276
Berks	213,334	244,986	—	31,652
Buckingham	219,376	243,497	—	24,121
Cambridge	238,944	258,574	—	19,630
Chester	97,518	115,781	—	18,263
Cornwall	445,732	477,551	—	31,819
Cumberland	510,079	561,604	—	51,525
Derby	210,127	224,668	—	14,541
Devon	919,164	995,899	—	76,735
Dorset	410,134	431,757	—	21,623
Durham	227,848	249,212	—	21,364
Essex	330,615	356,977	—	26,362
Gloucester	380,025	408,968	—	28,943
Hants	394,188	464,904	—	70,716
Hereford	338,559	360,535	—	21,976
Hertford	142,676	157,220	—	14,544
Huntingdon	111,830	119,229	—	7,399
Kent	975,953	1,027,684	—	51,731
Lancaster	316,956	348,654	—	31,698
Leicester	342,514	369,141	—	26,627
Lincoln	1,274,316	1,341,672	—	67,356
Middlesex	24,594	44,215	—	19,621
Monmouth	212,595	235,062	—	22,467
Norfolk	590,867	613,418	—	22,551
Northampton	441,317	477,770	—	36,453
Northumberland	1,014,738	1,042,693	—	27,955
Notts	240,644	250,712	—	10,068
Oxford	272,191	287,884	—	15,693
Rutland	89,380	91,281	—	1,901
Salop	495,521	523,689	—	28,168
Somerset	561,712	624,448	—	62,736
Stafford	283,729	305,198	—	21,469
Suffolk	452,666	474,747	—	22,081
Surrey	80,943	87,801	—	6,858
Sussex	500,021	515,985	—	15,964
Warwick	308,901	337,050	—	28,149
Westmorland	357,234	373,322	—	16,088
Wilts	586,750	626,659	—	39,909
Worcester	191,395	208,695	—	17,300
York (E. Riding)	459,264	493,271	—	34,007
York (N. Riding)	704,213	743,955	—	39,742
York (W. Riding)	711,704	746,537	—	34,833

represents this year's falling-off. In 1893 the sheep population has gone back below that of 1890, and whilst even eight years ago—in 1885—there were more sheep in England than were returned last June, we have not once within the last ten years touched the number of 18,395,620, which represents the annual average number of sheep and lambs in England for the decade 1871–80.

This year's deplorable decrease in the number of sheep has

TABLE XIII.—*Crops and Sheep in Eastern Counties of England in* 1893 *compared with* 1892.

County	*Decrease* in wheat in 1893	Increase in barley in 1893	Increase in oats in 1893	Increase in bare fallow in 1893	Increase in permanent pasture, *not for hay*, in 1893	*Decrease* in sheep in 1893
	acres	acres	acres	acres	acres	number
Cambridge .	11,198	3,613	2,105	7,664	5,913	19,630
Essex . .	23,101	4,048	8,540	11,838	27,458	26,362
Lincoln . .	29,333	1,923	9,386	7,948	13,371	67,356
Norfolk . .	23,417	6,353	8,031	5,680	3,314	22,551
Suffolk . .	18,862	4,341	8,878	4,462	9,093	22,081
	105,911	20,278	36,940	37,592	59,149	157,980

TABLE XIV.—*Number of Sheep of all Ages in England in each Year from* 1884 *to* 1893.

Year	Number	Increase (+) or decrease (−) on previous year	Year	Number	Increase (+) or decrease (−) on previous year
1884	16,428,064	+833,404	1889	15,839,882	+ 51,088
1885	16,809,778	+381,714	1890	16,841,288	+1,001,406
1886	16,402,138	−407,640	1891	17,874,722	+1,033,434
1887	16,452,508	+ 50,370	1892	17,993,756	+ 119,034
1888	15,788,794	−663,714	1893	16,805,280	−1,188,476

taken place side by side with the withdrawal of 304,100 acres from English wheat-fields and the conversion of 319,422 English acres into so-called permanent pasture "not for hay." If figures count for anything, those recorded in Table XII. may fairly be interpreted as indicating it to be the duty of flockmasters to stand by their sheep, and in the coming year to rear as many lambs as possible.

W. FREAM.

RECENT AGRICULTURAL INVENTIONS.

The subjects of Applications for Patents from Sept. 11, 1892, *to Dec.* 9, 1893.

N.B.—Where the Invention is a communication from abroad the name of the Inventor is shown in italics, between parentheses, after the name of the applicant.

Agricultural Machinery and Implements, &c.

No. of Application.	Name of Applicant.	Title of Invention.
17072	GORDON, J.	Aprons for harvesting, &c. machines.
17242	GARMAN, C. O.	Hand seed-sowing machine.
17638	ROBERT, A.	Drums of threshing machines.
17726	GASCOIGNE, E.	Cultivators.
17985	WEBER, M. (*Woods, Australia*)	Ploughs, cultivators, &c.
18063	EDWARDS, T. A. W.	Pressing and baling hay, &c.
18137	DULIER, E. E.	Thinning turnips, &c.
18551	STARR, E. J.	Bent cutter.
18682	FARRIS, J.	Mowing machines.
18753	HUNT & BENTALL	Root cutters.
18936	PATERSON, C. E.	Pea-threshing machine.
18981	SMITH, A. J. & anr.	Stone picker and poppy exterminator.
19060	BLENKINSOP, S.	Treating manure to extract the straw.
19173	BAMFORD, J.	Spring teeth of cultivators.
19285	GOUDEAU, C.	Sowing and drilling machine.
19509	SCHEBEN, F.	Mowing machines.
19526	KEANE, F. H.	Harrows.
19528	STARK, A.	Harvester elevator.
19577	LAWRENCE & BAYLIS	Rick tester.
19690	KNOWLSON, W.	Implement for tilling land.
19693	DARBY, T. C.	Digging machine.
19793	WILLIS, P. R. J. (*Cardinal and anr., U.S.A.*)	Ploughs.
19817	SARGEANT, T. C.	Agricultural drills.
19877	FOWLER, R. H. & anr.	Digger and cultivator.
20189	WILLIAMS, R. B.	'Swing about' and stop for furrow-wheel of turnover ploughs.
20217	BACKHOUSE, J.	Coverings for ricks, &c.
20704	HOWARD & GIBBS	Straw-trussing machines.
20711	ERB & HALDEMAN	Implement for tilling land.
21428	RANSOME & GERRARD	Ploughs.
21429	TYERMAN & anr.	Rotary turnip cutters.
21491	ARDAGH, R.	Device for training hops.
21693	BURNS, J.	Chain harrows.

No. of Application.	Name of Applicant.	Title of Invention.
21750	JENSEN, C. A. (*Gruhl & Co., Saxony*)	Feeding corn to threshing machines.
21892	STOKES, J. E.	Plough irons for plough planes.
21911	ALLAN, J.	Ploughs for raising potatoes.
21988	OAKEY, J.	Hoe.
22039	THOMPSON (*Mayerhofer, Germany*)	Cultivating plants as food for cattle.
22092	DIBBS, J.	Fodder and grain cleaners and separators.
22447	HERCOCK & NICHOLSON	Lever hay and straw cutting machine.
23151	WILSON, W.	Reaping and mowing machines.
23187	RIGAULT, V.	Lifting potatoes.
23202	SLEEP, W. H. & R. H.	Turnwrest ploughs.
23204	HORNSBY & INNOCENT	Knotting mechanism for sheaf-binding.
23207	HALL, B. G.	Machines for tilling land.
23255	HILLIER, C.	Collecting and loading hay, &c.
23260	TATTERSALL	Combined 'break' machine for treating wheat
23339	MACK, J.	Topping, tailing, and lifting turnips.
23489	HUGHES, G.	Digging, sorting, and harvesting potatoes.
23525	SUTTON, M.	Thinning turnips, &c.
23563	JOHNSON, D. & others	Raising or loading cut crops.
23588	HORNSBY and others	Ploughshares.

Stable Utensils and Fittings—Horse-shoes, &c.

17036	RICHARDSON, A.	Guards for horse-shoes.
17255	BONIMANN, J.	Saddles.
17499	POUPARD, M. E.	Horse-shoes.
17554	PIGOTT, J. D.	Horse-collars.
17724	THOMAS, L. P.	Curbing horses.
18041	GREGG, J. W.	Pneumatic cushion for saddles, &c.
18132	MURPHY, G. A.	Roller horse clipper.
18142	GAMBLE & BARTON	Fastenings for traces, &c.
18408	MONTGOMERIE, J. C.	Riding saddles.
18429	HART, A. E.	Shafting.
18744	THOMPSON, H. J. (*Poppe, Germany*)	Horse-collars.
18832	FRIEDRICH, W.	Bitless bridles.
18843	O'CONNOR, J. L.	Harness fastener.
18871	MARTIN, E.	Nose band.
18901	SOUTH, E. H.	Horse-shoe appliance to prevent slipping
18959	INGELS, L.	Pneumatic horse-collar.
19201	GARDNER, A.	Stopping runaway horses.
19341	WATTS & EVEREST	Horse-shoes.
19498	CARRINGTON, H.	Safety riding stirrup.
19507	THOMPSON, W. P. (*De Luca, Italy*)	Horse-shoe.

No. of Application.	Name of Applicant.	Title of Invention.
19537	MOORE, T.	Roughing horse-shoes.
19701	GRANDSIRE & anr.	Horse-shoes.
19729	BEACH & HARRIS	Horse-collar.
19823	SUMNER, J.	Reins and bridles.
19841	DE JEAN	Horse-shoes.
20058	BLAKE, B.	Driving rein and tail holder.
20111	CARR, H.	Knee-cap.
20448	EMERY, W. D.	Bit mouth for bridle bits.
20546	LEEDHAM, C.	Horse-shoes.
21010	BENNETT, A.	Frame for roughing horse-shoes.
21047	BARNES (*Conger & Spalding, U.S.A.*)	Safety device for hitching horses.
21056	TECHOW & STOEDTNER	Hoof calkins.
21109	SPENCER, R.	Frost nails and toe pieces.
21116	CROKER, C. W.	Roughing device for horse-shoes.
21166	MARSHALL, W. R.	Preventing horses getting their tongue over the bit.
21365	SCRUTTON, C.	Pneumatic pad to prevent chafing.
21576	GREEN, G.	Studs for horse-shoes.
21595	BAILEY, R. D.	Horse-collars.
21726	BOULT, A. (*Stephan & anr., Germany*)	Breaking-in device.
21837	SHORTEN, W.	Brushes for grooming horses.
22012	KENDALL, M.	Rein holder.
22021	PRINCE, F. O. (*Schmidt, New Zealand*)	Stopping runaway horses.
22033	ALLAN, M.	Horse-shoes.
22052	VERGER, H.	Checking restive horses.
22528	ABELL, R.	Preventing horses slipping.
22552	FLACK, M. C.	Harness.
22755	FUGE, R. P.	Horse-collars, &c.
22799	RAMPFEL, R.	Horse bandages.
23015	MILLER, J. E. & anr.	Collars, saddles and knee-caps.
23361	GARNETT, J.	Horse-shoes.
23407	BOULT, A. J. (*Rolland, France*)	Harness.
23565	KENT, F. W.	Detachable nailless horse-shoe.
23641	SCHNEIDER, G.	Curry combs.

Carts and Carriages.

17049	MORRISON, J.	Brakes for carts, &c.
17271	JARVIS, J.	Waggons.
17280	ECKLEY, H. A.	Detachable apparatus for distributing farmyard manure, &c. from tipping carts.
17435	POLLOCK, A.	Bogies, &c. for transporting hay or cut crops.
18142	GAMBLE, S. L. & anr.	Fastenings for traces, &c. in attaching horses to road vehicles.

No. of Application.	Name of Applicant.	Title of Invention.
18638	CLARK, I.	Catch for the tail board of carts, &c.
19796	JENNINGS, A.	Waggons.
20369	HOLMES, W.	Brakes.
20502	CROKER, G. H.	Horse vehicle brakes.
20505	INGERSOLL, S.	Thrust bearings for shafts.
20706	VON HOCKBERG	Brakes.
21669	WHIRLEDGE, J.	Carts, waggons, &c.
23277	ROWE, G.	Tipping apparatus for carts, &c.
23282	ASPINALL, H. E. & BARWELL, W.	Device for facilitating the starting and drawing of vehicles.

Dairy Utensils, &c.

17117	THORP, W.	Butter-worker.
17231	WITHELL, R.	Automatically disengaging the teat cups in milking machines.
17250	MCMULLAN, A.	Rotary churns.
17436	DAVIDSON, R.	Working and salting butter.
17545	BEGRIE, E. W.	Butter-making apparatus.
17968	LE CLERC	Milk receiver.
18349	JORDAN, W.	Lids for milk churns.
18628	GEDGE, A.	'Hygienic' milking pail.
18708	WRIGHT, S. H.	Making butter.
18768	BRADFORD, T.	Churning apparatus.
20354	FEHLEN, M.	Butter.
20406	SCHMOLLE, E. (*Durafort, France*)	Pots for conveying milk, &c.
20553	HARTNETT & ROBISON	Machines for milking cows.
20710	MERZ, F. J.	Cooling milk.
20725	MERRICK, P.	Making butter.
20838	BICKLEY, T.	Machine for cutting cheese.
21243	WILLIAMS & others	Milk-can holder.
21448	WALTERS, W. B.	Making butter and condensed milk.
21636	GILBFART, T.	Casings for milk and cream cans.
21858	LANGE, G. E. O.	Cooling milk.
22460	VINCENT, W.	Manufacture of butter.
22783	BRADFORD, T.	Butter-working machines.
22784	Do.	Butter-making apparatus.
22843	SHOOB, T. & MARTIN, R.	Unpillageable milk cans.
22884	STAGHALL, W. B.	Dash churns.
23600	NUTTALL, T.	Churns.

Poultry and Game, &c., Appliances.

17244	BOWLEY, J. H.	Case for transport of eggs.
17925	KLEIN, J.	Apparatus for feeding birds.
18606	GREENWOOD & PARKER	Incubators.

18672 ZIMMERMANN, O. . Feeding trough for poultry, &c.
18942 WINCHCOMBE & anr. . Hot-air and water incubator.
20040 WEBB, R. . . . Incubators.
20863 FURNISS, J. . . . Hatching and rearing chickens.
21438 BURALL, W. T. & H. C. Feeding bins for poultry.
21584 HEMMING, F. T. . . Drinking fountains for poultry.
23467 WALCH, F. G. . . Opening outlets of poultry houses, &c.

Miscellaneous.

17268 ADKINS, J. J. . . Desiccated hop fodder and litter.
17338 WYATT, S. . . . Reclaiming and preparing mud for manure.
17222 PRATT, H. . . . Compound cake for horses, cattle, &c.
18466 BRAMWELL, R. . . Sheep dip.
18576 WHITEHOUSE, T. G. . Condiment for horses and cattle.
18853 KENDRICK, T. S. & A. L. Convertible kennels.
20271 ALDERSON, G. H. W. . Automatically feeding cattle.
21251 VERKINDERE, M. & anr. Food preparations for live stock.
21627 MCDOUGALL, J. S., J. T. Protecting cattle, &c. from cold, heat and wet.
22441 GREENE & OATES. . Earthenware mangers.
23266 KROG, E. . . . Malted provender for cattle, &c.
23493 PANTON & MAWSON . Administering medicine to animals.
23572 THE WOLSELEY SHEEP-SHEARING MACHINE CO., LTD. and anr. . } Sheep-shearing & horse-clipping appliances.

Numbers of Specifications relating to the above subjects Published since June 12, 1892.[1]

(Price 8*d.* each copy.)

Specifications of 1892.

17217, 17396, 17943, 18110, 18592, 18635, 18924, 18956, 19405, 19466, 19700, 19869, 19977, 19991, 20184, 20407, 20539, 20823, 20857, 21150, 21553, 21567, 21644, 21726, 21778, 21983, 22612, 22750, 22793, 22807, 22829, 22888, 22906, 23032, 23038, 23605, 23694, 23753, 23890, 23968, 23990, 24043, 24126.

Specifications of 1893.

378, 477, 549, 578, 986, 1119, 1120, 1145, 1293, 1975, 2343, 3419, 4186, 8494, 11026, 11473, 13061, 13457, 14257, 14392, 14477, 14758, 14814, 14914, 15843, 15901, 16162, 16318, 16416, 16599, 16952, 17231, 17288, 18429, 18465, 18745, 18936, 18959, 19509.

[1] Copies may be obtained at the Patent Office (Sale and Store Branch), 38 Cursitor Street, London, E.C.

Table I.—*Acreage under each kind of* **Crop, Bare Fallow,** *and* **Grass** *as returned upon June* 5, 1893, *and June* 4, 1892, *in Great Britain, with Totals for the United Kingdom.*

		GREAT BRITAIN		UNITED KINGDOM, including Isle of Man and Channel Islands	
		1893	**1892**	**1893**	**1892**
Total Area of Land and Water (*a*)		acres 56,742,508	acres 56,742,508	acres 77,642,099	acres 77,642,099
Total Acreage under all Kinds of Crops, Bare Fallow, and Grass (*b*)		32,643,709	32,685,550	47,979,698	47,977,903
Corn Crops.	Wheat	1,897,524	2,219,839	1,955,213	2,298,607
	Barley or Bere	2,075,097	2,036,810	2,251,293	2,220,243
	Oats	3,171,756	2,997,545	4,435,944	4,238,036
	Rye	55,929	48,103	69,526	61,392
	Beans	244,954	311,310	248,304	315,413
	Peas	210,479	194,424	210,900	195,010
	Total	7,655,739	7,808,031	9,171,180	9,328,701
Green Crops.	Potatoes	527,821	525,361	1,262,674	1,276,835
	Turnips and Swedes	1,975,235	1,937,163	2,286,473	2,245,998
	Mangel	347,009	361,235	394,543	413,334
	Cabbage, Kohl Rabi, & Rape	156,202	150,992	203,270	198,895
	Vetches or Tares	175,492	198,678	181,152	204,399
	Other Green Crops	105,147	96,148	134,643	127,654
	Total	3,286,906	3,269,577	4,462,755	4,467,115
Clover, Sainfoin, and Grasses under Rotation.	For Hay	2,047,008	2,135,362	2,701,846	2,772,065
	Not for Hay	2,522,622	2,537,440	3,214,503	3,201,391
	Total	4,569,630	4,672,802	5,916,349	5,973,456
Permanent Pasture, or Grass *not broken up in Rotation.* (*c*)	For Hay	4,270,480	4,489,626	5,803,011	6,018,308
	Not for Hay	12,222,087	11,868,524	21,897,370	21,515,018
	Total	16,492,567	16,358,150	27,700,381	27,533,326
Flax		1,258	1,421	68,715	72,065
Hops		57,564	56,259	57,565	56,259
Small Fruit		65,487	62,148	(*d*) 65,845	(*d*) 62,547
Bare Fallow or Uncropped Arable Land		514,558	457,162	536,908	484,434

(*a*) Not including tidal water.
(*b*) Not including nursery grounds, woods, and plantations, or mountain and heath land.
(*c*) Exclusive of mountain and heath land.
(*d*) Not separately returned in Ireland.

TABLE II.—*Number of* **Horses, Cattle, Sheep,** *and* **Pigs** *returned upon June* 5, 1893, *and June* 4, 1892, *with Totals for the United Kingdom.*

		GREAT BRITAIN		UNITED KINGDOM, including ISLE OF MAN and CHANNEL ISLANDS	
		1893	1892	1893	1892
		No.	No.	No.	No.
HORSES.	Used solely for Agriculture	1,012,867	1,026,971	(*a*) —	(*a*) —
	Unbroken Horses	441,894	424,237	(*a*) —	(*a*) —
	Mares kept solely for breeding	69,766	66,874	(*a*) —	(*a*) —
	TOTAL	1,524,527	1,518,082	2,079,587	2,067,549
CATTLE.	Cows and Heifers in Milk or in Calf	2,554,624	2,650,891	4,014,055	4,120,451
	Other Cattle. 2 Years and above	1,580,242	1,666,706	2,683,415	2,719,615
	Other Cattle. 1 Year & under 2	1,354,523	2,627,186	2,334,049	4,679,351
	Other Cattle. Under 1 Year	1,211,287		2,176,035	
	TOTAL	6,700,676	6,944,783	11,207,554	11,519,417
SHEEP.	Ewes kept for breeding	10,128,676	17,957,049	19,760,056	20,881,837
	1 Year old and above	6,911,063			
	Under 1 Year old	10,240,595	10,777,655	12,014,768	12,760,971
	TOTAL	27,280,334	28,734,704	31,774,824	33,642,808
PIGS.	Sows kept for breeding	308,722	(*b*) —	(*a*) —	(*a*) —
	Other Pigs	1,804,808	(*b*) —	(*a*) —	(*a*) —
	TOTAL	2,113,530	2,137,859	3,278,030	3,265,898

(*a*) Not separately returned in Ireland. (*b*) Not separately distinguished in 1892.

Table showing the Estimated Total Production of **Hops** *in the Years* 1893 *and* 1892, *with the Acreage and Estimated Average Yield per Statute Acre, in each County in England in which Hops were grown.*

COUNTIES	Estimated total produce		Acreage		Estimated average yield per acre	
	1893	1892	1893	1892	1893	1892
	cwt.	cwt.	acres	acres	cwt.	cwt.
Berks	82	65	11	10	7·45	6·50
Gloucester	198	206	33	39	6·00	5·28
Hants	21,077	17,221	2,795	2,775	7·54	6·21
Hereford	65,939	45,213	7,079	6,797	9·31	6·65
Kent	230,891	258,431	34,815	34,058	6·63	7·59
Notts	—	35	—	14	—	2·50
Salop	1,318	646	123	117	10·72	5·52
Suffolk	—	5	21	18	—	0·28
Surrey	12,293	9,028	1,845	1,938	6·66	4·66
Sussex	50,445	61,170	7,326	7,124	6·89	8·59
Worcester	32,686	21,239	3,516	3,369	9·30	6·30
Total	414,929	413,259	57,564	56,259	7 21	7·35

Note.—As the above Preliminary Estimate is issued at the earliest possible moment after receipt of the particulars, it is necessarily subject to correction in the Annual Produce Statistics.

Royal Agricultural Society of England.

(*Established May* 9, 1838, *as the* ENGLISH AGRICULTURAL SOCIETY, *and Incorporated by Royal Charter on March* 26, 1840.)

Patron.

(*Letter from Secretary of State, dated March* 6, 1840.)

HER MOST GRACIOUS MAJESTY THE QUEEN.

President for 1892—1893.

THE DUKE OF WESTMINSTER, K.G.

Trustees.

Year when elected on Council	
1879	H.R.H. THE PRINCE OF WALES, K.G., *Marlborough House, Pall Mall*
1838–40 1855	ACLAND, Rt. Hon. Sir THOMAS DYKE, Bart., *Killerton, Exeter, Devonshire.*
1858	BRIDPORT, Gen. Viscount, G.C.B., *Cricket St. Thomas, Chard, Somerset.*
1861	CATHCART, Earl, *Thornton-le-Street, Thirsk, Yorkshire.*
1861	DENT, JOHN DENT, *Ribston Hall, Wetherby, Yorkshire.*
1871	EGERTON OF TATTON, Lord, *Tatton Park, Knutsford, Cheshire.*
1863	KINGSCOTE, Col. Sir NIGEL, K.C.B., *Kingscote, Wotton-under-Edge, Gloucestershire.*
1848	LAWES, Sir JOHN BENNET, Bart., *Rothamsted, St. Albans, Herts.*
1854–59 1862	MACDONALD, Sir ARCHIBALD K., Bart., *Woolmer Lodge, Liphook, Hants.*
1867	RAVENSWORTH, Earl of, *Ravensworth Castle, Gateshead, Durham.*
1852–57 1866	RICHMOND AND GORDON, Duke of, K.G., *Goodwood, Chichester, Sussex.*
1869	RIDLEY, Rt. Hon. Sir M. W., Bart., M.P., *Blagdon, Cramlington, Northumberland.*

Vice-Presidents.

1889	H.R.H. PRINCE CHRISTIAN, K.G., *Cumberland Lodge, Windsor, Berkshire.*
1874	CHANDOS-POLE-GELL, H., *Hopton Hall, Wirksworth, Derbyshire.*
1872–74 1884	CHAPLIN, Rt. Hon. HENRY, M.P., *Blankney Hall, Lincoln.*
1882	EMLYN, Viscount, *Golden Grove, Carmarthen, S. Wales.*
1876	FEVERSHAM, Earl of, *Duncombe Park, Helmsley, Yorkshire.*
1881	GILBEY, WALTER, *Elsenham Hall, Essex.*
1872	LATHOM, Earl of, G.C.B., *Lathom Hall, Ormskirk, Lancashire.*
1865	LOPES, Rt. Hon. Sir MASSEY, Bart., *Maristow, Roborough, Devon.*
1880	MORETON, Lord, *Sarsden House, Chipping Norton, Oxon.*
1874	SPENCER, Earl, K.G., *Althorp, Northampton.*
1881	THOROLD, Sir JOHN H., Bart., *Syston Park, Grantham, Lincolnshire.*
1870	WHITEHEAD, CHARLES, *Barming House, Maidstone, Kent.*

Other Members of Council.

Year when elected on Council	
1881	*Allender, G. Mander, 7 *Albemarle Street, W.*
1862–66, 1877	Arkwright, J. Hungerford, *Hampton Court, Leominster, Herefordshire.*
1880	*Ashworth, Alfred, *Tabley Grange, Knutsford, Cheshire.*
1890	Beach, Joseph, *The Hattons, Wolverhampton, Staffordshire.*
1871	*Bowen-Jones, J., *Ensdon House, Montford Bridge, Salop.*
1890	Brougham and Vaux, Lord, *Brougham Hall (Penrith), Westmoreland.*
1885	*Caird, James A., *Northbrook, Micheldever, Hants.*
1883	Clay, Charles, *Walton Grange, Wakefield, Yorkshire.*
1893	*Cornwallis, F. S. W., M.P., *Linton Park, Maidstone, Kent,*
1885	*Coventry, Earl of, *Croome Court, Severn Stoke, Worcestershire.*
1887	*Crutchley, Percy E., *Sunninghill Lodge, Ascot, Berkshire.*
1891	Curtis-Hayward, Lieut.-Col. J. F., *Quedgeley, Gloucester.*
1888	*Darby, Alfred, *Little Ness, Shrewsbury, Salop.*
1891	*Dugdale, J. Marshall, *Llwyn, Llanfyllin* (viâ *Oswestry*), *Mont.*
1879	Foster, S. P., *Killhow, Carlisle, Cumberland.*
1875	Frankish, William, *Limber, near Brocklesby, Lincolnshire.*
1879	*Gorringe, Hugh, *Kingston-by-Sea, Brighton, Sussex.*
1879	Grenville, R. Neville, *Butleigh Court, Glastonbury, Somerset.*
1889	*Hamond, Anthony, *Westacre, Swaffham, Norfolk.*
1888	Hornsby, James, *Stapleford Park, Melton Mowbray, Leicestershire.*
1876	*Howard, Charles, *Biddenham, Bedfordshire.*
1886	*Mainwaring, C. S., *Galltfaenan, Trefnant R.S.O., North Wales.*
1874	*Martin, Joseph, *Highfield House, Littleport, Isle of Ely, Cambs.*
1884	*Miller, T. Horrocks, *Singleton Park, Poulton-le-Fylde, Lancashire.*
1886	Muntz, Philip Albert, M.P., *Dunsmore, Rugby, Warwickshire.*
1881	*Parker, Hon. Cecil T., *Eccleston, Chester.*
1886	*Pell, Albert, *Hazelbeach Hill, Northampton.*
1889	Pidgeon, Daniel, *The Long House, Letherhead, Surrey.*
1888	Portland, Duke of, *Welbeck Abbey, Worksop, Notts.*
1886	Ransome, J. E., *Holme Wood, Ipswich, Suffolk.*
1871	Rawlence, James, *Bulbridge, Wilton, Salisbury, Wilts.*
1889	*Rowlandson, Samuel, *Newton Morrell, Darlington (Yorkshire).*
1874	Sanday, George H., *Langdale Lodge, Clapham Park, Surrey.*
1886	*Scarth, W. T., *Staindrop House, Darlington, Durham.*
1886	*Smith, Alfred J., *Rendlesham, Woodbridge, Suffolk.*
1889	Smith, Henry, *The Grove, Cropwell Butler, near Nottingham.*
1889	Spearman, Sir J. L. E., Bart., *Llansannor Court, Cowbridge, Glam.*
1891	*Stanyforth, E. Wilfrid, *Kirk Hammerton Hall, York.*
1875	Stratton, Richard, *The Duffryn, Newport, Monmouthshire.*
1882	Sutherland, Duke of, 23 *Berkeley Square, W.*
1883	Sutton, Martin J., *Kidmore Grange, Caversham, Oxon.*
1889	*Taylor, Garrett, *Trowse House, Norwich.*
1890	*Terry, Joseph P., *Berry Field, Aylesbury, Buckinghamshire.*
1889	Tremayne, John, *Heligan, St. Austell, Cornwall.*
1882	Warren, Reginald Augustus, *Preston Place, Worthing, Sussex.*
1892	Westminster, Duke of, K.G., *Eaton Hall, Chester.*
1889	Wheeler, E. Vincent V., *Newnham Court, Tenbury, Worcestershire.*
1889	*Wilson, C. W., *Rigmaden Park, Kirkby Lonsdale, Westmoreland.*
1865	*Wilson, Sir Jacob, *Chillingham Barns, Belford, Northumberland.*

* Members of Council who retire by rotation, but who may be re-elected.

STANDING COMMITTEES.

*** The PRESIDENT is a Member *ex officio* of all Committees, and the TRUSTEES and VICE-PRESIDENTS are Members *ex officiis* of all Standing Committees except the Committee of Selection.

Finance Committee.

KINGSCOTE, Col. Sir NIGEL (Chairman).
RIDLEY, Sir M. WHITE, Bart., M.P.
THOROLD, Sir J. H., Bart.
ASHWORTH, A.
FRANKISH, W.
SANDAY, G. H.

House Committee.

CHAIRMAN of Finance Committee.
THE PRESIDENT.
BRIDPORT, General Viscount.
PARKER, Hon. C. T.
WILSON, Sir JACOB.
ALLENDER, G. M.
GILBEY, WALTER.

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CATHCART, Earl (Chairman).
EMLYN, Viscount.
THOROLD, Sir J. H., Bart.
ASHWORTH, A.
CAIRD, J. A.
DENT, J. D.
FRANKISH, W.
PELL, A.
PIDGEON, D.
SUTTON, MARTIN J.
WHITEHEAD, CHAS.

Chemical Committee.

*EMLYN, Viscount (Chairman).
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ACLAND, Sir T. D., Bt.
*LAWES, Sir J. B., Bt.
*MACDONALD, Sir A. K., Bt.
SPEARMAN, Sir J. L. E., Bt.
*THOROLD, Sir J. H., Bt.
*ARKWRIGHT, J. H.
*BOWEN-JONES, J.
*CAIRD, J. A.
*DENT, J. D.
GRENVILLE, R. N.
*HOWARD, C.
*PELL, A.
ROWLANDSON, S.
STANYFORTH, E. W.
*SUTTON, MARTIN J.
*TERRY, J. P.
VOELCKER, Dr.
*WARREN, R. A.
*WHITEHEAD, CHAS.

* These constitute the Woburn Sub-Committee.

Seeds and Plant Diseases Committee.

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PARKER, Hon. C. T.
THOROLD, Sir J. H., Bt.
ARKWRIGHT, J. H.
ASHWORTH, A.
BOWEN-JONES, J.
CAIRD, J. A.
CARRUTHERS, W.
FRANKISH, W.
HORNSBY, J.
MAINWARING, C. S.
WHEELER, E. V. V.

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WILSON, Sir JACOB.
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CHANDOS-POLE-GELL, H.
CLAY, C.
COPE, A. C.
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DARBY, ALFRED.
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FOSTER, S. P.
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MILLER, T. H.
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WILSON, C. W.

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BROUGHAM and VAUX, Lord.
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SPEARMAN, Sir J. L. E., Bt.
WILSON, Sir JACOB.
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ASHWORTH, A.
BEACH, J.
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CHANDOS-POLE-GELL, H.
CRUTCHLEY, P. E.
DARBY, ALFRED.
FOSTER, S. P.
FRANKISH, W.
GILBEY, WALTER.
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HOWARD, C.
MAINWARING, C. S.
MARTIN, JOSEPH.
MILLER, T. H.
MUNTZ, P. A., M.P.
ROWLANDSON, S.
SIMONDS, Professor.
SMITH, A. J.
SMITH, HENRY.
STANYFORTH, E. W.
STRATTON, R.
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TERRY, J. P.
TREMAYNE, J.
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WILSON, C. W.
The Stewards of Live Stock.

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WILSON, Sir JACOB.
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BEACH, JOSEPH.
BOWEN-JONES, J.
CAIRD, J. A.
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CURTIS-HAYWARD, Lt.-Col.
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HORNSBY, J.
HOWARD, C.
MARTIN, JOSEPH.
PIDGEON, D.
RANSOME, J. E.
ROWLANDSON, S.
SANDAY, G. H.
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SMITH, HENRY.
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THE WHOLE COUNCIL, with the following representatives of the LOCAL COMMITTEE:—

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CHESTER, Town Clerk of.
DICKSON, GEORGE A.
JONES, J. MATTHEWS.
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SCOVELL, JOHN.

Show-Yard Works Committee.

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PARKER, Hon. C. T.
ALLENDER, G. M.
ASHWORTH, A.
CLAY, CHARLES.
FRANKISH, W.
HORNSBY, J.
HOWARD, C.
SANDAY, G. H.
STANYFORTH, E. W.

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GILBEY, WALTER.
ROWLANDSON, S.
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PIDGEON, D.
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SUTTON, M. J.
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THOROLD, Sir J. H., Bt.
ALLENDER, G. M.
ARKWRIGHT, J. H.
ASHWORTH, A.
CURTIS-HAYWARD, Lt.-Col.
DARBY, ALFRED.
DUGDALE, J. M.
MAINWARING, C. S.
GRENVILLE, R. N.
STANYFORTH, E. W.
TAYLOR, GARRETT.
VOELCKER, Dr.

Secretary.

ERNEST CLARKE, 12 Hanover Square, W.

Editor of the Journal—WILLIAM FREAM, B.Sc., LL.D., *Downton, Salisbury.*
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Consulting Botanist—W. CARRUTHERS, F.R.S., F.L.S., 44 *Central Hill, Norwood, S.E.*
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GEOGRAPHICAL DISTRIBUTION OF MEMBERS OF THE COUNCIL AND OF GOVERNORS AND MEMBERS OF THE SOCIETY.

Districts	Counties	Number of Governors and Members	Number of Members of Council	Names of Members of Council
A.	Bedfordshire . .	137	1	C. Howard.
	Buckinghamshire	156	1	Jos. P. Terry.
	Cambridgeshire .	180	1	Joseph Martin.
	Essex	239	1	Walter Gilbey, v.p.
	Hertfordshire .	190	1	Sir J. B. Lawes, t.
	Huntingdonshire	70	—	
	London	562	2	G. M. Allender; G. H. Sanday.
	Middlesex . . .	89		
	Norfolk	309	3	H.R.H. the Prince of Wales, K.G., t.; Anthony Hamond; Garrett Taylor.
	Oxfordshire . .	170	2	Lord Moreton, v.p.; M. J. Sutton.
	Suffolk	250	2	J. E. Ransome; A. J. Smith.
		——2,352	— 14	
B.	Cumberland . .	152	1	S. P. Foster.
	Durham	180	2	Earl of Ravensworth, t.; W. T. Scarth.
	Northumberland	286	2	Sir M. White Ridley, t.; Sir Jacob Wilson.
	Westmoreland .	84	2	Lord Brougham and Vaux; C. W. Wilson.
		—— 702	— 7	
C.	Derbyshire . . .	207	1	H. Chandos-Pole-Gell, v.p.
	Leicestershire .	151	1	J. Hornsby.
	Lincolnshire . .	320	3	Sir J. H. Thorold, v.p.; Rt. Hon. H. Chaplin, v.p.; W. Frankish.
	Northamptonshire	176	2	Earl Spencer, K.G., v.p.; A. Pell.
	Nottinghamshire	280	2	Duke of Portland; H. Smith.
	Rutland	35	—	
		——1,169	— 9	

DISTRIBUTION OF MEMBERS OF THE SOCIETY—*continued.*

Districts	Counties	Number of Governors and Members	Number of Members of Council	Names of Members of Council
D.	Berkshire	221	2	H.R.H. Prince Christian, K.G., V.P.; P. E. Crutchley.
	Cornwall	147	1	John Tremayne.
	Devonshire	186	2	Sir T. D. Acland, T.; Sir M. Lopes, V.P.
	Dorsetshire	87	—	
	Hampshire	255	2	Sir A. K. Macdonald, T.; J. A. Caird.
	Kent	406	2	C. Whitehead, V.P.; F. S. W. Cornwallis.
	Somersetshire	141	2	Visct. Bridport, T.; R. Neville Grenville.
	Surrey	260	1	D. Pidgeon.
	Sussex	330	3	Duke of Richmond and Gordon, K.G., T.; H. Gorringe; R. A. Warren.
	Wiltshire	156	1	J. Rawlence.
		2,189	— 16	
E.	Yorkshire	890	6	Earl of Feversham, V.P.; Earl Cathcart, T.; J. D. Dent, T.; C. Clay; S. Rowlandson; E. W. Stanyforth.
F.	Gloucestershire	284	2	Col. Sir Nigel Kingscote, T.; Lt.-Col. J. F. Curtis-Hayward.
	Herefordshire	160	1	J. H. Arkwright.
	Monmouthshire	45	1	R. Stratton.
	Shropshire	382	2	J. Bowen-Jones; A. Darby.
	Staffordshire	302	2	Duke of Sutherland; Jos. Beach.
	Warwickshire	332	1	P. A. Muntz.
	Worcestershire	250	2	Earl of Coventry; E. V. V. Wheeler.
	South Wales	207	2	Viscount Emlyn, V.P.; Sir J. L. E. Spearman.
		1,962	— 13	
G.	Cheshire	418	4	Duke of Westminster, P.; Lord Egerton, T.; Hon. Cecil T. Parker; A. Ashworth.
	Lancashire	444	2	Earl of Lathom, V.P.; T. H. Miller.
	North Wales	236	2	J. M. Dugdale; C. S. Mainwaring.
		1,098	— 8	
Scotland		228		
Ireland		169		
Channel Islands		12		
Isle of Man		9		
Foreign Countries		178		
Honorary Members		21		
		617		
Grand Total		10,979	— 74	

GOVERNORS OF THE SOCIETY.

	Date of election as Member	Date of election as Governor
H.R.H. THE PRINCE OF WALES, K.G....Marlborough House, Pall Mall, S.W., and Sandringham	—	Feb. 3, 1864
†H.R.H. THE DUKE OF EDINBURGH, K.G....Clarence House, St. James's, S.W.	—	Aug. 6, 1884
†H.R.H. THE DUKE OF YORK, K.G....Marlborough House, Pall Mall, S.W.	—	April 6, 1892
†H.R.H. THE DUKE OF CAMBRIDGE, K.G....Gloucester House, Piccadilly, W.	—	Aug. 6, 1862
H.R.H. PRINCE CHRISTIAN OF SCHLESWIG-HOLSTEIN, K.G....Cumberland Lodge, Windsor	—	Aug. 4, 1875
*ACLAND, Rt. Hon. Sir T. Dyke, Bart...Killerton, Exeter	May 29, 1838	Mar. 3, 1875
†ALLCROFT, Herbert John...Stokesay Court, Onibury, Salop	—	Dec. 12, 1888
ALLCROFT, John D....108 Lancaster Gate, W.	April 2, 1862	June 29, 1870
†ALLENDER, G. Mander...7 Albemarle Street, W.	June 1, 1859	May 7, 1890
†AMHERST OF HACKNEY, Lord...Didlington Hall, Brandon	Feb. 2, 1859	May 7, 1890
ANCASTER, Earl of...Normanton Park, Stamford	Mar. 3, 1869	May 5, 1875
ARCHER-HOUBLON, George B....Welford Park, Newbury, Berks	—	Mar. 6, 1889
*ARCHER-HOUBLON, R....Bartlow, Cambridge	Jan. 10, 1840	Mar. 5, 1890
†ARKWRIGHT, J. Hungerford...Hampton Court, Leominster	—	June 5, 1861
ASHBURTON, Lord...The Grange, Alresford, Hants	—	May 7, 1890
†ASHWORTH, Charles E....The Heath, Knutsford	July 5, 1865	July 29, 1891
*BAILLIE, W. Hunter...43 Norfolk Square, Hyde Park, W.	July 18, 1838	Mar. 5, 1890
BARNARD, Lord...Raby Castle, Darlington	—	July 27, 1892
†BATH, The Marquis of...Longleat, Warminster	—	July 6, 1853
*BATTEN, John...Yeovil, Somersetshire	July 16, 1839	Mar. 5, 1890
BECTIVE, Earl of...Underley Hall, Kirkby Lonsdale	—	July 1, 1868
†BENN, Thomas G....Reigny House, Newton Reigny, Penrith	Mar. 13, 1878	Aug. 2, 1882
†BLYTH, James...Woodhouse, Stansted, Essex	Nov. 3, 1875	July 27, 1892
BORTHWICK, Sir Algernon, Bart., M.P....Heath House, Hampstead Heath, N.W.	—	Dec. 12, 1888
BRADFORD, Earl of...Weston Park, Shifnal	Mar. 7, 1860	Mar. 3, 1875
BRASSEY, Henry Leonard C....Preston Hall, Aylesford	—	Feb. 3, 1892
BRIDPORT, Gen. Viscount, G.C.B....Cricket St. Thomas, Chard	Jan. 19, 1842	April 2, 1862
†BROOKS, Sir William Cunliffe, Bart....Barlow Hall, Chorlton-cum-Hardy, Manchester	—	Aug. 7, 1872
†BROWNE, Alexander H....Callaby Castle, Whittingham R.S.O., Northumberland	—	Mar. 6, 1872
BURTON, Lord...Rangemore, Burton-on-Trent	Nov. 7, 1888	June 25, 1890
CADOGAN, Earl, K.G...Culford Hall, Bury St. Edmunds	—	Dec. 11, 1889
†CALTHORPE Lord...Elvetham, Winchfield	Aug. 6, 1862	June 3, 1874
†CATHCART, Earl...Thornton-le-Street, Thirsk	Feb. 6, 1856	April 3, 1867
†CAVENDISH, Victor C.W., M.P....Devonshire House, Piccadilly, W.	—	Mar. 2, 1892
CAWDOR, Earl of...Stackpole Court, Pembrokeshire	Nov. 17, 1841	Mar. 3, 1875
†CHANDOS-POLE-GELL, H....Hopton Hall, Wirksworth, Derbyshire	Nov. 6, 1861	June 23, 1891
CHAPLIN, Rt. Hon. Henry, M.P....Blankney Hall, Lincoln	—	Nov. 2, 1870

* Elected a Foundation Life Governor March 5, 1890. † Life Governor.

	Date of election as Member	Date of election as Governor
†Clifden, Viscount... Holdenby House, Northampton	—	July 3, 1889
†Clinton, Lord...Heanton Satchville, Beaford, N. Devon	April 3, 1867	April 2, 1890
Clitherow, Colonel Edward J. S....Hotham Hall, Brough, Yorkshire	—	Feb. 6, 1889
*Clutton, John...Buckland Court, Betchworth, Surrey	Dec. 15, 1838	Mar. 5, 1890
†Colman, J. J., M.P....Carrow House, Norwich	June 1, 1870	Feb. 6, 1889
†Corbett, John, M.P....Impney, Droitwich	July 2, 1873	Feb. 4, 1891
Cornwallis, Fiennes S. W., M.P....Linton Park, Maidstone	—	July 2, 1884
Cotes, Charles Cecil...Woodcote, Newport, Salop	—	Dec. 6, 1876
†Cowper, Earl, K.G....Panshanger, Hertford	—	April 7, 1875
Crookshank, Prof. E. M....Saint Hill, East Grinstead	—	Nov. 6, 1889
Darnley, Earl of...Cobham Hall, Gravesend	—	May 5, 1852
D'Aumale, H.R.H. The Duke...Wood Norton, Evesham	—	April 7, 1875
Dartmouth, Earl of...Patshull Hall, Wolverhampton	—	Dec. 9, 1891
†Dent, John Dent...Ribston Hall, Wetherby	July 2, 1851	Feb. 3, 1875
†Derby, Earl of, K.G....Knowsley, Prescot	July 31, 1849	Mar. 5, 1890
Derwent, Lord...Hackness Hall, Scarborough	—	April 7, 1869
†De Trafford, Sir H. F., Bart....Trafford Park, Manchester	Aug. 1, 1883	June 1, 1892
†Devonshire, Duke of, K.G....Chatsworth, Chesterfield, Derbyshire	—	June 2, 1880
†Dickson-Poynder, Sir J., Bart., M.P....Hartham Park, Corsham, Wilts.	Nov. 2, 1887	April 2, 1890
†Dunmore, Earl of...Dunmore, N.B.	—	Feb. 3, 1869
†Durham, Earl of...Lambton Castle, Durham	—	July 14, 1880
Egerton of Tatton, Lord...Tatton Park, Knutsford	Mar. 6, 1872	Nov. 7, 1883
†Ellesmere, Earl of...Worsley Hall, Manchester	—	July 7, 1869
*Ellman, Robert H....61 North Street, Lewes	Feb. 13, 1839	Mar. 5, 1890
†Emlyn, Viscount...Golden Grove, Carmarthenshire	March 3, 1863	Mar. 2, 1892
Essex, Earl of...Cassiobury Park, Watford	Nov. 7, 1888	Nov. 2, 1892
Evans, John Carbery...Hatley Park, Gamlingay, Cambs.	—	Feb. 4, 1891
Feversham, Earl of...Duncombe Park, Helmsley	Mar. 5, 1862	Mar. 3, 1875
Fife, Duke of, K.T....15 Portman Square, W.	—	Nov. 7, 1888
Fitzwilliam, Earl, K.G....Wentworth Woodhouse, Rotherham	—	June 5, 1872
*Fletcher, John Philip...Darby Lodge, Sunbury-on-Thames	Feb. 19, 1840	Mar. 5, 1890
†Fortescue, Earl...Castle Hill, South Molton	—	Nov. 6, 1861
Freake, Sir Thomas G., Bart....Warfleet, Dartmouth	—	July 30, 1890
†Freeman-Mitford, A.B., C.B., M.P....Batsford Park, Moreton-in-the-Marsh, Gloucester	—	Nov. 3, 1886
†Fytche, J. Lewis...The Terrace, Freshwater, Isle of Wight	April 5, 1854	June 4, 1879
Gardner, Rt. Hon. Herbert, M.P....48 Charles Street, Berkeley Square, W.	—	Dec. 7, 1892
Gilbey, Walter....Elsenham Hall, Essex	Nov. 2, 1870	June 5, 1889
†Gill, Reginald B.E....Bickham, Roborough, S. Devon	July 2, 1884	Dec. 12, 1888
Gilstrap, Sir W., Bart....Fornham Park, Bury St. Edmunds	May 7, 1862	April 2, 1890
Gooch, Sir Alfred S., Bart...Benacre Hall, Wangford, Suffolk	—	July 13, 1882
Gordon, H. Panmure, Loudwater House, Rickmansworth	—	Mar. 1, 1893
Grafton, Duke of, K.G....Wakefield Lodge, Stony Stratford	—	June 3, 1884
†Grant, Sir G. Macpherson, Bt....Ballindalloch Castle, N.B.	April 1, 1863	April 2, 1890
*Greaves, William...Bakewell	Dec. 4, 1839	Mar. 5, 1890
*†Grey, Earl, K.G....Howick, Lesbury, Northumberland	—	May 12, 1838
Griffiths, John James...Highbury Grange, Highbury, N.	—	May 1, 1889

* Elected a Foundation Life Governor March 5, 1890. † Life Governor.

	Date of election as Member	Date of election as Governor
Gwynne, John...Kenton Grange, The Hyde, N.W.	—	Mar. 5, 1879
Harewood, Earl of...Goldsboro' Hall, Knaresborough	June 6, 1883	Nov. 2, 1892
Henry, Mitchell...Kylemore Castle, Co. Galway	Nov. 7, 1877	Dec. 10, 1890
Hertford, Marquis of...Ragley Park, Alcester	Aug. 2, 1882	May 7, 1884
Hesketh, R. Bamford...Gwrych Castle, Abergele, Denbighshire	—	Dec. 7, 1892
†Heywood, Sir T. Percival, Bt...Doveleys (Uttoxeter), Derbysh.	—	May 14, 1845
†Holford, Capt. George L., C.I.E....Westonbirt, Tetbury, Glos.	—	April 6, 1892
†Hothfield, Lord...Hothfield Place, Ashford, Kent	—	May 7, 1879
*†Hulse, Col. Sir Edward, Bt...Breamore Ho., Fordingbridge	—	June 13, 1838
Joicey, E....Blenkinsopp Hall, Haltwhistle, Northumberland	—	Dec. 12, 1888
*Kemble, Thomas...Runwell Hall, Wickford, Essex	July 10, 1839	Mar. 5, 1890
†Kingscote, Col. Sir Nigel, K.C.B....Kingscote, Wotton-under-Edge, Gloucestershire	April 6, 1854	July 1, 1874
†Knight, Sir F. Winn., K.C.B...Wolverley House, Kidderminster	—	June 15, 1842
Kohlapur, H.H. The Maharajah of...Kohlapur, India	—	Feb. 6, 1889
Kynnersley, Thomas F....Leighton Hall, Ironbridge, Salop	Nov. 7, 1883	Nov. 4, 1891
†Lathom, Earl of, G.C.B....Lathom House, Ormskirk	April 7, 1869	Nov. 6, 1872
†Lawes, Sir J. B., Bart...Rothamsted, St. Albans	April 29, 1846	Dec. 11, 1878
†Leconfield, Lord...Petworth House, Sussex	—	June 5, 1872
†Leicester, Earl of, K.G...Holkham Hall, Norfolk	—	Nov. 15, 1843
†Leigh, Lord...Stoneleigh Abbey, Kenilworth.	—	Dec. 1, 1858
†Londesborough, Earl of...Londesborough Pk., Market Weighton	Nov. 5, 1862	April 2, 1890
†Londonderry, Marquis of, K.G....Seaham Hall, Seaham Harbour, co. Durham	—	June 3, 1885
†Lonsdale, Earl of...Lowther Castle, Penrith	—	July 4, 1883
†Lopes, Rt. Hon. Sir Massey, Bart...Maristow, Roborough, Devon	Mar. 15, 1848	May 7, 1884
*Lovelace, Earl of...East Horsley Towers, Leatherhead	—	June 26, 1838
Lucas, Sir Thomas, Bart...12A Kensington Palace Gardens, W.	—	Dec. 12, 1888
†Luttrell, Col. H. A. F., C.B....Badgworth Ct., Axbridge R.S.O.	July 7, 1869	Mar. 5, 1890
*Macclesfield, Earl of...Sherburn Castle, Tetsworth	Aug. 8, 1838	Mar. 5, 1890
†Macdonald, Sir A. K., Bart...Woolmer Lodge, Liphook	July 31, 1849	Nov. 1, 1871
†Manvers, Earl...Thoresby Park, Ollerton, Newark	—	July 2, 1873
†Maple, John...Bedford Lodge, Haverstock Hill, N.W.	Nov. 2, 1864	Mar. 5, 1890
†Marjoribanks, Rt. Hon. Edward, M.P....Ninewells, Chernside, N.B.	—	July 31, 1889
Middleton, Lord...Birdsall House, York	—	Mar. 3, 1875
*Monck, J. Bligh...Coley Park, Reading	May 23, 1839	Mar. 5, 1890
†Moreton, Lord...Sarsden House, Chipping Norton, Oxon.	—	Mar. 3, 1875
†Morrison, Alfred...Fonthill House, Hindon, Wilts.	—	July 3, 1861
†Mount-Edgcumbe, Earl of...Mount-Edgcumbe, Plymouth	Nov. 6, 1861	Mar. 5, 1890
Muncaster, Lord...Muncaster Castle, Ravenglass, Cumberland	—	June 23, 1891
†Muntz, George F...Umberslade Park, Birmingham	Dec. 4, 1867	June 30, 1875
Neeld, Sir Algernon W., Bart...Grittleton, Chippenham	Nov. 7, 1888	Dec. 9, 1891
Newton, Lord...Lyme Park, Disley, Stockport	—	Aug. '4, 1858
Norfolk, Duke of, K.G....Arundel Castle, Sussex	—	July 29, 1891
Normanton, Earl of...Somerley, Ringwood, Hants.	—	Mar. 3, 1875
*North, Rt. Hon. Col. J. Sidney...Wroxton Abbey, Banbury	May 8, 1839	Mar. 5, 1890
†Northbrook, Earl of...Stratton, Micheldever Station, Hants.	—	June 2, 1880
Paget, Lord Alexander...The Oaklands, Tarporley, Cheshire	July 6, 1881	July 3, 1889
†Peel, Edmund...Brynypys, Ruabon	Feb. 3, 1858	Mar. 5, 1890

* Elected a Foundation Life Governor March 5, 1890. † Life Governor.

	Date of election as Member	Date of election as Governor
*Pinney, Col. William...30 Berkeley Square, W.	Mar. 13, 1839	Mar. 5, 1890
†Portland, Duke of...3 Grosvenor Square, W.	—	June 2, 1880
†Portman, Viscount...Durweston, Blandford	Aug. 6, 1862	Mar. 5, 1890
Portsmouth, Earl of...Hurstbourne Park, Whitchurch, Hants	—	Dec. 9, 1891
†Powis, Earl of...Powis Castle, Welshpool	April 6, 1887	June 23, 1891
Ravensworth, Earl of...Ravensworth Castle, Gateshead	Feb. 5, 1868	July 1, 1885
Revelstoke, Lord...Membland, Plymouth	—	June 4, 1890
*†Richmond & Gordon, Duke of, K.G...Goodwood, Chichester	June 20, 1838	Dec. 2, 1868
†Ridley, Rt. Hon. Sir Matthew W., Bart., M.P....Blagdon, Cramlington, Northumberland	Apr. 7, 1869	May 5, 1886
Ripon, Marquis of, K.G....Studley Royal, Ripon	—	July 3, 1861
Rothschild, Leopold de...Ascott, Wing, Leighton Buzzard	—	Mar. 1, 1893
Rothschild, Lord...148 Piccadilly, W.	Nov. 7, 1888	June 4, 1890
*Russell, Lord C. J. F....Drakelow Lodge, Woburn	May 26, 1838	Mar. 5, 1890
Rutland, Duke of, K.G....Belvoir Castle, Leicestershire	Dec. 12, 1888	Dec. 9, 1891
†Salisbury, Marquis of, K.G...Hatfield House, Herts	—	Feb. 6, 1889
Savile, Lord, G.C.B...Rufford Abbey, Ollerton, Notts.	—	Mar. 27, 1889
*Saunders, T. B....The Priory, Bradford-on-Avon	June 13, 1838	Mar. 5, 1890
†Schröder, Baron J. H. W....The Dell, Egham, Surrey	Nov. 3, 1869	April 2, 1890
†Sefton, Earl of, K.G....Croxteth, Liverpool	—	Dec. 8, 1869
*§Simonds, Prof. James Beart...St. John's Villa, Ryde, I. W.	July 25, 1838	Mar. 5, 1890
*Simonds, W. Barrow...Abbotts Barton, Winchester	June 19, 1839	Mar. 5, 1890
†Smith, Hon. W. F. D., M.P...3 Grosvenor Place, S.W.	—	Dec. 9, 1891
†Smyth, Sir J. H. Greville, Bart...Ashton Court, Som. (Bristol)	—	July 3, 1878
Souberbielle, Edouard...78 Cromwell Road, S.W.	—	Mar. 4, 1891
*Sparks, William...Crewkerne	June 6, 1838	Mar. 5, 1890
Spencer, Earl, K.G...Althorp Park, Northampton	Dec. 5, 1860	Mar. 3, 1875
†Stapylton, Major H. M....Myton Hall, Helperby, Yorks.	July 11, 1865	May 7, 1890
*Stratton, J. Locke...Turweston House, Brackley	May 13, 1839	Mar. 5, 1890
Sudeley, Lord...Toddington, Winchcomb	—	Nov. 5, 1879
Suffield, Lord, K.C.B....Gunton Park, Norwich	July 1, 1868	Nov. 3, 1875
Sutherland, Duke of...Trentham, Stoke-on-Trent	Mar. 1, 1882	Dec. 7, 1892
†Sutton, John Manners...Kelham, Newark	—	May 8, 1844
†Sutton, Martin J...Kidmore Grange, Caversham, Oxon.	May 1, 1878	Feb. 1, 1882
†Swinburne, Sir John, Bart....Capheaton, Newcastle-on-Tyne	May 1, 1867	May 7, 1890
Tanqueray, John S...Balmain, 5 Albany Road, St. Leonards	Feb. 16, 1848	May 8, 1849
†Thorold, Sir John H., Bart....Syston Park, Grantham	Aug. 5, 1868	May 1, 1889
Tredegar, Lord...Tredegar Park, Newport, Mon.	—	May 3, 1876
Turbervill, Col. J. P....Laleston House, Bridgend	Mar. 5, 1884	July 27, 1892
†Tweedmouth, Lord...Brook House, Park Lane, W.	July 9, 1845	April 2, 1890
*Verney, Rt. Hon. Sir Harry, Bart....Claydon House, Winslow	May 10, 1838	Mar. 5, 1890
†Wantage, Lord, V.C...Lockinge, Wantage	June 3, 1863	May 1, 1872
†Warwick, Earl of...Warwick Castle, Warwick	—	June 1, 1859
Westminster, Duke of, K.G...Eaton Hall, Chester	July 3, 1860	June 5, 1872
†Whitehead, Charles...Barming House, Maidstone	Apr. 1, 1857	Feb. 6, 1889
Willoughby de Broke, Lord...Kineton House, Warwick	—	Dec. 10, 1890
†Wilson, Sir Jacob...Chillingham Barns, Belford, Northumbd.	Dec. 5, 1860	Dec. 7, 1892
†Windsor, Lord...Hewel Grange, Bromsgrove	—	Nov. 6, 1878
*Wood, James...Ockley Manor, Keymer, Sussex	Aug. 8, 1838	Mar. 5, 1890
†Yerburgh, Robert A., M.P...Billinge, Scarr, Blackburn	—	Nov. 7, 1888

* Elected a Foundation Life Governor March 5, 1890. † Life Governor. § Honorary Member.

HONORARY MEMBERS OF THE SOCIETY.

(" *British Subjects or Foreigners who have rendered exceptional services to Agriculture or Allied Sciences," and who have been elected under Bye-law* 8 *as Honorary Members, without payment of subscription.*)

	Date of election as Ordinary Member	Date of election as Honorary Member
ANDERSON, Wm., D.C.L., M.Inst.C.E., F.R.S....Lesney Ho., Erith	Aug. 2, 1871	Nov. 6, 1889
BROWN, Professor George T., C.B....4 Whitehall Place, S.W.	Dec. 3, 1862	May 1, 1878
DANNFELT, Carl Juhlin...Consul-General of Sweden and Norway, 24 Great Winchester St., E.C.	—	Feb. 1, 1871
FLEMING, George, LL.D., C.B....Higher Loigh, Combe Martin, North Devon	—	Mar. 13, 1878
GILBERT, Dr. J. H., F.R.S....Harpenden, St. Albans	—	July 4, 1883
HELLRIEGEL, Prof. Hermann...Bernburg, Anhalt, Germany	—	Dec. 9, 1891
HOHENBRUCK, Baron Arthur von...I Niebelungengasse 8, Vienna	—	Nov. 5, 1890
LECOUTEUX, Edouard...26 Rue Jacob, Paris	—	April 7, 1869
MAERCKER, Prof. Dr. M....Versuchs-Station, Halle, Germany	—	Nov. 2, 1892
PASSY, Louis...45 Rue de Clichy, Paris	—	June 23, 1891
PASTEUR, Louis...Membre de l'Institut, 45 Rue d' Ulm, Paris	—	Aug. 1, 1883
PLAYFAIR, Rt. Hon. Lord, K.C.B....68 Onslow Gardens, S.W.	—	July 6, 1842
PROSKOWETZ, Emanuel Ritter von, Senr....Kwassitz, Moravia	—	Nov. 5, 1890
RILEY, Prof. C. V., M.A., Ph.D....Department of Agriculture, Washington, U.S.A.	—	Dec. 7, 1887
SANDERSON, Dr. J. Burdon, F.R.S....Oxford	—	May 1, 1878
SCHLIEFFEN, Count...Schlieffenburg, bei Lalendorf, Mecklenburg, Germany	—	Dec. 12, 1883
SICKESZ VAN DE CLOESE, Dr. C. J....Heerengracht 17, The Hague, Holland	—	Dec. 9, 1891
SIMONDS, Prof. J. Beart...St. John's Villa, Ryde, Isle of Wight	July 25, 1838	Apr. 3, 1849
THIEL, Dr. H....Privy Councillor and Director of the Department of Agriculture, 17 Lutherstrasse, Berlin	—	Aug. 1, 1883
TISSERAND, Eugène...Directeur de l'Agriculture, Ministère de l'Agriculture, 17 Rue du Cirque, Paris	—	Aug. 1, 1883
VILMORIN, Henry L. de...17 Rue de Bellechasse, Paris	Aug. 2, 1879	June 4, 1890

SUMMARY OF MEMBERS ON THE REGISTER,

MARCH 31, 1893.

25 **Foundation Life Governors** (Members elected before the granting of the Charter on March 26, 1840).

73 **Governors** paying an annual subscription of 5*l.*

83 **Life Governors** who have compounded for their annual subscriptions.

7,029 **Members** paying an annual subscription of 1*l.*

17 **Members** who, having paid annual subscriptions for **50 Years,** have become Life Members.

3,651 **Life Members** who have compounded for their annual subscriptions.

80 **Life Members by Examination.**

21 **Honorary Members.**

10,979 **Total number of Governors and Members at March 31, 1893.**

A County List of the Governors and Members on the Register at December 31, 1892, *arranged according to the Counties in which they reside, has been printed, and a copy will be sent to any Member on application.*

ROYAL AGRICULTURAL

Dr. BALANCE SHEET,

Corresponding figures for 1891		£ s. d.	£. s. d.
28,962	To RESERVE FUND at December 31, 1891 .	28,487 18 8	
804	Interest on 30,000*l.* Consols for one year .	804 7 8	
—	Bequests:—Mr. J. P. Stocker, 89*l.* 10*s.*; Col. T. Picton Turbervill, 50*l.* . . .	139 10 0	
1,480	Life Compositions received during 1892 .	1,265 0 0	
31,246		30,696 16 4	
2,758	Less: Contribution to Revenue from 3,903 Life Members at 14*s.*	2,732 2 0	
28,488			27,964 14 4
6,214	To CAPITAL as per last account, represented by Books, Furniture, Country Meeting Plant, Machinery, Cash, &c.	6,446 12 10	
	Less: DEPRECIATION written off:		
273	Books and Furniture (10 per cent. off 2,504*l.* 14*s.* 8*d.*) . £250 9 5		
221	Country Meeting Plant (15 per cent. off 1,457*l.* 8*s.* 3*d.*) . 218 12 3		
121	Machinery (10 per cent. off 1,284*l.* 16*s.*) 128 9 6		
615		597 11 2	
5,599		5,849 1 8	
743	Add: Balance at Credit of Ordinary Income and Expenditure Account, as per statement (*A*)	989 17 7	
104	Balance at Credit of Warwick Show Account, as per statement (*B*) . . .	2,055 4 8	
6,446			8,894 3 11
34,935			£36,858 18 3

ERNEST CLARKE, *Secretary.*

WELTON, JONES & CO., *Accountants.*

DECEMBER 31, 1892. Cr.

Corresponding figures for 1891		£ s. d.	£ s. d.
29,033	By 30,000*l.* NEW CONSOLS (2¾ per cent.) at cost		29,033 9 4
	Value on 31st December, 1892, at 97½ = 29,250*l.* [Of this 30,000*l.* Stock, 105*l.* is held against Special Prizes.]		
2,460	By BOOKS and FURNITURE (including 45*l.* 2*s.* 11*d.* purchased in 1892)	2,254 5 3	
1,252	By COUNTRY MEETING PLANT (including 205*l.* 8*s.* 3*d.* purchased in 1892)	1,238 16 0	
1,086	By MACHINERY (including 198*l.* 10*s.* purchased in 1892)	1,156 6 6	
			4,649 7 9
248	By Sundry DEBTORS		228 12 8
	By CASH IN HAND, December 31, 1892:		
1,956	Bankers	1,406 17 1	
95	Secretary and Surveyor	351 19 6	
			1,758 16 7
—	By EXPENDITURE in 1892, but belonging to 1893, and carried forward		1,996 13 9
36,130			37,667 0 1
1,195	Less: Sundry CREDITORS	754 0 10	
	Less: Subscriptions received in 1892, but belonging to 1893, &c., carried forward	54 1 0	
			803 1 10
	Memorandum:—The above Assets are exclusive of the value of the stock of Journals, Pamphlets and Diagrams; and also of 320*l.* the amount recoverable in respect of arrears of Subscriptions to the 31st December, 1892.		
34,935			£36,858 18 3

Examined, audited, and found correct, this 20th day of February, 1893.

C. G. ROBERTS,
A. H. JOHNSON,
S. B. L. DRUCE,
Auditors on behalf of the Society.

Corresponding figures for 1891	Income.	£ s. d.	£ s. d.
£	ANNUAL SUBSCRIPTIONS:—		
	Governors: Received in 1891, but belonging to 1892 .	5 0 0	
336	Subscriptions for 1892	346 0 0	
75	*Members*: Received in 1891, but belonging to 1892 .	69 0 0	
6,598	Subscriptions for 1892	6,847 14 0	
398	Subscriptions for previous years	199 0 0	
7,407			7,466 14 0
	LIFE COMPOSITIONS:—		
2,759	Contribution to Revenue (See Balance-Sheet)— 3,903 Members at 14*s*.		2,732 2 0
	RECEIPTS FROM PUBLICATIONS:—		
104	Ordinary Sales of Journal (less Publisher's Charges).	137 13 0	
426	Advertisements in Journal	424 17 3	
56	Sales in Office of Back Numbers of Journal	18 0 1	
34	Sales of Pamphlets and Lists of Members	67 18 3	
42	Sales of Insect, Wheat and Potato Diagrams . . .	71 10 5	
—	Sales of Text Book on Agriculture (1st, 2nd, and 3rd Editions)	696 2 3	
663			1,416 1 3
735	LABORATORY FEES	...	655 15 6
4	DEPOSITS OF COMPETITORS IN SENIOR EXAMINATION FORFEITED	...	7 0 0
210	RENTS FROM SUB-LETTING	...	210 0 0
47	INTEREST ON BANK BALANCES	...	40 4 6
11,824			£12,527 17 3

ERNEST CLARKE, *Secretary.*

WELTON, JONES & CO., *Accountants.*

Expenditure.

Corresponding figures for 1891 £		£ s. d.	£ s. d.
	GENERAL ADMINISTRATION:—		
2,130	Salaries of Secretarial Staff (including Temporary Assistance)	2,282 0 7	
190	Pensions to Officials	190 0 0	
53	Professional Charges (Solicitors, Auditors, &c.)	70 0 6	
811	House Rent, Taxes, House Expenses, and Repairs	747 0 9	
49	Binding and Purchase of Books	67 0 3	
432	Printing and Stationery	384 16 4	
198	Postage and Telegrams	144 14 10	
22	Carriage of Parcels, and Cabs	32 6 11	
99	Advertising and Miscellaneous Office Expenses	88 13 11	
3,985			4,006 14 1
	JOURNAL OF SOCIETY:—		
1,379	Printers' Bills for the four numbers of 1892	1,367 1 6	
113	Wood Engravings and Illustrations	183 9 3	
597	Literary Contributions	582 15 4	
640	Postage, Packing, and Delivery	652 9 11	
131	Miscellaneous Journal Printing	36 14 1	
48	Miscellaneous Journal Expenses	29 8 10	
2,907			2,851 18 11
53	**PRINTING OF PAMPHLETS**		88 7 5
321	**DIAGRAMS OF INJURIOUS INSECTS, OF WHEAT, AND OF THE POTATO**		300 8 0
	LABORATORY:—		
1,193	Salaries and Wages	1,083 18 8	
45	Apparatus and Chemicals	47 15 8	
48 261	Printing, and Sundry Expenses	52 6 8	
1,547			1,184 1 0
	TEXT BOOK ON AGRICULTURE:—		
	Printers' Bills for the First Three Editions	807 15 1	
	Author's Fee	105 0 0	
	Postage	4 2 7	
			916 17 8
62 200	**OTHER SCIENTIFIC DEPARTMENTS:—** Consulting Botanist's Salary	200 0 0	
500	Grant to Royal Veterinary College	500 0 0	
3	Medals for Proficiency in Cattle Pathology	2 14 0	
—	Leaflet on Contagious Foot Rot in Sheep	5 7 0	
31	Net Expenses to Society of Potato Experiments	40 6 6	
796			748 7 6
	EDUCATION PRIZES AND SCHOLARSHIPS:—		
175	*Senior Examination*: Money Prizes, 55*l.*; Eight Life Memberships at 15*l.*=120*l.*	175 0 0	
40	Fees to Examiners	55 13 0	
200	*Junior Examinations*: 10 Scholarships at 20*l.*	200 0 0	
16	Fees to Examiners	15 15 0	
11	Advertising Examinations	11 18 8	
13	Printing	24 7 2	
454			482 13 10
	GRANTS AND SPECIAL EXPENSES:—		
200 50 50	Grant to Registration Scheme of Farriers	...	50 0 0
115	Farm Prize Competition: Expenses of Judging	...	175 3 0
602	Stallion Premiums, and Expenses	...	602 8 3
—	Presentation to Sir Jacob Wilson	...	131 0 0
11,081	Total Expenditure	...	£11,537 19 8
743	Balance carried to Balance Sheet	...	989 17 7
11,824			£12,527 17 3

Examined, audited, and found correct, this 20th day of February, 1893.

C. G. ROBERTS,
A. H. JOHNSON,
S. B. L. DRUCE,
Auditors on behalf of the Society.

Corresponding figures for 1891.		£ s. d.	£ s. d.
2,000	**SUBSCRIPTION:—**		
	From Warwick Local Committee		2,000 0 0
	FEES FOR ENTRY OF IMPLEMENTS:—		
3,915	Implement Exhibitors' Payments for Shedding	4,185 19 6	
207	Non-Members' Fees for Entry of Implements	193 0 0	
4,122			4,378 19 6
	FEES FOR ENTRY OF LIVE STOCK:—		
436	By Members:—1,685 Entries @ 5*s.*	421 5 0	
59	46 Post Entries @ 10*s.*	23 0 0	
324	By Non-members:—196 Entries @ 1*l.*	196 0 0	
48	7 Post Entries @ 2*l.*	14 0 0	
867			654 5 0
511	Fees for Horse Boxes and Stalls		318 10 0
8	Fees for Shedding for Vehicles in Harness Classes		9 0 0
	FEES FOR ENTRIES OF POULTRY:—		
21	By Members:—199 Entries @ 2*s.* 6*d.*	24 17 6	
	24 Post Entries @ 5*s.*	6 0 0	
146	By Non-members:—554 Entries @ 5*s.*	138 10 0	
6	16 Post Entries @ 10*s.*	8 0 0	
2	Entries of Table Poultry, 42 @ 1*s.*	2 2 0	
175			179 9 6
	OTHER ENTRY FEES:—		
37	Non-Members' Fees for Entries of Produce	27 0 0	
6	Fees for Entry in Horse-shoeing Competition	8 0 0	
12	New Implement Fees forfeited	9 0 0	
—	Deposits in Plough Trials forfeited	12 0 0	
—	Deposits in Butter-making Competition forfeited	0 10 0	
55			56 10 0
	CATALOGUE:—		
74	Extra Lines for particulars of Implement Exhibits	178 9 0	
10	Woodcuts for New Implements	8 7 0	
242	Advertisements in Combined Catalogue	258 2 3	
325			344 18 3
50	Sales of Implement Section of Catalogue (including bound copies)	41 4 0	
710	Sales of Combined Catalogue @ 1*s.*	645 12 10	
	" " " (bound) @ 2*s.* 6*d.*	38 12 6	
25	Catalogues sold after Show, &c.	4 9 1	
785		729 18 5	
63	Less Commission on Sales in Showyard	57 10 0	
742			672 8 5
	MISCELLANEOUS RECEIPTS:—		
107	Fines for non-exhibition of Live Stock, &c.	118 12 6	
16	Fines outstanding from previous Shows	6 0 0	
123			124 12 6
515	Premiums for Supply of Refreshments		535 0 0
50	Premium for Cloak Rooms and Lavatories		50 0 0
9,495	Carried forward		9,323 13 2

Corresponding figures for 1891.		£ s. d.	£ s. d.
	COST OF ERECTION OF SHOWYARD:—		
5,052	Timber	5,004 7 11	
159	Ironmongery	135 13 11	
62	Paints, Oil, Glass, Lead, &c.	61 0 11	
94	Bricks, Lime, Cement, Coal, &c.	61 4 2	
1,625	Canvas, Roofing Cloth, Felt, Baize, &c.	1,436 11 2	
645	Railway Charges, 416*l.* 7*s.* 1*d.*; Horse Hire, 135*l.* 14*s.*	552 1 1	
71	Stationery, Postage, and Telegrams	61 0 11	
42	Insurance, 31*l.* 2*s.* 0*d.*; Hire of Furniture, 4*l.* 10*s.* 6*d.*	35 12 6	
2,266	Wages	2,060 13 8	
618	Superintendent of Works: Salary and Expenses	626 6 0	
10 635		10,034 12 3	
	Less:—		
3,050	Sale of Materials £2,880 7 10		
1,677	Work for Exhibitors and Purveyors 1,821 18 8		
		4,702 6 6	
4,726			5,332 5 9
5,908	**EXPENSES OF SECRETARY'S DEPARTMENT:—**		
31	Expenses of Inspection Committee	53 10 6	
9	Secretary's Journeys to Warwick and Expenses	13 8 9	
252	Expenses for Extra Clerkage	139 5 10	
31	Preparation of Catalogues	24 8 0	
			230 13 1
324	**PRINTING:—**		
360	Printing of Prize Sheets, Certificates, Admission Orders, Parchment Numbers, Circulars to Exhibitors, Prize Cards, Members' Tickets, and Miscellaneous	409 13 3	
6	Secretary's Local Printing	6 4 8	
39	Programmes for Members	37 4 9	
7	Plans of Showyard	10 19 6	
663	Printing of Stock and Implement Catalogues	630 11 4	
56	Binding of Catalogues	87 4 11	
17	Carriage of Catalogues to Showyard	37 14 3	
98	Printing Awards	74 17 0	
			1,294 9 8
1,245	**ADVERTISING, BILL POSTING, AND PLACARDING:—**		
71	Advertising Closing of Entries, &c., in Newspapers	72 2 1	
988	Advertising Show by Posters and in Newspapers	503 0 0	
	Printing of Posters	115 7 6	
			690 9 7
1,059	**POSTAGE, CARRIAGE, AND STATIONERY:—**		
107	General Postage, &c., 65*l.* 15*s.* 2*d.*; Postage of Tickets to Members, 20*l.* 8*s.* 9*d.*		86 3 11
4,950	**AMOUNT OF PRIZES AWARDED** (for details see page xviii) . .		3,965 14 0
	COST OF FORAGE FOR LIVE STOCK:—		
643	Hay, 139*l.* 5*s.* 2*d.*; Straw, 287*l.* 9*s.* 6*d.*; Green Food, 81*l.* 8*s.* 9*d.*; Wages, 11*l.* 2*s.*; Insurance, 1*l.* 3*s.* 9*d.*		520 9 2
	JUDGES' FEES AND EXPENSES:—		
243	Judges of Ploughs, 64*l.* 8*s.* 8*d.*; Judges of Miscellaneous Implements, 47*l.*; Ditto for Lodgings, 12*l.*	123 8 8	
671	Judges of Horses, 111*l.* 15*s.* 3*d.*; Cattle, 125*l.* 5*s.* 10*d.*; Sheep, 174*l.* 6*s.* 7*d.*; Goats, 15*l.* 14*s.* 6*d.*; Pigs, 36*l.* 6*s.* 9*d.*; Poultry, 34*l.* 5*s.* 3*d.*; Cheese, 15*l.* 4*s.*; Butter and Butter-making, 45*l.* 17*s.* 9*d.*; Ditto for Lodgings, 9*l.*; Cider and Perry, 7*l.* 8*s.* 6*d.*; Jams and Preserved Fruits, 7*l.* 17*s.*; Horse-shoeing, 32*l.*	615 1 5	
24	Badges for Judges and other Officials	21 12 0	
30	Rosettes	18 11 8	
			778 13 9
969	Carried forward . . .		12,898 18 11
15,205			

Corresponding figures for 1891.		£ s. d.	£ s. d.
9,495	Brought forward		9,323 13 2
	ADMISSIONS TO SHOWYARD:—		
41	Saturday, June 18, @ 2*s.* 6*d.*	23 10 0	
668	Monday, June 20, @ 5*s.*	891 9 1	
1,542	Tuesday, June 21, @ 2*s.* 6*d.*	2,070 11 4	
2,318	Wednesday, June 22, @ 2*s.* 6*d.*	1,891 16 2	
2,884	Thursday, June 23, @ 1*s.*	1,817 3 2	
1,003	Friday, June 24, @ 1*s.*	1,182 16 0	
8,455			7,877 5 9
	Day Tickets		29 6 0
82	Season Tickets		179 17 6
	ENTRANCES TO HORSE RING:—		
56	Monday, June 20	79 12 0	
193	Tuesday, June 21	207 14 0	
243	Wednesday, June 22	143 6 0	
139	Thursday, June 23	77 10 6	
66	Friday, June 24	52 18 6	
698			561 1 0
	DAIRY:—		
50	Receipts at Stand at Dairy	40 10 0	
69	Sale of Produce at Dairy	70 13 1	
120			111 3 1

PRIZES AWARDED:—

Horses, 1,285*l.*; Cattle, 1,356*l.* 10*s.*	2,641 10 0	
Sheep, 860*l.*; Goats, 28*l.*; Pigs, 397*l.*	1,285 0 0	
Poultry	249 10 0	
Cheese, 78*l.*; Butter, 62*l.*	140 0 0	
Cider and Perry, 40*l.*; Jams and Fruits, 12*l.*	52 0 0	
Butter-making, 64*l.*; Horse-shoeing, 32*l.*	96 0 0	
Ploughs	115 0 0	
Silver Medals for New Implements	7 4 0	
Contribution to Bee Department	40 0 0	
	4,626 4 0	
Less:—		
Prizes offered by Local Committee £538 0		
„ „ Various Societies 110 10		
„ „ Farriers' Company 12 0		
	660 10 0	
	3,965 14 0	
18,850		£18,082 6 6

ERNEST CLARKE, *Secretary.*
WELTON, JONES & CO., *Accountants.*

Corresponding figures for 1891.		£ s. d.	£ s. d.
15,205	Brought forward		12,898 18 11
	EXPENSES OF ADMINISTRATION:—		
354	*Stewards*:—Housekeeping Expenses, 164*l.* 4*s.* 5*d.*; Personal and Railway Expenses, 80*l.* 14*s.* 7*d.*	244 19 0	
99	*Assistant Stewards*:—Honoraria, 56*l.* 11*s.*; Railway Expenses, 16*l.* 12*s.* 9*d.*; Lodgings, 38*l.* 3*s.*	111 6 9	
115	*Secretary and Official Staff*:—Houses, 77*l.* 3*s.* 9*d.*; Secretary's Expenses, 10*l.* 13*s.* 9*d.*; Maintenance of Clerks, 49*l.* 12*s.* 6*d.*; Travelling Expenses, 11*l.* 19*s.* 6*d.*	149 9 6	
91	*Finance Office*:—Superintendent of Turnstiles, 17*l.* 2*s.*; Money Changer, 10*l.* 10*s.*; Money Takers, 44*l.* 2*s.*; Bankers' Clerks, 18*l.* 7*s.* 9*d.*	90 1 9	
60	*Awards Office*:—Superintendent, 15*l.*; Clerks, 31*l.* 14*s.* 2*d.*; Award Boys, 16*l.* 13*s.* 1*d.*	63 7 3	
719			659 4 3
	General Management:—		
37	Superintendent of Yard	25 11 4	
111	Foremen	50 0 11	
428	Yardmen, Grooms, and Foddermen	368 13 4	
44	Door and Gate Keepers	34 2 0	
158	Carriage Hire, 97*l.* 14*s.* 9*d.*; Horse Hire, 54*l.* 3*s.*	151 17 9	
778			630 5 4
111	*Veterinary Department*:—Veterinary Inspectors, 81*l.* 5*s.*; Ditto for Lodgings, 21*l.*; Veteriuary Assistants, 14*l.* 3*s.*; Yardmen, 2*l.*	118 8 0	
391	*Engineering Department*:—Consulting Engineers and Assistants, 134*l.* 7*s.* 1*d.*; Ditto for Lodgings, 11*l.*; Carriage, 9*l.* 18*s.* 1*d.*; Repairs and Maintenance of Machinery, 11*l.* 6*s.* 7*d.*; Insuranee, 7*l.* 17*s.* 6*d.*; Wages to Workmen, 28*l.* 10*s.* 2*d.*; Hot Water Fittings to Dairy, 17*l.* 15*s.* 11*d.*; Ironmongery, &c., 8*l.* 13*s.* 11*d.*	229 9 3	
542	*Police, &c.*:—Metropolitan Poliee, 525*l.* 12*s.* 8*d.*; Commissionaires, 14*l.* 0*s.* 11*d.*	539 13 7	
1,044			887 10 10
238	*Dairy*:—Milk, 73*l.* 8*s.* 8*d.*; Iee, 15*l.* 10*s.*; Dairy Staff, 68*l.* 8*s.* 3*d.*; Salt, 1*l.* 16*s.*; Utensils, 30*l.* 10*s.* 10*d.*; Carriage, 1*l.* 6*s.*; Coal, 1*l.* 8*s.* 9*d.*	192 8 6	
10	Expenses of Aualysing Milk of Dairy Cows	6 12 5	
248			199 0 11
42	*Poultry*:—Penning, Attendant and Food, 13*l.* 15*s.* 4*d.*; Prize Cards, 7*l.* 2*s.*; Killing Poultry, 3*l.* 10*s.* 4*d.*	24 7 8	
17	*Horse Shoeing*:—Gratuities	1 17 6	
			26 5 2
	GENERAL SHOWYARD EXPENSES:		
43	Hire of Furuiture, 13*l.* 6*s.* 3*d.*; Hire of Chairs, 28*l.* 10*s.*	41 16 3	
23	Tan, 2*l.* 10*s.*; Telegraph, 37*l.* 6*s.* 3*d.*; Telephone, 1*l.* 9*s.* 6*d.*; Disinfectants, 1*l.* 3*s.*; Newspapers, 1*l.* 4*s.* 6*d.*	43 13 3	
100	Band of Warwickshire Regimeut	64 14 6	
13	St. John's Ambulance Assoeiation	12 12 0	
56	Flowers for Royal Pavilion	15 0 0	
—	Ironmougery	20 12 6	
—	Mowing, 13*l.* 13*s.*; Field for Digger, 20*l.*	33 13 0	
52	Official Luncheons	10 6 2	
51	Miscellaneous Payments:—Secretary, 1*l.* 3*s.* 8*d.*; Surveyor, 26*l.* 14*s.* 4*d.*	27 18 0	
338			270 5 8
	TRIALS OF PLOUGHS:—		
	Hotel Expenses	79 12 10	
	Carriage Hire, 26*l.* 11*s.*; Cartage, 8*l.* 17*s.*	35 8 0	
	Horse Hire, 5*l.* 12*s.*; Police, 2*l.* 15*s.*; Ironmongery, 3*l.* 14*s.*	12 1 0	
354	Storage of Ploughs, 20*l.*; Fittiugs to Stores, 4*l.* 16*s.* 10*d.*	24 16 10	
	Engineers and Assistants, 120*l.* 14*s.* 7*d.*; Wages, 48*l.* 10*s.* 10*d.*	169 5 5	
	Tents, 7*l.* 3*s.*; Cost of providing Fields for Trials, 104*l.*	111 3 0	
	Petty Expeuses	23 3 8	
			455 10 9
18,745			16,027 1 10
104	Balance being exeess of receipts over expeuditure		2,055 4 8
18,850			£18,082 6 6

Exauiued, audited, and found correct, this 14th day of November, 1892.

A. H. JOHNSON,
C. G. ROBERTS, } *Auditors on behalf of the Society.*

Table showing the Number of GOVERNORS and MEMBERS in each Year from the Establishment of the Society.

Year ending with Show of	President of the Year	Governors		Members			Total
		Life	Annual	Life	Annual	Honorary	
1839	3rd Earl Spencer	—	—	—	—	—	1,100
1840	5th Duke of Richmond . . .	86	189	146	2,434	5	2,860
1841	Mr. Philip Pusey	91	219	231	4,047	7	4,595
1842	Mr. Henry Handley	101	211	328	5,194	15	5,849
1843	4th Earl of Hardwicke . . .	94	209	429	6,155	15	6,902[1]
1844	3rd Earl Spencer	95	214	442	6,161	15	6,927
1845	5th Duke of Richmond . . .	94	198	527	5,899	15	6,733
1846	1st Viscount Portman . . .	92	201	554	6,105	19	6,971
1847	6th Earl of Egmont	91	195	607	5,478	20	6,391
1848	2nd Earl of Yarborough . . .	93	186	648	5,387	21	6,335
1849	3rd Earl of Chichester. . . .	89	178	582	4,643	20	5,512
1850	4th Marquis of Downshire . .	90	169	627	4,356	19	5,261
1851	5th Duke of Richmond . . .	91	162	674	4,175	19	5,121
1852	2nd Earl of Ducie	93	156	711	4,002	19	4,981
1853	2nd Lord Ashburton	90	147	739	3,928	19	4,923
1854	Mr. Philip Pusey	88	146	771	4,152	20	5,177
1855	Mr. William Miles, M.P. . .	89	141	795	3,838	19	4,882
1856	1st Viscount Portman . . .	85	139	839	3,896	20	4,979
1857	Viscount Ossington.	83	137	896	3,933	19	5,068
1858	6th Lord Berners	81	133	904	4,010	18	5,146
1859	7th Duke of Marlborough . .	78	130	927	4,008	18	5,161
1860	5th Lord Walsingham . . .	72	119	927	4,047	18	5,183
1861	4th Earl of Powis	84	90	1,113	3,328	18	4,633
1862	H.R.H. Prince Consort . . / 1st Viscount Portman . .	83	97	1,151	3,475	17	4,823
1863	Viscount Eversley	80	88	1,263	3,735	17	5,183
1864	2nd Lord Feversham	78	45	1,343	4,013	17	5,496
1865	Sir E. C. Kerrison, Bt., M.P. .	79	81	1,386	4,190	16	5,752
1866	1st Lord Tredegar	79	84	1,395	4,049	15	5,622
1867	Mr. H. S. Thompson	77	82	1,388	3,903	15	5,465
1868	6th Duke of Richmond . . .	75	74	1,409	3,888	15	5,461
1869	H.R.H. Prince of Wales . . .	75	73	1,417	3,864	17	5,446
1870	7th Duke of Devonshire . . .	74	74	1,511	3,764	15	5,438
1871	6th Lord Vernon	72	74	1,589	3,896	17	5,648
1872	Sir W. W. Wynn, Bt., M.P. .	71	73	1,655	3,953	14	5,766
1873	3rd Earl Cathcart	74	62	1,832	3,936	12	5,916
1874	Mr. Edward Holland	76	58	1,944	3,756	12	5,846
1875	Viscount Bridport	79	79	2,058	3,918	11	6,145
1876	2nd Lord Chesham	83	78	2,164	4,013	11	6,349
1877	Lord Skelmersdale	81	76	2,239	4,073	17	6,486
1878	Col. Kingscote, C.B., M.P. . .	81	72	2,328	4,130	26	6,637
1879	H.R.H. Prince of Wales . . .	81	72	2,453	4,700	26	7,332
1880	9th Duke of Bedford	83	70	2,673	5,083	20	7,929
1881	Mr. William Wells	85	69	2,765	5,041	19	7,979
1882	Mr. John Dent Dent	82	71	2,849	5,059	19	8,080
1883	6th Duke of Richmond&Gordon	78	71	2,979	4,952	19	8,099
1884	Sir Brandreth Gibbs	72	72	3,203	5,408	21	8,776
1885	Sir M. Lopes, Bt., M.P. . . .	71	69	3,356	5,619	20	9,135
1886	H.R.H. Prince of Wales . . .	70	61	3,414	5,569	20	9,134
1887	2nd Lord Egerton of Tatton. .	71	64	3,440	5,387	20	8,982
1888	Sir M. W. Ridley, Bt., M.P. .	66	56	3,521	5,225	16	8,884
1889	Her Majesty The Queen. .	73	58	3,567	7,153	15	10,866
1890	Lord Moreton	122	58	3,846	6,941	17	10,984
1891	Earl of Ravensworth	117	60	3,811	6,921	19	10,928
1892	Earl of Feversham	111	69	3,784	7,066	20	11,050
1893 Mar.	Duke of Westminster	108	73	3,748	7,029	21	10,979

[1] The figures for 1843 are taken from the December report, after the removal of the names of members who had discontinued their subscriptions; but it was reported in the previous May that 1,436 had been elected during the preceding twelve months, bringing the then nominal total to 7,285. In all other cases, from 1840 to 1892, the figures are from the reports of the Council to the anniversary meeting on May 22. It should, however, be observed that the totals were occasionally affected by the necessary revision of the list.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

Proceedings of the Council.

WEDNESDAY, FEBRUARY 1, 1893,

THE DUKE OF WESTMINSTER, K.G. (PRESIDENT), IN THE CHAIR.

Present:—

Trustees.—H.R.H. the Prince of Wales, K.G.; Gen. Viscount Bridport, G.C.B., Earl Cathcart, Mr. John Dent Dent, Col. Sir Nigel Kingscote, K.C.B., Sir John Bennet Lawes, Bart., Sir A. K. Macdonald, Bart., Duke of Richmond and Gordon, K. G., Right Hon. Sir M. W. Ridley, Bart., M.P.

Vice-Presidents.—H.R.H. Prince Christian, K.G., Mr. Chandos-Pole-Gell, Mr. Walter Gilbey, Earl of Lathom, G.C.B., Right Hon. Sir Massey Lopes, Bart., Lord Moreton, Sir J. H. Thorold, Bart., Mr. Charles Whitehead.

Other Members of Council.—Mr. G. M. Allender, Mr. J. H. Arkwright, Mr. Joseph Beach, Mr. J. Bowen-Jones, Mr. J. A. Caird, Mr. Charles Clay, Earl of Coventry, Mr. Percy E. Crutchley, Lieut.-Col. J. F. Curtis-Hayward, Mr. Alfred Darby, Mr. J. Marshall Dugdale, Mr. S. P. Foster, Mr. W. Frankish, Mr. Hugh Gorringe, Mr. Anthony Hamond, Mr. James Hornsby, Mr. Charles Howard, Mr. C. S. Mainwaring, Mr. Joseph Martin, Mr. T. H. Miller, Mr. R. Neville-Grenville, Hon. Cecil T. Parker, Mr. Albert Pell, Mr. Dan. Pidgeon, Mr. J. E. Ransome, Mr. James Rawlence, Mr. G. H. Sanday, Mr. A. J. Smith, Mr. Henry Smith, Sir J. L. E. Spearman, Bart., Mr. E. W. Stanyforth, Mr. Richard Stratton, Mr. Martin J. Sutton, Mr. Garrett Taylor, Mr. John Tremayne, Mr. R. A. Warren, Mr. E. V. V. Wheeler, Mr. C. W. Wilson, Sir Jacob Wilson.

Mr. A. C. Cope, of the Board of Agriculture.

Officers.—Mr. Ernest Clarke, Secretary; Dr. Fream, Editor of the Journal; Dr. J. Augustus Voelcker, Consulting Chemist; Mr. Wilson Bennison, Surveyor.

The following members of the Chester Local Committee were also present:—The Town Clerk of Chester (Mr. Samuel Smith), the City Surveyor of Chester (Mr. J. Matthews Jones) Mr. John Scovell, Mr. George A. Dickson (Honorary Secretary of the Local Committee).

Apologies for non-attendance were received from the Earl of Feversham, Lord Egerton of Tatton, Mr. Ashworth, and Professor Simonds.

Election of New Members.

The minutes of the last monthly meeting of the Council having been approved, the election of the following 75 members was then proceeded with:—

Members.

ALLMAND, F...Wrexham.
ANDERSON, J...Chapel Farm, Barton-on-Hr.
ANDREWS, F. J...6, Newgate St., Chester.
BARNETT, R...Brindley Farm, Nantwich.
BATHO, Wm. J...Muswell Hill, N.
BENNISON, W.J...66, Ashley Rd., Crouch Hill, N.
BEVAN, Wm...Littleton Ho., Shepperton.
BICKERTON, W. H...Maesmynan Hall, Denbighshire.
BIRCH, R. E...Maes Elwy, St. Asaph.
BLANTERN, T...Old Castle, Malpas.
BROCKLEHURST, S...Fernhill, Edge Lane, Liverpool.
CARSE, G. J...Wilton, Salisbury.
CARTWRIGHT, T. B...Brackley, Northants.
CLARE, W. A...Greenfield, Saddleworth, Yorks.
CLARKE, R...The Bennhills, Sheepy, Leics.

COLEMAN, G...Highney Grange, Ramsey, Hunts.
COOKE, J. B...Sutton, Long Sutton, Lincs.
CRAMPTON, R...Terrington St. Clement, Lynn.
DUTTON, H. R...Spurstow Lower Hall, Tarporley.
EADY, J. C...Irchester Grange, Wellingborough.
ELDRIDGE, J. H...Burston Hall, Diss.
EVANS, J...Micklewood, Leebotwood, Shrewsbury.
EVERETT, D...Broadlands Office, Romsey.
GIBSON, Levi..Woolstanwood, Nantwich.
GILLHAM, W.T...Gorstella, Kinnerton, Chester.
GINNER, A. G...Town Hall, Bromley.
GREENALL, A...Grappenhall Hall, Warrington.
HADDEN, T. H...Hanmer, Whitchurch, Salop.
HARDING, C...Upton Grove, Tetbury, Glos.
HARRISON, G...Underpark, Lealholm, Yorks.
HEATON, W...Lostock Junction, near Bolton.
HINDMARSH, W. T...Alnbank, Alnwick.
HOLTBY, A. C...Heaton Ho., Boro'bridge.
HORTON, H...21, Trafalgar Rd., Birkdale, Southport.
HOWSIN, E. G...Simonstone, Burnley.
JENKINSON, Sir G. B., Bt...Eastwood, Falfield.
JOHNSON, J.B...Mickleton, Chipping Campden.
JONES, T...Brooklyn, Talybont, Brecon.
JOWETT, S. A...Bentley, Doncaster.
KELLY, J. D...Landican, Woodchurch, Ches.
KNIGHT, E...Caerwent, Chepstow.
LLOYD, H...12, Salisbury Square, E.C.
MCFADYEAN, Prof...Royal Veterinary College, N.W.
MARCOLETA, Don V...Santiago, Chili, South America.
MARTIN, W. B...Paulsgrove, Cosham.
MILES, Capt. C. N...Burton Hill, Wilts.
MILES, H., Sudgrove, Cirencester.
MILLIGAN, W...1, Queen Anne's Avenue, N.
MURLESS, C...Wynnstay Arms Hotel, Wrexham.
NEEDHAM, W. B...Ye Whytchouse, Worcester.
POGSON, E. F...Belvoir, Grantham.
POORE, G. V., M.D...30, Wimpole Street, W.
PRONERT, T. H...Bretton Hall, Chester.
RICKETTS, J...Davenham, Northwich.
RICKETTS, J. P...Davenham, Northwich.
RODDICK, A...Quinton Hill, Waltham Abbey.
SHILLITO, E...Epworth, Lincolnshire.
SMITH, F. P...Barnes Hall, Sheffield.
SMITH, J...Pulford, Wrexham.
SMITH, P., jun...Hillbrook, Keighley.
STEEVENSON, J. E...1, Radcliffe Rd., Nottingham.
STOREY, Ralph S...Beanley, Alnwick.
STRETTON, B...Wisboro' Tower, Billingshurst.
TANFIELD, R...Cherry Burton, Hull.
TAYLOR, E. F...New Barnet.
TAYLOR, John..Hoole Hall, Chester.
TIPPER, W...Astley Abbots, Bridgnorth.
TOFT, W...The Oldfields, Pulford, Wrexham.
TOWNSON, T...Snab Ho., Hornby, Lancs.
TYAS, F.C...14, Doughty Street, W.C.
WADDINGHAM, W. K...South Ferriby, Barton-on-Humber.
WEST, T. B. C...Hythe, Southampton.
WILLIAMS, H...Newton-on-the-Hill, Shrewsbury.
WILLIAMS, W...Glasfryn, Caerwys, Holywell.
WILLIS, T. T...Manor House, Carperby, Yorks

Country Meeting of 1894.

The Earl of COVENTRY read the report of the Committee of Inspection appointed by the Council at their last meeting to examine and report upon the sites and other accommodation offered by the Borough of Cambridge and the City of St. Albans for the Country Meeting of 1894. The Committee, after describing the various sites examined by them, stated that the circumstances of the two invitations were so different that they did not feel in a position to make a definite recommendation for the acceptance of either Cambridge or St. Albans, and they must leave the decision, therefore, in the hands of the full Council.

Invitation from Cambridge.

Mr. JOSEPH MARTIN then introduced a deputation from Cambridge, consisting of the Duke of Rutland, K.G. (High Steward of the Borough), the Duke of Devonshire, K.G. (Chancellor of the University), the Rev. Dr. Porter (Master of Peterhouse, Deputy for the Vice Chancellor of the University), Mr. C. W. Townley (Lord-Lieutenant of the County), the Earl of Hardwicke, Lord de Ramsey (Custos Rotulorum of the Isle of Ely), Lord Claud Hamilton, Mr. R. U. Penrose-Fitzgerald, M.P., Mr. George Newnes, M.P., the Mayor of Cambridge (Mr. S. L. Young), the Town Clerk of Cambridge (Mr. J. E. L. Whitehead), Mr. Alderman Kett, Mr. C. R. W. Adeane, Mr. William Birt (General Manager of the Great Eastern Railway), Mr. George E. Foster, J.P., and Mr. R. Peters (Local Secretary).

The Duke of RUTLAND said he had the honour as High Steward of the Borough of Cambridge to introduce a deputation which he thought he might fairly describe as alike influential and representative. Of its influential character the Council would be as well able to judge as himself. Of its representative character, he thought he might say that it represented not only the Borough of Cambridge, which of course was primarily interested in the object of the deputation, but also the great University, which was inseparably connected with the Borough. It also represented the County of Cambridge, which was no unimportant section of the agricultural world of England, and that most interesting semi-independent terri-

tory which was known as the Isle of Ely. All those bodies were influentially represented on the deputation, and he was certain that when the Council had heard what they had to say in support of the invitation which had already been given to the Council of the Royal Agricultural Society to hold their Meeting of 1894 in the town of Cambridge, they would see that there were most cogent reasons why that request should be complied with. Should the Council grant their request and accept the invitation offered, neither in point of funds, nor of space, nor of convenience of access would the Society have occasion to regret the decision at which they might have arrived.

The Mayor of CAMBRIDGE (Mr. S. L. Young) wished to put before the Council the leading points as to the advantages which Cambridge possessed for the purposes of the Society's Meeting. Cambridge was the centre of a purely agricultural district. It had upon its borders the strictly agricultural counties of Suffolk, Norfolk, Lincoln, Northampton, Bedford, Hertford, Huntingdon, and Essex. He need not point out to them, as practical men, how hard these counties had been hit by the recent depression in the agricultural interest. Any step that could be taken to alleviate that distress was worthy the consideration of their great Society. Nor need he take up their time by dwelling upon the high reputation which the county of Cambridge and the adjoining counties had acquired for stock-breeding. Cambridge was a great railway centre, served by the four lines of the Great Eastern, the Great Northern (extending from London to York), the London and North-Western, and the Midland Companies. So that the extensive ramifications of these four lines put them into communication with the greater part of England, Scotland, Ireland, and Wales, whilst the Great Eastern put them into communication with the Continent within a few hours by means of a splendid fleet of steamers. The hotel accommodation was abundant, and the hotels were well managed and were reasonable in their charges. As to lodging-houses, those gentlemen on the Council who had graduated at either of their Universities would appreciate the point that the lodging-houses in an University town were a great institution. The site which they offered on Midsummer Common had the rare advantage of being within five minutes' walk of the centre of the town, and the proximity to the railway station was another great consideration. It was within ten minutes' drive of the railway station. All the necessary funds had been subscribed; and he might say that they had a guarantee from a wealthy gentleman interested in the Borough that he would be prepared to meet any deficiencies. He could only say that if the Council decided to hold its Show at Cambridge, nothing would be wanting on the part of the authorities to make it a success.

The PRESIDENT said he understood there were certain footpaths across the grounds that were public. Would the Borough give an assurance to the Council that these footpaths would be closed—not only at the time of the Show, but also from March 1st prior to the Meeting—in order to afford the Society time to erect the showyard, and to make the necessary preparations?

The TOWN CLERK said that although he could not bind the Borough Council, he felt sure that those paths could be closed during the time suggested by his Grace. The whole was common land, and no doubt by arrangement with the Society's Surveyor the difficulty could easily be overcome. The Town Council were ready to take the responsibility upon themselves of closing the paths. When the Local Show was held upon this site at Cambridge, the paths were always closed.

The PRESIDENT having again pointed out that for the Society's Show it would be necessary for the paths to be closed four months previous to the Meeting,

The TOWN CLERK replied that he did not think there would be any difficulty with regard to the matter.

Mr. W. BIRT, Manager of the Great Eastern Railway Company, stated that the Company were seeking Parliamentary powers this Session to erect a new station at Cambridge,

and to improve the branch line to Newmarket. The bill would have the active support of the Corporation of Cambridge, and would no doubt be carried through. If so, the works would certainly be commenced at once. The twelve months would not be sufficient to complete the station, but it would be sufficient time to enable them to get the necessary accommodation provided for the Show.

Mr. RANSOME asked the nature of the soil upon which it was proposed to hold the Show.

The TOWN CLERK replied that it was gravel soil.

The Duke of DEVONSHIRE said he would only add a few words. He accompanied that deputation as Chancellor of the University of Cambridge. He had reason to believe that the invitation would be cordially supported by the University, who were, of course, considerably interested in the matter, as many of the Colleges were owners of property in the neighbourhood of Cambridge, and in their capacity of landlords were naturally anxious that their tenants should have the advantage of the visit of the Royal Agricultural Society to Cambridge. As members of the Council were probably aware, the University had considerable opportunities for dispensing hospitality. He believed that the Colleges —or a very large number of them— would be very glad of the opportunity to show hospitality to the Royal Agricultural Society, should they think fit to visit Cambridge, and to place their accommodation very largely at the disposal of the members of the Society. He only rose to make it quite clear that the invitation was cordially supported by the University.

The PRESIDENT having expressed the thanks of the Council for the attendance of the deputation, and

The DUKE OF RUTLAND having acknowledged the appreciation of the deputation of the attention with which they had been heard and of the courtesy with which they had been received, the deputation retired, pending the decision of the Council.

Invitation from St. Albans.

The deputation from Cambridge having withdrawn,

Sir JOHN LAWES introduced a deputation from St. Albans, consisting of the Earl of Clarendon (Lord-Lieutenant of Hertfordshire), the Marquis of Salisbury, K.G., Viscount Grimston, Sir John Evans, K.C.B., F.R.S., Sir Blundell Maple, M.P., Mr. Vicary Gibbs, M.P., Mr. T. F. Halsey, M.P., Mr. G. B. Hudson, M.P., Mr. Abel Smith, M.P., Mr. Richard Benyon Croft (High Sheriff of Hertfordshire), the Mayor and Town Clerk of St. Albans, Mr. C. T. Part, J.P., and Mr. A. Rumball.

The Earl of CLARENDON said he had often noticed that aspiring orators were in the habit of expressing regret, whether addressing a public or a private body, that their task had not been entrusted to more able hands. However loth he was to indulge in that trite and well-worn form, he could certainly do so without conventionality in the presence of Sir John Bennet Lawes, whose name was so well known all over England not only as an agricultural expert, but also as a member of the inner circle of that honourable Society itself. It fell to him, as an unworthy substitute, to lay the case for Hertfordshire before the Council, and he did not care to do so upon private or local grounds. He thought the benefits that were undoubtedly derived from the Royal Agricultural Society's Show in any particular district would hurt the argument in no way, but he would put the matter upon less local and more imperial and national grounds. It would conduce very materially to the agricultural benefit of many of the whole group of counties in the immediate neighbourhood of the Metropolis. The funds were forthcoming, and he might say that even before there was a prospect of the Council entertaining the idea of a show being held at St. Albans in 1894, more than double the amount was already subscribed, which was a sufficient guarantee that the Show would be held under the most favourable auspices so far as money was concerned, and that the whole affair would be conducted in a manner

befitting a great occasion. Other arguments in their favour were the accessibility to all parts of the United Kingdom by three lines of railway, and the propinquity of St. Albans to London. A whole week not only of enjoyment, but of instruction and edification on agricultural matters, might be imparted both directly or indirectly to those connected with or interested in agriculture in the Metropolis. A new line would be opened out for the Eastern portion of the inhabitants of London who had not the opportunity of attending either the Kilburn or the Windsor Show during the last twenty-five years. They had had the honour of supplying for the Inspection Committee five alternative sites, three of which were practically of permanent pasture. They possessed in Hertfordshire a gravelly, porous, and chalky soil, which would reduce the inconvenience and perhaps the irritability which would arise from humidity, even in the wettest of all possible seasons. The most eligible of the three sites could be prepared in the least possible time. with the greatest possible convenience, and the least possible expense. Hertfordshire had never had within its area the benefit of a visit from the parent Society of the agricultural societies of England; and although he wished to say nothing with regard to their rival in the field, Cambridge had already had a visit from the Society. In proportion to the acreage, the number of members of the Society in Hertfordshire was larger than that in the county of Cambridge. It was for these reasons that the invitation was sent last June by the Hertfordshire Farmers' Club, the Hertfordshire Agricultural Society, and later in the year by the Hertfordshire County Council; and it was for these reasons that they renewed that invitation once more, with the firm and earnest hope that the Council would give to it their most favourable consideration.

The Marquis of SALISBURY said he was in a position which was not unfamiliar to the members of that Society, of succeeding to an occupation which had been entirely exhausted by the person who had gone before him—(laughter)—and therefore no great performance could be expected of him. There was very little to add to what his noble friend (Lord Clarendon) had stated, but he could not imitate his chivalrous action in not noticing the claims of their competitor. After all, it was the comparison of the claims of St. Albans with the claims of their competitor which must decide the judgment of that assembly. In the first place, Cambridge was a good deal further off. With all their high education, they could not compete with St. Albans—not only because that by going to Cambridge they would shut out to a great extent the instruction which the Royal Agricultural Society should give to the large population in this Metropolis, but also because the Society would be deprived of a vast amount of payments which would be made by the inhabitants of that great city. Therefore, on purely financial grounds, he thought the neighbourhood of the Metropolis was something which should weigh with that Council. St. Albans could claim this: that it was an agricultural borough. The most important occupation of the town of Cambridge was not agriculture. It was something else—perhaps something nobler. It produced undergraduates. (Laughter.) But, as they well knew, they could not have competitions for a prize for undergraduates, in whatever state of development they might be. He now referred to a very painful matter, and this was that Cambridge would draw the main portion of its exhibitors from the Eastern Counties to a greater extent than they could; and the Eastern Counties were not at this moment in such a position that they could undertake the burden of an exhibition. He was far from saying that the Royal Agricultural Society should not give them all the encouragement in its power; but it could not expect them to go to a great expense at a period when the most necessary outgoings were curtailed. He would press the claims of Hertfordshire upon the Council, and would remind them that Hertfordshire had never shared in the sunshine which the Royal Agricultural Society had so freely shed over the rest of the country.

Lord GRIMSTON said he followed most unworthily the speakers who had gone before him in advocating the claims of his home—of the city near to which he lived, and in which he took great interest. He thought that the best way in which he could advocate those claims would be to call attention to one fact which had not been mentioned up to that time, *viz.* the proximity of the great experimental farm at Rothamsted. It must encourage those interested in agriculture to have the opportunity of visiting it, and thus spread a knowledge of those invaluable experiments amongst agriculturists.

Sir JOHN EVANS, F.R.S., said he happened to be the Chairman of the Lawes Agricultural Trust, which had been so patriotically founded by Sir John Bennet Lawes. This year was the Jubilee of those experiments, and he thought that it would be proper and a happy compliment to pay to Sir John Lawes if they accepted the invitation from St. Albans for the Country Meeting of 1894.

Sir JOHN LAWES said as a resident in the County of Hertford he felt he ought to say a few words to induce them to come next year to St. Albans. In the first place, Cambridge had already had the pleasure of a visit from the Society. It was true that this was many years ago, but they had enjoyed the advantages derived from such a visit. Hertfordshire, on the other hand, had not, although it had been hoping to see the Society some day. He had taken the trouble to look into the statistics of the members of the Royal Agricultural Society. There was a group of eight or nine counties in the Society's District A. He took the agricultural acreage of each county and divided that by the number of members, and he found that, taking the whole group of eight or nine counties—beginning with Norfolk and ending with Hertfordshire—Hertfordshire supplied a much larger number of members per acre than any of the others. They had, therefore, a claim upon the Society superior to any of the other counties in the group. He did not think they should ignore the county which had subscribed so liberally towards their funds.

The MAYOR of ST. ALBANS (Mr. James Fisk) said he did not think he could add to the arguments placed before them; but he would assure the Council that if they selected Hertfordshire, the Mayor and Corporation of St. Albans would give the Society the most hearty welcome, and do all in their power to make the Show a success. He would not himself be Mayor of St. Albans next year; but he could assure them that the Mayor and Corporation would show them all proper hospitality. The City cordially supported the invitation.

The deputation then retired.

Selection of Cambridge.

Mr. DENT said he had but one hesitation in moving that the Royal Agricultural Society should meet at Cambridge in 1894. His only feeling of regret was that in doing so they could not pay the compliment to their old friend Sir John Lawes by visiting St. Albans. In all other respects Cambridge possessed greater advantages. In the first place, it was the centre of a most important group of agricultural counties—counties which had no doubt suffered considerably the past year or so—but this was all the more reason why the Royal Agricultural Society should hold its Show among them. The accommodation which was afforded by Cambridge was confessedly far more than that at St. Albans. All those who had had the happiness of being educated at Cambridge were aware of the great hospitality, and of the accommodation which could be provided for those who were present at any great function that took place there. He had, therefore, great pleasure in moving: "That Cambridge be selected for the place of Country Meeting for 1894."

Mr. MARTIN, in seconding the resolution, said that with regard to the paths across the common, when they held their local shows, there was no difficulty whatever. The undergraduates and all the other inhabitants complied with the orders laid down. With regard to the St. Albans invitation, he had no hesitation whatever in saying that their experience

of Metropolitan exhibitions had not been at all satisfactory.

Mr. PELL advocated the cause of Cambridge because he was interested in it as the owner of property there, and as farming a very considerable amount of land. He did not wish to say anything disparaging with regard to St. Albans. The noblemen who appeared for that city overlooked one feature which they should not have forgotten. St. Albans was the City of the proto-martyr of England, but possibly if the Society went there, there might be an instance of a greater martyr. Lord Salisbury made an endeavour to influence their views upon the point of finance, but he (Mr. Pell) did not forget—and other members of the Council did not forget—that, so far as finances were concerned, the nearer they got to the Metropolis, the further they got from profit. His Lordship referred to the poverty of their district. That was sufficiently severe; but they were perfectly certain that the money was subscribed. Therefore, on that ground, there need not be any feelings of apprehension on the part of the Council. The climate of Cambridge was notoriously the driest and best climate in England. The rainfall in that county was less than in any other, so that there was greater probability of their having fine weather. Cambridge was a district of producers, whereas St. Albans was a district of consumers. Cambridge was the largest grower of wheat in proportion to its area of any county in the kingdom. The University had lately taken a definite and honourable lead in the direction of agricultural education, with which he was happy to say that Council had identified itself. On these grounds, therefore, he ventured to support the motion in favour of Cambridge.

Earl CATHCART moved, and Sir JACOB WILSON seconded, an amendment that St. Albans should be selected as the place of Country Meeting for the year 1894.

The amendment having been put, was declared lost by 14 votes to 31.

It was then decided that the Country Meeting of 1894 be held on Midsummer Common at Cambridge, subject to the usual agreement being entered into with the Society by the Mayor and Corporation of Cambridge.

The deputation from Cambridge having been recalled, The PRESIDENT informed them of the Council's decision.

The MAYOR expressed the gratification of the deputation at learning the result, and undertook the closing of the footpaths running across Midsummer Common from March 1, 1894, until after the expiration of the Show.

Lord CLAUD HAMILTON, on behalf of the Great Eastern Railway Company, promised that the Company would do their best to meet the views of the Council with regard to the accommodation at the Cambridge Railway Station, and said that when railways undertook to do things they generally performed them.

The deputation then withdrew.

The Reports of the various Standing Committees were then presented and adopted as below:—

Finance.

Sir NIGEL KINGSCOTE reported his election as Chairman of the year. The accounts for the month ended December 31, 1892, as certified by the Society's accountants, showed total receipts amounting to 341*l.* 8*s.* 7*d.* and expenditure amounting to 1,956*l.* 17*s.* 2*d.* The actual balance at the bankers' on December 31, 1892, allowing for cheques outstanding, was 1,406*l.* 17*s.* 1*d.* The accounts for the period ended January 28, 1893, showed total receipts amounting to 7,285*l.* 4*s.*, and expenditure amounting to 130*l.* 17*s.* 4*d.* The balance at the bankers' on January 28, 1893, allowing for cheques outstanding, was 8,561*l.* 3*s.* 9*d.* Accounts amounting in all to 1,131*l.* 15*s.* 5*d.* had been passed, and were recommended for payment. The quarterly statement of arrears and property as at December 31, 1892, and a tabular statement of subscriptions received month by month during the last ten years, were laid upon the table.

Sir NIGEL KINGSCOTE said that copies had been placed upon the table of the new List of Governors and Members of the Society, arranged

according to the counties in which they resided, and giving their addresses and dates of election. The compilation contained, besides the actual names and addresses of the members, a considerable amount of statistical information in reference to the past and present operations of the Society. Lists were given in it of the present and past Presidents, Trustees, Vice-Presidents, Members of the Council, Honorary Members, and officers of the Society, as well as of the Standing Committees. The total number of the Governors and members as at December 31, 1892, was 10,934, being composed of twenty-five Foundation Life Governors (members elected before the granting of the charter on March 26, 1840); seventy-two Governors paying the annual subscription of 5*l.*; eighty-four Life Governors who have compounded for their annual subscriptions; 6,956 members paying the annual subscription of 1*l.*; seventeen members who, having paid annual subscriptions for fifty years, have become life members; 3,679 life members who have compounded for their annual subscriptions; eighty life members by examination; and twenty-one honorary members, elected for "their exceptional services to Agriculture or Allied Sciences." Tables were given showing the number of Governors and members in each year since the establishment of the Society in 1838, and giving the geographical distribution of the members of the Council and of the Governors and members, arranged according to the scheme of rotation for the Society's Annual Country Meetings. A copy of the List might be had free by any member of the Society on application to the Secretary; and he (Sir Nigel) trusted that all members who received it would study it carefully, and endeavour to induce the agriculturists in their districts to join the Society, in order to fill up the vacancies which were necessarily caused by deaths and resignations.

House.

Sir NIGEL KINGSCOTE reported his election as Chairman of the year, and presented the recommendation of the Committee that the thanks of the Society should be sent to Sir Jacob Wilson for a coloured lithograph of the Society's Meeting at Bristol in 1842, and to Mr. Joseph Davis for two engravings of Country Meetings at Oxford (1839) and Cambridge (1840). He added that, as the Council were aware, the House Committee had been engaged for a considerable time in endeavouring to obtain more suitable premises than their present house for the Society's requirements. The inadequacy of No. 12, Hanover Square, for the rapidly-increasing operations of the Society had, as they knew, been for several years past under the anxious consideration of the Council; indeed, larger premises and greater facilities had now become imperative. Of late years, moreover, a considerable number of other useful and nationally important agricultural organisations, such as Stud- and Herd-Book Societies and the like, had been established; but owing to the impossibility of finding accommodation for them under the same roof as the Royal Agricultural Society, it had been necessary for them to seek offices elsewhere. The Councils of these bodies, composed to a large extent of the same representatives, had been obliged, therefore, to hold their Monthly Councils in different parts of London, which involved a very disproportionate waste of time and trouble. It had been felt on all hands that great advantage would accrue if all these Societies could be centred in one place. The Royal Agricultural Society appeared to be the proper organisation to take the lead in endeavouring to provide for this want; but although the House Committee had been continuously engaged for some considerable period in inquiries as to suitable sites, it had not up to the present been able to mature a satisfactory plan. Recently, however, it had become known to the Committee that there was a possibility of obtaining, as a site for this purpose, part of the property known as Harewood House, next door to No. 12, Hanover Square. This site, otherwise extremely eligible, was rendered more suitable by the fact that for half a century Hanover Square had been looked upon as the head-quarters of agriculture in England. Very shortly after the

rising of the Council on December 7, the House Committee had received an intimation that the refusal of this property could be obtained; but as this refusal was only given for a very limited time, it was impossible to consult the Council on the subject. Under these circumstances, the Duke of Westminster and Mr. Walter Gilbey had generously taken upon themselves the responsibility of purchasing the property, in order to secure such portions of it as might be required for the purposes of the Royal Agricultural Society and kindred societies. The terms of contract for purchase had been settled, and the contract itself would be signed almost immediately. The site of the existing house had been offered by the Duke of Westminster and Mr. Gilbey to the Society on very favourable terms, and the Committee strongly recommended that this offer be accepted. If the general principle of the purchase of the site of Harewood House for the future home of the Society were approved by the Council, the House Committee proposed at once to consider plans for the accommodation of the "Royal," and of other societies who wished to be located in the building; and they asked for full powers to carry this into effect. They thought it right to state, however, that the scheme could not be completed without substantial financial assistance from the members and well-wishers of the Society.

The PRESIDENT said it was well known that there had been for some time a very strong feeling as to the inconvenience and inadequacy of the Society's present offices, and when it was understood that the adjoining premises of Harewood House were in the market, Mr. Walter Gilbey and himself had agreed to take the responsibility of purchasing the site, hoping that the "Royal" would purchase at all events a part of it, if suited to their requirements, for the purpose of housing itself and any other societies connected with agricultural objects. It remained for them to decide whether they would adopt the proposal of the House Committee, and take measures to raise money for the purchase and erection of the new building.

H.R.H. the PRINCE of WALES moved that a cordial vote of thanks be given to the Duke of Westminster and Mr. Walter Gilbey for their public-spirited action. He said they were all very grateful for the very handsome manner in which they had come to the assistance of the Society in this matter, which was one of great importance to their future deliberations. (Hear, hear.)

The Duke of RICHMOND and GORDON had the greatest pleasure in seconding the motion which His Royal Highness had made. The Duke of Westminster and Mr. Walter Gilbey had come forward at a moment of very considerable difficulty; and, indeed, had they not done so, the Society would still be in the inconvenient position in which they had been for so many years. He thought there could not be two opinions amongst the members of the Council as to the report of the House Committee being adopted, and the resolution of thanks being passed.

The Duke of WESTMINSTER, in thanking His Royal Highness and the Council for the resolution which had been proposed and adopted, said it would be an undeniable advantage to the Society to be housed in a more creditable manner than at present.

Mr. WALTER GILBEY also expressed his thanks for the resolution, and said that he was only too delighted at being able to do anything that was for the benefit of the Society. He thought that their experiences of that day were a sufficient indication of the necessity of some more spacious accommodation being available for their deliberations. They had not been able to find sitting accommodation for the members of Council who were present, and the influential deputations who had waited upon them were subjected to considerable inconvenience. He hoped the House Committee would have the financial support of the members and the well-wishers of agriculture generally in their endeavours to provide a more worthy home for the Society.

Journal.

Earl CATHCART reported his election as Chairman of the year. Copies were laid upon the table of the last

number of the Journal, and also of the reprint of the article on "Cottage Sanitation" appearing therein, which had been issued at a cheap price for circulation in rural districts by Sanitary and Parochial Committees. The Secretary had been instructed to send a specimen copy of this reprint to the Chairman of the Technical Education Committee of each county. The issue of a new edition (the fourth) of Mr. Whitehead's *Hints on Vegetable and Fruit Farming* had also been reported. The Committee had considered the question of the appointment of a Commissioner to visit selected farms in District G, and they agreed upon the name of the gentleman who should be asked to act—the inspection to be made in May or June. Various applications for permission to republish articles appearing in the Journal had been granted on the usual conditions. The Secretary had reported that he had acquired for the library the missing volumes of the Annual Reports of the U.S. Secretary of Agriculture, thus making the Society's set of this valuable publication complete to date. The arrangements for the next number of the Journal had been considered, and directions thereon given to the Editor. The Secretary had been authorised to arrange for the reproduction, as a frontispiece to the next number of the Journal, of a portrait of Arthur Young, a biography of whom by Mr. Albert Pell would appear in the number.

Chemical.

Mr. WARREN reported the election of Viscount Emlyn as Chairman of the year. The report of the Woburn Sub-Committee had been received and adopted, and various matters relating to the Chemical Department of the Society settled. Dr. Voelcker had laid before the Committee the statistics relating to analyses during the past year. The Woburn Sub-Committee proposed to continue for another year the experiments at the Society's farm with *bouillie bordelaise* as a preventive of potato disease.

Seeds and Plant Diseases.

Mr. WHITEHEAD reported his election as Chairman of the year. A statement had been received from the Superintendent (Mr. Giles) of his expenses in connection with the potato experiments of the past season, together with various accounts from persons upon whose land the experiments were made. The Committee recommended that a cheque be drawn for the balance due to Mr. Giles, and that this be forwarded to him, with an expression of the Society's appreciation of the manner in which he had conducted the experiments. Mr. Carruthers had undertaken to carry out during the coming season further experiments with the view of determining the exact effect of the *bouillie bordelaise* upon the fungus causing the potato disease. A number of letters had been read from Professors at the Universities and others, deprecating the decision of the Society to submit intending candidates for the post of Zoologist to a competitive examination. After considerable discussion, it had been resolved to recommend that a new advertisement be issued, substituting the following for the concluding sentence of the original advertisement :—"Suitable candidates may be subjected to an examination, or to such other test of fitness as the Council may determine." Saturday, February 18th, had been appointed as the last day for the receipt of further applications. The Committee also recommended the appointment of a Sub-Committee to meet as soon as possible after the final date of receiving applications, in order to select from the whole of the replies received the names of those candidates who appeared to possess the necessary qualifications for the post. The Committee proposed to interview these selected candidates at their next meeting. In reference to Earl Cathcart's remarks at the last meeting of the Council, the Committee recommended that an investigation be made during the coming season into the attacks of finger-and-toe in turnips, and that a paper upon this subject be prepared for the Journal under the direction of the Consulting Botanist.

Veterinary.

Sir JOHN THOROLD reported his election as Chairman of the year.

The Committee had considered

the terms of the motion of which notice had been given by Mr. Stratton, but they were of opinion that as the question raised was of such importance it ought to be decided by the full Council rather than by a recommendation of the Committee. The subject of the prevalence of abortion in cattle had again been discussed, and it had been resolved to recommend that the Royal Veterinary College be asked to report to the Committee as to the feasibility and cost of making further experiments into the nature of this disease. Professor McFadyean had presented the Annual Report for 1892 of the Royal Veterinary College, which the Committee recommended for publication in the next number of the Journal (see page 133). A letter had been read from the agent to the Duke of Northumberland as to an outbreak of "louping-ill" amongst sheep, and it had been resolved that the Society should afford any assistance in its power towards an investigation of the complaint. Correspondence relating to the outbreak amongst young cattle of a disease locally known as "skanter" upon a farm near Tavistock had been laid before the Committee, together with a report upon the subject from Professor McFadyean, who had made a personal investigation on the spot. Sir Jacob Wilson had drawn the attention of the Committee to a case in Northumberland of the poisoning of some young beasts by their having been fed upon rotted yellow turnips, which had become putrid from the effects of the late frost.

Mr. COPE (for Professor Brown) had presented the following report:—

PLEURO-PNEUMONIA. — The whole of the United Kingdom may now be looked upon as practically free from pleuro-pneumonia, there having been no case of the disease found among home-bred cattle for four months. The last outbreak in Great Britain was discovered in a London cowshed on October 1st, while the last in Ireland occurred during the last week of September.

FOOT-AND-MOUTH DISEASE.—Since the last meeting of the Council an outbreak of this disease was discovered in a cowshed in North London on January 1st. Prompt measures were at once adopted to prevent the spread of the infection. The whole of the nine cows in the shed (six of which were infected) were slaughtered on the premises, the offal, hides, &c., destroyed, as well as the whole of the litter, fodder and other things in the shed, and the premises then thoroughly cleansed and disinfected. No further case of the disease has been found since, and the country is again free.

SWINE FEVER.—In the first three weeks of the present year there were 122 fresh outbreaks of this disease in Great Britain and 674 swine attacked. In the corresponding periods of 1890, 1891, and 1892, the swine fever outbreaks were 166, 166, and 89 respectively, and the pigs attacked were 1,087, 1,237, and 682.

ANTHRAX.—This disease has been more prevalent recently than is usually the case at this time of the year. The outbreaks in the first three weeks of this year have numbered 26, as compared with 9 in 1890, 10 in 1891, and 16 in 1892; and the number of animals attacked this year has been 48, whereas in the three preceding years the numbers were 11 in 1890, 19 in 1891, and 21 last year.

Importation of Foreign Live Stock.

Mr. STRATTON then moved the following resolution:—

That in the interests of the producers and consumers of meat in the United Kingdom, it is essential, as a safeguard against the introduction of foreign contagious diseases with animals, that all cattle, sheep, and swine imported into the United Kingdom from foreign countries, which are not for the time being "prohibited countries," be slaughtered at the port of debarkation, except in special cases, when they may be admitted under such conditions as the Board of Agriculture may from time to time consider necessary.

He remarked that for the first time during the last half-century this

country might be said to be free from contagious diseases. That, he thought, was an argument in favour of such a resolution as he had placed upon the agenda paper. It would serve as an endorsement of the spirited action which had been taken by the last Minister of Agriculture, to whom he thought immense credit was due, and also of the way in which his successor had carried out that policy. There was one kind of Protection to which he thought the farmers of this country were entitled—that was, protection from foreign diseases; and, so far as experience went, it was quite clear that they could have no immunity from disease so long as foreign animals were allowed to be imported and distributed all over the country. The insidiousness of these infectious diseases of cattle, and their long period of incubation, were such that they could not possibly be detected for many months after they had been contracted. He thought the resolution, therefore, was one which should be passed. It would be an encouragement for the Minister of Agriculture to proceed on the lines on which he had hitherto gone, and might be the means of keeping this country permanently free from these foreign diseases, from which they, as consumers and producers, had suffered so much. He was not going to occupy their time with figures as to the millions or hundreds of millions which Mr. Duckham estimated this country had lost from preventable disease, but it was undoubtedly a very large amount. Several of the best markets of the world—such, for instance, as Australia—had been closed against them for pedigree stock, in consequence of the disease which had been rife in this country. The prevalence of these diseases had very seriously interfered with the trade in pedigree stock with foreign countries. He begged to move this resolution, and that a copy of it be sent to the Board of Agriculture.

Mr. MARTIN seconded the resolution, which was then put and carried unanimously.

Stock Prizes.

Mr. SANDAY reported his election as Chairman of the year. The following offers of champion prizes at the Chester Meeting were recommended for acceptance:—

(1) A prize of 10*l*. 10*s*. for the best animal exhibited in the Kerry classes, from the Kerry and Dexter Cattle Society.

(2) A gold medal, value 5*l*., for the best two-shear ram or shearling ram in Classes 138 and 139, offered by the Shropshire Sheep-Breeders' Association.

(3) A prize of 10*l*. for the best boar or sow in the Berkshire pig classes, from the British Berkshire Society.

A letter had been read from the Ayrshire Cattle Herd-Book Society, expressing dissatisfaction at the smallness of the prizes offered for Ayrshire cattle at the Chester Meeting, and stating that under the circumstances they had reluctantly decided not to offer their challenge cups. The Committee having fully considered the question as to the number of classes for Ayrshire cattle when arranging the prize-sheet, could not recommend any alteration in the published list. Lord Coventry had informed the Committee that it had occurred to him that the President might not be unwilling to allow some of his thoroughbred stallions to be exhibited in the Chester showyard, as he felt sure that such an exhibition would prove a great attraction to visitors to the Show. Under the circumstances, he (Lord Coventry) had written to the Duke of Westminster on this subject, and had received a letter from his Grace expressing his willingness to allow three of his thoroughbred stallions—*viz*., Bend Or, Arklow, and Blue Green—to be on exhibition during each day of the Meeting. The Committee desired to express their appreciation of Lord Coventry's action in having brought this matter before the President, and recommended that the Duke of Westminster's kind offer be accepted with the best thanks of the Council. The question of rates proposed to be charged by the railway companies for the carriage of grooms and herdsmen travelling with live stock to and from the Show had been discussed, but, in view of the resolution on the subject proposed to be moved by Sir Nigel

Kingscote at the Council Meeting, the Committee did not make any recommendation. Various letters on the subject of the prize sheet had been read, and instructions given for the replies thereto.

Railway Rates.

Sir NIGEL KINGSCOTE then moved:—

> That, looking to the revised schedules of rates for the carriage of live stock and agricultural produce which have been issued by the various railway companies, it is desirable that the Royal Agricultural Society should co-operate with the Mansion House Association on Railway and Canal Traffic in endeavouring to obtain a reconsideration of those rates, and that the Society should contribute an annual subscription of 10*l.* 10*s.* to the funds of such Association.

He said he did not very often rise to ask the Council to spend money; it was generally the other way. He hoped, however, that he should have the Council with him on that occasion. He was very much disappointed that this trouble with regard to railway rates should have arisen again; but everyone hoped that, as the result of the Committee over which the noble duke (the Duke of Richmond) had presided, and the tribunal on which Lord Balfour of Burleigh and Sir Courtenay Boyle had sat, the matter would have been finally settled. He was afraid that the railway companies had rather overshot the mark in imposing the new rates. He had a letter in his pocket from a representative of his county of Gloucester, stating that the rates from the localities between Bristol and Birmingham had risen 35 per cent. It was certain that some investigation into the matter was required, as this was only one instance of hundreds—he might say of thousands. It would cost the Society a considerable sum if they undertook inquiries themselves with regard to the details of these rates. Such inquiries could be made through the Mansion House Association very readily, and if they subscribed 10*l.* 10*s.* to the funds of the Association, they would be able to get the information required. He brought the question before the Council because he thought it was a step in the right direction; and it would save trouble and be an economy if they became subscribers to the Association.

Mr. SANDAY seconded the motion.

Mr. DENT did not raise the slightest opposition to the motion for the proposed subscription, if the Council liked to make it. But he understood that at the Mansion House meeting the other day the cry was that the Board of Trade should have power to regulate railway rates and fares. The moment they went to a Government Department or to the Legislature to interfere with the price of commodities—and he held that the carriage of commodities was an article which could be paid for in the same way as the commodities themselves—they would get worse off than by dealing directly with the companies. A great deal of misunderstanding had arisen, and a great deal of pressure had been put upon the railway companies, to bring out their revised schedules of rates. From his own experience, he knew that many of the railway officers had been pretty well killed in their endeavour to get out these rates by the time required by the Legislature. There was very little doubt that agriculturists would find, as had been found in the North of England, that, generally speaking, the rates would be put upon something like their old level. He thought that the matter was more likely to be settled, and put upon a satisfactory footing, by the traders themselves dealing with the railway companies than by putting the matter into the hands of the Mansion House Association, and by endeavouring to get the Legislature to put power into the hands of a Government Department.

The Duke of RICHMOND said that as he had had the honour of presiding over the Committee on Railway Rates, he should like to make one or two observations. The present condition of things was due, not to the action of the railway companies, but to the traders. When they considered that the rates were not satis-

factory, they went to Parliament to ask the Legislature to interfere between them and the railway companies, through the medium of the Board of Trade, and the Committee of which he had been Chairman. They said now that they would never have asked Parliament to interfere, if they had known that they would do as they had done. A great deal had been said and written on the subject of milk, he thought, erroneously, because up to the time that these bills became Acts there was nothing to compel the companies to carry milk at all. They might carry as little or as much as they chose, and charge as much or as little as they liked. The action of his Committee was to put milk into a particular class to which a scale of rates was appended. Therefore, it appeared to him that those who sold milk were better off, though not of course if the railway companies charged them very high. Previously to his Committee there had been no obligation on behalf of the railway companies to carry milk at all. In the course of the Committee's inquiries he had made the acquaintance of almost all the railway managers, and he was astonished at the remarkable grasp which they had of the whole of the business. As they knew, the number of rates was something extraordinary. There were something like 13 million rates which had to be dealt with. He thought that it would better conduce to an arrangement if the traders dealt with the companies themselves, rather than if they were represented by a great body. He understood, however, that the object of Sir Nigel Kingscote's motion was to get information which they could not otherwise get except by considerable expense to themselves.

Mr. CHANDOS-POLE-GELL said that he lived on the Midland System, and he understood that the increase in the railway charges for the carriage of milk would, in the case of some traders, make a difference of 60*l.* per annum. He had had rather a curious experience in connection with this matter about forty-two years ago. He wanted to send milk to London from a farm in Derby, at which his neighbours laughed. At the time he was told by the company that they had no objection to carry the milk as an experiment, but that it must go in the guard's van, as it would dirty the parcels. (Laughter.)

Sir Nigel Kingscote's motion was then agreed to *nem. dis.*

Judges' Selection.

Mr. SANDAY (Chairman) reported that the Committee had selected a list of judges to be invited to act on the usual terms at the Chester Meeting in June next for the various classes of stock, poultry, produce, and implements. (See p. xli.)

Implement.

Mr. FRANKISH reported his election as Chairman of the year. The Committee presented their recommendations for the appointment of judges for (1) self-binding harvesters, (2) sheep-shearing machines, and (3) miscellaneous implements at the Chester Meeting, and for the arrangements to be made for the trials of sheep-shearing machines.

General Chester.

Mr. DENT presented the recommendation of the Committee that the prices of admission to the showyard on the several days of the Meeting should be as follows:—Saturday, June 17, 2*s.* 6*d.*; Monday, June 19, 5*s.*; Tuesday and Wednesday, 2*s.* 6*d.* each day; Thursday and Friday, 1*s.* each day. The Bishop of Chester had promised to preach the sermon at the Service to be held in the showyard on Sunday, June 18.

Showyard Works.

Sir JACOB WILSON reported his election as Chairman of the year. The form of tender for refreshments at the Chester Meeting had been approved and ordered to be issued, the tenders to be returnable by Monday, the 27th inst. The Committee recommended that in some of the towns and districts of Wales placards and other advertisements be circulated in the Welsh language, as well as in English. The Surveyor submitted plans showing the rearrangement of the pavilions in the showyard, which were amended and approved. He had also submitted plans, which were approved, showing

the passage in front of the seats of the Grand Stand 9 ft. wide, instead of 6 ft. wide, as hitherto. The Committee had considered the question of the accommodation to be provided for the three thoroughbred stallions which the Duke of Westminster had kindly promised to exhibit at Chester, and had instructed the Surveyor to construct three special loose-boxes for their exhibition.

Selection.

Earl CATHCART reported his election as Chairman of the year. The Committee presented their recommendation as to the nomination of a member of Council for the county of Kent, in the room of Mr. Faunce De Laune, deceased; and also recommended that the Hon. Cecil T. Parker be appointed Honorary Director of the Country Meetings.

On the motion of Earl CATHCART, seconded by Sir NIGEL KINGSCOTE, the Hon. Cecil T. Parker was formally elected Honorary Director of the Society's Country Meetings, to hold office for three years.

Subsequently, the Hon. CECIL T. PARKER in presenting the report of the Dairy Committee, said he would like to take the opportunity of saying how deeply impressed he was with the honour which the Council had done him in electing him as Honorary Director. He was sensible of the importance of the duties attached to the office, and also of the difficulty of following such a man as Sir Jacob Wilson. Sir Jacob had kindly promised his assistance, and it would be his (Mr. Parker's) endeavour always to maintain the prestige to which their Country Meetings had attained under Sir Jacob's able management.

Education.

Lord MORETON reported his election as Chairman of the year, and stated that about half of the 5,000 copies of the fourth edition of the Society's Text-book had already been sold. The Committee presented their recommendations as to the appointment of the examiners for the Senior Examination to be held next May. The question of the provision for agricultural education at the proposed new Gresham University of London had been considered at some length, in connection with the following suggestion made by Dr. Webb at the General Meeting held on December 8 last, viz.:—

> That the Council should use their influence with the Royal Commissioners for the proposed Gresham University of London, to secure provision for a Degree for students in Agriculture.

After considerable discussion, it was decided to submit the following resolution for the adoption of the Council:—

> (1) That, in the opinion of the Royal Agricultural Society of England, it is desirable that provision be made in all Universities for the granting of a Degree in Science for students of Agriculture;
>
> (2) That this resolution be conveyed to the Royal Commission now sitting on the proposed Gresham University.

An application from the Berks County Council, asking permission to issue a leaflet compiled from the Society's publications, for the use of students attending the Council's lectures, had been granted upon the usual condition that due acknowledgment be made of the source whence the information was derived.

Dairy.

The Hon. CECIL T. PARKER reported his election as Chairman of the year. The Committee recommended the acceptance of an offer by the Local Committee of prizes amounting to 36*l.* for 2 lb. of fresh butter, slightly salted, made from milk that had been drawn from cows other than Channel Island or cows crossed with the Channel Island breeds. The arrangements for the dairy at Chester had been considered, and the Secretary had been authorised to make the usual arrangements for the supply of milk.

Date of Next Meeting.

Various letters and other documents having been laid upon the table, the Council adjourned until Wednesday, March 1st, at noon.

WEDNESDAY, MARCH 1, 1893,

THE DUKE OF WESTMINSTER, K.G. (PRESIDENT), IN THE CHAIR.

Present:—

Trustees.—Earl Cathcart, Col. Sir Nigel Kingscote, K.C.B., Sir A. K. Macdonald, Bart., Earl of Ravensworth, Right Hon. Sir M. W. Ridley, Bart., M.P.

Vice-Presidents.—Mr. H. Chandos-Pole-Gell, Earl of Feversham, Mr. Walter Gilbey, Lord Moreton, Sir J. H. Thorold, Bart., Mr. Charles Whitehead.

Other Members of Council.—Mr. G. M. Allender, Mr. Alfred Ashworth, Mr. Joseph Beach, Mr. J. Bowen-Jones, Mr. J. A. Caird, Mr. Charles Clay, Earl of Coventry, Mr. Percy E. Crutchley, Lieut.-Col. J. F. Curtis-Hayward, Mr. J. Marshall Dugdale, Mr. W. Frankish, Mr. Anthony Hamond, Mr. James Hornsby, Mr. Charles Howard, Mr. C. S. Mainwaring, Mr. Joseph Martin, Hon. Cecil T. Parker, Duke of Portland, Mr. J. E. Ransome, Mr. S. Rowlandson, Mr. W. T. Scarth, Mr. Henry Smith, Sir J. L. E. Spearman, Bart., Mr. E. W. Stanyforth, Mr. Martin J. Sutton, Mr. Garrett Taylor, Mr. J. P. Terry, Mr. R. A. Warren, Mr. E. V. V. Wheeler, Mr. C. W. Wilson, Sir Jacob Wilson.

Officers.—Mr. Ernest Clarke, Secretary; Dr. Fream, Editor of the Journal; Dr. J. Augustus Voelcker, Consulting Chemist; Mr. W. Carruthers, F.R.S., Consulting Botanist; Mr. Wilson Bennison, Surveyor.

Apologies for non-attendance were received from H.R.H. Prince Christian, K.G., General Viscount Bridport, G.C.B., Viscount Emlyn, Mr. J. H. Arkwright, Mr. J. D. Dent, Mr. Albert Pell, Mr. Dan. Pidgeon, Mr. G. H. Sanday, Mr. A. J. Smith, and Professor Simonds.

Election of New Governors and Members.

The minutes of the last monthly meeting of the Council, held on February 1, having been approved, the election of the following two Governors and sixty-nine members was then proceeded with:

Governors.

GORDON, H. Panmure..Loudwater House, Rickmansworth.
ROTHSCHILD, Leopold de..Ascott, Wing, Leighton Buzzard.

Members.

ALLAN, J...Ava Lodge, Berwick-on-Tweed.
BAINBRIDGE, T. H...Eshott Hall, Felton.
BAYARD, F. C...Hillmorton Lodge, Wallington.
BEECROFT, P...Nortou's End Farm, Kinlet, Salop.
BROCKLEHURST, W...R.A. College, Cirencester.
BURTON, D. F...Cherry Burton, Beverley.
CARR, A. C...The Firs, Rainhill, Prescot.
CODRINGTON, S...Chipping Sodbury.
COLE, Capt. F. B. O...Llys Meirchiou, Trefnant.
COLEBROOK, W. M...120, Broad St., Reading.
COOKSON, E...Poulton, Wrexham.
COOPER, Capt. F. E...Dorchester Ho., Chester.
CORDINER, T...Burton, Neston, Cheshire.
COWGILL, B. B. H...53, Burlington Ter., Bradford.
DICKSON, J...Upton House, Chester.
DONE, H...Dungrey Hall, Bangor-is-y-coed.
EDMUNDS, C. C...Oulton Park, Tarporley.
EDWARDS, T. A. W...Denbigh.
EVANS, A...Drayton Bassett, Tamworth.
FELL, H. W...Shavington Grange, Market Drayton.
FINNEY, C. P...Hartington, Ashbourne.
FORDHAM, D. P...19, Raymond St., Chester.
FOSTER, R. H...Knowle, Warwickshire.
FREEMAN, W. W...1, Lorne St. North, Chester.
GALLOWAY, G...Woodhouses, Whitehureh, Salop.
GARNETT, F. W...Bowness-on-Windermere.
GREENALL, H...Beech House, Lymm.
GUTHRIE, D. C., M.P...East Haddon Hall, Northampton.
HARDINGE, Capt. Hon. H...Newton, Chester.
HARRISON, F. J...Maer Hall, Staffordshire.
HARRISON, F. L...The Knowle, Brenchley, Kent.
HARTER, G. L. Foster...Puckrup Hall, Tewkeshury.
HOARE, A...Stone Court, Falfield, Glos.
JANION, F. A...Marone, Knutsford.
JENKINS, E. R...Bodwenni, Llandderfil, Corwen.
JOLIFFE, W. D...Claverton, Hough Green.
KERRY, F. J...Acton Hall, Sudbury.
LUCKOCK, E. H. M...The Deanery, Lichfield.
LUTWYCHE, H. L...Kynaston, Ross.
LYSTER, J. L...Mockbeggar, Whiteknights, Reading.
MERKDITH, J...Comberton Ho., Kidderminster.
MUSSON, J...Fair View West, Rainhill.
NORBURY, John..Prineess Street, Knutsford.
OWENS, W...Bryn Farm, Tremeirehion, St. Asaph.
PARKER, J...Rake Lane, Eecleston, Chester.
PARKER, R...Pulford (Ches.), Wrexham.
PEARSON, G. F...Downton, New Radnor.
PEASE, A. F...Tees Grange, Darliugton.

PELLING, T. L...6, Victoria Street, Liverpool.
ROBERTS, J...Plas Heaton Farm, Trefnant.
ROBERTS, W...St. Helen's, Lancashire.
SADLER, A...Newton Ho., Tatenhall, Chester.
SANCTUARY, C. F. S...Mangerton, Melplash, Dorset.
SCOTT, C. T...Bosworth Pk., Market Bosworth.
SHARPE, A...The Hollies, Malvern Link.
SHAW, T...Hatton Heath, Chester.
SHEAF, A. T...Cleeve Prior, Evesham.
SIMCOCK, G. H...Woodhouses, Whitchurch, Salop.
SOWERBY, T. G...Putteridge Bury, Luton.
STARKIE, Mrs. E. E...Mitchells, Saffron Walden.
THOMSON, W...Douglas, Isle of Man.
TINSLEY, H...High Legh, Knutsford.
WAITE, J. A...Postern Heath Farm, Tunbridge.
WEBB, H...Riversleigh, Battenhall, Worcester.
WHITEHEAD, C. B...Barming, Maidstone.
WILLIAMS, Col. R...Bridehead, Dorchester.
WYNNE, T...Cuckoo's Nest, Pulford, Wrexham.
YATES, F. H., junr...Great Barr, Walsall.
YOUNG, Rev. H...Pulford Hall, Wrexham.

The reports of the various Standing Committees were then presented and adopted, as below :—

Finance.

Sir NIGEL KINGSCOTE (Chairman) reported that the accounts for the period ended February 25 last, as certified by the Society's Accountants, showed total receipts amounting to 842*l.* 4*s.* 8*d.*, and expenditure to 1,131*l.* 18*s.* 6*d.* The balance at the bankers' on February 25, 1893, allowing for cheques outstanding, was 8,271*l.* 9*s.* 11*d.* Accounts amounting in all to 2,029*l.* 4*s.* 1*d.* had been passed, and were recommended for payment. Copies were laid upon the table of the balance-sheet for 1892, which had been duly passed by the three Auditors, Mr. A. H. Johnson, Mr. C. Gay Roberts, and Mr. S. B. L. Druce, at an audit held on February 20 last. The final result of the year was that, after writing off the customary percentages for depreciation, the Society's total assets on December 31, 1892, amounted to 36,858*l.* 18*s.* 3*d.*, as against 34,935*l.* at the end of 1891 (see pp. xii. & xiii).

House.

Sir NIGEL KINGSCOTE (Chairman) reported that the House Committee had carefully considered, with the assistance of the Society's Solicitors and Counsel, the best method of raising funds for the erection of the new building for the accommodation of the Royal Agricultural Society and kindred organisations; and, with the approval of his colleagues, he now desired to move the following resolution :—

> That steps be forthwith taken to invite subscriptions for Stock to be issued for an amount not exceeding 65,000*l.*, to carry interest at the rate of 3 per cent. per annum, to be denominated Harewood House Debenture Stock, and to be secured upon the portion of the Harewood House premises about to be acquired by the Society, but without recourse to the Society's general funds.

This resolution was seconded by Sir JACOB WILSON, and carried unanimously.

The PRESIDENT said that he hoped the individual members of Council and the members of the Society generally would make a generous and prompt response to this appeal to take up Debenture Stock, in order that the House Committee might be able to proceed without delay with the necessary preparations.

Journal.

Earl CATHCART (Chairman) reported that a letter had been read from Mr. Bowen-Jones accepting the Society's invitation to act as commissioner to inspect and report for the Journal upon the selected farms in the district of the Chester Meeting; and the list of such farms submitted by the Local Committee had been finally approved. The Secretary had submitted a proof of the portrait of Arthur Young to be published with Mr. Pell's biography in the next number of the Journal. The receipt had been reported of a complete set of the reports of the American Bureau of Animal Industry. The arrangements for the next number of the Journal had been considered in detail, and the necessary directions given to the Editor.

Chemical.

Mr. WARREN presented the report of this Committee and of the Woburn Sub-Committee, which dealt with various matters of detail connected with the Chemical Department.

On the motion of Mr. WARREN, the Quarterly Report of the Chemical Committee was adopted, and ordered to be published in the Journal (see p. 142).

Seeds and Plant Diseases.

Mr. WHITEHEAD (Chairman) presented the report of the Sub-Committee for the selection of a Zoologist, which had been received and adopted. The full Committee had given detailed consideration to the applications and testimonials of three candidates, who had been selected by the Sub-Committee, and each of these gentlemen had been interviewed in turn. Having very carefully considered the experience and qualifications of each of the three candidates, the Committee had unanimously agreed to recommend that Mr. Cecil Warburton, M.A., of Christ's College, Cambridge, be appointed by the Council as Zoologist to the Society at a commencing salary of 200*l.* per annum. It was proposed that Mr. Warburton should continue to reside in Cambridge, where he would have the advantages of laboratory facilities and of access to the College libraries; and that he should be allowed to continue his winter lectures for County Councils as at present. The Committee recommended that the charge of 1*s.* be fixed for information respecting any animal (quadruped, bird, insect, worm, &c.) which in any stage of its life affects the farm or rural economy generally, with suggestions as to methods of prevention and remedy in respect to any such animal which may be injurious.

Appointment of Zoologist.

Mr. WHITEHEAD in formally moving "That Mr. Cecil Warburton, M.A., of Christ's College, Cambridge, be elected Zoologist to the Society, at a remuneration of 200*l.* per annum," said that at an unusually full Committee held yesterday it was, after most careful consideration, unanimously decided to recommend the selection of Mr. Warburton for the post of Zoologist to the Society. His testimonials were of the highest order, and his manner and presence, and the answers he gave to the Committee, were most satisfactory. He thought that in Mr. Warburton the Society would have an officer who would be of the greatest use to agriculturists, whilst, at the same time, he would have opportunities of enhancing his reputation as a zoologist by study and independent research. His appointment would, the Committee trusted, also add prestige to the Society.

Earl CATHCART, in seconding the resolution, said that he cordially agreed with every word that Mr. Whitehead had said.

Mr. Warburton was then unanimously appointed.

Veterinary.

Sir JOHN THOROLD (Chairman) announced that the Examiners in Cattle Pathology for the Diploma of the Royal College of Veterinary Surgeons in 1892 had reported that the following gentlemen, placed in order of merit, had become entitled to the medals given by the Society:—(1) F. L. Clunes, Newcastle-under-Lyme; (2) F. T. G. Hobday, Redhill, Surrey. The Committee recommended, therefore, that the Society's large medal be given in silver to Mr. Clunes, and in bronze to Mr. Hobday.

Professor Brown had presented the following report:—

PLEURO-PNEUMONIA. — During the first seven weeks of the present year no case of this disease has been found among home-bred cattle, and therefore during that period no contact cattle had to be slaughtered. Nine suspected cattle, however, were killed and found on post-mortem free from pleuro-pneumonia. In the corresponding periods of 1890, 1891, and 1892, the diseased cattle killed were 262, 111, and 31 respectively; the contact cattle killed were 652, 1,289, and 450 respectively; while the suspected cattle killed in the same years were *nil*, 30, and 37 respectively.

FOOT-AND-MOUTH DISEASE.—A fresh outbreak of this disease has occurred since the last meeting of the Committee at Pound Farm, Guestling, near Hastings. The disease first manifested itself among four store cattle in a shed, and from them it spread to the other cattle, about twenty, in other parts of the farm buildings, no doubt through the same attendant feeding all these cattle. There are over 250 sheep on the farm, and up

to the present they have not become affected, being at some distance from the homestead where the cattle are. Strict isolation has prevented the spread of the infection from the farmyard. The origin of the disease has not yet been made out.

SWINE FEVER.—This disease is again increasing, there having been 282 fresh outbreaks and 1,438 swine attacked, as compared with 207 outbreaks and 1,410 swine attacked last year.

ANTHRAX.—This disease shows a very marked increase in the present year as compared with the corresponding period of last year, there having been 62 outbreaks and 142 animals attacked this year, and only 36 outbreaks and 62 animals attacked last year.

Stock Prizes.

Mr. FRANKISH reported that it had been incidentally ascertained that a new arrangement was about to be made by the railway companies under which unsold articles exhibited at agricultural shows were to be conveyed back or transferred to another show at half rates, and men in charge of live stock were to pay half the ordinary fare on production of a certificate signed by the secretary of the show. Having regard to the impossibility of such a certificate being given by the secretary of a show, the Secretary had written to the General Manager of the London and North-Western Railway Company, explaining that the responsibility of signing such a certificate as that suggested must obviously rest upon the exhibitors themselves. The terms of the Secretary's letter, as below, had been approved by the Committee, and he had been authorised to acquaint the railway company with this fact, and to ask for a reconsideration of the decision.

[COPY.]

Royal Agricultural Society of England,
12, Hanover Square, London, W.
February 18, 1893.

Dear Sir,—My attention has been called to a new arrangement that, as I understand, is about to be made by the railway companies, under which unsold articles exhibited at agricultural shows are to be conveyed back or transferred to another show at half rates, and men in charge of live stock are to pay half the ordinary fare on production of a certificate signed by the *Secretary of the Show*.

I shall be glad if you will kindly inform me officially whether this is correct, in order that I may report the matter formally to the Council, in view of this Society's Meeting at Chester next June.

I venture, at the same time, to draw your attention to the impossibility of the secretary of a show certifying that certain goods of a particular exhibitor are unsold, or that specified individuals are travelling with, and *bonâ fide* in charge of, consignments of stock.

For a very long period the forms which I enclose herewith have been in use by this Society with the sanction and approval of the railway companies. On forms A and B I certify, as I am able to do, that an entry for exhibition at the Meeting has been made by a particular exhibitor; but the declaration (required for the return journey) that the articles are unsold has to be made by the exhibitor himself. The exhibitor also has to certify on forms C and D that a particular individual is in charge of certain specified animals, and is therefore entitled to a free pass. It is obvious that this is a matter which must rest upon the responsibility of the exhibitors themselves, and that it would be impossible for me to issue certificates in the proposed new form except in blank, which would defeat the object which the companies apparently have in view.

I would venture, therefore, to submit that it would be far better and safer to impose the duty of making the declaration upon the persons really responsible, *viz.* the exhibitors, as has been the case up to the present time.

If desired, the forms for enabling men in charge of stock to travel at half rates could commence with a declaration by myself (in similar terms to forms A and B) that an entry of live stock for exhibition at

the Meeting had been made by an exhibitor (whose name I could fill in); but beyond this it appears to me impossible for the secretary of a show to certify.

Yours faithfully,
(Signed) ERNEST CLARKE,
Secretary.

The General Manager,
London and North-Western Railway.

Mr. C. W. WILSON said that he should like to move that the Secretary, in writing again to the railway companies, be instructed to request, on behalf of that Society, that the same privilege as heretofore be granted in allowing men in charge of stock to travel free to and from agricultural shows. He thought this was a very bad time for the companies to have chosen to increase the rates of carriage to and from the shows, and that, in so doing, they were standing considerably in their own light. There was much less risk of injury to live stock if a competent man were travelling with and in charge of them.

Mr. BOWEN-JONES seconded the motion, and suggested that at the same time opportunity should be taken of inquiring whether what he understood to be the new privilege of allowing unsold articles to travel from one show to another at half rates was intended to apply to live stock as well as to implements.

The motion, with the suggested rider, was then adopted *nem. con.*

Judges Selection.

Mr. FRANKISH reported that the invitations to judge at Chester had, with very few exceptions, been accepted, and the necessary instructions had been given for the completion of the list.

Implement.

Mr. FRANKISH (Chairman) reported the recommendation of the Committee, that a competitive trial of oil engines take place in connection with the Cambridge Meeting of 1894, and the Consulting Engineers had been instructed to bring up to the next meeting of the Committee suggestions as to the regulations for such trials. The Secretary had laid upon the table a list of implements to which prizes had been awarded at the Society's Country Meetings from the year 1839 (Oxford) to 1892 (Warwick) inclusive. The Committee were of opinion that the list would be found very useful by exhibitors and others as a book of reference, and recommended its publication by the Society at the price of 1*s.* per copy.

Showyard Works.

Sir JACOB WILSON (Chairman) reported that the showyard works at Chester had been commenced, and that the yard had been partly enclosed and the offices erected. The Committee had considered the tenders for the supply of refreshments at Chester, and recommended the following for acceptance:

Shed No. 1.—Miss Dodds (Birmingham School of Cookery).
„ No. 2.—Burbridge & Heath, Kidsgrove.
„ No. 3.—A. C. Doe, Liverpool.
„ No. 4.—Milbourn & Co., Liverpool.
„ No. 5.—E. Allcock, Shrewsbury.
„ No. 6.—Bodega Company.
„ No. 7.—Milbourn & Co., Liverpool.
„ No. 8.—Bourne & Co., Dudley.

Selection.

Earl CATHCART (Chairman) having read the recommendations of this Committee, it was unanimously resolved, on the motion of Earl CATHCART, seconded by Mr. CHARLES WHITEHEAD, that Mr. F. S. W. Cornwallis, M.P., of Linton Park, Maidstone, be elected a member of Council in the room of Mr. De Laune, deceased.

Education.

Lord MORETON (Chairman) reported that the Gresham University Commission would receive evidence from representatives of the Royal Agricultural Society on Friday next at noon. As Mr. Dent and Sir John Lawes, who were originally asked to give evidence, were unable to do so, the Chairman had undertaken at the request of the Committee to give evidence upon the subject of agricultural education.

Dairy.

The Hon. C. T. PARKER (Chairman) presented this report, dealing with various details as to the dairy at the forthcoming Chester Meeting.

Date of next Meeting.

The Council then adjourned over the Easter recess until Wednesday, April 12, at noon.

LIST OF JUDGES

APPOINTED TO ACT FOR THE

CHESTER MEETING, JUNE 17 TO 23, 1893.

IMPLEMENTS.

Self-Binding Harvesters.

WILLIAM ANDERSON, C.E., D.C.L., F.R.S., Lesney House, Erith.
MASON COOKE, The Lawns, near Ely.
JAMES EDWARDS, Belmont, Flax Bourton, Bristol.

Sheep-shearing Machines.

WILLIAM ANDERSON, C.E., D.C.L., F.R.S., Lesney House, Erith.
ALFRED J. SMITH, Rendlesham, Woodbridge.

Miscellaneous Implements.

MASON COOKE, The Lawns, near Ely.
JAMES EDWARDS, Belmont, Flax Bourton, Bristol.

HORSES.

Hunters.—*Classes* 1, 3, 5, 6, & 7.

GORDON CUNARD, Thorpe Lubenham, Market Harborough.
JAMES HOPE, Eastbarns, Dunbar, N.B.

Hunters.—*Classes* 2, 4, 8, 9, & 10.

R. A. BARKLEY, Palgrave Priory, Diss, Norfolk.
LORD WILLOUGHBY DE BROKE, Kineton House, Warwick.

Cleveland Bays, Coach Horses, and Harness Horses and Ponies.
Classes 11–14, & 26 & 27.

COL. BARLOW, Hasketon, Woodbridge, Suffolk.
ALFRED E. PEASE, Pinchinthorpe, Guisborough, Yorks.

Hackneys.—*Classes* 15–21.

JAMES GRIGGS, South Creake, Fakenham, Norfolk.
ALEXANDER MORTON, Gowan Bank, Darvel, N.B.

Ponies and Welsh Mountain Ponies.
Classes 22–25.

JOHN HILL, Felhampton Court, Church Stretton, Salop.
OWEN J. WILLIAMS, Cefn, St. Asaph, R.S.O.

Shire and Agricultural.
Classes 28–34; 47—49.

HENRY SMITH, The Grove, Cropwell Butler, near Nottingham.
C. W. TINDALL, Scawby, Brigg.

Clydesdales.—*Classes* 35–41.

J. M. MARTIN, Auchendennan, Balloch, N.B.
ANDREW RALSTON, Glamis, N.B.

Suffolks.—*Classes* 42–46.

WILLIAM BIDDELL, The Hall, Lavenham, Suffolk.
JAMES TOLLER, Blaxhall, Wickham Market.

CATTLE.

Shorthorn.—*Classes* 50–56.

C. R. LYNN, Church Farm, Stroxton, Grantham.
JOHN C. TOPPIN, Musgrave Hall, Skelton, Penrith.

Hereford.—*Classes* 57–63.

AARON ROGERS, The Rodd, Presteign, Radnorshire.
A. P. TURNER, The Leen, Pembridge, Herefordshire.

Devon and Sussex.—*Classes* 64–75.

T. A. ABBOTT, Old Paddockhurst, Worth, Crawley.
W. S. PERRY, Whiteraw, Lew Down, Devon.

Welsh.—*Classes* 76–82.

JOHN ROBERTS, Well House, Chester.
JOHN WILLIAMS, Gwernhefin, Bala, N. Wales.

Red Polled.—*Classes* 83–88.

THOMAS BROWN, Marham Hall, Downham Market, Norfolk.
FRED. SMITH, Warren Hill, Woodbridge, Suffolk.

Aberdeen Angus.—*Classes* 89–92.

ROBERT WALKER, Altyre, Forres, N.B.
GEORGE WILKEN, Waterside of Forbes, Alford, N.B.

Galloway and Ayrshire.
Classes 93–98.

WILLIAM GRAHAM, Hawksdale, Carlisle.
ANDREW MONTGOMERY, Nether Hall, Castle Douglas, N.B.

Jersey.—*Classes* 99–104.

W. ASHCROFT, Layhams Farm, Hayes, Kent.
S. H. HYDE, Kempton Park, Sunbury, Middlesex.

Guernsey.—*Classes* 105–109.

Hon. & Rev. A. BAILLIE-HAMILTON, Combs, Stowmarket.
CHRISTOPHER MIDDLETON, Marton, R.S.O., Yorkshire.

Kerry and Dexter Kerry.
Classes 110–115.

LUKE CHRISTY, Carrigeen, Croom, Limerick.

Dairy.

CHARLES MARSHALL, Broomhaugh, Riding-Mill-on-Tyne.
JOHN TREADWELL, Upper Winchendon, Aylesbury.

SHEEP.

Leicester.—*Classes* 122–125.

DAVID LINTON, Low Street Brewery, Bedale, Yorks.
H. H. STAVELEY, Southburn, Driffield, Yorks.

Cotswold.—*Classes* 126–129.

J. GAY ATTWATER, Britford, Salisbury.
J. J. GODWIN, Troy Somerton, Banbury.

Lincoln.—*Classes* 130–133.

HENRY GOODYEAR, The Austerby, Bourne, Lincs.
JOSEPH R. KIRKHAM, Biscathorpe, Lincoln.

Oxford Down.—*Classes* 134–137.

W. D. LITTLE, Middleton Stoney, Bicester, Oxon.
SAMUEL TREADWELL, Windmill Hill, Winchendon, Aylesbury.

Shropshire. (Rams.)
Classes 138—140.

JOSEPH BEACH, The Hattons, Wolverhampton.
MATTHEW WILLIAMS, Whiston Grange, Albrighton, Wolverhampton.

Shropshire. (Ram Lambs and Ewes.)
Classes 141–142.

THOMAS F. CHEATLE, Dosthill, Tamworth.
JOHN HARDING, Norton House, Shifnal, Salop.

Southdown.—*Classes* 143–146.

G. M. SEXTON, Stone Lodge, Ipswich.
R. R. VERRALL, Falmer, Lewes.

Hampshire Down.—*Classes* 147–150.

FRANCIS P. BROWN, Compton, Newbury, Berks.
J. M. FRIEND, Kimpton Farm, Andover, Hants.

Suffolk.—*Classes* 151–154.

JOHN A. HEMPSON, Erwarton Hall, Ipswich.
HENRY SPURLING, Princes Street, Ipswich.

Wensleydale.—*Classes* 155–157.

AARON EWAN, Gooda, Westhouse, Kirkby-Lonsdale.
JAMES PICKARD, Thoresby, Aysgarth Station, R.S.O.

Border Leicester.—*Classes* 158–160.

GEORGE BOLAM, Fawdon, Alnwick.
WILLIAM FORD, Fentonbarns, Drem, N.B.

Somerset and Dorset Horned.
Classes 161–163.

HENRY MAYO, 4 Temple Terrace, Dorchester.
GEORGE R. PITFIELD, Eype, Bridport.

Kentish or Romney Marsh.
Classes 164 & 165.

JOHN NOAKES, Furnace Farm, Lamberhurst.
THOMAS POWELL, East Lenham, Maidstone.

Cheviot.—*Classes* 166 & 167.

THOMAS ELLIOT, Blackhaugh, Galashiels, N.B.
WILLIAM HINDMARSH, Ilderton, Wooperton, R.S.O.

Black-faced Mountain.
Classes 168 & 169.

JOHN CLAY, Kerchesters, Kelso, N.B.
JAMES GREENSHIELDS, West Town, Lesmahagow, N.B.

Lonk and Herdwick.
Classes 170–173.

ROBERT HAWELL, Lonscale, Keswick.
JOHN IRVING, Shap Abbey, Shap.

Welsh Mountain.—*Classes* 174–177.

DAVID PRICE, Bulwark House, Brecon.
THOMAS ROBERTS, Tan-y-fynwent, Aber, near Bangor.

PIGS.

White.—*Classes* 178–189.

JOHN ANGUS, Whitefield, Morpeth.
JOHN BARRON, Borrowash, Derby.

Berkshire and Black.

Classes 190–197.

JOHN A. SIM, Wootton Wawen, Henley-in-Arden.
PETER STEVENSON, Dingley Grange, Market Harborough.

Tamworth.—*Classes* 198–201.

LORD MORETON, Sarsden House, Chipping Norton.
JAMES R. RANDELL, Chadbury, Evesham.

POULTRY.

Classes 202–295.

D. BRAGG, Southwaite Hall, Carlisle.
EDWARD BROWN, 16, Woodberry Grove, N.
JAMES DIXON, North Park, Lidget Green, Bradford.
J. W. LUDLOW, Vauxhall Road, Birmingham.

PRODUCE.

Cheshire Cheese.—*Classes* 296–303.

WILLIAM OUBRIDGE, Town Hall Buildings, Newcastle-on-Tyne.
RICHARD PEDLEY, Winter House, Winterley, Crewe.
P. W. STONE, 105 Victoria Street, Westminster, S.W.
(And one other judge to be appointed.)

Other Cheese.—*Classes* 304–314.

GEORGE GIBBONS, Tunley Farm, Bath.
JAMES WATSON, Berwick, Shrewsbury.

Butter.—*Classes* 315–317.

HENRY A. HOWMAN, Kingsbury, Tamworth.
J. A. STEPHENSON, Greenside, Milton, Carlisle.

Cider and Perry.—*Classes* 318–321.

R. NEVILLE GRENVILLE, Butleigh Court, Glastonbury.

Jams and Preserved Fruits and Vegetables.—*Classes* 322–327.

FREDERIC LAURENCE, 8, Somerfield Terrace, Maidstone.

Hives and Honey.—*Classes* 328–345.

REV. J. F. BUCKLE, Bidston Rectory, Birkenhead.
W. B. CARR, Meopham, Kent.
WALTER MARTIN, Wainfleet, Lines.

COMPETITIONS.

Butter-making.

HENRY A. HOWMAN, Kingsbury, Tamworth.
J. A. STEPHENSON, Greenside, Milton, Carlisle.

Horse-shoeing.

JOHN D. BARFORD, F.R.C.V.S., Above Bar, Southampton.
CLEMENT STEPHENSON, F.R.C.V.S., Sandyford Villa, Newcastle-on-Tyne.

PRINCIPAL ADDITIONS TO THE LIBRARY DURING THE YEAR 1892.

[*The name of the Donor, or the mode of acquisition, appears in Italics after the title of each work.*]

ACLAND, Sir Thos. D., An Introduction to the Chemistry of Farming, specially prepared for Practical Farmers. 2nd edition. 8vo. London, 1892. *Publishers*

BARRAL, J. A., Dictionnaire d'Agriculture. Fasc. 26. 8vo. Paris, 1892. *Purchased*

Blacker, W., An Essay on the Improvement to be made in the Cultivation of Small Farms. 8vo. Dublin, 1834 ..... *Walter Gilbey*

—— The Management of Landed Property in Ireland. 8vo. Dublin, 1834 *Walter Gilbey*

CLARKE, A. Dudley, Modern Farm Buildings. 8vo. Winchester ..... *Author*

Complete Farmer; or, a Dictionary of Husbandry, &c. 2nd edition. 4to. London, 1769 ..... *Walter Gilbey*

DANGEARD, P. A., Les Maladies du Pommier et du Poirier. 8vo. Paris, 1892..... *Purchased*

Daubeny, Dr. Chas., Three Lectures on Agriculture; delivered at Oxford, on July 22, November 25, 1840; and January 26, 1841. 8vo. Oxford, 1841 ..... *Walter Gilbey*

Davis, H., Farming Essays. 8vo. London, 1848 ..... *Walter Gilbey*

—— Practical Essay for the Improvement of Farming. 8vo. London, 1860. *Walter Gilbey*

Dehérain, P. P., Annales Agronomiques. Tome XVIII. 8vo. Paris, 1892. *Govt. of France*

—— Traité de Chimie Agricole. 8vo. Paris, 1892..... *Author*

Dixon's Law of the Farm. 5th edition. By Aubrey John Spencer. 8vo. London, 1892..... *Purchased*

Flock-Books:—

Dorset Horn Sheep Flock-Book. Vol. I. 8vo. Dorchester, 1892 ... *Society*

Hampshire Down Flock-Book. Vols. I–III. 8vo. Salisbury, 1890–92 *Society*

Oxford Down Flock-Book. Vol. IV. 8vo. London, 1892 ..... *Society*

Suffolk Sheep Flock-Book. Vol. VI. 8vo. Bury St. Edmunds, 1892. *Society*

Wensleydale Longwools. Pure Select. Vol. III. 8vo. Hawes, 1892. *Society*

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FOURNIER, V., Les Travaux des Champs. 2ème édition. 8vo. Paris, 1892. *Publishers*

Fresenius, Dr. C., Zeitschrift für analytische Chemie. Jahrgang 31. 8vo. Wiesbaden, 1892 ..... *Purchased*

GARNIER, Russell M., History of the English Landed Interest. 8vo. London, 1892..... *Publisher*

Goubaux, A., and Prof. G. Barrier, The Exterior of the Horse. 2nd edition. Translated and edited by Dr. Simon J. J. Harger. 8vo. Philadelphia and London, 1892.....*Publishers*
Grandeau, L., Annales de la Science Agronomique Française et Etrangère. Tome I. Fasc. 2. 8vo. Paris, 1892.....*Author*

Herd-Books :—

British Berkshire Herd-Book. Vol. VIII. 8vo. Salisbury, 1892 ...*Society*
Coates's Herd-Book. New Series. Vol. XXXVIII. 8vo. London, 1892. *Society*
Davy's Devon Herd-Book. Vol. XV. 8vo. Exeter, 1892.....*Society*
English Guernsey Cattle Society's Herd-Book. Vols. I.–VIII. 8vo. London, 1885–91.....*Society*
English Herd-Book of Jersey Cattle. Vol. VI. 8vo. London .....*Society*
Galloway Herd-Book. Vol. XII. 8vo. Dumfries, 1892.....*Society*
Herd-Book of Hereford Cattle. Vol. XXIII. 8vo. Hereford, 1892...*Society*
North Wales Black Cattle Herd-Book. Vol. IV. 8vo. Bangor, 1892...*Society*
Polled Herd-Book, Aberdeen-Angus Cattle. Vol. XVI. 8vo. Banff, N.B., 1892 .....*Society*
South Devon Herd-Book. Vol. II. 8vo. Exeter, 1892.....*Society*
Sussex Herd-Book. Vol. VII. 8vo. London, 1892 .....*Society*
Huidekoper, Dr. R. S., Age of the Domestic Animals, being a complete Treatise on the Dentition of the Horse, Ox, Sheep, Hog, and Dog, and on the various other Means of determining the Age of these Animals. 8vo. Philadelphia and London, 1891.....*Publishers*

Johnson, C. W., On Increasing the Demand for Agricultural Labour. 8vo. London, 1841.....*Walter Gilbey*
—— On Increasing the Depth of Soils. 8vo. London, 1840.....*Walter Gilbey*

Kalm's Visit to England, 1748. Translated by Joseph Lucas. 8vo. London, 1892.....*Purchased*

Lance, E. J., The Food of Plants, and Drill Husbandry of Turnips. 8vo. London, 1842.....*Walter Gilbey*
Lawes, Sir John B., Memoranda of Origin, Plan, and Results of Field and other Experiments at Rothamsted, Herts. 4to. London, 1892...*Author*
Lawrence, John, The History and Delineation of the Horse, in all his Varieties. 4to. London, 1809.....*Purchased*

Marchet, Dr. G., Das Recht des Landwirthes. 2 vols. 8vo. Wien, 1890. *Author*
Mentzel's Schafzucht. 3rd and rev. ed. 4to. Berlin, 1892.....*Publisher*
Miller, P., The Gardener's Dictionary, &c. 3rd edition, fol. London, 1787. *Walter Gilbey*
Monostori, C., Die Schweine Ungarns und ihre Züchtung, Mästung und Verwertung. 8vo. Berlin, 1891 .....*Publisher*
Munro, J. M. H., Soils and Manures. 8vo. London, 1892.....*Publishers*

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Neumann, Prof. L. G., A Treatise on the Parasites and Parasitic Diseases of the Domesticated Animals. Translated and Edited by Dr. Geo. Fleming. 8vo. London, 1892.....*Dr. Fleming*

Ormerod, Miss E. A., A Text-Book of Agricultural Entomology. 2nd ed. 8vo. London, 1892.....*Author*
—— Fifteenth Report of Observations of Injurious Insects, with Methods of Prevention and Remedy. 8vo. London, 1892.....*Author*

Parliamentary Papers :—

Adulteration of Artificial Manures and Fertilisers, and Feeding Stuffs used in Agriculture, with Minutes of Evidence and Appendices, Report on the. Fol. London, 1892.....*Board of Agric.*

Agricultural Produce Statistics of Great Britain for 1891. 8vo. London, 1892 .....*Board of Agric.*

Agricultural Returns of Great Britain, &c., for 1892. 8vo. London, 1892. *Board of Agric.*

Agricultural Statistics of Ireland for 1891. Fol. Dublin, 1892. *Registrar-General for Ireland*

Army Veterinary Department, Annual Statistical and General Report of the, for 1892. Fol. London, 1892.....*Dept.*

Board of Trade Journal. Vols. XII., XIII. 8vo. London, 1892. *Board of Trade*

Statistical Abstract for the several Colonial and other Possessions of the United Kingdom in each Year from 1877 to 1891. 8vo. London, 1892 .....*Board of Trade*

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POWIS, Third Earl of, Speeches, Articles, &c. 8vo. London, 1892.....*Exors.*

RICHARDS, Westley, Agricultural Distress. 8vo. London, 1893.....*Author*

Riley, C. V., Insect Life. Vol. IV. 8vo. Washington, 1892...*U.S. Sec. Agric.*

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Rohde's Schweinczucht. 4th and rev. ed. 4to. Berlin .....*Publisher*

SEMLER, H., Die tropische Agrikultur. Band IV. 1ste Hälfte. 8vo. Wismar, 1892.....*Purchased*

Sinclair, Sir John, The Code of Agriculture. 2nd ed. 8vo. London, 1819. *Purchased*

Smith, Veterinary-Captain, A Manual of Veterinary Physiology. 8vo. London, 1892.....*Publishers*

Stebler, Dr. F. G. and Dr. C. Schröter, The Best Forage Plants fully described and figured. Translated by A. N. McAlpine. 4to. London, 1889. *Purchased*

Stud-Books :—

Cleveland Bay Stud-Book. Vol. VIII. 8vo. York, 1892 .....*Society*

Clydesdale Stud-Book. Vol. XIV. 8vo. Glasgow, 1892 .....*Society*

Clydesdale Stud-Book. (Select Clydesdale Horse Society of Scotland) Vols. I.–III. 8vo. Glasgow, 1884–88 ..... *Society*

Hackney Stud-Book. Stallions and Mares. Vol. IX. 8vo. Norwich, 1892. *Society*

Hunters' Improvement Society. Vol. IV. Record of Prize Mares, &c. 8vo. London, 1892 .....*Society*

Shetland Pony Stud-Book. Vol. I. 8vo. Aberdeen, 1891.....*Society*

Shire-Horse Stud-Book. Vol. XIII. 8vo. London, 1892.....*Society*

Suffolk Stud-Book. Vol. VII. 8vo. Diss, 1892.....*Society*

Yorkshire Coach-horse Stud-Book of Great Britain and Ireland. Vol. IV. 8vo. York, 1892 .....*Society*

TUKE, John, General View of the Agriculture of the North Riding of Yorkshire. 8vo. London, 1800 ..... *Walter Gilbey*

VETERINARIAN. Vol. LXV. 8vo. London, 1892 ..... *Editor*
Veterinary Journal. Vols. XXXIV., XXXV. 8vo. London, 1892 ..... *Editor*
Veterinary Record for 1892. 4to. London, 1892 ..... *Editor*

WARINGTON, R., F.R.S., Six Lectures on the Investigations at Rothamsted Experimental Station delivered under the provisions of the Lawes Agricultural Trust, before the Association of American Agricultural Colleges and Experiment Stations at Washington, 1891. 8vo. Washington, 1892 ..... *Author*
Werner, Dr. H., Die Rinderzucht, Körperbau, Schläge, Züchtung, Haltung und Nutzung des Rindes. 8vo. Berlin, 1892 ..... *Publisher*
Wrightson, J., Live Stock. 4to. London, 1892 ..... *Publisher*

YOUNG, Arthur, Tour in Ireland (1776–1779). Edited with Introduction and Notes by A. W. Hutton. 2 vols. 8vo. London, 1892..... *Purchased*

ZUNE, A. J., Traité Général d' Analyse des Beurres. 2 vols. 8vo. Paris, 1892. *Purchased*

Transactions of Societies, &c.

Bath and West of England Society Journal. 4th Series. Vol. II. 8vo. London, 1892 ..... *Society*
Board of Trade Journal. Vols. XII., XIII. 8vo. London, 1892 *Board of Tr.*
British Dairy Farmers' Association Journal. Vol. VII. 8vo. London, 1892. *Association*
Deutsche Landwirtschafts-Gesellschaft. Jahrbuch. Band VII. 8vo. Berlin, 1892 ..... *Society*
Geological Society. Quarterly Journal. Vol. XLVIII. 8vo. London, 1892. *Society*
Highland and Agricultural Society of Scotland. 5th Series. Vol. IV. 8vo. Edinburgh, 1892 ..... *Society*
Imperial Institute Year Book. I. 8vo. London, 1892 ..... *Institute*
Institution of Civil Engineers. Minutes of Proceedings. Vols. CIX., CX. 8vo. London, 1892 ..... *Institution*
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K. K. Landwirtschafts-Gesellschaft. Jahrbuch, 1891. 8vo. Wien, 1892. *Society*
Landwirtschaftliche Jahrbücher. Band XXI. 8vo. Berlin. 1892..... *Govt.*
Linnean Society, Journal of Botany. Vol. XXIX. 8vo. London, 1892–93. *Society*
Ministère de l'Agriculture. Bulletin for 1892 ..... *Govt. of France*
Ministère de l'Agriculture. Bulletin for 1892. Royal 8vo. Bruxelles, 1892 *Govt. of Belgium*
Royal Society. Proceedings. Vol. L. 8vo. London, 1892..... *Society*
Royal Botanic Society, Quarterly Record of, for 1891–92. 8vo. London, 1891–92 ..... *Society*
Royal Gardens, Kew. Bulletin of Miscellaneous Information for 1892. 8vo. London, 1892..... *Director*
Royal Geographical Society. Proceedings. Vol. XIV. 8vo. London, 1892. *Society*
Royal Horticultural Society. Journal. Vol. XIV. 8vo. London, 1892. *Society*

Royal Institution of Great Britain. Proceedings. Vol. XIV. 8vo. London, 1892 .....*Institution*
Royal Meteorological Society. Quarterly Journal. Vol. XVIII. 8vo. London, 1892 .....*Society*
Royal Meteorological Record. Vol. XI. Nos. 41, 42. 8vo. London, 1891. *Society*
Royal Statistical Society. Journal. Vol. LV. 8vo. London, 1892. *Society*
Royal United Service Institution. Journal. Vol. XXXVI. 8vo. London, 1892.....*Institution*
Société des Agriculteurs de France. Bulletin. Tome XXV. 8vo. Paris, 1892. *Society*
Société Centrale d'Agriculture de Belgique. Journal. Tome XXXIX. 8vo. Bruxelles, 1892 .....*Society*
Société Nationale d'Agriculture de France. Mémoires. Tome CXXXIV. Bulletin. Tome LII. 8vo. Paris, 1892 .....*Society*
Society of Arts. Journal. Vol. XLIX. 8vo. London, 1892 .....*Society*
Surveyors' Institution. Transactions. Vol. XXV. 8vo. London, 1892. *Institution*

United States Department of Agriculture.

Bureau of Animal Industry. Annual Reports. Vols. I.–VII. 8vo. Washington, 1885–91 .....*Secretary of Agriculture*
—— Diseases of Cattle and on Cattle Feeding, Special Report on. 8vo. Washington, 1892.....*Secretary of Agriculture*
—— Sheep Industry of the United States, Special Report on the History and Present Condition of the. 8vo. Washington, 1892 *Secretary of Agriculture*
Commissioner of Agriculture, Reports of the, for 1864, 1867, 1873, 1886, 1889, 1891. 8vo. Washington, 1865–92 .....*Secretary of Agriculture*

The Society is indebted to numerous Government Departments, both at home and abroad, to Boards of Agriculture, Agricultural Societies, and kindred institutions, for copies of their Annual Reports, Journals, Proceedings, Transactions, Bulletins, and other documents received regularly for the Library, in exchange for copies of the Journal, as well as to the Editors of many agricultural and general papers for the current numbers of their publications, which have been placed in the Reading Room for reference.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

Proceedings of the Council.

WEDNESDAY, APRIL 12, 1893.

THE DUKE OF WESTMINSTER, K.G. (PRESIDENT), IN THE CHAIR.

Present:—

Trustees.—Earl Cathcart, Col. Sir Nigel Kingscote, K.C.B., Sir A. K. Macdonald, Bart., Right Hon. Sir M. W. Ridley, Bart., M.P.

Vice-Presidents.—H. R. H. Prince Christian, K.G., Mr. Chandos-Pole-Gell, Earl of Feversham, Mr. Walter Gilbey, Right Hon. Sir Massey Lopes, Bart., Sir J. H. Thorold, Bart, Mr. Charles Whitehead.

Other Members of Council.—Mr. G. M. Allender, Mr. J. A. Caird, Mr. Charles Clay, Mr. F. S. W. Cornwallis, M.P., Earl of Coventry, Mr. Percy E. Crutchley, Lieut.-Col. J. F. Curtis-Hayward, Mr. Alfred Darby, Mr. J. Marshall Dugdale, Mr. W. Frankish, Mr. Hugh Gorringe, Mr. James Hornsby, Mr. Charles Howard, Mr. Joseph Martin, Mr. P. A. Muntz, M.P., Hon. Cecil T. Parker, Mr. Dan. Pidgeon, Mr. J. E. Ransome, Mr. J. Rawlence, Mr. S. Rowlandson, Mr. G. H. Sanday, Mr. W. T. Scarth, Mr. A. J. Smith, Mr. Henry Smith, Mr. R. Stratton, Mr. Garrett Taylor, Mr. J. P. Terry, Mr. R. A. Warren, Mr. E. V. V. Wheeler, Mr. C. W. Wilson, Sir Jacob Wilson.

Officers.—Mr. Ernest Clarke, Secretary; Dr. Fream, Editor of the Journal; Dr. J. Augustus Voelcker, Consulting Chemist; Professor J. B. Simonds, Consulting Veterinary Surgeon; Mr. Wilson Bennison, Surveyor.

Professor Brown, C.B.

The following members of the Chester Local Committee were also present:—Mr. John Seovell and Mr. George A. Dickson (Honorary Secretary of the Local Committee).

Apologies for non-attendance were received from the Earl of Ravensworth, Viscount Emlyn, Lord Moreton, Sir Joseph Spearman, Bart., Mr. J. H. Arkwright, Mr. Alfred Ashworth, Mr. Joseph Beach, Mr. Anthony Hamond, Mr. C. S. Mainwaring, Mr. R. Neville Grenville, Mr. E. W. Stanyforth, and Mr. Martin J. Sutton.

Death of the Duke of Bedford.

The minutes of the last monthly meeting of the Council, held on March 1, having been approved,

The PRESIDENT referred in feeling terms to the death of the Duke of Bedford, a member of Council, and said he was sure that every member of their body would feel deeply the loss of so munificent a patron of the Society. He felt confident that it would be the wish of the Council that they should pass a resolution of sincere condolence with the family of the late Duke, and he therefore desired to move, in the name of the whole Council, the resolution which he understood had been passed by the Chemical Committee on the previous day, and which was in the following terms:—

The Council feel that they cannot meet without placing on record their deep sense of the loss which the Society has sustained by the death of the Duke of Bedford, who has generously borne, since his accession to the title, the whole of the expenses of the Woburn Farm founded by his late father.

Sir NIGEL KINGSCOTE seconded the motion, which was carried unanimously, and his Grace undertook to communicate it by a personal letter to the present Duke.

New Member of Council.

Earl CATHCART, Chairman of the Committee of Selection, introduced Mr. F. S. W. Cornwallis, M.P., who was elected a member of the Council at the last meeting in the room of the late Mr. De Laune, and who now attended for the first time.

Election of New Members.

The election of the following seventy-five members was then proceeded with :—

ALLEN, John..The Laurels, Lancaster.
ANDREWS, H. W...Carnesure, co. Down.
BAGSHAW, H...Westleigh, Oldham.
BALMER, T...4, Lane Ends, Tarporley.
BARKER, F...Rudgwick, Sussex.
BARKER, R. L...St. Werburgh's Chambers, Chester.
BARKWORTH, E...Piddletrenthide, Dorchester.
BISHOP, H. J...Little Tarrington, Ledbury.
BRAMALL, G. H...National Provincial Bank, Chester.
BUDDICOM, H. W...Penbedw, Mold, Flints.
BURNETT, J. G...Hartington, Ashbourne.
BURRELL, W...Fornham St. Martin, Suffolk.
CALVERT, H. H...Foscombe, Arkleworth, Glos.
CHILD, C...Dalgan Park, Tuam.
CLARKE, T...223, Upper Thames St., E.C.
COMBE, G...Glan Aber, Hough Green, Chester.
COTTON, G...Mayfield, Willaston, Crewe.
COTTRELL, H. E...Southcote Farm, Reading.
CROOK, T. M...Stanley Gr., Hoghton, Preston.
D'EYNCOURT, L. T...Boyons Manor, Mkt. Rasen.
DE LA PERRELLE, G. H...Southampton.
DE LAUNE, A. F...Sharsted Ct., Sittingbourne.
DIGGLE, Thomas..Ewerby, Sleaford.
DOWSE, G. A...255, Pentonville Road, N.
ELLIS, R. G...Gregson, Plasnewydd, Ruthin.
ELLIS, W. S...Gregson, Plasnewydd, Ruthin.
FAULKNER, C. P...Pattingham, Wolverhampton.
FEILDEN, A. B...Reymerston Hall, Attleborough.
FITTON, J...Ightfield Hall, Whitchurch, Salop.
FITZROY, Hon. E. A...West Haddon, Northants.
FOWLER, E. P...Southampton.
GARDNER, E... 80, Watergate Flags, Chester.
GLASIER, W. F...Winterton, Lincs.
GORDON, J. S...Stragollen House, co. Tyrone.
GOULDING, W. J...North Wall, Dublin.
GREEN, John J...Claremont, Halifax.
GREGSON, B. P...The Hall, Caton, Lancaster.
GRESSWELL, J. B...Karnak House, Louth.
HANDLEY, J...Brigflatts, Sedbergh, Yorks.
HATHERELL, C. E. G...Alverne Lodge, Leamington.
HARRIS, J...Shipley, Pattingham, Wolverhampton.
HUGHES, J. A...Bryn-y-groes, Gresford, Wrexham.
JILLINGS, Wm...Fornham All Saints, Suffolk.
JONES, Thomas L...Builth, Brecon.
KAY, G. B...Bankfield, Bury.
KIRKHAM, J. R...Biseathorpe House, Lincoln.
LAMBERT, Major M. H...Widdrington, Acklington.
LANCASTER, John A...Handsworth Wood, Birmingham.
LENEY, E...Ashridge Farm, Wokingham.
MARSHALL, J...Maybole, Ayrshire.
MONK, H. E...Albrighton, Wolverhampton.
MORGAN, H. L...Maes-y-rhiw, Newport, Mon.
MURPHY, G. F...The Grange, Dunsany, co. Meath.
MYLCHREEST, J...Kirk Michael, I. of M.
NEWTON, Wm...Westbeech, Pattingham, Wolverhampton.
PEARSON, Major P. A. M...Naval & Military Club, W.
PERCIVAL, Aubrey P...Sudbury, Derby.
POTTS, A...Glanafon, Mold.
PRICE, D...Bulwark House, Brecon.
PRINCE, T...Princes Farm, Tattenhall.
SADLER, J...Acton, Nantwich.
SHEPHEARD, T...Kingsley Lodge, Chester.
SIMPSON, B. R...County Hall, Northampton.
STEPHEN, J...Union Oil Mill, Hull.
STURGEON, T. J...South Ockendon Hall, Romford.
THISTLEWOOD, G. W...Crowle, Doncaster.
THOMAS, H. E...Sunnybank, Brecon.
THOMAS, R...Hanmer, Whitchurch, Salop.
TRELAWNY, H...Shotwick Park, Chester.
WALSHAW, C...Wadsley Bridge, Sheffield.
WILLIAMS, J...George Ho., Hay, Brecon.
WILLIAMS, J. R...Park Hall Home Farm, Oswestry.
WITHERS, Col. J...Briery Close, Windermere.
WRIGHTSON, W. H...Battie, Cusworth, Doncaster.
WYTHES, E. J...Copped Hall, Epping.

The reports of the various Standing Committees were then presented and adopted as follows :—

Finance.

Sir NIGEL KINGSCOTE (Chairman) reported that the accounts for the period ended March 30, as certified by the Society's accountants, showed total receipts amounting to 2,975*l.* 11*s.* 1*d.*, and expenditure to 2,031*l.* 6*s.* The actual balance at the bankers' on March 30, 1893, allowing for cheques outstanding, was 9,215*l.* 15*s.* Accounts amounting in all to 4,094*l.* 17*s.* 1*d.* had been passed, and were recommended for payment. The quarterly statement of subscriptions, arrears, and property to March 30, 1893, was laid upon the table. The Committee had considered the cases of the members in arrear with their subscriptions, and had given

instructions for further applications to be made for payment.

House.

Sir NIGEL KINGSCOTE (Chairman) reported that the draft of the Trust Deed for the proposed issue of Harewood House Debenture Stock had now been settled by Sir Horace Davey, Q.C., and Mr. F. B. Palmer; and the Committee recommended that the Duke of Westminster, Mr. Walter Gilbey, and Sir Nigel Kingscote be appointed as Trustees under the Deed. It is proposed, under the Deed, that the Society shall, while it retains possession of the new premises, place and keep them under a competent manager, who shall be under the immediate control of a committee of three members of the Council; and the Committee recommended that the Duke of Westminster, Mr. Walter Gilbey, and Sir Nigel Kingscote be nominated as the Committee for this purpose. The Committee had settled the terms of the proposed prospectus for the issue of the Debenture Stock, and recommended that it be now circulated forthwith.

Sir JACOB WILSON said that those who had watched the progress of this matter—and he had no doubt all present had done so—must be aware that two Members of Council, above all others, had shown by their action the deep interest which they had taken with reference to the acquisition of Harewood House; and, whatever the outcome of it all might be, he was sure that they would agree that the Society had been placed under a deep obligation to those gentlemen. Yesterday, when this matter came before the House Committee, and it was necessary to recommend to the Council the names of three Trustees, it occurred to him (Sir Jacob Wilson) that two of the gentlemen certainly who had identified themselves with this project stood out most prominently as eminently suitable for the office of Trustee, and as inspiring confidence in the public mind. He thought without doubt that they could not do better than extend their obligations to them still further; and he had, therefore, the greatest gratification in proposing that the Duke of Westminster and Mr. Walter Gilbey should be two of these Trustees. (Hear, Hear.) With regard to the third Trustee, the name which naturally occurred to him was that of their tried and trusted friend Sir Nigel Kingscote, who, as Chairman of the Finance and House Committees, seemed, as he thought, to stand out most prominently as a fit and proper person for the office. He had, therefore, much pleasure in moving:—

> That the Duke of Westminster, Mr. Walter Gilbey, and Sir Nigel Kingscote be appointed Trustees under the Trust Deed proposed to be executed with regard to the issue of Harewood House Debenture Stock.

Sir MASSEY LOPES said he had much pleasure in seconding the motion, not only because the names would carry weight with the public outside, but because they would receive the hearty co-operation of every member of that Council.

The resolution having been carried unanimously,

The DUKE OF WESTMINSTER said he cordially acknowledged the resolution so far as he was concerned, and he was much obliged to them for having nominated him as Trustee.

Sir NIGEL KINGSCOTE said that he owed his sincere thanks for the kind expressions of Sir Jacob Wilson, and his best services would be at the disposal of the Society.

Mr. WALTER GILBEY also expressed his appreciation of the compliment paid to him by his election as a Trustee. He would venture to urge upon the Members of Council present the desirability of their showing their confidence in the scheme by taking up some of the Stock, with the view of encouraging others to subscribe. They had had valuable promises of support already, but those of them who were endeavouring to interest their friends outside to subscribe for the Stock, would be fortified in doing so if they had a good preliminary list of subscribers amongst the Council itself to start with.

Subscriptions for the Stock were promised by several gentlemen present. The Stock, which is for a total amount of 65,000*l.*, will bear interest at 3 per cent. per annum, payable half-yearly on January 1st and July 1st.

Journal.

Earl CATHCART (Chairman) laid upon the table copies of the new number of the Journal, which had now been issued to all the members. A resolution asking the Society to publish all available information as to the success of Agricultural Co-operative Societies in England and the Colonies had been received from the Shropshire Chamber of Agriculture. The Secretary had been instructed to thank the Shropshire Chamber for their suggestion, and to say that it should receive careful consideration. The proposed arrangements for the next number of the Journal had been considered, together with a variety of suggestions for articles and notes, and directions respecting them had been given to the Editor.

Lord CATHCART also expressed the thanks of the Journal Committee to Mr. Pell, Mr. Ashworth, Mr. Pidgeon, Mr. Caird, and Mr. Parker for their contributions to the recent issue of the Journal. He said nothing was so satisfactory as having papers in the Journal written by members of the Council, and the Committee were exceedingly obliged to those gentlemen for their able contributions.

Chemical.

Mr. WARREN read the following resolution of the Committee, with reference to the death of the Duke of Bedford:—"The Committee feel that they cannot meet without placing on record their deep regret at the loss which the Society has sustained by the death of the Duke of Bedford, who has generously borne, since his accession to the title, the whole of the expenses of the Woburn Farm founded by his late father." He also reported that the Committee had settled a revised statement of Chemical Privileges, with new instructions for sampling, &c., which was approved and ordered to be issued.

Seeds and Plant Diseases.

Mr. WHITEHEAD (Chairman) reported the receipt of the following letter from the Board of Agriculture as to the use of refuse tobacco for the manufacture of sheep washes, insecticides, &c.:—

[COPY.] Board of Agriculture,
4, Whitehall Place, London, S.W.
(20,660.) March 22nd, 1893.

SIR,—I am directed by the Board of Agriculture to acquaint you, for the information of the Royal Agricultural Society, that in consequence of the representations made from time to time in this Department respecting the withdrawal of the Treasury sanction to the experimental cultivation in this country of tobacco, which was permitted from 1886 to 1890, the Board have been in correspondence on this subject with the Treasury and the Customs and Inland Revenue Departments. The information placed before the Board would seem to indicate that so little success attended the experiments in question that their further extension with a view to the production of tobacco for smoking purposes would appear to be hardly justifiable under the circumstances.

It has, however, been urged by certain agriculturists that it might be possible to arrive at some arrangement whereby, without danger to the Revenue, certain experiments in growth of tobacco for use only in the preparation of sheep-washes and insecticides might be permitted under such conditions as might be prescribed.

The Board has been accordingly in communication with the Departments concerned in this matter, and they have intimated that much difficulty and inconvenience would accompany any such permissions. They have, moreover, pointed out that large quantities of so-called refuse snuff, deposited at the Queen's warehouses for drawback and abandoned, are at present available for the manufacture of washes and insecticides. This snuff, the Board understand, is occasionally disposed of by the Crown to certain manufacturers of the dressings referred to, a price being obtained for an inappreciable portion of the supply only, although its disposal in the manner indicated has, in these cases, saved the Crown the cost of its destruction. The quantity of abandoned snuff returned as having been delivered to manufacturers of sheep dip, fumigants, and blight powder in 1892 was 1,109,357 lb.

The Board have also ascertained that there is a certain quantity of tobacco, amounting in 1892 to 110,000 lb., which is destroyed by the proprietors thereof in the bonded warehouses after garbling, butting, or cutting off as damaged, much of which might possibly be economically used for making the preparations in question, as it might probably be obtained at a very small price from the owners of the damaged commodity.

As regards the abandoned snuff, the Board understand that the Customs authorities will be prepared to receive any offers for the purchase of such snuff, and that it has not been deemed necessary to advertise it for

sale, as its existence is sufficiently well known to interested parties.

It must be added, however, that the regulations of the Customs Warehousing Code would not, the Board learn, admit of farmers and fruit-growers converting refuse snuff and tobacco into sheep-wash and insecticides except in approved premises, under the supervision of Revenue officers, and that in the interests of the Revenue it is considered that these regulations could not be safely departed from.

In view of these facts the Board are disposed to think that the existing facilities for obtaining cheap refuse snuff and tobacco for the manufacture of washes and dressings could not well be extended; but they would therefore be glad of any observations which the Council of your Society desire to offer on the question, and especially as to whether any useful purpose would still be served by the further experimental cultivation of tobacco in this country,—I am, Sir, your obedient servant.

(Signed) T. H. ELLIOTT,
Secretary.

Ernest Clarke, Esq.
Secretary, Royal Agricultural Society.

The Committee recommended that the Secretary, in thanking the Board for their communication, be directed to point out the desirability of facilities being afforded by the Government officials for the sale to agriculturists, for the purposes of sheep-washes and insecticides, of refuse tobacco and snuff, which had previously been rendered by the Government officials unfit for use, instead of its sale being limited, as at present, to certain privileged traders.

Finger-and-Toe in Turnips.

Earl CATHCART said that on December 7th last year he mentioned the subject of finger-and-toe in turnips and roots, and the matter was referred to the Seeds and Plant Diseases Committee. Mr. Whitehead, in a few words upon that occasion, said that the matter should be looked into. Mr. Carruthers was to be consulted, and the Seeds and Plants Committee would take the matter into consideration. He now wished to remind the Seeds and Plants Committee of the matter, and to ask what had been done. He was quite certain that the exhaustion of the soil had a great deal to do with the disease, and in any inquiry which might be undertaken analyses of the soil would be required.

Mr. WHITEHEAD, in reply, said the matter was referred to the Seeds and Plant Diseases Committee at the monthly Council on December 7, 1892, and it was considered by that Committee at their next meeting in February, 1893, when they reported to the Council as follows:—

> In reference to Earl Cathcart's remarks at the last meeting of the Council, the Committee recommend that an investigation be made during the coming season into the attacks of finger-and-toe in turnips, and that a paper on this subject be prepared for the Journal under the direction of the Consulting Botanist.

He would take care that the Consulting Botanist was again communicated with upon the subject.

Veterinary.

Sir JOHN THOROLD (Chairman), presented the recommendation of the Committee that Mr. F. W. Garnett, M.R.C.V.S., of Windermere, be appointed the Society's Provincial Veterinary Surgeon for Westmoreland. It had been arranged that Professor McFadyean would shortly proceed to Northumberland in order to investigate the outbreak of louping-ill amongst sheep in that county.

The following report had been presented from Professor Brown:—

> PLEURO-PNEUMONIA.—During the first three months of this year no fresh outbreak of pleuro-pneumonia was reported in Great Britain, nor was any case of the disease discovered, and no cattle were slaughtered in consequence of having been exposed to infection. There were nineteen suspected cattle slaughtered and found on post-mortem examination free from the disease. In the corresponding period of 1892, sixty-one diseased, 652 contact, and fifty-six suspected cattle were slaughtered. In 1891 there were in the first quarter 168 diseased, 2,075 contact, and fifty-eight suspected cattle slaughtered. Since the returns for the week ended April 1st were made up, an outbreak has been reported in Forfarshire, in which one diseased animal and forty-six healthy in contact have been slaughtered.
>
> SWINE FEVER.—During the first quarter of the present year there have been 561 fresh outbreaks of this disease reported, and 2,735 pigs attacked. In the corresponding periods of the three preceding years, the returns in 1892 were 412 outbreaks and 2,625 attacked; 1891, 884 outbreaks, 5,365 attacked; 1890, 690 outbreaks, 3,891 attacked.
>
> ANTHRAX.—This disease has been much more prevalent in the present year than in any of the three preceding ones. The outbreaks this year have been 119, as compared with sixty-five in the corresponding period of 1892, fifty-three in 1891, and forty-three in 1890. The animals attacked have this year been 284, as compared with 118 in 1892, 106 in 1891, and sixty-nine in 1890.
>
> GLANDERS, including FARCY.—There have

been reported to the Board of Agriculture this year 378 outbreaks and 652 horses attacked. In the corresponding period of last year there were 385 outbreaks and 710 horses attacked.

RABIES.—This disease is, unfortunately, again increasing at a very rapid rate. In the first quarter of this year there have been nineteen cases, as compared with two last year in the same period.

FOOT-AND-MOUTH DISEASE.—The outbreak of this disease which occurred at Guestling, near Hastings, in February has now died out, without having spread beyond the farm buildings in which it was first discovered. In the first thirteen weeks of this year there have been two outbreaks of foot-and-mouth disease and thirty animals attacked, whereas last year in the corresponding period there were fifty-nine outbreaks and 2,355 animals attacked.

Abortion in Cattle.

Sir JOHN THOROLD also reported that the Committee had had under their careful consideration the question of abortion in cattle, and recommended that a letter be addressed to the President of the Board of Agriculture, asking the Board to undertake at the earliest possible moment an exhaustive inquiry into the nature and causes of this disease. They had prepared the following memorandum on the subject, which they suggested should be sent to the Board of Agriculture for their information :—

Epizootic Abortion in Cattle.

Although there are no official statistics showing the losses caused by abortion in cattle, such losses have now become exceedingly serious, and they are very widely spread amongst the herds of the country. In a single outbreak of this disease, which occurred at Kirkby Overblow, in Yorkshire, in the year 1886, no less than 300 cases were recorded, of which not less than 200 occurred within a radius of two miles, and the estimated total loss to the owners of the aborting animals was £1,600. The cause of the affection has never yet been definitely ascertained, and, consequently, there is no degree of certainty attaching to any of the remedies that may be applied. To show the difference of opinion which prevails as to the nature of the disease, it is only necessary to mention some of the various causes which have been assigned to it, such as ergoted grasses, unsuitable food, impure water, "sympathy," bad smells, disease in the bull, tendency to fatten, &c. That the disease is either contagious or infectious, practical men entertain no doubt, but the question as to the means whereby the contagion or infection is communicated still remains unsolved.

In 1887, an inquiry was conducted under the auspices of the Highland and Agricultural Society by Dr. Sims Woodhead, Professor McFadyean, and Dr. A. P. Aitken, the results of which were published in that Society's transactions for 1887 and 1889. The inquiry showed that the disease was becoming increasingly prevalent throughout the length and breadth of Scotland, and that it caused a great annual loss to cattle breeders. As a result of experiments which were carried on in connection with this inquiry, five distinct organisms were stated to have been separated from vaginal and uterine discharges. The experiments, however, stopped at this stage, and the point as to whether such organisms were capable of producing the disease in other cows remained undetermined.

The necessity of further investigations into the causation of the disease, with a view of discovering remedies of a reliable and efficacious kind, is therefore apparent. Such investigations ought to be directed in the first place to discovering whether any structural alteration or abnormality in the womb, calf, or fœtal membranes is present in cases of abortion. This cannot be ascertained except by making a post-mortem examination of both cow and fœtus in a considerable number of cases, say twenty. For this purpose it would be essential to have the cows killed and examined immediately, or, at most, within a few hours after the act of abortion. The inquiry ought to embrace experiments planned so as to prove whether the disease is contagious or infectious. In order to throw light upon this point, it would be necessary to stall together, in healthy premises, aborted cows and cows bought from stocks known to be free from abortion, and to use other likely means of infecting cows on the assumption that the disease is thus transmissible.

Unless the inquiry can be commenced early in August next, it will necessarily be delayed for another year ; and in view of the great importance of this matter to the agricultural interests of the United Kingdom, the Council of the Royal Agricultural Society strongly urge the Board of Agriculture to undertake an exhaustive inquiry into the subject at the earliest possible moment.

Signed on behalf of the
Veterinary Committee.
J. H. THOROLD, Chairman.

Royal Agricultural Society of England,
April 11th, 1893.

Sir JOHN THOROLD observed that it was very important that steps should be taken to deal with the disease of abortion in cattle, which, as the Council were aware, occasioned every year great losses amongst stockowners in this country, and had lately increased to a very serious extent. The Veterinary Committee considered that the time had arrived when definite measures should be taken to inquire into the nature and causes of the disease, with a view to the application of effectual remedies against it. They felt, therefore, that this matter should be brought strongly under the notice of the Board of Agriculture, and that the extreme

importance of an exhaustive inquiry into the nature and causes of the disease being undertaken at the earliest possible moment should be urged upon the Government. If such inquiry could not be commenced early in August next, it must necessarily be postponed for another year. The Veterinary Committee had, therefore, prepared a statement showing what had previously been done in regard to this matter, and the lines upon which, in their opinion, the inquiry should proceed, and they thought that this might usefully be sent to the Board with a covering letter, to be signed by the President of the Society. They had reason to believe that the inquiry they suggested had the sympathy of the President of the Board of Agriculture, and they hoped he might be able to secure the carrying out of the investigations they had in view.

Rabies in Dogs.

The PRESIDENT said he did not know what the feeling of the Council might be with regard to rabies, as the present muzzling regulations were very tiresome and a great nuisance. The only practical remedy appeared to be a general muzzling Order throughout the country for a whole year, and the prevention of the importation of dogs from abroad. The present system of partial muzzling was absolutely useless, and gave a great deal of annoyance to a vast number of people.

Sir MATTHEW RIDLEY asked whether Professor Brown could inform them in what counties the reported increase in cases of rabies had occurred.

Professor BROWN, in reply, stated that according to the weekly returns for the first quarter of the year the cases were as follows:—In the week ended January 7th six cases—viz., one in Lancashire, two in Yorkshire (N.R.), three in Lanarkshire; January 28th, two cases in Cheshire and Lancashire; February 4th, one case in Lancashire; February 18th, one case in Linlithgow; February 25th, one case in Lanarkshire; March 4th, one case in Lanarkshire; March 11th, two cases in the county of London; March 25th, three cases, one each in the counties of London, Dumbarton, and Renfrew; April 1st, two cases in the counties of Middlesex (*ex* London) and Lancaster.

Stock Prizes.

Mr. SANDAY (Chairman) reported that the Secretary had, as instructed by the Council, again communicated with the London and North-Western Railway Company on the subject of the carriage of exhibits to the Society's Meetings, and the free conveyance of men in charge of live stock. A reply had been received, stating that at a meeting held at the Clearing House on March 21st, the general managers of the principal railway companies had carefully considered the Society's communications, and had decided to accept the signature of exhibitors to the form of certificate entitling them to the return of their unsold stock, &c., at half rates, in the place of those of secretaries of shows; but they regretted that they did not see their way to sanction the free conveyance of men in charge of live stock, nor to extend to live stock the recent concession as to half rates for "unsold articles" sent from one agricultural show to another. The Committee recommended that the Secretary be instructed to address a further communication to the railway companies, expressing the Council's regret that it had not been found possible to carry the men in charge of live stock to agricultural shows free of charge, and to request that the subject might again receive careful consideration, with a view to reverting to the arrangement which had been in force for many years.

Judges' Selection.

Mr. SANDAY (Chairman) reported that the following changes had taken place in the list of judges for the Chester Meeting since its publication in the Journal (see page xli).

Heavy-weight Hunters.—Mr. D. L. Dixon-Brown, of Unthank Hall, Haltwhistle, *vice* Mr. Gordon Cunard, unable to act.

Cheshire Cheese.—Mr. Hugh Cawley, of Ashley, Cheshire (fourth judge).

Poultry.—It is proposed that the classes be distributed amongst the judges as follows :—Langshans, Wyandottes, Plymouth Rocks, Ducks, Geese, and Turkeys to be judged by Mr. D. Bragg; Houdans and other French Breeds, Brahmas, Cochins, Leghorns, Hamburghs, and any other varieties by Mr. James Dixon; Dorkings, Game, Minoreas, and Andalusians by Mr. J. W. Ludlow; Table Fowls and Ducks by Mr. Edward Brown.

As the list of judges had been widely published in the agricultural papers, as well as in the Journal, it did not appear necessary to print it again in the proceedings of the Council. The Committee had selected the Umpires to act in case of necessity for the several classes.

Implement.

Mr. SANDAY reported that upwards of 13,000 feet had been applied for in the Implement Department of the Chester Meeting; that three entries had been received for the sheep-shearing prizes from two competitors; that in the class for self-binding harvesters, twenty-three entries had been made by nine competitors. In addition to the entries for the competitions, upwards of 120 entries of new implements had been received for the Society's silver medals. The Committee recommended that the trial of sheep-shearing machines should take place in the showyard on Saturday, June 17th. It was proposed to give two exhibitions of sheep-shearing daily during the show week.

The Committee had considered the question of the trials of oil engines at the Cambridge Meeting of 1894, and they recommended that the competition be divided into two classes, with two prizes in each class, as follows :—

	First prize.	Second prize.
Class 1.—Fixed engines of 4 to 8 brake horse-power.	£50	£25
Class 2.—Portable engines of 9 to 16 brake horse-power.	£50	£25.

General Chester.

The Earl of FEVERSHAM presented the recommendations of this Committee as to various points of detail connected with the Chester Meeting. The Committee had granted permission to several breed and other societies to hold meetings in the large tent during the show week.

Showyard Works.

Sir JACOB WILSON (Chairman) reported that the showyard at Chester was enclosed with a high fence, and that about 6,000 ft. of implement shedding and 2,000 ft. of cattle sheds were built. The entrance and pavilions were nearly complete, and the grand stand, dairy, and refreshment-rooms were well in hand. The Local Committee had nearly completed the levelling of the yard, and were now laying the water mains. The whole of the works were in a very forward state. The following offers were recommended for acceptance :—Messrs. W. and T. Brown and Co., for furnishing the Royal Pavilion in the Chester Showyard; Messrs. Dickson, for floral decorations; the National Telephone Co., for telephonic communication; the Victoria Stone Co., for dairy floor; Messrs. J. and C. Major, Ltd., for roofing of dairy. The Committee recommended that Messrs. Churton, Elphick, and Co., of Chester, be appointed auctioneers for the sale of timber after the show.

Selection.

Earl CATHCART (Chairman) presented the recommendation of this Committee as to the nomination for the vacancy caused in the Council by the lamented death of the Duke of Bedford.

On the motion of Earl CATHCART, seconded by the Hon. C. T. PARKER (Honorary Director), Mr. Joseph Martin was elected Steward of Forage for the Cambridge Meeting of 1894.

Education.

Mr. WHEELER reported that thirty-seven entries had been received for the forthcoming Senior Examination to be held from the 9th to the 13th of May next. As the accommodation in the Society's house was insufficient for seating this number of candidates, the Committee recommended that the Secretary be instructed to arrange for the hire of a room elsewhere for

the purposes of the examination. The Secretary had reported that Lord Moreton, as Chairman of the Committee, and Mr. Albert Pell had attended before the Gresham University Commissioners on March 3, as the Society's representatives, to give evidence upon the subject of Agricultural Education, and that he himself had also given evidence, in compliance with the request of the Commissioners made at the time. The Secretary had also reported that he had received an invitation from the Local Examinations and Lectures Syndicate of the University of Cambridge to take part in a conference on Technical Education, to be held at Cambridge, on April 20 and 21, and Dr. Voelcker had reported that he had received a similar invitation. The Committee considered it desirable that the Society should be represented at this conference by the Secretary and Dr. Voelcker, and accordingly recommended that both be authorised to attend it.

Dairy.

The Hon. CECIL T. PARKER (Chairman) presented the recommendations of this Committee as to various details in connection with the arrangements for the dairy at the Chester Meeting. The Committee did not propose to recommend the offer of prizes for cheese made in the year 1893 in connection with the Cambridge Meeting of 1894. The question of offering prizes at this Meeting for salt butter to be sent six months beforehand would be considered upon a future occasion.

Retiring Members of Council.

The following list was prepared of the Members of Council who retire by rotation, showing the number of attendances at Council and Committee meetings of each of such members during the past two years, in accordance with Bye-law No. 23:—

Attendances at Meetings of Council and Committees from April, 1891, to March, 1893, inclusive	Council Meetings Total number, 18	Committees	
		No. of Meetings	Attendances
ALLENDER, G. Mander.	17	115	66
ASHWORTH, Alfred . .	12	112	60
BOWEN-JONES, J. . .	16	105	58
CAIRD, James A. . . .	11	88	42
CORNWALLIS, F.S.W., M.P. (elected March 1, 1893)	—	—	—
COVENTRY, Earl of . .	13	26	6
CRUTCHLEY, Percy E. .	15	54	39
DARBY, Alfred. . . .	13	56	39
DUGDALE, J. Marshall (elected November 4, 1891)	11	20	20
GORRINGE, Hugh . .	7	24	—
HAMOND, Anthony . .	11	17	8
HOWARD, Charles . .	11	90	37
MAINWARING, C. S. . .	14	72	50
MARTIN, Joseph . . .	17	40	17
MILLER, T. Horrocks .	15	41	19
PARKER, Hon. Cecil T.	14	135	86
PELL, Albert	11	87	41
ROWLANDSON, Samuel .	10	46	34
SCARTH, W. T. . . .	12	—	—
SMITH, Alfred J. . . .	16	57	41
STANYFORTH, E. W. .	15	53	38
TAYLOR, Garrett . . .	17	48	38
TERRY, Jos. P. . . .	13	57	33
WILSON, C. W. . . .	17	41	30
WILSON, Sir Jacob. . .	14	102	46

Country Meeting of 1894.

The SECRETARY submitted for approval a proposed modification in one clause of the draft agreement for the holding of the Country Meeting of 1894, suggested by the Town Clerk of Cambridge. This was approved, and the Society's seal authorised to be affixed to the agreement.

Miscellaneous.

Various letters from Messrs. W. H. Smith of Slcaford, D. Tallerman, and H. J. B. Heath, the Société des Agriculteurs de France, and others having been read and ordered to lie on the table, the Council adjourned until Wednesday, May 3 next, at noon.

WEDNESDAY, MAY 3, 1893.

THE DUKE OF WESTMINSTER, K.G. (PRESIDENT), IN THE CHAIR.

Present:—

Trustees. — Viscount Bridport, G.C.B., Earl Catheart, Lord Egerton of Tatton, Col. Sir Nigel Kingscote, K.C.B., Sir A. K. Macdonald, Bart. Right Hon. Sir M. W. Ridley, Bart., M.P.

Vice-Presidents. — Mr. Chandos-Pole-Gell, Mr. Walter Gilbey, Earl of Lathom, G.C.B., Right Hon. Sir Massey Lopes, Bart., Lord Moreton, Sir J. H. Thorold, Bart., Mr. Charles Whitehead.

Other Members of Council.—Mr. G. M. Allender, Mr. J. H. Arkwright, Mr. A. Ashworth, Mr. Joseph Beach, Mr. J. Bowen-Jones, Lord Brougham and Vaux, Mr. Charles Clay, Mr. F. S. W. Cornwallis, M.P., Mr. Percy E. Crutchley, Lieut-Col. J. F. Curtis-Hayward, Mr. Alfred Darby, Mr. J. Marshall Dugdale, Mr. Hugh Gorringe, Mr. James Hornsby, Mr. Charles Howard, Mr. Joseph Martin, Mr. T. H. Miller, Mr. P. A. Muntz, M.P., Mr. R. Neville Grenville, Hon. Cecil T. Parker, Mr. Albert Pell, Mr. Dan Pidgeon, Mr. J. E. Ransome, Mr. J. Rawlence, Mr. G. H. Sanday, Mr. W. T. Searth, Mr. A. J. Smith, Mr. Henry Smith, Sir J. L. E. Spearman, Bart., Mr. E. W. Stanyforth, Mr. Martin J. Sutton, Mr. Garrett Taylor, Mr. J. P. Terry, Mr. R. A. Warren, Mr. E. V. V. Wheeler.

Officers.—Mr. Ernest Clarke, Secretary; Dr. Fream, Editor of the Journal; Dr. J. Augustus Voelcker, Consulting Chemist; Professor J. B. Simonds, Consulting Veterinary Surgeon; Mr. Wilson Bennison, Surveyor.

Professor Brown, C.B., Mr. Alex. C. Cope.

The following members of the Chester Local Committee were also present:—Mr. Charles Brown (Mayor of Chester), Mr. S. Smith (Town Clerk of Chester), and Mr. George A. Dickson (Honorary Secretary of the Local Committee).

Apologies for non-attendance were received from the Earl of Feversham, the Earl of Coventry, Viscount Emlyn, Sir Jacob Wilson, Mr. Frankish, Mr. Stratton, and Mr. Tremayne.

The minutes of the previous meeting of the Council, held on April 12, having been approved,

The PRESIDENT read a letter from the Duke of Bedford, asking his Grace to convey to the Council the heartfelt thanks of himself and his late brother's family for the vote of condolence passed at that meeting.

New Governors and Members.

The election of the following Governor and ninety-three members was then proceeded with:—

Governor.

BEDFORD, Duke of..Woburn Abbey, Beds.

Members.

ALLWOOD, W...Bank House, Hurleston, Nantwich.
ASKREN, M. W...The Levels, Thorne, Doncaster.
BARKER, A...6, Abbey Street, Chester.
BAXENDALE, F. H...Framfield S.O., Sussex.
BAXENDALE, Mrs. L...Greenham Lodge, Newbury.
BELL, W. H...Rothwell, Kettering.
BEST, T. W...Lingfield, Barmouth.
BOURNE, J...Queen's Hotel, Alderley Edge.
BOWMAN, C. S...Londesborough Arms, Selby.
BOYD, A. D...The Lakes, Dukinfield, Chester.
BRAND, Hon. T. S...Glynde, Lewes.
BRINKMAN, C...Thakeham Place, Pulboro'.
BROCKLEHURST, W. S...Weldon, Wansford.
CAIN, A. D...Aigburth Road, Liverpool.
CAIN, H...Highbury, Hargreaves Rd., Liverpl.
CAMPBELL, F...Branbridge Park, Balcombe.
CHARLETON, G. B...Caynham, Ludlow.
CLARK, G...Exchange Chambers, Carlisle.
CORRIE, A. B...Iddesleigh Mansions, S.W.
COXON, Henry..Ripley, Yorks.
DARLINGTON, T...Leighton, Crewe.
DAVIES, E. J...Haywardsend, Stonehouse.
DAVIES, H...Goldby's Frm., Astley, Nuneaton.
DUNCAN, W. M...Barrel Wall House, Chester.
EARDLEY, W. P...Newton Hall, Malpas.
ENYON, R. C...Hylas, Rhuddlan, Flints.
FINDLAY, A...Markinch, Fifeshire.
FRANK, T...Cound Arbour, Shrewsbury.
FROGLEY, Albert..Sparsholt, Wantage.
FURBER, J. jun...Austerson Hall Farm, Nantwich.
GARDNER, E. H...Walton Lodge, St. Albans.

GEPP, W. P...Maynetrees, Chelmsford.
GERRARD, T...Gibbstown, Navan.
GERY, R. WADE,..Bushmead, St. Neots.
HARRISON, W...Rushford Park, Levenshulme.
HARTSHORN, J...Eccleston Hill Farm, Chester.
HEAP, J...Outwood, Claughton, Birkenhead.
HENRY, R. W...4, Sunny Bank, Queen's Park, Chester.
JONES, J...Whitegate Farm, Wrexham.
JONES, W...Edenhope, Bishop's Castle.
JONES, W. P...Bromfield Villa, Mold.
KAPUR, Vishnu Singh..Royal Colonial Institute, W.C.
KELLOCK, C. W., jun...Highfields, Audlem, Nantwich.
KEMP-SMITH, J. F...Orsett, Essex.
KIRKHAM, R. R...Gayton-le-Wold. Lincoln.
KNOLLYS, C. R...Fitzhead Court. Taunton.
LE CORNU, C. L. H...La Hague Manor, Jersey.
LEWIS, W...Rossett, Wrexham.
LITT, E...Woodfield, Shrewsbury.
LOUIS, A. G...Salperton, Cheltenham.
MADGE, C. A...Thakeham Place, Pulborough.
MANGLES, G. U...Gt. Gwendale, Borobridge.
MATHIAS, W. H...Greenmeadow, Porth, Pontypridd.
MEREDITH, W...Borras Farm, Gresford, Wrexham.
MOSFORD, G...Tattenhall, Chester.
MOSS, S...Broad Oak, Rossett, Wrexham.
MULLOCK, Mrs...Poulton, Wrexham.
NEWBOULD, J. J...Tatenhill, Burton-on-Trent.
NOAKES, W. J...Trottenden, Goudhurst, Kent.
NODEN, E...Brand Farm, Market Drayton.
NUNNERLEY, T...Bradeley Green, Whitchurch, Salop.
OAKES, Rev. B. P...Hawkedon, Rectory, Bury St. Edmunds.
OUVRY, P. A...East Acton, London, W.
PAINE, James K...Caxton, Cambridge.
PARROTT, J. W...Normandy, Guildford.
PRENTICE, Ernest..Uplands, Stowmarket.
RANDALL, Major R. G...Thurlaston Holt, Hinckley.
REEVES, H...Emsworth, Portsmouth.
RIGBY, Armitage..Ballantona, Isle of Man.
ROBERTS, John..Chester Street, Wrexham.
ROGERSON, G. H...12, Whitefriars, Chester.
RUTLEDGE, T. F...Werronggurt, Warrnambool, Victoria.
SALT, James.. Market Place, Buxton.
SCOTT, H. L...Cadeby Hall, Hinckley.
SLATTER, J. A...Hill Ho., Somerton, Banbury.
SMITH, James..Olrig House, Thurso.
SMITH, W. H...Irby Hall, Birkenhead.
SMYTH, W. D. Watson..Woodham Ferris, Chelmsford.
TATTON, R. A...Chelford, Crewe.
THORNE, Frederick..Helsby, Chester.
THURSBY-PELHAM, J. A. H...Cound Hall, Shrewsbury.
TICKLE, W...Feathers Hotel, Wrexham.
TOLER, T. C...Fernilee Hall, Whaley Bridge.
TOLER, F. W...Fernilee Hall, Whaley Bridge.
TUCKER, C. M...Over Worton, Steeple Aston.
WALFORD, Rev. W. S...Dallinghoo, Wickham Market.
WARD, E...1, Castle Grove, Nottingham.
WILLIAMS, O...Cwybrfawr, Rhuddlan.
WILSON, J. M...Langham Hall, Bury St. Eds.
WOOD, William..32, English St., Carlisle.
WOOSNAM, C. W...Cefnllysgwynne, Builth.
WOOTTON, J. H...Byford, Hereford.
WYATT, A. N...Whitegate, Northwich.

On the motion of Sir NIGEL KINGSCOTE, it was unanimously resolved :—

That the Secretary be authorised to receive nominations of members, and to admit them to the privileges of membership for the Chester Meeting, on condition that they sign the usual contract and pay their subscription for the current year.

The reports of the various Standing Committees were then presented and adopted as below :—

Finance.

Sir NIGEL KINGSCOTE (Chairman) reported that the accounts for the month ended April 29, 1893, as certified by the Society's Accountants, showed total receipts amounting to 3,473*l.* 8*s.* 10*d.*, and expenditure to 4,096*l.* 2*s.* 2*d.* The actual balance at the bankers' on April 29, 1893, allowing for cheques outstanding, was 8,593*l.* 1*s.* 8*d.* Accounts amounting in all to 1,434*l.* 12*s.* 9*d.* had been passed and were recommended for payment. The Committee had authorised the Secretary to enforce strictly the regulations as to the closing of the entries for the Chester Meeting at ordinary rates. The Committee recommended that the Society give a subscription of two guineas to the Rothamsted Jubilee Fund. They also recommended that Mr. Sanday and Sir John Thorold be elected Stewards of Finance for the Chester Meeting.

House.

Sir NIGEL KINGSCOTE (Chairman), in presenting a detailed report from this Committee, said that the Council would be interested to know that they had made what he thought might be regarded as a very satisfactory start in obtaining subscriptions for the Harewood House Debenture Stock. The prospectus had not yet been circulated except amongst a few noblemen and gentlemen known to be interested in the matter; and they had obtained from twenty-eight gentlemen promises of subscriptions for the Stock, amounting in all to 14,000*l.* In addition to the above, they had received from four gentlemen cash donations towards the Building Fund, amounting to 625*l.*; and eight other gentlemen had promised financial assistance—the pre-

cise form of which had not yet been settled—but which amounted in all to another 2,350*l*. They had, therefore, already secured more than a quarter of the total sum required. It was proposed now to make a general issue of the prospectus amongst members and others who were likely to subscribe, and they hoped that, in order that their arrangements might not be delayed, members of Council would not only take up some of the Stock themselves, but would use all their efforts to place it also amongst their friends. The Committee proposed to hold another meeting on Tuesday next to consider the question as to obtaining plans for the new building, and they recommended that Sir Matthew Ridley be added to the Committee.

Journal.

Earl CATHCART (Chairman) reported that the Committee had passed various accounts for printing, &c., which they had referred to the Finance Committee for payment. Directions had been given to the Editor in regard to the contents of the forthcoming number of the Journal, and various suggestions for articles and notes had been considered.

Chemical.

Mr. WARREN stated that the Report of the Woburn Sub-Committee had been received and adopted. The revised statement of Chemical Privileges, &c., had been laid upon the table, and the Committee recommended that it be issued forthwith, copies being sent to all members of the Council and to the members of the Society who were accustomed to send samples for analysis. Various letters arising out of recent Quarterly Reports of the Committee had been considered, and the Committee presented their recommendations thereon.

Woburn Experimental Farm.

Mr. WARREN said he was happy in being able to inform the Council that the present Duke of Bedford had expressed his wish to provide for the carrying on of the experimental farm at Woburn as heretofore. (Cheers.)

The PRESIDENT said he felt sure the Council would wish the sincere and grateful thanks of the Society to be conveyed to the Duke of Bedford for his munificence in providing for the carrying on of the invaluable experiments that had now been in progress at Woburn during the last seventeen years, and the continuance of which was so important in the general interests of agriculture. (Hear, hear.)

Seeds and Plant Diseases.

Mr. WHITEHEAD (Chairman) reported that Mr. Carruthers had undertaken to prepare by the end of May an article on "Finger-and-Toe in Turnips," to be published in the next number of the Journal. In reference to the inquiry to be made this season into the nature of this disease, decided upon by the Council upon the recommendation of the Committee in February last, the Committee recommended that the Consulting Chemist and the Consulting Botanist be instructed to draw up a scheme for such an inquiry from their respective points of view. Mr. Warburton had reported that he had received, since his appointment as Zoologist, a number of applications from members as to various common insect attacks. The Committee recommended that prizes for jams, preserved fruits and vegetables, and cider and perry, be offered in connection with the Cambridge Meeting, of the same amount and in the same classes as at Chester.

Finger-and-Toe in Turnips.

Earl CATHCART, in reference to the proposed inquiry into the disease of finger-and-toe in turnips, said that the correspondence which he had received showed the subject to be one of great urgency, and no time should be lost in taking the necessary steps. Mr. Carruthers had undertaken to write a paper for the next number of the Journal upon what was already known in regard to the disease, and with the view of eliciting the experience of those who had suffered from it. Dr. Voelcker had drawn up a scheme for an inquiry from a chemical point of view, and he (Lord Cathcart)

thought that Dr. Voelcker should be fully authorised to proceed with it at once. It was very desirable that both the chemical and botanical branches of the subject should be investigated, but upon perfectly separate lines. This should be done forthwith, with all the energy which their very able officials could put into the matter, because in the meantime the country was suffering very much from this disease through its unknown causes and its unknown treatment. He would suggest that any members of Council who could give practical information, or who had fields where finger-and-toe was always prevalent, should be invited to communicate with the Society on the subject.

Mr. RAWLENCE said that he had many acres of land subject to this disease, and he would gladly afford any assistance in his power.

Mr. WHITEHEAD, as Chairman of the Seeds and Plants Committee, said he had read Dr. Voelcker's proposed scheme, of which he thoroughly approved. He saw no reason why it should not be proceeded with forthwith. He moved, therefore, that Dr. Voelcker's scheme be approved by the Council, and that Dr. Voelcker be empowered to act upon it at once.

The motion having been carried unanimously, the report of the Committee was then adopted.

Veterinary.

Sir JOHN THOROLD (Chairman) reported the recommendation of the Committee that Mr. Clement Stephenson be asked to lecture on Farriery upon one of the days of the show at Chester, at which he is to act as one of the judges of horse-shoeing. Professor Brown had presented the following report:—

PLEURO-PNEUMONIA.—In the first sixteen weeks of the present year there has been only one case of this disease in Great Britain. Forty-six contact, and 21 suspected cattle were, during that time, slaughtered, but all of them were found free from the disease. In the corresponding period of last year there were 71 diseased, 734 contact, and 68 suspected cattle slaughtered by order of the Board of Agriculture.

SWINE FEVER.—This disease is again increasing. The published returns show 786 outbreaks and 3,927 swine attacked this year, as compared with 561 outbreaks and 3,512 attacked in the corresponding period of last year.

ANTHRAX.—Since the beginning of the present year anthrax has been much more prevalent than it has been in the corresponding period of any of the past three years. There have been this year 146 outbreaks and 335 animals attacked. In the corresponding periods of 1892, 1891, and 1890, there were 82, 68, and 49 outbreaks respectively.

GLANDERS (including FARCY).—The returns of these diseases show a slight decrease this year as compared with last year. There have been 451 outbreaks and 769 horses attacked this year, as compared with 473 outbreaks and 870 horses attacked in the corresponding period of 1892.

Stock Prizes.

Mr. SANDAY (Chairman) reported that the Committee had again had under consideration the proposal of the railway companies to discontinue for the future the free conveyance of men travelling to and from agricultural shows in charge of live stock, and they submitted further correspondence on the subject. They were unanimously of opinion that it was desirable for a joint deputation of the leading Agricultural and Breed Societies to wait upon the Managers, to urge a reconsideration of their recent decision and the restoration of the arrangement heretofore in force, under which men travelling in charge of stock were conveyed free to and from shows, and they suggested that the Secretary be instructed to communicate both with other societies and with the railway managers on the subject. They recommended that the following members of Council be nominated as the representatives of the Royal Agricultural Society on the deputation:—The President, the Hon. Cecil T. Parker (Hon. Director), Sir Jacob Wilson, Mr. Chandos-Pole-Gell, Mr. Walter Gilbey, Mr. Sanday, and Mr. C. W. Wilson.

This recommendation was adopted by the Council, and the Secretary was instructed to communicate accordingly with the Railway Managers and with the leading Agricultural and Breed Societies.[1]

Mr. SANDAY, at the unanimous request of the Stock Prizes Committee, gave notice that at the next meeting of

[1] After the rising of the Council an intimation was received that the Railway Managers would be willing to receive the deputation at 12.30 p.m. on Thursday, the 11th May, at the Railway Clearing House, 123, Seymour Street, Euston Square, N.W. (see page lxxii.).

the Council he would move that a grant of 5,000*l.* be made for prizes for live stock, poultry, and produce at the Cambridge Meeting of 1894. The Committee had received various suggestions as to the prize sheet, which would be duly considered. The Committee proposed at a future meeting to reconsider the fees at which entries of poultry and produce were now accepted from members for the Country Meetings.

Implement.

Mr. SANDAY reported that the draft regulations for the trials of explosive oil engines at the Cambridge Meeting, in 1894, had been considered and amended, and the Committee recommended that the regulations as settled by them be issued forthwith, as follows :—

Cambridge Meeting, 1894.

PRIZES FOR EXPLOSIVE OIL ENGINES.

In connection with the Cambridge Meeting of 1894, the following prizes are offered by the Royal Agricultural Society of England for fixed oil engines and portable oil engines :—

	First Prize.	Second Prize.
	£	£
Class I. Fixed Oil Engines, of 4 to 8 brake horse power	50	25
Class II. Portable Oil Engines, of 9 to 16 brake horse power	50	25

General Regulations of Trials.

1. Notice of the place and date of the trials will be posted to every competitor as soon as they are fixed.

2. A covered and locked building, under the charge of the Society's officers, will be provided, in which the trials will take place, the space for each engine being partitioned off from that of the others.

3. Every competitor must himself provide for the delivery of his engine to the trial shed, not later than a week previous to the date on which the trials will be commenced, and for its removal as soon as finished with.

4. Each competitor in Class I. must state the nature and give detailed dimensions of the foundation he may require. The Society will find the necessary material and labour for such foundation, but the responsibility for its sufficiency and for the fixing of the engine must rest with the exhibitor.

5. The necessary supply of petroleum and water for the trials will be provided by the Society. All the engines will be worked with the same sample of oil, which shall be one of the well-known brands, *e.g.* Russolene oil—and, if considered desirable by the judges, a further trial of the selected engines will be made with a cheaper oil.

6. Each engine must be fitted with suitable indicating gear—to be approved by the engineers—revolution counter and flywheel with turned flat face, on which the brake gear may be applied.

7. The adaptability of each engine for general purposes on a farm will be considered, especially as regards simplicity of design, strength, durability, stability, and freedom from fouling.

8. After each engine is fixed, the competitor will be allowed a preliminary run, to satisfy himself that the engine is in proper working order.

9. The engines must all be ready to start for trial on a given date; they will then have to run for three days—running ten hours per day on their declared brake load—the petroleum and lubricating oil being weighed out.

10. Each competitor will be allowed one attendant only in charge while the engine is running. Such attendant will be under the direction of the judges.

11. At the end of the above run, each engine will go—just as it stands—on to a full-load trial, during which indicator diagrams will be taken, brake load recorded, and oil used weighed. This will be followed by a light and half-load trial under similar conditions.

12. The points to which the special attention of the Judges and Engineers will be particularly directed are :—

(1) Simplicity, workmanship, and durability, combined with facilities for repairs.
(2) Economy in getting to work and attendance.
(3) Consumption of oil and circulating water.
(4) Governing power and uniformity of speed.
(5) Efficiency.
(6) Cost.

(7) Weight
(8) Facility of transport and stability
(9) Arrangements and capacity for carrying oil and circulating water.

} In Class II. (Portable engines) only.

13. Should the Judges find any of the engines to be of practically equal merit, they are empowered to bracket them as equal, and so divide the prize-money.

14. Entries for these prizes must be made by exhibitors on the ordinary forms of application for space in the implement department of the Cambridge Meeting, which will be issued in January, 1894. The last date for receiving entries for the prizes will be Saturday, March 31, 1894.

By Order of the Council,
ERNEST CLARKE, Secretary.
12, Hanover Square, London, W., May 3, 1893.

General Chester.

Sir MATTHEW RIDLEY reported that the draft programme of the Chester Meeting had been preliminarily considered, and would be finally settled at the next meeting, which the Committee recommended should be held at 3 p.m. on Tuesday, May 30. The Committee recommended that Messrs. Philipson and Golder and Messrs. Minshull and Meeson, both of Chester, be appointed local agents for the sale of season tickets. Various applications for permission to

hold meetings in the large tent at Chester had been sanctioned, and referred to the Secretary to arrange.

Showyard Works.

Mr. ALLENDER reported that the implement shedding at Chester was practically complete, and about 4,000 ft. of cattle shedding was built. The grand stand, band-stand, dairy, and offices, and all of the pavilions were in a very forward state. The Local Committee had finished the levelling and draining of the yard, and all the principal water-mains were laid. The Committee recommended that the following resolution be adopted by the Council:—

> That any exhibitor who may wish to provide a building for his exhibits can do so if he complies with all the regulations of the Society, adheres to the space allotted, the frontage line, and the specified height, deposits plans with the Honorary Director or Superintendent of Works, and absolves the Society from all risk and liability.

Selection.

Earl CATHCART (Chairman) presented the recommendations of this Committee, and formally moved: "That the Duke of Devonshire, K.G., nominated at the last meeting, be elected a member of the Council, in the room of the late Duke of Bedford."

Sir NIGEL KINGSCOTE seconded the motion, which was carried unanimously.

Earl CATHCART further moved, Sir NIGEL KINGSCOTE seconded, and it was unanimously resolved: "That the name of the Duke of Devonshire be suggested to the general meeting on the 29th instant as President of the Society for the ensuing year."

Education

Lord MORETON (Chairman) reported that the Committee had arranged for the Society's Senior Examination to take place next week at the Examination Hall of the Royal College of Physicians and the Royal College of Surgeons, situated on the Victoria Embankment. The Committee had approved of the following time-table which had been arranged for the Senior Examination:—

TIME TABLE.

Tuesday, May 9.
Agricultural Engineering . 10 a.m. to 1 p.m.
Agriculture (written paper) 2 p.m. to 5 p.m.

Wednesday, May 10.
Land Surveying . . . 10 a.m. to 1 p.m.
Agriculture (viva voce) commencing at . . 2 p.m.

Thursday, May 11.
Chemistry (General) . . 10 a.m. to 1 p.m.
Book-keeping . . . 2 p.m. to 5 p.m.

Friday, May 12.
Chemistry (Agricultural) . 10 a.m. to 1 p.m.
Botany . . . . 2 p.m. to 4 p.m.
Agricultural Entomology . 4 p.m. to 5 p.m.

Saturday, May 13.
Geology . . . . 10 a.m. to 1 p.m.
Anatomy . . . . 2 p.m. to 4 p.m.

As instructed by the Council, the Secretary and Dr. Voelcker had attended the Conference on Technical Education, held at Cambridge on the 20th and 21st ult., and copies were laid upon the table of the scheme for the course of scientific instruction bearing on agriculture, which had been organised at Cambridge. The Committee cordially approved of this scheme (to which publicity was given in the proceedings of the Council of November 1st, 1892), and recommended that the following letter, to be signed by his Grace the President of the Society, be addressed to the Vice-Chancellor of the University of Cambridge:—

May 3rd, 1893.

Sir,—The Council of this Society, having had under consideration the course of scientific instruction in subjects bearing upon agriculture which has been organised at Cambridge, request me to convey to you their cordial assent to the general scheme of the instruction in question.

They trust that the Senate of the University may see fit, as suggested in the scheme, to sanction an examination in connection with this course, and to grant a diploma to successful candidates; and in this connection they would direct attention to the resolution passed by them on February 1st last:—"That in the opinion of the Royal Agricultural Society of England, it is desirable that provision be made in all Universities for the granting of a Degree in Science for students of Agriculture."

I am, sir, your obedient servant,
WESTMINSTER, President.

The Vice-Chancellor of the University of Cambridge.

Communications had been received from the Charity Commissioners, forwarding copies of schemes for the administration of the Hanley Castle (Worcestershire) Grammar School and the Drax (Yorks, W. R.) School Foundations, both of which received the approval of Her Majesty in Council on March 15th last, and the Committee recommended that the Earl

of Coventry and Mr. E. W. Stanyforth be asked, as members of the Council, to accept the office of representative Governor upon the Hanley Castle and Drax Foundations respectively, in accordance with the provisions of each scheme.

Mr. PELL asked to be permitted to say a few words with reference to the letter which Lord Morcton had just read, and which it was proposed to send to the Vice-Chancellor of the Cambridge University. He had attended in the Senate House on the second of the two days on which the recent Conference on Technical Education was held, when the Cambridge Agricultural Education Scheme was very clearly explained by Professor Liveing, and the greatest possible interest was shown in the question by the representatives of the different counties who were present. Perhaps the Council would like to know how far they had gone in the matter. A very good room had been taken for the students, most of whom were not merely attending the course, but were also going to Downing College. Mr. Brook-Hunt, Inspector of the Board of Agriculture, attended the conference, and spoke of the interest of the Board of Agriculture in the scheme. He (Mr. Pell) entertained the hope that the Board of Agriculture would not only give this scheme their favourable consideration, but would aid them in the coming year with a very considerable grant, and so enable them to carry on the scheme with greater efficiency.

The proposed letter to the Vice-Chancellor of the University of Cambridge was then approved, and signed by the President.

Dairy.

The Hon. CECIL T. PARKER (Chairman) reported that various details in connection with the dairy at the Chester Meeting had been discussed. In connection with the Cambridge Meeting of 1894, the Committee recommended that prizes of 5*l*, 3*l*, and 2*l*. be offered for "One keg or other package of butter, not less than 14 lb. and under 40 lb. in weight, to be delivered on or before February 1, 1894." It was proposed that the butter, when received, should be stored at Cambridge.

Retiring Members of Council.

In compliance with Bye-Law 23 (c) the list of the Members of Council retiring by rotation, but eligible for re-election at the anniversary General Meeting, was laid upon the table (see page lvii).

Railway Charges at Chester Meeting.

The SECRETARY reported that the following particulars had been received from the railway managers of the charges which have now been decided upon by the companies for dealing with the various descriptions of traffic in connection with the Country Meeting of the Society at Chester:—

To be added to the ordinary rates:—

General traffic	3*s.* 0*d.* per ton.
Agricultural implements	3*s.* 0*d.* per ton.
Agricultural implements on their own wheels (Minimum 1*s.* per consignment)	2*s.* 6*d.* per ton.
Live stock	2*s.* 6*d.* per wagon or horse-box.
Carriages, two wheels	2*s.* 0*d.* each.
Carriages, four wheels	3*s.* 0*d.* each.

To be made in addition to the above, and collected at Chester when the Companies are called upon to deliver to, or collect from, the Show Grounds:—

Boilers, Machinery, Forgings, and other heavy articles;—	
Exceeding 5 tons but not exceeding 9 tons each	2*s.* 0*d.* per ton.
Exceeding 9 tons but not exceeding 12 tons each	4*s.* 6*d.* per ton.
Exceeding 12 tons but not exceeding 15 tons each	7*s.* 0*d.* per ton.
Exceeding 15 tons	9*s.* 6*d.* per ton.
Engines and other machines on their own wheels:—	
Exceeding 5 tons but not exceeding 9 tons each	2*s.* 6*d.* per ton.
Exceeding 9 tons but not exceeding 12 tons each	4*s.* 6*d.* per ton.
Exceeding 12 tons but not exceeding 15 tons each	6*s.* 6*d.* per ton.
Exceeding 15 tons	8*s.* 6*d.* per ton.
Cattle floats	5*s.* 0*d.* per float.
Sheep or pigs in large crates	2*s.* 0*d.* per crate.
Sheep or pigs in small crates	1*s.* 3*d.* per crate.
Sheep or pigs loose in floats (minimum 1*s.* per float)	1*s.* 0*d.* each.
Horses led	1*s.* 0*d.* each.
Carriages, 2 or 4 wheels	2*s.* 0*d.* each.
Poultry and produce in small packages and parcels	0*s.* 3*d.* per package.
Fodder (minimum 1*s.* per consignment)	3*s.* 0*d.* per load.

Country Meeting of 1895.

The SECRETARY said that it was customary at the May meeting of the Council each year to declare the district in which it was proposed to hold the Society's Country Meeting two years in advance, in order that the towns in that district might have ample opportunity for considering whether they desired to invite the Society to hold its Meeting in their midst. The counties comprised in the district selected were announced in the Report of the Council to the anniversary General Meeting. Last year the Council, on the recommendation of a Special Committee presided over by Sir Jacob Wilson, agreed upon a new rotation of districts for nine years, certain of the very largest provincial towns being made extra-territorial, and coming into the rotation every third or fourth year.[1] This new rotation would commence next year (in 1894) with district A (the Eastern counties), for which Cambridge had already been selected; for 1895 Birmingham was named; for 1896, District B (Cumberland, Durham, Northumberland, and Westmoreland); for 1897, District C (the Midlands); for 1898, Liverpool or Manchester; for 1899, District D (Southern England); and so on. The question, therefore, now before the Council was whether they would decide to go to Birmingham in 1895, or, failing that place, would pass on to the Northern counties comprised in District B.

Mr. P. A. MUNTZ, M.P., said that, as representing on the Council the county of Warwick, and also representing that portion of the county in which Birmingham was situated, he would like to say that he proposed to put himself into communication with the authorities of that city in order to ascertain whether they would be prepared to invite the Society to visit Birmingham in 1895, and he hoped to report the result at the next meeting of the Council.

It was then formally decided that the Country Meeting of 1895 be held in the city of Birmingham, or, failing that place, in the Society's District B, consisting of the counties of Cumberland, Durham, Northumberland, and Westmoreland.

[1] See Vol. III., part II., 1892, p. 363.

Miscellaneous.

Various letters and other documents having been laid upon the table, and the Report from the Council to the General Meeting on the 29th instant having been prepared, the Council adjourned until Wednesday, May 31, next, at 10.30 a.m. (Derby Day).

STATEMENT OF ENTRIES AT CHESTER MEETING, 1893, AS COMPARED WITH THE FIVE PREVIOUS YEARS.

Shedding in Implement Yard (in feet).

Shedding (Excl. of Open Ground Space)	Chester, 1893.	Warwick, 1892.	Doncaster, 1891.	Plymouth, 1890.	Windsor, 1889.	Nottingham, 1888.
	ft.	ft.	ft.	ft.	ft.	ft.
Ordinary .	8,610	8 241	8,313	6,117	10,378	7,253
Machinery-in-motion	2,211	2,151	2,106	1,291	2,496	1,607
Special (incl. seeds, models, &c.) . .	2,197	2,119	2,024	1,670	2,728	1,883
Total . .	13,018	12,511	12,473	9,078	15,602	10,743

Number of Animals and Exhibits in Stock Yard.

—	Chester, 1893.	Warwick, 1892.	Doncaster, 1891.	Plymouth, 1890.	Windsor, 1889.	Nottingham, 1888.
Horses	509	447	713	328	968	546
Cattle	758	605	661	642	1,637	646
Sheep	631	610	643	571	1,106	546
Pigs	161	202	204	223	265	148
Total	2,059	1,864	2,221	1,764	3,976	1,886
Poultry	836	836	800	695	862	843
Produce	957	423	425	456	1,202	556

WEDNESDAY, MAY 31, 1893.

THE EARL OF FEVERSHAM (EX-PRESIDENT) IN THE CHAIR.

Present:—

Trustees.—Gen. Viscount Bridport, G.C.B., Earl Cathcart, Mr. John Dent Dent, Lord Egerton of Tatton, Col. Sir Nigel Kingscote, K.C.B., Duke of Richmond and Gordon, K.G., Right Hon. Sir M. W. Ridley, Bart., M.P.

Vice-Presidents.—H.R.H. Prince Christian, K.G., Mr. Chandos-Pole-Gell, Mr. Walter Gilbey, Right Hon. Sir Massey Lopes, Bart., Sir J. H. Thorold, Bart.

Other Members of Council.—Mr. G. M. Allender, Mr. J. Bowen-Jones, Lord Brougham and Vaux, Mr. James A. Caird, Mr. F. S. W. Cornwallis, M.P., Earl of Coventry, Lieut.-Col. J. F. Curtis-Hayward, Mr. Alfred Darby, Duke of Devonshire, K.G., Mr. J. Marshall Dugdale, Mr. S. P. Foster, Mr. W. Frankish, Mr. Hugh Gorringe, Mr. Joseph Martin, Mr. P. A. Muntz, M.P., Hon. Cecil T. Parker, Mr. Albert Pell, Mr. J. E. Ransome, Mr. S. Rowlandson, Mr. G. H. Sanday, Mr. A. J. Smith, Mr. Henry Smith, Sir J. L. E. Spearman, Bart., Mr. E. W. Stanyforth, Duke of Sutherland, Mr. Martin J. Sutton, Mr. John Tremayne, Mr. R. A. Warren, Mr. E. V. V. Wheeler, Sir Jacob Wilson.

Officers.—Mr. Ernest Clarke, Secretary; Dr. Fream, Editor of the Journal; Dr. J. Augustus Voelcker, Consulting Chemist.

Apologies for non-attendance were received from Viscount Emlyn, Lord Moreton, Mr. Alfred Ashworth, Mr. Charles Clay, Mr. P. E. Crutchley, Mr. Charles Howard, Mr. C. S. Mainwaring, Professor J. B. Simonds, Mr. Charles Whitehead, and Mr. C. W. Wilson.

In the unavoidable absence of the President, the Earl of FEVERSHAM, as ex-President, was called to the chair.

Election of New Members.

The minutes of the last monthly meeting of the Council, held on May 3, having been approved, the election of the following seventy-two members was proceeded with:—

ARKWRIGHT, S. J. . Cheswardine, Mkt. Drayton.
‡ARNOLD, E. M. . . Glynde Road, Bexley Heath.
BALL, Wm. . . Hill Side Ho., Strood, Kent.
BARNES, Henry . . Malpas, Cheshire.
BATHER, J. T. . . 9 The Square, Shrewsbury.
BELL, W. K. . . Rhydorddwy Fawr, Rhyl.
‡BEVEN, S. . . 31 Cecily Hill, Cirencester.
BOURNE, John E. . . Muckleston, Mkt. Drayton.
BROWNLOW, Col. Wm. V., C.B. . . Broughton Hall, Chester.
BURGESS, Joseph . . Tabley, Knutsford.
CAMPBELL, A. W. Montgomery . . Bennington Park, Stevenage.
CHESNEY, E. S. . . 376 Upper Brook Street, Manchester.
CHOLMONDELEY, V. H. . . East Burnham Lodge, Slough.
‡CHOPE, J. A. . . 107 Ledbury Rd., Bayswater.
COOKE, Fred. R. . . Hildenborough, Tonbridge.
COOPER, G. W. . . Shenton, Nuneaton.
CORBIDGE, Cooper . . 19A Coleman Street, E.C.
‡CUNLIFFE, R. S. . . Mavisbank, Banchory, N.B.
DICKSON, Richard C. . . Haigh, Wigan.
DOUGLAS, F. J. . . Catherington, Horndean.
DRUMMOND, F. C. Beresford . . Ashton, Chester.
DUTTON, Fred. . . Mollington, Chester.
ELPHICK, Walter . . Borstal, Rochester.
FITZWILLIAM, G. C. W. . . Milton, Peterborough.
‡FORRESTER, J. J. . . Bryanston, Blandford.
‡GODDARD, Ernest . . R. A. Coll., Cirencester.
GORE, Leicester . . Hartford, Cheshire.
GRAHAM, Y. R. . . Yardley, Birmingham.
GRANT, C. E. . . King's College, Cambridge.
‡GREAVES, A. H. . . Hankelow, Nantwich.
GREEN, R. H. . . The Park, Wrotham, Kent.
HAGEN, B. B. . . Sway House, Lymington.
‡HILL, John Smith . . The Beeches, Woodbridge.
HOSKEN, Wm. J. . . Loggans Mill, Hayle.
JAMES, R. B. . . Hallsannery, Bideford.
JOHNSON, Chas. F. . . Charlecote, Marple, Ches.
‡JONES, C. B. . . 3 Idris Terrace, Dolgelly.
‡JONES, Frank V. . . Bodfeirig, Anglesey.
JONES, Wm. A. . . Leigh Lodge, Knutsford.
KEELER, Walter . . Ridley Road, Rochester.
LEGGE, Henry C. . . Dorking.
LOMAX, R. T. . . Clayton Hall, Accrington.
MACAN, Captain Hy. P. . . Peak, Scarborough.
MASON, Chas. . . Forton Hall, Newport, Salop.
MASON, Geo. . . Warton Grange, Newport, Salop.
MORTEN, Hy. . . Goyt Hall, Bredbury, Stockport.
PAGET, Chas. J. . . Ashton Hayes, Chester.
PAIN, Geo. L. . . Silverdale, Carnforth.
PARSONAGE, Thomas . . Nantwich.
POYSER, H. A. . . Rose Cottage, Wrexham.
PROBERT, E. O. . . Hope, Mold, Flints.
‡RAFFETY, H. W. . . High Wycombe, Bucks.
‡RASTALL, R. H. . . The Priory, Grosmont, Yorks.
SCHWABE, Clifford . . Hart Hill, Pendleton.
SIMPSON, A. . . Haunton Manor, Tamworth.
STRINGER, J. G. . . Crowley, Northwich.

‡ Life Member by Examination.

SUTTON, F. R...Coates, Cirencester.
THOMAS, E. D...Treago, Ross, Herefordshire.
THORNILEY, Geo. H...Shooters Hill Ho., Wem.
TIMMIS, Wm. W...Forton, Montford Bridge.
TOWNSEND, Geo...Biggen Farm, Fordham.
TURNER, J. S...White House, Suckley, Worc.
VERNON, A. L...Hilton Pk., W'hampton.
VILLIERS, Wm. N...8 Grosvenor Square, W.
‡WARD, M. H...Agril. Coll., Aspatria.
WATKINS, W...Harmer Hill, Salop.
WHITE, John...Barryfield, Warrington.
WILLIAMS, E. M...Prospect Ho., Hope, Mold.
WILSON, S. H...Broddan, Isle of Man.
‡WILSON, Wm...Goody Hills, Maryport.
WORMLEY, Wm...Kelfield Grange, Escrick.
YATES, Capt. E. W. Park...Inee Hall, Chester.

‡ Life Member by Examination.

The reports of the various Standing Committees were then presented and adopted, as below:—

Finance.

Sir NIGEL KINGSCOTE (Chairman) reported that the accounts for the period ended May 27, as certified by the Society's Accountants, showed receipts amounting to 1,962*l.* 1*s.* 10*d.*, and expenditure to 1,440*l.* 1*s.* 4*d.* The balance at the bankers' on May 27 last, allowing for cheques outstanding, was 9,115*l.* 2*s.* 2*d.* Accounts amounting in all to 6,797*l.* 16*s.* 4*d.* had been passed, and were recommended for payment. The Committee had considered various applications for the purchase, at reduced prices, of large quantities of tickets for the shilling days at the Chester Meeting, and recommended that *bonâ fide* employers of labour be allowed to purchase not less than 100 tickets at the price of 4*l.*, tickets beyond that quantity being sold in packets of twenty-five only, at the rate of 1*l.* The Committee had considered the question as to the sale to the Local Committee, at reduced rates, of a number of season tickets and day tickets in excess of the free allowance of tickets already granted to them, but the Committee were of opinion that it was very undesirable to alter the arrangement made in December last as to the issue by the Society of tickets to Local Committees for subscribers to local funds.

House.

Sir NIGEL KINGSCOTE (Chairman) reported that the prospectus of the Harewood House Debenture Stock had now been issued.[1] The Committee had nominated four architects to send in competition designs for the new buildings, and recommended that the Secretary and Surveyor be instructed to draw up a detailed specification of the accommodation required, as soon as possible after the Chester Meeting. The Committee recommended that the parish rates for the present year be paid "under protest," in accordance with the advice of the Society's Solicitors.

Sir NIGEL KINGSCOTE said the Council would be interested to know that they were making excellent progress with regard to the subscriptions to the Harewood House Debenture Stock; but as the purchase money had to be paid in July, he desired to ask individual members of the Council to do what they could to obtain additional subscriptions to the Stock. He had the pleasure to announce that they had that morning received subscriptions for 2,500*l.* of the Stock, including 1,500*l.* from the Duke of Devonshire, and 500*l.* from the Duke of Sutherland. (Hear, hear.)

Journal.

Earl CATHCART (Chairman) reported that various payments for printing, &c., had been passed, and referred to the Finance Committee. A detailed statement, comparing the cost of the production of the Journal in its half-yearly form previous to 1890 with its quarterly form as issued since that time, was laid upon the table. A letter had been received from the Meteorological Office asking if any changes were desired in the list of recipients of the Hay Harvest Forecasts for 1893. The Committee drew the attention of the Members of Council to the results of previous Forecasts, which appeared to have been satisfactory, and they recommended that the Secretary be instructed to ask the Meteorological Office if the names of any members of the Council who might express a desire to receive the Forecasts in future could be added to the list. Directions had been given to the Editor as to the contents of the forthcoming number of the Journal, and as to various suggestions which had been received for articles and notes.

Earl CATHCART said it was remarkable how successful the Hay

[1] See statement on page lxxix.

Harvest Forecasts had been. The percentage of complete success was something like 56, and it was very seldom that there had been any total failure in these prognostications of "the Clerk of the Weather." He understood that the recipients of these Forecasts were expected to post them in some public place for general information.

In answer to a question by Sir MATTHEW RIDLEY,

Lord CATHCART stated that the mean results of the Forecasts as issued in 1892 were as follows:—Complete success, 56 per cent.; partial success, 32 per cent.; partial failure, 10 per cent.; total failure, 2 per cent.; total percentage of success, 88 per cent.

Chemical.

Mr. WARREN presented the usual Quarterly Report of this Committee, which, on his motion, was adopted and ordered to be published in the Journal (see page 363). He also reported that the Committee had considered a correspondence with Messrs. A. Whittet and Co. as to the appearance of the name of that firm in the last Quarterly Report of the Committee, and they had passed the following resolution, which they recommended for publication in the Proceedings of the Council, and also in the next number of the Journal:—

Referring to a case of linseed cake sold to Mr. C. Lethbridge, of Sherfield Manor, Basingstoke, and reported in the last number of the Society's Journal (Vol. IV., Part I., page 145), the Committee, on further inquiry, regret that the name of Messrs. A. Whittet and Co. was introduced into the case, and, in justice to Messrs. Whittet and Co., the Committee publish the letter which has been received from them [see page 363].

The Report of the Woburn Sub-Committee, presented by Mr. Warren, was also adopted, and the date of the Committee's annual visit of inspection to the farm was fixed for Wednesday, June 7th.

Seeds and Plant Diseases.

Mr. BOWEN-JONES stated that Mr. Warburton, the Society's Zoologist, had reported a number of inquiries from Members, which he had received and dealt with, relating to insect pests, voles, and disorders of fowls. The Committee had given lengthened consideration to a scheme for an inquiry into the disease of finger-and-toe in turnips, which had been drafted by Mr. Carruthers from a botanical, and by Dr. Voelcker from a chemical point of view. They had drawn up the following series of questions relating to the disease, which they recommended should be printed and issued forthwith to all the Members of the Council, and to any others who were known as likely to be in a position to afford information on the subject:—

INQUIRY INTO "FINGER-AND-TOE," ANBURY, OR CLUB-ROOT.

(Caused by the fungus, *Plasmodiophora Brassicæ*.)

1. Have you on your farm a field or fields on which "finger-and-toe" is always liable to occur?
2. Are the crops, as a rule, seriously or only slightly affected by "finger-and-toe"?
3. Have you, at the same time, on your farm a field or fields where "finger-and-toe" never appears?
4. Will either or both of these two kinds of fields be in roots this season?
5. (*a*) Have you grown a *healthy* crop of turnips on a field on which a previous crop had been attacked by this disease?
(*b*) What interval elapsed between the diseased crop and the following healthy crop?
(*c*) What was the cultivation and crop of each intervening year?
6. (*a*) Have you had a *diseased* crop of turnips on a field on which a previous diseased crop had grown?
(*b*) What interval elapsed between the two crops?
(*c*) What was the cultivation and crop of each intervening year?
7. What is the nature of the soil, and on what geological formation is it?
8. Have you noticed whether the prevalence or absence of "finger-and-toe" is associated with any peculiarity of the season?
9. Have you applied anything to the land which you believe has alleviated or cured the injury? And, if so, what was it?
10. What is the name and postal address of your farm?
11. Which is the nearest railway station, and what is its distance from your farm?

Dr. Voelcker had been authorised to make personal visits of inspection to the fields in those cases which, from the replies received, he might consider it desirable to visit, especially with the view of analyses being taken of soils infected with the disease, and of adjacent soils which were not so infected. The Committee invited the particular attention of the Council to this inquiry, and would be greatly obliged if individual members of the Council would either send replies to the questions themselves, or supply the Secretary with

the names and addresses of any farmers in their neighbourhood or county to whom the schedule of questions might usefully be sent. Mr. Carruthers had undertaken, at the request of the Committee, to carry out a series of experiments, with a view to determine the influence of mineral additions to the soil on the fungus causing the disease.

As no entries had been received in Classes 325, 326, and 327 (preserved vegetables, &c.) for the Chester Meeting, the Committee recommended that they be eliminated from the schedule for the Cambridge Meeting of 1894, but that prizes be offered for whole fruit, jams, bottled fruits, and preserved fruits. Mr. F. S. W. Cornwallis, M.P., had been added to the Committee.

Mr. BOWEN-JONES having read a letter from Mr. Whitehead, Chairman of the Committee, regretting his inability to attend the Council, said that with reference to the proposed inquiry into the disease of finger-and-toe in turnips, it was the intention of Mr. Carruthers to have a quantity of the soil from the Woburn Farm brought up to his own house, to be placed in pots along with the germs of anbury, for the purpose of investigating the action of the disease. He would also apply different chemical mineral re-agents, and notice their effect upon the disease. At the same time it was proposed that duplicate experiments should be tried at the Woburn Farm, under the direction of Dr. Voelcker, who would act in conjunction with Mr. Carruthers.

Some conversation arose as to the suggestion of the Committee that the prizes for jams and preserved fruits should be continued at the Cambridge Meeting, in which Mr. BOWEN-JONES, Mr. WHEELER, the Hon. CECIL T. PARKER, and Mr. SANDAY took part; and eventually it was decided that no formal announcement on the subject should be made until the Stock Prizes Committee had had an opportunity of considering the proposals of the Seeds and Plants Committee.

Veterinary.

Sir JOHN THOROLD (Chairman) reported that the Committee, having considered the Report of the Departmental Committee on Swine Fever, recommended that the following resolution be adopted by the Council and forwarded to the Board of Agriculture:—

> The Council desire to express their entire agreement with the conclusions of the Departmental Committee on Swine Fever, and they trust that their recommendations may be carried into effect with the least possible delay.

The Committee recommended that the times of the Horse-shoeing Competitions at Chester be fixed as follows:—Class I., Tuesday, June 20, at 10 a.m.; Class II., Thursday, June 22, at 10 a.m. Also that a lecture on Farriery be given in the Horse-shoeing Department on Wednesday, June 21, at 12 noon.

The following report had been received from Professor Brown:—

> PLEURO-PNEUMONIA.—Since the last meeting of the Council, there have been two outbreaks of this disease discovered in Great Britain. The first of these occurred near Barnsley, where cases were found among the nine cattle on the premises. The other outbreak took place at Hendon, on a dairy farm where there were 145 head of cattle. In the course of slaughtering out these animals, ten cases of the disease were found.
>
> SWINE FEVER.—In the twenty weeks ended May 20 there have been 1,663 fresh outbreaks of this disease reported in Great Britain, and 5,244 pigs attacked. In the corresponding period of last year there were 790 outbreaks, and 4,906 pigs attacked.
>
> ANTHRAX.—Since the beginning of the year there have been 183 outbreaks of anthrax reported, and 412 animals attacked. This is a very considerable increase over the returns for the corresponding period of last year, when there were 101 outbreaks, and 203 animals attacked.
>
> RABIES.—This disease is still on the increase, three cases being reported in the week ending May 20. There have been since the beginning of the year twenty-six cases recorded, as compared with nine in the corresponding period of last year.

The resolution as to swine fever, recommended by the Veterinary Committee, was formally moved by Sir JOHN THOROLD, seconded by Sir NIGEL KINGSCOTE, and carried unanimously, a copy being ordered to be sent to the Board of Agriculture.

Stock Prizes.

Mr. SANDAY (Chairman) reported that various letters connected with entries for the Chester Meeting had been read and directions given thereon. Three entries of White Castlemartin cattle were accepted

for competition in the Welsh cattle classes, in the absence of any clear evidence that they were ineligible for the Herd Book. Various entries of pigs were accepted, on the understanding that the attention of the exhibitors should be clearly drawn to the regulations of the prize sheet. It had been decided that, in addition to the general disclaimer as to the non-responsibility of the Society printed at the beginning of the catalogue, the following note should be placed at the head of each breed of animals :— "The responsibility for the accuracy of the description, pedigree, or eligibility to compete of the animals entered in the following classes rests solely with the exhibitors." The Committee proposed to consider at their next meeting to be held in London (Tuesday, July 25) the composition of the prize sheet for the Cambridge Meeting of 1894, together with any alterations in the regulations or entry fees that might be found desirable for the limitation of the entries. The Committee had accepted the prize for salt butter to be delivered on February 1, 1894, suggested by the Dairy Committee, and recommended that the entries close on January 1, 1894. The Committee had considered the recommendation of the Seeds and Plant Diseases Committee as to a renewal of the prizes for jams and preserved fruits; but, in view of the small number of entries, they did not think any public announcement as to these prizes should be made until they had had an opportunity of considering the matter. Mr. J. Marshall Dugdale had been added to the Committee.

Judges' Selection.

Mr. SANDAY (Chairman) reported that the Committee had confirmed the appointment of Mr. Eustace Elliott, of Landulph Hall, as an additional Judge of Cider, and of Messrs. Roger Bate, of The Ash Hill, Tarporley, and Henry Thompson, of Liverpool, as additional judges of Cheshire Cheese.

Implement.

Mr. FRANKISH (Chairman) reported that various letters as to the sheep-shearing competitions and demonstrations had been read, and directions given thereon. Any action necessary to be taken before the next meeting of the Committee, on July 25, as to the trials of sheaf-binders, had been left in the hands of the Chairman, the Honorary Director, and the Secretary. As the space which would be available for the Cambridge showyard could not be increased, the Committee recommended that notice be given to exhibitors that some reduction in the space that could be allotted to them would probably become necessary.

General Chester.

Viscount BRIDPORT reported that the programme for the forthcoming Chester Meeting had been discussed and finally settled. The question of the issue of tickets on the shilling days in large quantities at reduced rates had been discussed, and the Committee recommended that *bonâ fide* employers of labour be allowed tickets at the rate of 1*l.* for twenty-five, not less than 100 to be taken at a time. The Committee recommended that application be made to the Chief Commissioner of Police for the services of the same number of constables of the A Division as at Doncaster and Warwick.

Various applications from societies asking for permission to hold meetings in the showyard had been acceded to, and the following time table for them had been arranged :—

Tuesday, June 20, 1893.

National Sheep Breeders' Association	10 0 a.m.
Shropshire Sheep Breeders' Association	10 30 a.m.
Polo Pony Stud Book Society	11 0 a.m.
Royal Agricultural Society	12 30 p.m.
Shire Horse Society	2 0 p.m.
Shorthorn Society	2 30 p.m.
North Wales Black Cattle Society	2 45 p.m.
Hereford Herd Book Society	3 0 p.m.
Cotswold Sheep Society	3 30 p.m.
National Pig Breeders' Association	4 0 p.m.

Wednesday, June 21, 1893.

Hackney Horse Society (Council)	11 0 a.m.
British Berkshire Society	12 noon
Hunters' Improvement Society	2 0 p.m.
British Bee-Keepers' Association	3 0 p.m.
Agricultural Exhibitors' Association	3 30 p.m.

Showyard Works.

Sir JACOB WILSON (Chairman) reported that the implement yard was quite completed, and that the whole

of the stock yard was in hand. The Committee recommended that, in view of the very numerous societies that now desire to have meetings in the showyard on the early days of the Show, the Surveyor be instructed to erect a second platform at the end of the Members' Tent, and to arrange for a canvas division so as to divide the tent in two. The arrangements for the ambulance station had been approved. The Committee had arranged for a special Cloak Room (for the use of Members only) in the Members' Pavilion, a fee of 2*d.* per person to be paid by Members leaving parcels. The Committee recommended that a note respecting this arrangement be made in the programme for the information of Members.

Selection.

Upon the motion of Earl CATHCART, Mr. Crutchley was appointed Steward of Implements for the Chester Meeting, in the room of Mr. D. Pidgeon, who was unable to undertake the duties in consequence of ill-health.

Education.

Mr. TREMAYNE reported that thirty-seven candidates entered, and thirty actually competed, at the Society's Senior Examinations, which took place from the 9th to the 13th inst. at the Examination Hall, Thames Embankment. The Committee had agreed upon a detailed Report (see page 367) embodying the results of the examination, and the various points dealt with by the Examiners, from which it appeared that fourteen of the thirty candidates who competed had gained first-class certificates with the Life Membership of the Society, and eight others had gained second-class certificates.

In reference to the letter which the Council at their last meeting addressed to the Vice-Chancellor of the University of Cambridge, the Committee noted with satisfaction that the Council of the Senate had recommended the appointment of a Special Syndicate "to consider whether it was desirable to establish an examination in Agricultural Science and to grant a diploma connected therewith under the supervision of a Special Managing Syndicate, and, if desirable, to draw up regulations for the examination and for the constitution of the Syndicate." The Secretary had been authorised to make the usual arrangements for the holding of the Society's Junior Examination on November 7 and 8 next.

Dairy.

The Hon. C. T. PARKER (Chairman) reported that in the number of entries the butter-making competitions was:—Class I., 17 entries; Class II., 37 entries; Class III., 11 entries; Class IV., 20 entries; total, 85 entries.

The Committee had settled the programme for the demonstrations by Miss Maidment, and fixed the times for the butter-making competitions as under:—

Class I.	Tuesday, June 20, 2 p.m.
„ II.	Wednesday, June 21, 2 p.m.
„ III. & IV.	Thursday, June 22, 2 p.m.
Champion Class	Friday, June 23, 11 a.m.

They recommended that the classes of Cheshire Cheese be judged as follows:—Classes 296–297 by Messrs. Oubridge and Stone; Classes 298–300 by Messrs. Bate and Pedley; Classes 301–303 by Messrs. Cawley and Thompson. The Committee recommended that exhibitors sending butter from a distance be asked to send their packages to the showyard by parcel post instead of by rail. In view of the very large entries of cheese and other produce, the Committee recommended that the cheese shed be not open to the public until the Tuesday of the Meeting; a notice to this effect to be inserted in the programme and in the circulars addressed to exhibitors.

Cambridge Meeting of 1894.

Mr. SANDAY, in moving, pursuant to notice, "That a sum not exceeding 5,000*l.* be placed at the disposal of the Stock Prizes Committee for providing prizes for live stock, poultry, and produce at the Cambridge Meeting of 1894," said that the whole of the sum asked for would not necessarily be offered in prizes, and that the Committee would do their best to keep the amount within limits. They felt very strongly that the very large increase in the entries necessitated some alterations with regard to the regulations and entry fees. They proposed on a subsequent occasion to make some suggestions on the

subject for the consideration of the Council.

The motion was seconded by the Hon. CECIL PARKER, and carried unanimously.

Mr. WALTER GILBEY presented a numerously-signed memorial from residents in the counties included in the district of the Cambridge Meeting of 1894, asking that prizes may be offered at that Meeting for various descriptions of grain and mustard seed. He said that as the Council had accepted the recommendation of the Stock Prizes Committee that the large sum of 5,000*l.* should be placed at the disposal of the Committee for prizes at the Cambridge Meeting, he hoped that when the time arrived for dealing with the matter a small sum might be devoted towards the prizes for which the petitioners had asked. He suggested that the matter should be referred to the General Cambridge Committee as soon as formed.

Mr. MARTIN having also supported the object of the memorial, and expressed the hope that early intimation would be given if the prizes were decided upon, the question was ordered to be referred to the General Cambridge Committee for consideration at their first meeting on July 25, in accordance with Mr. Gilbey's suggestion.

A letter from the Mayor of Cambridge, as to the date to be fixed for holding the Cambridge Meeting, was referred to the same Committee.

Conveyance of Men in Charge of Live Stock.

The Earl of FEVERSHAM stated that, in the unavoidable absence of the Duke of Westminster, it had devolved upon him, as ex-President, to introduce the influential joint deputation to the Railway Managers which, at their last meeting, the Council decided to organise of the leading Agricultural and Breed Societies, for the purpose of urging a reconsideration of the decision of the companies to discontinue the free conveyance of men travelling in charge of live stock to and from agricultural shows, and the restoration of the arrangement heretofore in force, under which such men were conveyed free. He was happy to inform the Council that the Chairman of the Managers announced on that occasion that he and his colleagues were unanimous in recommending that the concession asked for should be granted, and that the old arrangements with regard to the free conveyance of men travelling in charge of live stock to and from agricultural shows should be restored, this decision taking immediate effect.

The following were the societies represented at the deputation :—

AGRICULTURAL SOCIETIES.

Royal Agricultural Society of England—The Earl of Feversham (ex-President), Sir Jacob Wilson, Mr. H. Chandos-Pole-Gell, Mr. F. S. W. Cornwallis, M.P., Mr. Walter Gilbey, Mr. C. W. Wilson, Mr. Ernest Clarke (Secretary).

Highland and Agricultural Society of Scotland—Mr. James Macdonald (Secretary).

Bath and West and Southern Counties Society—Sir J. F. Lennard, Bart. (Chairman of the Stock Prize Sheet Committee), Mr. Martin J. Sutton.

Royal Counties—Mr. James Dymore Brown, Sir Henry Simpson, Mr. Thomas Stirton, Mr. W. M. Harris, Mr. C. Simmons (Secretary), Mr. C. F. Simmons (Assistant-Secretary).

Smithfield Club—The Marquis of Huntly (Vice-President), the Earl of Coventry (Vice-President), Mr. Howard P. Ryland Steward), Mr. E. J. Powell (Secretary).

Royal Manchester, Liverpool, and North Lancashire—Mr. William Scotson (Chairman of Showyard Committee), Mr. James Birch (Secretary).

Birmingham Agricultural Exhibition Society—Mr. H. P. Ryland.

Bedfordshire—Mr. H. R. J. Swaffield (Secretary).

Cambridgeshire—Mr. R. Peters (Secretary).

Gloucestershire—Mr. T. R. Hulbert (Secretary).

Herefordshire—The Earl of Coventry, Mr. Alfred Edwards (Secretary).

Leicestershire—Mr. J. Glover, Mr. Henry Humphreys, Mr. J. T. Ardron (Secretary).

Lincolnshire—Mr. Jonas Webb, Mr. A. H. Clark.

Norfolk—Mr. Francis Taylor, M.P.

Nottinghamshire—Mr. Philo L. Mills.

Oxfordshire—Mr. J. Pittman King.

Radnorshire—Mr. F. Edwards, M.P.

Shropshire and West Midland—Mr. M. Hulton Harrop (Hon. Director).

Somerset Agricultural Association—Mr. Alfred Peace (Vice-President).

Suffolk—Mr. Ernest Prentice.

Yorkshire—The Earl of Feversham, Colonel Gunter, M.P., Mr. Marshall Stephenson (Secretary).

BREED SOCIETIES.

HORSES.

Royal Commission on Horse Breeding—The Duke of Portland, General Ravenhill.

Cleveland Bay Horse Society—Mr. George Seoby (President), Mr. W. Searth Dixon (Secretary).

Hunters' Improvement Society—Dr. Thomas Bond, Major-General John Fryer, C.B.
Hackney Horse Society—Mr. C. E. Galbraith, Mr. W. Pope.
Shire Horse Society—Captain Heaton, Mr. P. Albert Muntz, M.P.
Suffolk Horse Society—Mr. Fred. Smith (Secretary).
Yorkshire Coach Horse Society—Mr. John White (Secretary).

CATTLE.

Shorthorn Society of Great Britain and Ireland—Sir Jacob Wilson (President), Mr. Philo L. Mills (Vice-President), Lord Moreton, Mr. E. J. Powell (Secretary).
Hereford Herd-Book Society—The Earl of Coventry.
English Jersey Cattle Society—Mr. Ernest Matthews.
English Guernsey Cattle Society—Sir John Lennard, Bart., Mr. Julian Stephens (Secretary).
Polled Cattle Society—The Marquis of Huntly.
Red Polled Society—Lord Amherst of Hackney.

SHEEP.

Cotswold Sheep Society—Mr. M. Hulton Harrop.
Dorset Horn Sheep Breeders' Association—Lord Bridport (President).
Hampshire Down Sheep Breeders' Association—Mr. W. M. Harris.
Lincoln Longwool Sheep Breeders' Association—Mr. Robert Wright, jun.
National Sheep Breeders' Association.—Mr. H. F. Locke-King (President), Mr. W. W. Chapman (Secretary).
Oxford Down Sheep Breeders' Association—Mr. W. D. Little.
Suffolk Sheep Society—Mr. E. Prentice (Secretary).

PIGS.

National Pig Breeders' Association—Mr. Philo L. Mills (President), Mr. Denston Gibson.
British Berkshire Society—Lord Middleton (President).

Several other societies, not able to send representatives, had expressed in writing their concurrence in the object of the deputation.

The following official letter on the subject had since been received by their Secretary:—

Railway Clearing House,
Seymour Street, Euston Square, N.W.
May 12th, 1893.

DEAR SIR,—I am in receipt of your letter of yesterday, with enclosures, and have the pleasure to confirm what was stated verbally to your deputation—viz. that the railway managers agree to revert to the arrangement in force last year, under which men travelling *bonâ fide* in charge of live stock (including horses) to or from shows will be conveyed free in the same train as the animals—one man for each vehicle—upon presentation of a duly authenticated certificate. This arrangement will include all railway companies in Great Britain, and will apply to both passenger and goods train traffic.—Yours truly,

H. SMART.

Ernest Clarke, Esq., Secretary,
The Royal Agricultural Society of England,
12, Hanover Square, W.

Country Meeting of 1895.

Mr. MUNTZ said that, in accordance with the undertaking which he gave at the last meeting, he communicated with the Mayor of Birmingham and with leading gentlemen in the county of Warwick as to the Society's Country Meeting being held at Birmingham in 1895. He found the general opinion to be that, as the Meeting was held at Warwick last year, it would be too soon to hold the Country Meeting at Birmingham in 1895, and it had, therefore, been considered advisable by the local authorities to postpone an invitation to the Society until a longer period had elapsed.

Sir JACOB WILSON said that under these circumstances he desired, as Chairman of the Special Committee appointed last year with regard to the rotation of districts, to move formally, "That the Country Meeting of 1895 be held in the Society's District B, consisting of the counties of Cumberland, Durham, Northumberland, and Westmoreland."

This was seconded by the Hon. CECIL T. PARKER, and carried unanimously.

Jubilee of Rothamsted Experiments.

On the motion of Mr. DENT, seconded by Mr. MARTIN, it was resolved to present an address from the Society to Sir John Lawes and Dr. Gilbert on the occasion of the Jubilee of the Rothamsted Experiments.

Dates of Future Meetings.

Various letters and other documents having been read and laid upon the table, the Council adjourned until Wednesday, June 21, 1893, at 1 p.m., in the showyard at Chester, and it was at the same time arranged that a meeting of the Council should be held in the Council Pavilion in the showyard at 1 p.m. daily, from Monday, June 19, to Friday, June 23, inclusive. The general meeting of Governors and Members was fixed to be held in the large tent in the showyard at 12.30 p.m. on Tuesday, June 20.

Proceedings at 54th Anniversary Meeting of Governors and Members.

HELD IN THE HALL OF THE ROYAL MEDICAL AND CHIRURGICAL SOCIETY, 20 HANOVER SQUARE.

MONDAY, MAY 29, 1893,

THE DUKE OF WESTMINSTER, K.G. (PRESIDENT), IN THE CHAIR.

THE fifty-fourth anniversary general meeting of Governors and Members was, in order to comply with Clause 6 of the Charter, held, *pro formâ*, at 12, Hanover Square, on May 22, 1893 (Whit Monday), Earl Cathcart, Trustee, in the chair, but was immediately adjourned until the following Monday, May 29th, when it was held in the hall of the Royal Medical and Chirurgical Society, at 20, Hanover Square, his Grace the Duke of Westminster, K.G., President, in the chair.

Present:—

Trustees.—General Viscount Bridport, G.C.B., Earl Cathcart, Mr. John Dent Dent, Colonel Sir Nigel Kingscote, K.C.B., Right Hon. Sir Matthew White Ridley, Bart., M.P.

Vice-Presidents.—Right Hon. Sir Massey Lopes, Bart., Sir John Thorold, Bart.

Other Members of Council.—Messrs. G. Mander Allender, J. Bowen-Jones, James A. Caird, F. S. W. Cornwallis, M.P., the Earl of Coventry, Messrs. Percy E. Crutchley, Joseph Martin, Hon. Cecil T. Parker, Duke of Portland, Sir Joseph Spearman, Bart., E. W. Stanyforth, Martin J. Sutton, John Tremayne, and Sir Jacob Wilson.

Governor.—Sir George Macpherson Grant, Bart.

Members.—Lord Ribblesdale, Sir Henry Simpson, Messrs. T. Davies Burlton, Arthur Carey, Arthur Coode, Thomas Dunn, Henry Field, John Gilmour, H. J. Greenwood, Frederick King, Claude M. Pilkington, Professor William Pritchard, Major-General Ravenhill, Messrs. Emil Reiss, R. Henry Rew, G. F. Sheppard, J. Herbert Taylor, &c.

Officers.—Mr. Ernest Clarke, Secretary; Dr. J. Augustus Voelcker, Consulting Chemist; Mr. Cecil Warburton, Zoologist.

The SECRETARY having read the Bye-Laws governing the transaction of business at the anniversary meetings,

President for 1893-4.

Lord RIBBLESDALE moved: "That his Grace the Duke of Devonshire, K.G., be elected President of the Society for the year ensuing the Chester Meeting."

Mr. JOSEPH MARTIN (Isle of Ely) seconded the motion, and said he was sure that the election of his Grace as President of the Society would be very acceptable to the county and town of Cambridge.

The motion having been carried unanimously,

The PRESIDENT read a letter from the Duke of Devonshire, expressing his regret that he was unable to get back from Ireland in time to attend the meeting.

Re-election of Council.

The Trustees and Vice-Presidents having been re-elected by show of hands, the election of twenty-five members of Council was proceeded with, and the PRESIDENT appointed Mr. Arthur Carey, Mr. H. J. Green

wood, and Mr. Claude M. Pilkington to act as Scrutineers of the voting papers. These having been duly collected, and the report of the Scrutineers thereon received, it was announced that the twenty-five members of Council who retired by rotation had been re-elected.

The SECRETARY then read an abstract of the Report of the Council to the meeting (see page 355).

Sir HENRY SIMPSON, in moving the adoption of the Report, said that nearly all the paragraphs presented matter of congratulation. He was glad to find that the number of members of the Society was so satisfactory, and showed an increase on the previous year. The financial statement also was better than last year. With regard to the future housing of the Society, he thought they must all feel deeply indebted to his Grace the Duke of Westminster and to Mr. Walter Gilbey for kindly coming forward and securing that building, which he trusted in future would be the home of the Society. (Cheers.) If there was one matter of which to speak regretfully, it was the retirement of Sir Jacob Wilson as Honorary Director of the Society's Country Meetings. He felt sure they would all regret very much losing Sir Jacob's valuable assistance; but perhaps the only matter which would cause them to regret his retirement less was the fact of the able gentleman who had been appointed as Sir Jacob's successor. They felt perfectly certain that under Mr. Parker's management the duties would be carried on in the same excellent manner in which they had hitherto been performed.

General RAVENHILL seconded the motion.

Mr. FREDERICK KING thought the Society was greatly indebted to the liberal spirit in which their noble President and their friend Mr. Walter Gilbey had acted in the matter of the housing of the Society. It had long been a wish of his that the Society should possess a worthy home of its own. He thought, however, that they were following the shadow and forgetting the substance. He deprecated the proposal to house other agricultural societies besides the Royal, and thought that the Royal Agricultural Society should be kept distinct by itself. He thought the value of the property, especially of the frontage to Oxford Street, had been underrated, and that to build a house worthy of the Society, and also one architecturally worthy of Hanover Square, would take at least 20,000*l.* more than had been estimated.

The PRESIDENT said that he listened with the greatest possible pleasure to Mr. King's remark as to the value of the premises being so very much higher than the estimate. He hoped that opinion might prove to be founded on fact, and that therefore they might be able to dispose of that part of the property not required for the purposes of the Society at a substantial profit. It was the intention of those who had the matter in hand that a building worthy of the Royal Agricultural Society should be erected. They must consider the funds which were likely to be obtained; but they hoped to have a modest, respectable building, suited to the requirements and the aspirations of that great Society.

The motion for the adoption of the Report was then put, and carried unanimously.

Vote of Thanks to Chairman.

No one rising in response to the usual inquiry from the chair as to whether any Governor or Member had any remarks to make or suggestions to offer that might be referred to the Council for consideration,

The Duke of PORTLAND said he had much pleasure in proposing that a hearty vote of thanks be given to the Duke of Westminster for having taken the chair at that meeting. No words were necessary from him to cause them to pass such a vote most heartily.

Sir GEORGE MACPHERSON GRANT having seconded the motion, it was put by the SECRETARY, and carried unanimously.

The PRESIDENT briefly acknowledged the vote of thanks, and the proceedings then terminated.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

Guide to the Purchase of

FEEDING-STUFFS AND MANURES.

FEEDING-STUFFS.

Linseed-cake, Cotton-cake (Decorticated and Undecorticated), and **Rape-cake** (for feeding purposes) should be purchased according to the Society's form of contract. A supply of these forms will be sent to any Member upon application.

Purchasers are reminded that the use of such terms as "best," "genuine," "95 per cent.," "oil-cake," &c., affords no security against adulteration.

Mixed Feeding-cakes, Meals, &c., should be purchased with a guarantee of analysis and of fitness for feeding purposes.

On delivery of a purchase, a sample should at once be taken from the bulk, one half to be sent for analysis, and the other half retained for reference.

MANURES.

Raw Bones, Bone-meal, or **Bone-dust** should be guaranteed "PURE," and to contain from 45 to 48 per cent. of Phosphate of Lime, and not less than 4 per cent. of Ammonia.

Boiled Bones should be guaranteed "PURE," and to contain from 55 to 60 per cent. of Phosphate of Lime, and not less than 1 per cent. of Ammonia.

Mineral Superphosphate of Lime should be guaranteed to contain a certain percentage of "Soluble Phosphate." [From 25 to 28 per cent. of Soluble Phosphate is an ordinarily good quality.]

Dissolved Bones should be guaranteed to be "made from raw bone and acid only," and should be sold to contain stated percentages of Soluble Phosphate, Insoluble Phosphates, and Ammonia.

Compound Artificial Manures, Bone-manures, Bone Compounds, &c., should be sold by analysis stating the percentages of Soluble Phosphate, Insoluble Phosphates, and Ammonia contained.

Peruvian Guano should be described by that name, and be sold with a guarantee of analysis.

Sulphate of Ammonia should be guaranteed to be "PURE," and to contain not less than 24 per cent. of Ammonia.

Nitrate of Soda should be guaranteed to contain 95 per cent. pure Nitrate of Soda.

Kainit should be guaranteed to contain 23 per cent. of Sulphate of Potash.

All manures should be guaranteed to be delivered in good and suitable condition for sowing.

Upon delivery of a purchase, a sample should at once be drawn from the bulk, one half to be sent for analysis, and the other half retained for reference.

Instructions for Selecting & Sending Samples for Analysis.

GENERAL INSTRUCTIONS.[1]

1. A sample taken for analysis should be fairly *representative of the bulk* from which it has been drawn.

2. The sample should reach the Analyst *in the same condition* as it was at the time when drawn.

FEEDING-STUFFS.

Linseed, Cotton, and other Feeding Cakes.—If a single cake be taken, it should be broken across the middle, and off each half and along the middle line, two strips about four inches wide should be broken off right across the cake, one piece to be sent for analysis, and the other retained for reference. The piece forwarded for analysis can be wrapped in paper, and be sent by post or rail.

A more satisfactory plan is to select four to six cakes from different parts of the delivery, then break off a piece about four inches wide from the middle of each cake, and pass these pieces through a cake-breaker. The broken cake should then be well mixed, and about 1 lb. of it be forwarded, in a tin or bag, for analysis, the remainder being kept for reference. It is advisable, also, with the broken pieces to send a small strip from an unbroken cake.

Feeding-meals, Grain, &c.—Handfuls should be drawn from the centre of half-a-dozen different bags of the delivery; these lots should then be well mixed, and two $\frac{1}{2}$-lb. tins or bags filled from the heap, one to be forwarded for analysis and the other retained for reference.

MANURES.

When **Manures** are delivered in bags, select four or five of these from the bulk, and either turn them out on a floor and rapidly mix their contents; or else drive a shovel into each bag and draw out from as near the centre as possible a couple of shovelfuls of the manure, and mix these quickly on a floor.

Halve the heap obtained in either of these ways, take one-half (rejecting the other) and mix again rapidly, flattening down with the shovel any lumps that appear. Repeat this operation until at last only some 3 or 4 lbs. are left.

From this fill two tins, holding from $\frac{1}{2}$-lb. to 1-lb. each, and send one for analysis, and retain the other for reference.

Or, the manure may be put into glass bottles provided with well-fitting corks, the bottles being then packed in wooden boxes and sent by post or rail.

When manures are delivered in bulk, portions should be successively drawn from *different parts* of the bulk, the heap being turned over now and again. The portions drawn should be thoroughly mixed, subdivided, and, finally,

[1] For more detailed directions as to the sampling of manures and feeding-stuffs, see Journal, Third Series, Vol. II., No. VIII., December, 1891, pp. 858–863.

samples should be taken as before, except that when the manure is coarse and bulky, it is advisable to send larger samples than when it is in a finely-divided condition.

SOILS, WATERS, &c.

Soils.—Have a wooden box made 6 inches in length and width, and from 9 to 12 inches deep, according to the depth of soil and subsoil of the field. Mark out in the field a space of about 12 inches square; dig round in a slanting direction a trench, so as to leave undisturbed a block of soil and its subsoil 9 to 12 inches deep; trim this block to make it fit into the wooden box, invert the open box over it, press down firmly, then pass a spade under the box and lift it up, gently turn over the box, nail on the lid, and send by rail. The soil will then be received in the position in which it is found in the field.

In the case of very light, sandy, and porous soils, the wooden box may be at once inverted over the soil and forced down by pressure, and then dug out.

Waters.—Samples of water are best sent in glass-stoppered Winchester bottles, holding half a gallon. Care should be taken to have these scrupulously clean. In taking a sample of water for analysis it is advisable to reject the first portion drawn or pumped, so as to obtain a sample of the water when in ordinary flow. The bottle should be rinsed out with the water that is to be analysed, and it should be filled nearly to the top. The stopper should be secured with string, or be tied over with linen or soft leather. The sample can then be sent carefully packed either in a wooden box with sawdust, &c., or in a hamper with straw.

Milk.—A pint bottle should be sent in a wooden box.

GENERAL SUGGESTIONS.

Time for Taking Samples.—In justice to the vendor it is only fair that samples, both of manures and feeding-stuffs, should be taken as soon after their delivery as possible. In every case the Analyst's certificate should be received before a manure is sown or a feeding-stuff is given to stock.

Procedure in the Event of the Vendor wishing Fresh Samples to be Drawn.—Should a purchaser find that the Analyst's certificate shows a manure or feeding-stuff not to come up to the guarantee given him, he may inform the vendor of the result and complain accordingly. If then the vendor should demand that a fresh sample be drawn, the purchaser must allow this, and also give the vendor an opportunity of being present, either in person or through a representative whom he may appoint. In that case, samples should be taken in the presence of both parties with the same precautions as before described, but it is advisable to draw *three* samples, *each* of which should be duly packed up, labelled, and *sealed* by both parties. One of these is to be given to the vendor, who may send it for analysis to whomever he may select, and the other *two* samples should be kept by the purchaser for reference or future analysis if necessary. But there is no occasion whatever at this stage for the *purchaser* to go to any further expense in having the fresh sample analysed on his behalf. This is a matter entirely for the *vendor*.

12, *Hanover Square, London, W.*
May, 1893.

All samples should be addressed (postage or carriage prepaid) to the Consulting Chemist of the Society, Dr. J. Augustus VOELCKER, 12, Hanover Square, London, W. Separate letters of instruction should be sent at the same time.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

STATEMENT AS TO HAREWOOD HOUSE THREE PER CENT. DEBENTURE STOCK.

THE present accommodation for the various agricultural societies that now have offices and hold monthly meetings in London has long been recognised as unsatisfactory.

As regards the ROYAL AGRICULTURAL SOCIETY in particular, the inadequacy of its house at No. 12, Hanover Square for the rapidly increasing operations of the Society has been for several years past under the anxious consideration of the Council; indeed, larger premises and greater facilities have now become imperative.

Of late years, moreover, a considerable number of other useful and nationally important agricultural organisations, such as Stud and Herd Book Societies and the like, have been established.

The Councils of these bodies, composed to a large extent of the same representatives, have been obliged to hold their monthly meetings in different parts of London, which involves a very disproportionate waste of the time and attention of gentlemen who come regularly great distances, from all parts of the country, to perform valuable voluntary services for the welfare of agriculture and the nation generally.

It has been felt that great advantage would accrue if all these societies could be centred in one place, and if the Royal Agricultural Society could be placed in a position to offer the various societies office accommodation under the same roof.

The Society has now under offer, as a site for this purpose, part of the property known as Harewood House, next door to No. 12, Hanover Square. This site, otherwise extremely eligible, is rendered more suitable by the fact that for half a century Hanover Square has been looked upon as the headquarters of agriculture in England.

The site for the new buildings will cost 35,000*l.*, and it is estimated that the buildings themselves will cost another 25,000*l.*, so that (in order to provide for contingencies) it is necessary to raise some 65,000*l.* in all.

After mature deliberation, the Council of the Royal Agricultural Society have unanimously passed the following Resolution:—

> "That steps be forthwith taken to invite subscriptions for Stock to be issued for an amount not exceeding 65,000*l.*, to carry interest at the rate of 3 per cent. per annum, to be denominated HAREWOOD HOUSE DEBENTURE STOCK, and to be secured upon the portion of the Harewood House Premises about to be acquired by the Society, but without recourse to the Society's General Funds."

A copy of the Trust Deed constituting and securing the Stock, intended to be executed between the Society of the one part, and the DUKE OF WESTMINSTER, K.G., Sir WALTER GILBEY, BART., and Col. Sir NIGEL KINGSCOTE, K.C.B., as Trustees of the other part, may be seen at the Society's Offices, at 12, Hanover Square, London, W.

In order that the Council may be in a position to commence operations without delay, it is hoped that Members of the Society and all others interested in the great national industry of agriculture will, by subscribing for this Stock, provide the funds for enabling the Council to carry out the scheme.

As it is important that operations should be commenced without delay, a prompt reply on the annexed form is earnestly requested.

WESTMINSTER,
President.

12, HANOVER SQUARE, LONDON, W.
June 1893.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

HAREWOOD HOUSE DEBENTURE STOCK,

Bearing Interest at Three per Cent., payable half-yearly on the 1st January and 1st July.

(Power is given in the Trust Deed for the eventual redemption of the Stock at par, and the Trustees hope to be in a position to commence such redemption on the 1st January, 1896.)

Trustees { THE DUKE OF WESTMINSTER, K.G.
SIR WALTER GILBEY, BART.
COL. SIR NIGEL KINGSCOTE, K.C.B.

FORM OF SUBSCRIPTION.

To the Council, Royal Agricultural Society of England.

I shall be willing to subscribe for £.....

of the Harewood House Three Per Cent. Debenture Stock, *when the Trust Deed has been duly executed.*

Signature .....

£ : : *Name in full* .....

Description .....

Address .....

.....

Dated this ..... *day of* ..... 1893.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

Proceedings of the Council.

WEDNESDAY, JUNE 21, 1893,

(IN THE SHOWYARD AT CHESTER.)

COL. SIR NIGEL KINGSCOTE, K.C.B. (TRUSTEE), IN THE CHAIR.

Present:—

Trustees.—Earl Cathcart, Mr. John Dent Dent, Col. Sir Nigel Kingscote, K.C.B., Earl of Ravensworth.

Vice-Presidents.—Viscount Emlyn, Sir J. H. Thorold, Bart.

Other Members of Council.—Mr. G. M. Allender, Mr. J. H. Arkwright, Mr. Alfred Ashworth, Mr. Joseph Beach, Mr. J. Bowen-Jones, Mr. Charles Clay, Lieut.-Col. J. F. Curtis-Hayward, Mr. J. Marshall Dugdale, Mr. W. Frankish, Mr. Hugh Gorringe, Mr. James Hornsby, Mr. Joseph Martin, Mr. T. H. Miller, Mr. R. Neville-Grenville, Hon. Cecil T. Parker, Mr. Albert Pell, Mr. J. E. Ransome, Mr. S. Rowlandson, Mr. G. H. Sanday, Mr. W. T. Scarth, Mr. A. J. Smith, Mr. Henry Smith, Sir J. L. E. Spearman, Bart., Mr. E. W. Stanyforth, Mr. Martin J. Sutton, Mr. Garrett Taylor, Mr. R. A. Warren, Mr. E. V. V. Wheeler, Mr. C. W. Wilson, Sir Jacob Wilson.

Officers.—Mr. Ernest Clarke, Secretary; Dr. Fream, Editor of the Journal; Dr. J. Augustus Voelcker, Consulting Chemist; Mr. Wilson Bennison, Surveyor.

In the unavoidable absence of the President,

Col. Sir NIGEL KINGSCOTE, K.C.B. (Trustee), was called to the Chair.

Confirmation of Minutes.

The minutes of the last monthly Meeting of the Council, held on May 31, were taken as read, and approved, and the minutes of the Special Council Meeting, held in the Showyard on Monday, June 19, were read and confirmed. The minutes of the Special Council Meeting related to an outbreak of fire which occurred at one of the implement stands on Monday, and to the general precautions against fire adopted in the Showyard; as well as to details connected with the demonstrations of sheep-shearing.

Election of New Members.

The election of the following 151 new members was then proceeded with, the SECRETARY stating that this was the largest number of new members elected at one time since 1889, the year of the Windsor Meeting:—

AGNEW, E. T...5, Mount St., Manchester.
AGNEW, H...29, Booth St., Manchester.
ALLEN, A...Hindlip, Worcester.
ANSDELL, T. C...Beech Hurst, Eccles.
ARMITAGE, C. S...Cromlea, Manchester.
ASHWORTH, A...Accrington.
ATCHERLEY, F. R. H...Stone Ho., W. Felton, Salop.
BARKER, A...Sutton Bonnington, Loughboro'.
BATES, A. L...32, Bairstow St., Preston.
BELL, J...Hedley Hall, Swalwell, co. Durham.
BELLHOUSE, E...Groby Road, Altrincham.
BELLHOUSE, W...Windlehurst, Stockport.
BEVINGTON, T...Hedingham Castle, Essex.
BIRCHENOUGH, W. T...Gawsworth New Hall, Macclesfield.
BISHOP, T...Kintbury, Hungerford.
BLACKWALL, T. V...Cilcennus, Llanwrst.
BOWER, W. W...The Manor Farm, Hawarden
BRETHERTON, F. S...The Hall, Rainhill, Prescot,

BULLOCK, W. D...Statham, Warrington.
CAWLEY, F...Moss Ho., Blackley, Manchester.
CECIL, C...Bregner, Bournemouth.
CHAVE, E...Widhayes, Halberton, Tiverton.
CHICHESTER, C. H...Hall, Barnstaple.
CLEMENCE, T...10, Northgate St., Chester.
COLEBORN, R...Cherry Lane, Walton, Liverpl.
COPE, G...Morriston, Maybole, N.B.
CRANKSHAW, R. L...Peover, Chelford, Chesh.
CRASKE, W. R...Borstal, Rochester.
DARLEY, C. H...109, Alton Terrace, Eccles.
DAVIES, J...Tyn-y-coed Farm, Adwy, Wrexham.
DEAN, J. W...26, Hamilton Sq., Birkenhead.
DEWHURST, H...Lostock Hall, Preston.
D'EYNCOURT, E. T...2, Hawthorn Ter., Newcastle-on Tyne.
DIXON, G. H...Armathwaite Hall, Cumberland.
DOGGETT, A. H...Cherryhinton, Cambridge.
DOWNES, Wm. A...Queen Street, Redditch.
DRAKE, J. E...Stokestown Ho., New Ross, co. Wexford.
DRINKWATER, Mrs. G...Kirby, Douglas, I. of Man.
DWYER, Lt.-Col. L. F. W...Beaumaris, Anglsy.
EDWARDS, W...Lyddyn Fadog, Llanfair P.G.
ESCRITT, Hy...High Street, Grantham.
EVERSHED, P...Norfolk Lodge, Burton-on-Trent.
FAIR, A. E...16, West Beach, Lytham.
FALCONER, J. R...Manor Ho., Ashton-on-Mersey.
FINLAY, O...Burton Ho., Rossett, Wrexham.
FINLEY, J...46, King St., Manchester.
FOX, Wm. S...Potter Hanworth, Lincoln.
FOSTER, H...Neap Ho., Doncaster.
FRANK, E. J...Beslow Farm, Wroxeter, Salop.
GALLOWAY, W. J...Old Trafford, Manchester.
GARROD, H. J...Cheveley, Newmarket.
GILL, John..Warwick, Carlisle.
GILL, R. P., junr...Woodhayes Hall, Ashton-on-Mersey.
GILLIBRAND, H...Withington Hall, Chelford, Cheshire.
GLAZEBROOK, J. K...Lymm Hall, Lymm.
GLOVER, J. W...Wood End, Handforth, Chesh.
GORTON, P. C...Cranford Ho., Knutsford.
GRANT, W. J...Bassaleg, Newport, Mon.
GREEN, Wm...Bolnhurst, St. Neots.
GRIFFIN, W. S...Bushey Lodge, Watford.
GRIFFITHS, Broken Cross Farm, Northwich.
HALL, J...Vale Bank, Bowdon, Cheshire.
HARTSHORN, A. J...Hoole, Cheshire.
HESKETH, J. K...Lyndhurst, Toft Rd., Knutsford.
HESKETH, W...Lynwood, Lostock Gralam, Northwich.
HIBBERT, F. A...10, Castle Str., Cardiff.
HIGGIN, T. H...33, Tower Buildings, Liverpl.
HOARE, H. S...Yelden, Higham Ferrers.
HOLLINS, H. M. D...Rhewl Ho., Mostyn.
HONYMAN, Sir W. M., Bart...Coton Hall, Salop.
HOPKIN, Fedbar, Manchester.
HOWARD, D...Barrow Hall, Bold, Lancs.
HUGHES, R...Plas Llangwyffan, Ty Croes, Anglesey.
HULTON, E...Union Club, Manchester.
JOHNSON, H. A...Oak Hurst, Ambergate, Derby.
JOHNSTON, F. H...Greenbank, Plumbley, Knutsford.
JONES, H...Ty Maur, Aberffraw, Anglesey.
JONES, Maj.-Gen. R. Owen, C.B...Bryn Tegid, Bala.
JOYNSON, E. W...Ashfield, Sale, Cheshire.
KAY, A. H...Bankfield, Bury, Lancs.
KING, A...Sound Bridge, Nantwich.
LAING, G...Flodden, Milfield, Wooler.
LEA, W. E...Priors Heys, Tarvin, Chester.
LEES, J. D...Brook House, Timperley.
LEWIS, A. T. B...Lower Cotts, Yarkhill, Hereford.
LILLY, John, junr...Manchester.
LOCKETT, R. R...34, Alexandra Drive, Liverpl.
LONGWORTH, T...Oak Hill, Whalley, Lancs.
MACLEAN, A. D...R. A. College, Cirencester.
MACNICOL, D...Rhewl Lodge, Mostyn.
MAITLAND, Dalrymple, Brook Mooar, I. of Man.
MARTYN, H...Trevemper Bridge, Newquay.
MATTHEWS, John..Bangor.
MELLOR, J. E...Helensfield, Dukinfield, Chesh.
METCALFE, W. H...Everton, Bawtry.
MILNES, R...St. Ann's, Alpha Rd., Ramsgate.
MINSHULL, W...Peover Superior, Knutsford.
MORGAN, Capt. H. G...Tabley, Knutsford
MUIR, Thos...Bodorgan, Anglesey.
MURLESS, Philip..Ruabon.
NEWTON, R. F. N...Tatton Dale, Knutsford.
PARKINSON, J. A...Ravensknowle, Ashton-on-Ribble.
PARRINGTON, M. B...Holborough, Rochester.
PATTERSON, R. G...Broughton, near Chester.
PATTINSON, J...Rhos Rhodyn Farm, Broughton, Wrexham.
PEDLEY, G. A...164, Nantwich Road, Crewe.
PERCIVAL, Robert H...101, Portland St., Manchester.
PHILLIPS, Wm. D...Combe Fields, Rugby.
PILKINGTON, A. L ..Wilmastone, Peterchurch, Hereford.
PRYTHERCH, Wm. B...Ty Croes, Anglesey.
QUAYLE, J...Croggan, Port Soderie, I. of Man.
RALLI, P...Alderbrook, Cranleigh.
RAVENSCROFT, J...Moss Farm, Plumbly, Knutsford.
ROBERTS, Frank A...Annesdale, Windermere.
ROBERTS, J...Lower Kinnerton, Chester.
ROGERS, J. T...Littleborough, Manchester.
RUSHTON, T. H...Halliwell Hall, Bolton.
RYMER, T. H...Broughton Park, Manchester.
SAMPSON, W...Beauchief Abbey, Sheffield.
SAVORY, H...Salford Priors, Evesham.
SCOTT, Capt. J...Ardeley Bury, Stevenage.
SLY, Col. W. J...Lancaster.
SOUTHAM, G. A...Irlams o' th' Height, Lanes.
SPARROW, A. G...The Hollies, Knutsford.
SPENCER, N...Peover, Knutsford.
STANDISH, Capt. W. P...Brockenhurst, Hants.
STUTTARD, H. H...Read Hall, Blackburn.
SWABY, R. I...Scunthorpe, Doncaster.
TALBOT, H...Preston Brook, Cheshire.
TEMPERLEY, T. L...Southpark, Hexham.
THARRATT, G...South Willingham, Lincoln.
THOMPSON, J. R...Bramley Meade, Whalley, Lanes.
THOMPSON, T. H...Bramley Meade, Whalley, Lancs.
THORNHILL, W. W...Hales Farm, Market Drayton.
TINSLEY, H...Grappenhall, Warrington.
TINSLEY, W. C...Springfield, Bunbury, Tarporley.
TOLER, C. H...Saltersford Hall, Holmes Chapel.
TRENCH, R. C...Derby Estate Office, Preston.
VERNON, Arthur, High Wycombe.
VERNON, S. C. F...Burton Latimer, Kettering.
WAITE, J...Parkside, Mossley Hill, Liverpool.
WEBSTER, G. W...5, Eversley Park, Chester.
WHITE, A...Bank Ho., Helsby, Warrington.
WHITTINGHAM, W...Hafod Farm, Mold.
WILLIAMS, R...Caerglaw, Valley, Anglesey.
WILLIAMS, S...Caerglaw, Valley, Anglesey.
WINDER, C. J...Bradford Mill, Bolton.
WINTERBOTTOM, W. D...Holme Hall, Bakewell.
WRIGHT, Chas. F. S...Rhuallt, St. Asaph.
WYNNE, John..Waverton, Chester.
YORATH, Hy...Maesmawr, Bwlch, Brecon.

Reports from the Finance, Journal, Implement, and Showyard Works Committees were then received and adopted as follows:—

Finance.

Mr. SANDAY presented a formal report from the Finance Committee recommending the payment of a number of accounts in connection with the Chester Meeting, and the Society's general administration, amounting in all to 1,958*l.* 3*s.* 11*d.*

Journal.

Earl CATHCART (Chairman) reported that various accounts for printing, duly examined by the Printing Auditor, had been passed, and referred to the Finance Committee for payment. The fourth edition of the Text Book having been exhausted, the Committee recommended that a fifth edition of 5,000 copies be published as soon as possible. The Secretary had been in communication with the Meteorological Office as to the addition of names to the list of free recipients of the Hay Harvest Forecasts. As there was a considerable area between Liverpool and the Thames Valley from which reports were not now received, the Committee recommended that the names of Major Fosbery, of Warwick, and Mr. T. H. Thursfield, of Broseley, Shropshire, be suggested to the Meteorological Office for addition to the list.

Implement.

Mr. FRANKISH (Chairman) reported that the arrangements for the forthcoming trials of sheaf-binders had been discussed, and that Mr. Sanday, at the request of the Committee, had undertaken to inspect the ground and crops to be used for the purposes of the competitions. Accounts in connection with the sheep-shearing competition had been passed for payment.

Showyard Works.

Sir JACOB WILSON (Chairman) announced that a report had been received from the Stewards of Implements, stating that, in company with the Society's Engineer, they had made a thorough inspection of the yard, and had done all they possibly could to minimise the danger of fire during the present Meeting. With regard to the fire which occurred at Messrs. Hornsby's stand, after careful investigation, the Stewards had come to the conclusion that the fire was not caused in any way by the working of the oil engine. A detailed report respecting the fire from the officer in charge of the fire station in the Showyard had also been read and considered. After discussion of the arrangements which should be adopted at future Meetings, the Committee recommended that both the above reports be deferred until the next Meeting of the Council, at 12 Hanover Square, in order that the suggestions contained in them might be duly considered in full Committee. The complaint made by Mr. Samuel Kidner at the General Meeting, to the effect that exhibitors of stock, not being members, were admitted before 9 A.M. on Monday, whilst members who were exhibitors were not so admitted, had been fully gone into; and Mr. Sanday had reported that one of the officials in charge had, in view of the crowd at the entrance gates, given permission for the admission of exhibitors of stock before the advertised hour of opening. This was, of course, done with the best intentions; but the Committee recognised the inconveniences likely to arise from a departure from the regulations, and they therefore recommended that for the future instructions be given that the advertised time of opening the Showyard on the judging day (9 A.M.) is to be strictly adhered to.

Chester Meeting.

The Hon. CECIL T. PARKER (Hon. Director) read a telegram which he had received on Saturday, June 17, from Mr. P. A. Muntz, M.P., expressing his inability to undertake his duties as Steward of Stock. In consequence of this he (Mr. Parker) had been obliged to make other arrangements for the supervision of the pig department of the show.

After a discussion, in which Earl CATHCART, Mr. DENT, and Mr. C. W. WILSON took part, it was decided

that the matter should be referred to the Committee of Selection for consideration and report.

Mr. C. W. WILSON said he had undertaken, as Steward of Sheep, to bring before the Council the recommendation of the Judges of Hampshire Downs for a third prize in Class 149, in which only two prizes were offered in the prize sheet. He had informed the judges that the advertised list of prizes could not be increased, but had promised to lay their representation before the Council.

In accordance with invariable rule, it was decided that the recommendation of the Hampshire Down judges could not be acceded to.

Prizes in Small Classes.

The further question was, however, raised as to the working of the present rule with regard to the award of second and third prizes where there were very few exhibits in the class. Under this rule (No. 20) no third prize was given in any class unless at least six entries were exhibited, and no second prize was given unless at least three entries were exhibited, "except in the case of sufficient merit, and on the recommendation of the judges to the Stewards at the time of judging." Mention was made by Mr. WHEELER and Mr. ASHWORTH of recommendations to them by the judges of third prizes where there were less than six exhibits. Two cases were cited in the horse classes where there were only three animals shown, and all had been awarded money prizes. Moreover, in the Suffolk classes four animals were shown in each of four classes, but all three prizes were awarded in every class. In the remaining Suffolk class there were three exhibits, and two prizes were awarded.

The CHAIRMAN (Sir Nigel Kingscote) said he thought this was a rule that ought to be revised. At present they were in the hands of the judges as to the giving of these second and third prizes, and it was impossible to say how much of the extra money voted in this way, which must amount to a considerable sum, was given in consequence of the "sufficient merit" of the animals and how much in consequence of the good-nature of the judges. This was not a matter which they could discuss at any length that day; but he should like the Stock Prizes Committee to consider whether the rule ought not to be made definite and final—*viz.*, that no third prize would in any case be given if less than six animals were exhibited, and no second prize unless three animals were exhibited. He thought also that in view of the large size which their Showyards had now attained, and the fact that with 67 acres at Chester the yard was very crowded, there must be some further limitation of entries. How this was to be done, whether by omitting from the prize sheet certain breeds for which there was little competition, or by further limiting the number of entries by an exhibitor in a class, it would be for the Stock Prizes Committee to consider.

Sir JACOB WILSON said everybody must sympathise with what Sir Nigel had said, but he disagreed as to his proposal that there should be a hard-and-fast line drawn. The question had been considered every year for twenty-five years, and the decision always come to by the Stock Prizes Committee was that they must give some latitude of discretion to the judges. The rule said that the second and third prizes should not be given except there was sufficient merit, and on the recommendation of the judges to the Steward at the time. There were often cases in which the animals exhibited in a small class were far superior in point of merit to the animals in larger classes; and it would be a pity to withhold prizes, in consequence of insufficient numbers, from animals which might be far more worthy of them than those in classes that were better filled in point of mere numbers. He thought the Society was safe in the hands of the Stewards and the gentlemen appointed as judges, as they were men in whom they had confidence.

Mr. BOWEN-JONES presented a report from the Stewards, stating that a communication had been received from Mr. John Smith, bailiff to Sir William Williams, Bart., stating that a mistake had been made

in placing his two heifers in Class 69. No. 724, to which the first prize was awarded, was really *Fiction 5th*, entered in the catalogue as No. 725; and 725, commended, was *Fancy 8th*, entered in the catalogue as No. 724. The Stewards had ordered the prize cards and awards to be corrected. No. 451, a Clydesdale filly exhibited by Lord Polwarth, had been placed by the groom in stall 450. Owing to No. 450 being absent, she was not disturbed, and was consequently paraded as No. 450, Mr. Pilkington, who entered No. 450, being credited in the list of awards with the third prize awarded to this animal. Seeing that these careless mistakes were so frequent, the Stewards recommended that a rule be inserted in the prize-sheet to the effect that exhibitors would be fined for errors made by their servants in labelling and placing their animals. The Stewards had also received a communication from an exhibitor of Welsh cattle, stating that the Welsh heifer No. 793, exhibited in Class 80, won a prize at the last Smithfield Club Show, and was therefore ineligible under Rule 70 for competition. The exhibitor argued with the Steward of the judging ring that the rule mentioned referred to the Society's prizes, but not to the prizes offered by the Chester Committee. The question as to whether the application of Regulation 70 should be more clearly defined, the Stewards referred to the Council.

It was decided by the Council that the animal in question (No. 793) should be formally disqualified, and that, in order to obviate any question in future, Regulation 70 should be altered to read as follows:—"No cattle, sheep, or pigs which have been exhibited as fat stock at any show are eligible to compete for the prizes offered at the Society's Meetings."

The other matters were remitted to the Stock Prizes Committee for consideration.

Votes of Thanks in Connection with the Chester Meeting.

On the motion of the Hon. C. T. PARKER (Honorary Director), seconded by Mr. J. BOWEN-JONES (Senior Steward of Stock), it was unanimously resolved:—

(1) That the best thanks of the Society are due and are hereby tendered to—

(*a*) Parr's Banking Company, Limited (the local Bankers of the Society), the City Police, and the County Police, for the efficient assistance rendered by them during the Chester Meeting.

(*b*) To the London and North-Western, the Great Western, and the Cheshire Lines Railway Companies, for the facilities afforded by them in connection with the Meeting.

(*c*) To the St. John Ambulance Association for the ambulance arrangements in the Showyard.

(*d*) To the National Telephone Company, Limited, for their efficient arrangements in the provision of telephonic communication in the Showyard and with the City of Chester.

(*e*) To Messrs. Shand, Mason and Co., for the efficient arrangements made by them for the prevention of fire, and for the promptitude with which their officials dealt with an outbreak of fire on the Monday of the Meeting.

(*f*) To Messrs. W. and F. Brown, of Foregate Street, Chester, for furnishing the Royal Pavilion.

(*g*) To Messrs. Dicksons, Limited, of Chester, for providing the floral decorations in and around the pavilions in the Showyard.

(2) That a letter be addressed to the Home Secretary, after the conclusion of the Meeting, conveying the appreciation of the Council of the very efficient services rendered by the A Division of the Metropolitan Police at the Chester Meeting.

Cambridge Meeting of 1894.

A General Cambridge Committee was appointed, to consist of the whole Council, with nine representatives to be nominated by the Local Committee, the Committee to sit for the first time on Wednesday, July 26.

The Hon. CECIL T. PARKER (Honorary Director) submitted a preliminary plan, prepared by the Surveyor, showing generally the proposed dis-

position of the exhibits at the Cambridge Meeting. In doing so, he pointed out that the area available for the Showground at Cambridge could not by any possibility be exceeded, and that as Midsummer Common was smaller in size than the area which it had been found necessary to enclose for the purposes of the Chester Show, it was obvious that some further limitation of the entries would have to be made. As the Council could see for themselves, the Chester Showyard was very crowded; in fact, it might be said that every available yard of space was utilised. That with no less than 67 acres of space, they could only just contrive room for the exhibits sent for competition was a very serious fact for the Society's consideration, in view of the increasing difficulty which was experienced in finding suitable sites of sufficient area in the vicinity of large towns. Some further limitations of entries were apparently inevitable, and he should be much obliged if members of Council would kindly consider for themselves the best plan to be adopted to this end, with a view to assist the Council in coming to a decision on the subject.

Sir JACOB WILSON thought that in framing the regulations for the Cambridge Meeting it was worth consideration whether the present rules with regard to herd-books and the eligibility of animals to compete should remain in their present form. The recent extension of the rule requiring eligibility for entry in a herd-book as a condition precedent to an animal being allowed to compete for the Society's prizes had imposed an enormous increase of work on the Secretary's department. It was necessary that the entries should be verified in each case, and this fell upon the Secretary as additional work. Quite recently, within the past year or two, the rule had been extended to pigs. It might, perhaps, assist the Secretary if the exhibitor were required to furnish the certificate of registration, instead of the record of the entry having to be searched for at Hanover Square.

Sir NIGEL KINGSCOTE considered it a great pity that they had gone beyond horses and cattle in requiring registration of pedigree in a herd-book, as no one could verify the registration of either sheep or pigs. He thought it would be sufficient if the Society's regulations as to eligibility of live stock for herd-books were confined to those breeds of animals that produced, as a rule, only one at a birth.

Date of Next Meeting.

Various other matters having been dealt with, the Council adjourned until Wednesday, July 26, at 12 Hanover Square.

WEDNESDAY, JULY 26, 1893,

THE RIGHT HON. SIR M. W. RIDLEY, BART., M.P. (TRUSTEE), IN THE CHAIR.

Present:—

Trustees.—Earl Catheart, Col. Sir Nigel Kingscote, K.C.B., Sir A. K. Maedonald, Bart., Rt. Hon. Sir M. W. Ridley, Bart.

Vice-Presidents.—Viscount Emlyn, Sir Walter Gilbey, Bart., Sir J. H. Thorold, Bart., Mr. Charles Whitehead.

Other Members of Council.—Mr. G. M. Allender, Mr. J. H. Arkwright, Mr. Alfred Ashworth, Mr. J. Bowen-Jones, Mr. F. S. W. Cornwallis, M.P., Lieut.-Col. J. F. Curtis-Hayward, Mr. J. Marshall Dugdale, Mr. Joseph Martin, Mr. Albert Pell, Mr. J. E. Ransome, Mr. James Rawlenee, Mr. A. J. Smith, Mr. Garrett Taylor, Mr. J. P. Terry, Mr. R. A. Warren, Mr. E. V. V. Wheeler, Sir Jacob Wilson.

Professor Brown, C.B.

Officers.—Mr. Ernest Clarke, Seeretary; Dr. Fream, Editor of the Journal; Dr. J. Augustus Voelcker, Consulting Chemist; Mr. Wilson Bennison, Surveyor.

The following members of the Cambridge Local Committee were also present:—Mr. Alderman Cunnington, the Town Clerk of Cambridge (Mr. J. E. L. Whitehead), the Rev. E. H. Morgan, Mr. C. F. Cunliffe Foster, Mr. George Jonas, Mr. J. O. Vinter, Mr. R. Peters (Seeretary of the Local Committee).

In the unavoidable absenee of the President, Sir Matthew White Ridley, Bart., M.P. (Trustee), was called to the Chair.

The SECRETARY reported that in consequence of the Trials of Sheaf Binders, which commenced that day, the Hon. Ceeil T. Parker (Hon. Director), and Mr. S. Rowlandson and Sir Joseph Spearman, Bart. (Stewards of Implements), were detained on duty at Chester. Mr. Frankish and Mr. Sanday, who had presided yesterday at the meetings of the Committees of which they were Chairmen, were unable to attend the Counеil. Apologies for non-attendance had also been received from the Duke of Devonshire, K.G. (President), the Duke of Westminster, K.G., the Earl of Coventry, Viscount Bridport, G.C.B., Mr. J. Beaeh, Mr. C. Clay, Mr. J. Hornsby, Mr. C. Howard, Mr. T. H. Miller, Mr. D. Pidgeon, Professor Simonds, Mr. H. Smith, and Mr. E. W. Stanyforth.

Confirmation of Minutes.

The minutes of the last Ordinary Counеil, held in the Chester Showyard on Wednesday, June 21, were approved, and the following minutes of a Speeial Council held on Thursday, June 22 (Sir Walter Gilbey, Bart., Viee-President, in the Chair), were read and confirmed:—

1. The Steward of Cattle (Mr. Wheeler) reported that he had found it necessary to disqualify two Channel Island heifers which had been entered in the classes for cows or heifers "in milk," but which had not calved by the opening day of the show, as required by the regulations—viz.: Mr. W. Alexander's Jersey heifer *Auckland* (Class 102, No. 1,006), and Messrs. Fowler and de la Perrelle's Guernsey heifer *Rosa des Belles 2nd.* (Class 107, No. 1,095). The Steward's action in the matter was approved, and the subject of any further steps necessary to be taken referred to the Stock Prizes Committee.

2. A protest by Mrs. Swan against the award of the champion prize in Classes 116A and 116B was not entertained, as the prize had, in accordance with the conditions, been awarded to the cow "yielding the largest quantity of butter in proportion to her live weight."

Election of New Governor and Members.

The eleetion of the following Governor and thirty-one Members was then proeeeded with:—

Governor.

MOORSOM-MITCHINSON-MAUDE, C. R., Harewood, Leeds.

Members.

BAILES, T...Ridge Villa, Meanwood Rd., Leeds.
BARRON, Thomas Metcalfe..Darlington.
BELL, Thomas..Lincoln.
BENTON, J...Clyne Ho., Stretford, Lancs.
BOWER, D. H...Riseley Lodge, Bedford.
BROWN, V. W...Balnagowan, Dublin.
BUCKLEY, A...Ryecroft Hall, Lancs.
CHARRINGTON, N. E...Sidlow, Reigate.
DE VITRE, D. F. D...Keep Hatch, Wokingham.
EVANS, Rev. A...Snelston Rectory, Ashbourne.
FARQUHAR, A...Hillside, Wimborne.
KOENIG, P...10 Cumberland Pl., Kew Gardens.
LEEKE, Col. R...Longford Hall, Newport, Salop.
MARGETSON, A. G...Avondale, Redland Road, Bristol.
MARTIN, E...The Ravine, Filey, Yorks.
MILNE, C. D...Bassendene, Cheadle, Ches.
MONEY, F. B...The Limes, Landbeach, Cambs.
NIVEN, W...Carswell, Faringdon, Berks.
PULLING, A...Beddington, Croydon.
RADLEY, A. W...Whitfield Ho., Congleton.
RASHLEIGH, J. C. S...5 Bury Street, St. James's, S.W.
ROBINSON, F. W...King Charles Croft, Leeds.
RUSSELL, Hon. G...Hardwick, Durham.
SUMMERS, W...Mitchelstown, co. Cork.
THOMAS, M...Aber Senny, Brecon.
THOMPSON, E. P...Whitchurch, Salop.
THOMSON, Surg.-Maj. S. J...Kenfield Hall, Petham, Kent.
WHITE, G. M...Congelow, Yalding, Kent.
WHITEBREAD, T. W...Frindsbury, Rochester.
WITHERINGTON, G. A. Long Itchington, Rugby.
WOODIWISS, I. N...Tamworth Ho., Duffield, Derby.

The reports of the several Standing Committees were then presented and adopted, as below:—

Finance.

Sir NIGEL KINGSCOTE (Chairman) reported that the accounts for the period ended June 30, as certified by the Society's Accountants, showed receipts amounting to 2,886*l.* 5*s.* 2*d.*, and expenditure to 7,677*l.* 18*s.* 8*d.* The balance at the Bankers' on June 30, allowing for cheques outstanding, was 4,323*l.* 8*s.* 8*d.* The accounts for the period ended July 22, 1893, showed receipts amounting to 959*l.* 11*s.* 4*d.*, and expenditure to 1,423*l.* 13*s.* 2*d.*, with a balance at the bank, allowing for cheques outstanding, of 3,859*l.* 6*s.* 10*d.* (excluding the takings in the Chester Showyard). Accounts relating to the Chester Meeting amounting in all to 11,326*l.* 11*s.* 6*d.*, and relating to the ordinary business of the Society amounting to 2,531*l.* 1*s.* 7*d.*, had been passed, and were recommended for payment. The quarterly statement of subscriptions and arrears and of the Society's property, as at June 30, 1893, had been laid upon the table.

On the motion of Sir NIGEL KINGSCOTE, it was resolved,

That in view of the desirableness of winding up the accounts of the Chester Meeting as early as possible, authority be given to the President, the Chairman of the Finance Committee, and the Secretary, to issue, during the recess, orders on the Society's Bankers for the payment of accounts connected with the Show and the Trials of Self-Binding Harvesters about to take place; such accounts to have been previously submitted to and passed by a Steward of Finance.

Sir NIGEL KINGSCOTE added that the Committee had had before them that morning a letter from Mr. A. Gordon, of Southwood, Hildenborough, Kent, who had been good enough to send a cheque for 100*l.* towards the cost of acquiring the Society's new premises at Harewood House, on the sole condition that during his lifetime he should receive the privileges of membership of the Society without further payment. Mr. Gordon said in his letter that "he was anxious the Society should secure the new premises, and that if all the members would do likewise the money was secured." The Finance Committee felt, as he need not say, exceedingly obliged to Mr. Gordon for his generosity, and had with pleasure given instructions for his enrolment as a life member. The Committee trusted that Mr. Gordon's example might be extensively followed by members who were in a position to do so. (Hear, hear.)

House.

Sir NIGEL KINGSCOTE (Chairman) said that, as the Council would be aware, the House Committee had given very careful and detailed consideration, at a considerable number of special meetings, to the question as to the way in which the site of Harewood House, which the Council had decided to purchase for the future home of the Society, could be most advantageously utilised. They were now in a position to make their final recommendations on the subject, and they accordingly submitted for the approval of the Council the following report:—

REPORT OF THE HOUSE COMMITTEE AS TO HAREWOOD HOUSE.

It will be within the recollection of the Council that many efforts have been made

in the past to secure more suitable house accommodation for the Society. The premises at 12 Hanover Square, which have been occupied by the Society for over fifty years, have long been inadequate for its rapidly-increasing operations, and the House Committee, under instruction from the Council, have of late been continuously employed in searching for more commodious quarters.

2. Various proposals have from time to time been considered by the Committee and Council, but these all involved a removal from the neighbourhood of Hanover Square —which for the last half-century has been looked upon as the head-quarters of agriculture in England—and they were for other reasons undesirable.

3. The coming into the market of the freehold of Harewood House, next door to the Society's offices, afforded a long-wished-for opportunity of acquiring a more convenient home for the Society's future operations in the vicinity desired. The refusal of this site could, however, only be obtained for a very short time, and the sum asked for the property as a whole (including the stables and the Oxford Street frontage) was, moreover, beyond the Society's resources. Under these circumstances, the Duke of Westminster and Sir Walter Gilbey, in order to secure for the Society the portion of the property abutting on Hanover Square, generously made themselves responsible for the acquisition of the whole.

4. The House Committee have already agreed with the Duke and Sir Walter for the purchase of the site on which the mansion of Harewood House now stands, for the sum of 35,000*l.*, and for the purchase of an additional strip of land at the side for a further 2,000*l.*, making 37,000*l.* in all.

5. On this site it has been suggested that a wholly new building should be erected, at a further cost estimated at 25,000*l.*, in which structure there would have been some spare rooms capable of being sub-let. On consideration, however, of the proposed schemes for new buildings, difficulties presented themselves which were not of course insurmountable, but which would have greatly delayed the completion of the purchase, and would have involved a somewhat considerable financial outlay and responsibility for the Society.

6. The existing Harewood House is an exceedingly well-built and solid structure of the Adams period; and would not be difficult of adaptation for the Society's requirements. The fabric itself was not considered as comprised in the original arrangement with the Duke of Westminster and Sir Walter Gilbey; but, on learning that the Committee were considering the question of adaptation as against rebuilding, the Duke and Sir Walter not only expressed their willingness to regard the house itself as included in the purchase, but also to undertake, at their own cost, the considerable expense of adapting it so as to meet the Society's requirements. By its acceptance of this generous offer, therefore, the Society will not only be placed in possession of a very commodious and handsome freehold house, where it can make its permanent home, but it will have acquired the important power—should in future this prove to be needed—of extending its accommodation by the building of additional floors without disarranging the existing rooms.

7. Under these circumstances, the House Committee can have no hesitation in recommending that the munificent proposals of the Duke of Westminster and Sir Walter Gilbey be accepted, and that the cordial thanks of the Society be tendered to them for their public-spirited action in the matter.

8. It will not now be necessary for the Society to raise more than 40,000*l.* on security of the Harewood House Debenture Stock, to provide for the purchase of the site and other incidental capital expenditure. As, however, it may be necessary at some future time to make extensions of the premises, the Committee recommend that power be taken in the Trust Deed about to be executed for the creation of Stock to a maximum amount of 50,000*l.*

9. The purchase-money for the site being now due, the Committee recommend that letters of allotment for the Debenture Stock be issued as soon as the Trust Deed has been executed.

10. By the transference of the Society's administrative offices to Harewood House, the premises at 12 Hanover Square would be available for the accommodation of such other Societies as may desire to obtain offices adjacent to those of the Royal Agricultural Society.

NIGEL KINGSCOTE, Chairman.

July 25, 1893.

After some general discussion, it was unanimously resolved, on the motion of Sir NIGEL KINGSCOTE, seconded by Sir JOHN THOROLD:—

1. That the report of the House Committee be received and adopted. 2. That the Society purchase, for the sum of 37,000*l.*, Harewood House and an additional strip of land 6 ft. wide to the north, and that the Solicitors be instructed to prepare immediately the necessary conveyance of the property to the Society. 3. That the Draft Trust Deed between the Society and the Trustees of the Stockholders of the Harewood House Debenture Stock be approved, and that the Society's Solicitors be instructed to complete the same forthwith.

In order that the necessary formal action might be taken before the recess for the acquisition of the property, it was decided that a Special Meeting of the Council be held at noon on Wednesday, August 2, when the conveyance and Trust Deed would be ready for execution and sealing with the Society's Seal. (See page xcvi.)

Issue of Harewood House Debenture Stock.

Sir NIGEL KINGSCOTE said that they were now only waiting for the formal execution of the Trust Deed to issue the allotment letters for the 40,000*l.* Debenture Stock which it had been decided to issue. The formal allotment of the Stock would be made by the House Committee on August 2, and as there was some of it

still available, he trusted that all friends of the Society who had not already subscribed would kindly do so before that date. As the Council were aware, they had received various actual gifts of money, amounting in all to 2,000*l.*, from well-wishers of the Society, towards the fund for the purchase of their new premises. The House Committee thought that they should best meet the wishes of the donors if the money thus received were invested in the names of the Trustees of the Harewood House Debenture Stock, in order that the Trustees might be in a position to start a redemption fund with the interest accruing on the Stock in question.

The thanks of the Society were ordered to be formally sent to the following noblemen and gentlemen for their generous donations towards assisting the Council to purchase Harewood House as the future permanent home of the Society:—

	£
The Duke of Northumberland, K.G.	500
Lord Leconfield	400
Sir Wm. Cunliffe Brooks, Bart.	300
The Marquis of Ripon, K.G.	200
Mr. W. W. Astor	200
Lord Burton	100
Lord Tollemache	100
Mr. Alex. Gordon	100
Sir John Ramsden, Bart.	50
Hon. W. F. D. Smith, M.P.	25
Mr. H. Cosmo Bonsor, M. P.	25
	£2,000

Vote of Thanks to the Duke of Westminster and Sir Walter Gilbey.

On Sir Walter Gilbey subsequently entering the room,

Sir NIGEL KINGSCOTE said he had postponed until Sir Walter was present the moving of a resolution which, he was sure, would meet with the hearty assent of all there. Carrying out the wishes of the House Committee, as expressed in their report, which had been adopted by the Council, he desired to move:—

> That the sincere and cordial thanks of the Council, and of the Society at large, are due, and are hereby tendered, to the Duke of Westminster and Sir Walter Gilbey for their public-spirited action in connection with the purchase of Harewood House, and for their great generosity in undertaking the cost of adapting it for the Society's requirements.

Earl CATHCART seconded the motion, which was carried by acclamation.

Sir WALTER GILBEY, who was received with cheers, said, in reply, that he was sorry that the Duke of Westminster was not present to receive the highly complimentary resolution which Sir Nigel Kingscote had moved and Lord Cathcart had seconded, and which had been so cordially adopted by the Council. It had afforded the Duke and himself a great deal of pleasure to do what they had done, and, with the able assistance of the House Committee, they hoped to be able to carry the matter through successfully. He trusted that the new premises would be of material assistance in carrying on the valuable work that was being performed by their great national Agricultural Society. The House Committee had had the plans of the proposed alterations before them, but if anything should occur to the Council in the way of improvements or suggestions to make the building more suitable for its objects, he was sure that the Duke and himself would be only too pleased to have them carried out. He hoped that, by the new year, Harewood House would be ready for the Society's occupation.

Journal.

Earl CATHCART (Chairman) reported the publication on June 30 of Vol. IV., Part 2, of the Journal, the copies of which had been duly distributed to members. Various accounts in respect of literary contributions and printing had been passed. The Committee recommended that Mr. Whitehead's article on Hops, appearing in the last number of the Journal, be reprinted in pamphlet form, and that the price of the pamphlet be fixed at 1*s.* per copy. A fifth edition of 5,000 copies of the Society's Text Book on Agriculture was in course of preparation. Directions had been given as to the contents of the next number of the Journal, and a variety of suggestions for articles and notes had been considered.

Addresses of Congratulation to Sir John Lawes and Dr. Gilbert.

Earl CATHCART also submitted for approval the drafts of the congratulatory Addresses which it was proposed to present from the Royal Agricultural Society to Sir John Lawes and Dr. Gil-

bert on Saturday July 29, upon the occasion of the celebration of the Jubilee of the Rothamsted Experiments.

Both Addresses were formally approved and adopted, as below:—

To Sir JOHN BENNET LAWES, Bart., D.C.L., LL.D., F.R.S., &c., &c.

Trustee of the Royal Agricultural Society of England.

The Royal Agricultural Society of England by its Council gladly embraces the occasion of the Jubilee of the Rothamsted Experiments to tender to you its hearty congratulations upon the satisfactory completion of half a century of unceasingly applied scientific knowledge to the solution of problems affecting the cultivation of the soil, and the theory and practice of economic animal nutritiou—problems of world-wide importance.

It has been well said that nothing in the records of scientific research is more honourable to our country than the experiments which, with self-denying skill, you have, in conjunction with Dr. Gilbert, carried on and continue at Rothamsted.

These independent and continuous scientific operations, conducted under uniform conditions, are unique in the whole history of science. They have been carried on during fifty years at your sole cost, and their future continuance you have secured by munificent endowment.

As regards ultimate cultivation, without added or artificial enrichment, you have taught those concerned how to estimate the actual mean fertility of the earth's surface; and amongst other innumerable and invaluable lessons, be it especially remembered that in the composition of permaneut pasture you have, to the practical advantage of the farmer, successfully employed readily available chemistry to modify at pleasure the entire character of the vegetation.

Good and true work is usually abundantly prolific; and the Rothamsted example has already led, in various directious, to the formation of lesser experimental stations, and, notably, the Royal Agricultural Society owes to your immediate advice, precept, and example much of such success as may have attended the experimental station established at Woburn.

As a member of the Council during a period of forty-five years, the Society has benefited by your active co-operation. You have frequently been applied to for special advice and assistance, and, in response, you invariably rendered services to the Society which have been simply invaluable; and, further, you have, in conjunction with Dr. Gilbert, contributed to the Journal of the Society a series of scientific papers, which papers alone would render the Journal famous.

In an age of science, a period of active evolution, Time, without doubt, will, in an ever-increasing ratio, cause your fructifying labours, and recorded experience, to be more and more realised and appreciated. The Society hopes that Providence may long spare you to continue your beneficent labours; and for all you have done for Agriculture and for the cognate sciences, and for the cultivators of the soil, the Royal Agricultural Society offers you very hearty acknowledgments and most grateful thanks.

Signed on behalf of the Council,
DEVONSHIRE, President.

July 26, 1893.

To JOSEPH HENRY GILBERT, M.A., Ph.D., LL.D., F.R.S., &c., &c.

Honorary Member of the Royal Agricultural Society of England.

On the occasion of the formal celebration of the Jubilee of the Rothamsted Experiments, which have been so munificently endowed by Sir John Lawes, the Council of the Royal Agricultural Society of England, desire, on behalf and in the name of the general body of members of that Society, to offer you their sincere congratulations on the completion of fifty years' uninterrupted association with these experiments to the value and success of which you have greatly contributed.

In the organising and systematic arrangement and record of the researches conducted at Rothamsted you have had a leading share; and you have there set before us a model of what all work of experimental inquiry should be.

Your investigations into the applications of chemistry to the cultivation of crops and the feeding of live stock have been of the highest possible importance to the practical agriculturist, and the sincere thanks of the agricultural community at large are due and are hereby tendered to you for the scientific skill and indefatigable industry which you have brought to bear upon the conduct of the Rothamsted researches.

The Royal Agricultural Society of England is proud of ranking you amongst its honorary members, and it desires to take this opportunity of expressing its indebtedness to you for your ever-ready counsel and assistance, as well as for the many admirable and exhaustive papers which, in conjunction with Sir John Lawes, you have contributed to the Society's Journal.

The names of Lawes and Gilbert are already inseparably linked with the Rothamsted Experiments, and the Society earnestly hopes that you may both be long spared to continue in uninterrupted collaboration your labours for the public welfare.

Signed on behalf of the Council,
DEVONSHIRE, President.

July 26, 1893.

The SECRETARY announced that His Grace the President of the Society had promised to present these Addresses personally at the ceremony on July 29.

Chemical.

Viscount EMLYN (Chairman) reported that a letter had been read from Mr. F. R. Armytage on behalf of the Technical Instruction Committee of the County Council of Salop, asking whether the Society would have any objection to their Schedule of Fees for Chemical Analysis being copied, in part or in whole,

for the information of tenant-farmers wishing their manures, feeding-stuffs, &c., to be analysed, in accordance with a scheme recently adopted by the County Council. The Committee recommended that permission be given. Various other matters connected with the Society's Chemical Department had been discussed.

The Committee also presented their usual quarterly report, containing particulars of analyses of materials sold as "pure dissolved English bones," "fish-bone manure," "fish manure," and "rice meal." This report was adopted on the motion of Viscount EMLYN, and ordered to be published in the Journal (see page 621).

Seeds and Plant Diseases.

Mr. WHITEHEAD (Chairman) reported the receipt of 149 answers to the circular letter of inquiry which by direction of the Council at their last meeting had been sent to each member of the Council and to others interested, on the subject of finger-and-toe in turnips. The inquiry into this disease was being duly proceeded with, and the Committee proposed that Dr. Voelcker and Mr. Carruthers should be authorised to take the necessary steps for the completion of the investigation during the present season upon the lines already laid down. Dr. Voelcker would pay a personal visit of inspection to the farms in those cases where it was considered desirable to do so.

The Committee had referred to the Implement Committee their recommendation that prizes be offered in connection with the Cambridge Meeting for spraying machines and insecticide distributors. A letter had been read from Her Majesty's Customs Office forwarding a copy of the regulations at present in force for the denaturing and disposal of abandoned tobacco and snuff, with the view of its being used for the manufacture of insecticides. The Committee recommended that the Society's thanks be given for the information so supplied.

Veterinary.

Sir JOHN THOROLD (Chairman) presented the following report from Professor Brown :—

ANTHRAX.—According to the published returns, this disease is increasing in Great Britain. During the four weeks ended July 15, 45 outbreaks were reported, as compared with 31 in the preceding four weeks.

SWINE FEVER.—This disease maintains about the same rate of prevalence as it did last year. Since the beginning of the year there have been 1,577 outbreaks reported and 7,726 pigs attacked, as compared with 1,419 outbreaks and 8,015 swine attacked in the corresponding period of last year.

RABIES.—There have been 43 cases of this disease in Great Britain this year, as compared with 18 in the corresponding period of 1892.

Sir Jacob Wilson had laid before the Committee a letter from Mr. Clement Stephenson in reference to cases of anthrax in Northumberland. In one of these a farmer, under the impression that an animal had been killed by lightning, skinned and cut up the carcass, afterwards ringing a sow with a litter of pigs. The result was that the pigs had died through inoculation with the anthrax virus, and the farmer himself had become very seriously ill with the same disease. The Committee desired to emphasise the great necessity for caution in dealing with the carcasses of animals that might have died from anthrax, and would especially point out that on no account should such carcasses be cut prior to their burial or destruction. Copies of the recent circular of the Board of Agriculture, warning against the danger of handling carcasses of animals affected with anthrax, had been laid upon the table. Professor Brown had presented a certificate certifying that during the week of the Chester Meeting no outbreak of infectious or contagious disease had occurred in the Showyard. The Secretary had reported that he had been in communication with the Earl of Cawdor in reference to a serious outbreak on his lordship's estate of a disease which was supposed to be quarter-ill. It was arranged that Professor McFadyean should immediately visit the farm where the outbreak occurred, in order to investigate the nature of the disease, and to advise as to the measures to be adopted against its recurrence.

Stock Prizes.

Sir JACOB WILSON (in the absence of Mr. Sanday, Chairman) reported that Sir Nigel Kingscote had attended

the Committee to draw attention to the number of cases in which all the prizes offered by the Society in particular classes had been awarded by the judges at Chester, notwithstanding that less than six animals were exhibited. After consideration, the Committee had agreed to recommend that Regulation 20 be altered to read as follows :—

> . . . . . except in the case of sufficient merit, and on the recommendation of the judges *with the approval of the Steward of the Department* at the time of judging.

The Committee had considered the case of the two Channel Island animals, Mr. Alexander's Jersey heifer *Auckland* (Class 102, No. 1,006) and Messrs. Fowler and de la Perrelle's Guernsey heifer *Rosa des Belles 2nd* (Class 107, No. 1,095), which were disqualified at Chester in consequence of having been entered in the class for "in-milk" cows, and not having calved before the show. To meet such cases for the future, the Committee recommended that Regulation 53 be altered to read as follows :—

> No cow entered as in-milk will be eligible to compete for a prize unless she be certified either at the date of entry, *or between the date of entry and the 10th June in the year of the show*, to have had a living calf—or that the calf, if dead, was born at the proper time—within fifteen months preceding the date of the show.

The Secretary had been authorised to retain the papers entitling "in-milk" animals to admission to the show, until the receipt by him of the certificate in question.

The Committee recommended that, in future, Rule 70 of the Prize Sheet be altered so as to read as follows :—

> No cattle, sheep, or pigs which have been exhibited as fat stock at any show are eligible to compete for the prizes *at the Society's Meetings.*

Further letters written on behalf of Mrs. Swan with reference to the award of the champion prize in Classes 116A and 116B of the Chester Prize Sheet had been read; but the Committee recommended that Mrs. Swan be informed that the prize had, in accordance with the conditions, been awarded to the cow "yielding the largest quantity of butter in proportion to her live weight," and that the Council were unable to re-open the matter. Sir Humphrey de Trafford had written to say that a mistake had been made in the age of the Berkshire sow pigs, No. 2,002, entered by him at the Chester Meeting, such pigs having been actually born on the 24th of December, 1892, and that he therefore withdrew all claim to the third prize awarded to that pen in Class 193. The Committee accordingly recommended that such pen be formally disqualified, and that the prize be awarded to the reserve number (No. 2,000) exhibited by Mr. T. H. Atkins. The Committee had carefully considered the steps which should be taken for the limitation of the entries in consequence of the large number of exhibits of live stock at the Society's Meetings; and in view of the limited area available for the show at Cambridge next year, they recommended that no exhibitor be allowed to make more than *two* entries in any one class, and that the entry fees to be charged should be as follows :—

To a member :—For the first entry in a class, 5*s.*; for a second entry in the same class, 10*s.*; for any post entry, 15*s.*

To a non-member :—For the first entry in a class, 1*l.*; for a second entry in the same class, 2*l.*; for any post entry, 3*l.*

The Committee further recommended that exhibitors be informed that post entries for the Cambridge Meeting could only be accepted provisionally, subject to sufficient space in the Showyard being available. After renewed consideration, the Stock Prizes Committee offered no objection to the prizes for Jams and Preserved Fruits which the Seeds and Plants Committee proposed should be offered for the Cambridge Meeting of 1894; and they therefore recommended that such prizes, together with those for Cider and Perry, which they approved, should be announced forthwith as follows :—

CIDER AND PERRY (to be made from Fruit grown in 1893, open to both makers and growers).	£	£	£
Cask of not less than 18 and not more than 30 gallons of Cider made in the autumn of 1893	5	3	2
Twelve bottles of Cider made in the autumn of 1893	5	3	2
Twelve bottles of Cider made in any year before 1893	5	3	2
Twelve bottles of Perry	5	3	2

JAMS AND PRESERVED FRUITS (all of 1893 growth).

	£	£	£
Collection of Whole-fruit Jams . .	3	2	1
Collection of Bottled Fruits . . .	3	2	1
Collection of Preserved Fruits for dessert purposes	3	2	1

The Committee had given instructions to the Secretary as to a large number of letters received since the show with reference to matters connected with the Chester Meeting. They had preliminarily discussed the prize sheet for the Cambridge Meeting of 1894, and would further consider the matter when the proposals of the Cambridge authorities for local prizes were before them.

Mr. BOWEN-JONES said that as he had been unable to remain during the whole of the meeting of the Stock Prizes Committee, he would like to point out that the Committee had deviated from a principle laid down formerly with regard to the reduction of the number of entries in a class that were accepted from an exhibitor. Three entries in a class was the former number, on the principle that there were three prizes offered. If the number were limited to two in each class, a successful and enterprising man was precluded from gaining the whole of the three prizes, which he might win as the result of his enterprise. He thought the matter required reconsidering, as, to his mind, the present proposal was not an equitable one.

Sir JACOB WILSON said that, though it might be perfectly proper that an exhibitor should be able to compete for all the prizes offered in a class, circumstances had arisen which had induced the Committee to decide otherwise.

The report of the Committee was then adopted.

Implement.

Mr. MARTIN (in the absence of Mr. Frankish, Chairman) reported that arrangements had been made for the Trials of the Self-binding Harvesters to commence at Blacon Point, Chester, on that day (Wednesday), and that the Stewards, Judges, and Engineers were now at Chester conducting the trials. Of the twenty-three Harvesters originally entered by nine competitors, nine machines only remained for trial, fourteen having been withdrawn since the conclusion of the Chester Meeting by the following firms:—

Samuelson & Co., Ltd., Banbury, three entries; one withdrawn.
R. Hornsby & Sons, Ltd., Grantham, four entries; two withdrawn.
McCormick & Co., Chicago, three entries; all withdrawn.
A. C. Bamlett, Thirsk, four entries; all withdrawn.
George Dawson, Darlington, one entry; withdrawn.
Harrison, McGregor & Co., Leigh, three entries; all withdrawn.

Having regard to the great expense which had been unnecessarily incurred by the Society in providing crops for the number of machines (twenty-three) originally entered, the Committee recommended that in future a substantial entry fee should be charged in the case of machines, &c., entered for competition, the fees to be returned to those competitors who sent the machines for competition, but otherwise to be retained by the Society.

The Committee recommended that a prize of 5*l.* be offered in connection with the Cambridge Meeting for a sheep-dipping apparatus, and that in accordance with the recommendation of the Seeds and Plants Committee prizes be also offered at that Meeting for Spraying Machines as follows:—

1. Horse machine for distributing the Bouillie Bordelaise or other mixture on potatoes. Prize of 10*l.*
2. Machine for distributing insecticides and fungicides upon fruit trees and bushes. Prize of 10*l.*

The Committee recommended that an entrance fee of 1*l.* be charged for each machine competing for these prizes, and also for the prizes for oil engines already announced, such fee to be returned if the machine were actually sent for competition.

General Cambridge.

Mr. BOWEN-JONES stated that at the meeting of Council held on June 21, the General Cambridge Committee had been constituted of the whole Council, together with nine representatives of the Local Committee. The following gentlemen, having been nominated by the Local Committee, had been duly elected members of

the Committee:—The Mayor, the Town Clerk, the Vice-Chancellor of Cambridge University, the Rev. E. H. Morgan (Jesus College), Mr. Alderman Cunnington, Mr. Charles Bidwell, Mr. C. F. Cunliffe Foster, Mr. George Jonas, Mr. J. O. Vinter, with Mr. R. Peters as Local Secretary. After discussion, the Committee had agreed to recommend that the Cambridge Meeting should commence on Monday, June 25, 1894, the Implement Yard and Dairy being opened on the previous Saturday, June 23. The dates for the closing of entries for Implements and Live Stock had been fixed as usual—Saturday, March 31, and Tuesday, May 1, respectively. The question of giving prizes for Grain and Mustard Seed in connection with the Cambridge Meeting had been discussed at some length, but no definite decision had been arrived at, and the question had been postponed for future consideration.

After some discussion it was resolved, on the motion of Mr. MARTIN, seconded by Mr. RAWLENCE, that the question as to giving prizes for Grain and Mustard Seed should be referred to the Seeds and Plants Committee for consideration and report.

Showyard Works.

Sir JACOB WILSON (Chairman) reported that the whole of the shedding at Chester had been pulled down, and that a large portion of the Society's plant had been sent to Cambridge, where it was being stored. He also reported that two sales of materials at Chester had been held, and that very satisfactory prices had been realised. The concluding sales would take place on August 3 and 4. The report of the officer in charge of the Fire Station at Chester had been read. Letters from Messrs. Shand, Mason & Co., offering to provide fire appliances at the Cambridge Meeting, were considered, and the Committee recommended that the offer be accepted on certain conditions. A letter had been read from the Agricultural Exhibitors' Association as to the provision of refreshment accommodation in the Showyard a week before the opening of the show, and the Committee recommended that the temperance refreshment shed in the implement part of the yard be opened on the Monday before the opening of the show, a notice to this effect being inserted in the form of tender, and made a condition on the acceptance of the contract.

Dairy.

Mr. ASHWORTH reported the recommendation of the Committee that the prizes for butter at the Cambridge Meeting, announced on May 3 last, be altered from three prizes of 5*l.*, 3*l.*, and 2*l.*, to two prizes of 10*l.* and 5*l.* The class will therefore read as follows:—"One keg or other package of butter, not less than 14 lb. and under 40 lb. in weight, to be delivered on or before February 1, 1894: 10*l.*, 5*l.*" The entries to close January 1, 1894.

Miscellaneous.

The SECRETARY read a communication received from the Charity Commissioners, forwarding copies of the scheme for the future administration of the Foundation known as the South-Eastern Agricultural School and College, Wye, Kent.

On the motion of Mr. BOWEN-JONES, seconded by Sir JACOB WILSON, it was unanimously resolved that Mr. Charles Whitehead, of Barming House, Maidstone, be appointed as the Society's representative upon the governing body, as provided by the scheme in Clause 7.

Mr. WHITEHEAD said he accepted the office with the greatest pleasure, and was much honoured at being selected to represent the Society.

Various letters and other documents having been laid upon the table, the dates of the remaining meetings of the Council for the present year were fixed for Wednesday, November 1, and Wednesday, December 6, and the date of the General Meeting of Governors and Members was fixed for Thursday, December 7 (the Thursday of the Smithfield Show week). The Council then adjourned over the recess until November 1, 1893.

Special Council,

WEDNESDAY, AUGUST 2, 1893,

THE DUKE OF DEVONSHIRE, K.G. (PRESIDENT), IN THE CHAIR.

In accordance with the decision of the Council at their Meeting held on July 26, a Special Meeting of the Council was held on Wednesday, August 2, 1893, to take the necessary formal action respecting the acquisition of Harewood House as the future permanent home of the Society.

The DUKE OF DEVONSHIRE, K.G. (President), was in the chair, and there were also present: Col. Sir Nigel Kingscote, K.C.B., Sir John Lawes, Bart. (Trustees), Sir Walter Gilbey, Bart. (Vice-President), Mr. G. Mander Allender, Lord Brougham and Vaux, Messrs. F. S. W. Cornwallis, M.P., Percy E. Crutchley, Hugh Gorringe, James Hornsby, Hon. Cecil T. Parker, Mr. Martin J. Sutton, and the Duke of Westminster, K.G. (Members of the Council), Mr. Ernest Clarke (Secretary).

The SECRETARY read the following formal Requisition for a Special Council, delivered to him on July 26, in accordance with the provisions of Bye-Law 27:—

To the Secretary, Royal Agricultural Society of England.

We, the undersigned, being "one Trustee, together with one Vice-President, and three other Members of the Council," hereby request and authorise you, under the Society's Bye-law 27, to convene a Special Meeting of the Council, for the purpose of considering the following Resolutions [viz.: the Resolutions quoted below]. We beg to suggest as the date of such Meeting, Wednesday, the 2nd August next.

(Signed) NIGEL KINGSCOTE (Trustee), J. H. THOROLD (Vice-President), JACOB WILSON, ALFRED ASHWORTH, G. MANDER ALLENDER, (Members of Council).

Wednesday, July 26th, 1893.

Sir NIGEL KINGSCOTE presented a report from the House Committee, stating that at a meeting of the Committee, held that morning, allotments had been made to 108 applicants of a total amount of 30,800*l.* Harewood House Debenture Stock. The Committee had considered and approved the terms of the allotment letter, and had also approved a Prospectus proposed to be issued inviting applications for the unallotted balance of the Debenture Stock. The Committee proposed to hold another meeting on August 16, to make allotments of Stock to further applicants.* The Society's Solicitor had attended, and explained to the Committee the terms of the proposed Conveyance of Harewood House to the Society, and of the Trust Deed with respect to the Debenture Stock, and the Committee recommended that the Seal of the Society be affixed thereto. The Committee recommended that out of the balance at the credit of the Society's general account, 5,000*l.* be temporarily advanced towards paying off, forthwith, part of the purchase-money of 37,000*l.* due in respect of Harewood House, and that all payments made by allottees in respect of the Debenture Stock be paid into a separate account at the London and Westminster Bank, to be called the "Harewood House Account," such account to be drawn upon as required by cheques or schedules of payments to be signed by the President, a Trustee, and the Secretary. This report was adopted.

On the motion of Col. Sir NIGEL KINGSCOTE, K.C.B., seconded by Lord BROUGHAM AND VAUX, it was then unanimously resolved:

* At the Meeting of the House Committee held on August 16, the payment of the balance due (with interest) in respect of the purchase-money of 37,000*l.* was authorised, 3,600*l.* Stock was allotted to 12 further applicants, and the repurchase sanctioned of 10,000*l.* Consols for restoration to the Society's General Reserve Fund.

"That the Conveyance from the Duke of Westminster and Sir Walter Gilbey, Bart., to the Society, of Harewood House and an additional strip of land six feet wide on the north, for the sum of Thirty-seven Thousand Pounds (37,000*l.*), be approved, and that the Society's Seal be affixed thereto." The Society's Seal was accordingly affixed to two copies of the Conveyance, and attested by the signatures of the President, Sir John Bennet Lawes, Bart., as Trustee, and the Secretary.

On the motion of the Hon. CECIL T. PARKER, seconded by LORD BROUGHAM AND VAUX, it was further resolved: "That the Trust Deed between the Society of the one part, and the Duke of Westminster, K.G., Sir Walter Gilbey, Bart., and Col. Sir Nigel Kingscote, K.C.B., as Trustees for the Stockholders of the Harewood House Debenture Stock, of the other part, be approved, and that the Society's Seal be affixed thereto." In pursuance of the above resolution, the Society's Seal was affixed to two copies of the Trust Deed, and attested by the signatures of the President, Sir John Bennet Lawes, as Trustee, and the Secretary.

On the motion of the Hon. CECIL T. PARKER, seconded by LORD BROUGHAM AND VAUX, it was resolved: "(*a*) That the total amount of Harewood House Debenture Stock to be created be limited to 50,000*l.* and that the sum to be now raised be limited to 40,000*l.*; (*b*) That the 40,000*l.* Harewood House Debenture Stock above mentioned be issued at par, the amount due in respect thereof being payable in two instalments of 50 per cent. each, on the 15th August and 1st October next respectively; (*c*) That the President, the Chairman of the Finance Committee, and the Secretary, be authorised to apply the moneys paid in respect of such Stock towards the payment of the purchase-money for Harewood House, as and when such moneys may be paid into the Society's account; (*d*) That 15,000*l.* of the Society's Consols be sold out, and applied, either temporarily or otherwise as may be hereafter determined, in part payment of such purchase-money, and that the Society's Seal be affixed to the necessary Power of Attorney." In pursuance of the last-named resolution, the Society's Seal was affixed to a Letter of Attorney to the Bank of England to sell out 15,000*l.* of the Society's Consols, the Seal being attested by the President, Sir Nigel Kingscote, K.C.B., as Trustee, and the Secretary.

On the motion of the Hon. CECIL T. PARKER, seconded by Mr. JAMES HORNSBY, it was resolved: "That during the recess the House Committee be empowered to take such further action arising out of the above resolutions as they may deem necessary towards preparing Harewood House for the Society's accommodation."

Trials of Sheaf-Binders at Chester.

The Hon. CECIL T. PARKER reported formally, as Honorary Director, that the Trials of Sheaf-Binders competing for the Society's prizes had been held on the 26th to the 29th July, and announced that the following awards had been made by the Judges (Dr. Anderson, F.R.S., Mr. Mason Cooke, and Mr. James Edwards):—

Messrs. R. Hornsby & Sons, Limited, Grantham, were awarded the first prize of 50*l.*, for their improved Sheaf-binding Harvester, No. B (price 45*l.*), numbered 5,172 in the catalogue.

The Sheaf-binding Harvester, open end (price 45*l.*), numbered 4,031 in the catalogue, exhibited by the Massey-Harris Co., Limited, 54 and 55 Bunhill Row, E.C., and

The Improved Sheaf-binding Harvester, No. A (price 45*l.*), numbered 5,171 in the catalogue, exhibited by Messrs. R. Hornsby & Sons, Limited, Grantham,

Were bracketed equal by the Judges, and the second prize of 30*l.* and the third prize of 20*l.* were, therefore, divisible between them.

Certain payments in respect of these trials and the Chester Meeting having been authorised, the Council adjourned until the next ordinary meeting on Wednesday, November 1, 1893.

Proceedings at General Meeting of Governors and Members,

HELD IN THE LARGE TENT IN THE

SHOWYARD AT CHESTER.

TUESDAY, JUNE 20, 1893.

THE DUKE OF WESTMINSTER, K.G. (PRESIDENT), IN THE CHAIR.

Present on the Platform:

H.R.H. the Prince of Wales, K.G., H.R.H. Prince Christian, K.G., the Duke of Devonshire, K.G. (President-elect), the Duke of Richmond and Gordon, K.G., Earl Cathcart, the Earl of Coventry, the Earl of Feversham, the Earl of Ravensworth, Viscount Bridport, G.C.B., Lord Barnard, Lord Brougham and Vaux, Lord Egerton of Tatton, Viscount Emlyn, Lord Morcton, the Right Hon. Sir Massey Lopes, Bart., the Right Hon. Sir M. W. Ridley, Bart., M.P., the Hon. C. T. Parker (Hon. Director), the Hon. Atholl Liddell, Sir Walter Gilbey, Bart., Sir Joseph Spearman, Bart., Sir Mark Stewart, Bart., M.P., Sir John Thorold, Bart., Colonel Sir Nigel Kingscote, K.C.B., Sir Jacob Wilson, Messrs. G. Mander Allender, J. H. Arkwright, Alfred Ashworth, J. Bowen-Jones, Professor Brown, C.B., Messrs. James A. Caird, H. Chandos-Pole-Gell, Charles Clay, Percy E. Crutchley, John Dent Dent, J. Marshall Dugdale, S. P. Foster, W. Frankish, A. B. Freeman-Mitford, C.B., M.P., H. Gorringe, James Hornsby, Joseph Martin, T. H. Miller, P. Albert Muntz, M.P., Albert Pell, S. Rowlandson, W. T. Scarth, A. J. Smith, Henry Smith, E. W. Stanyforth, R. Stratton, Martin J. Sutton, R. A. Warren, E. V. V. Wheeler, and Charles Whitehead.

There were also present, as representatives of the Local Committee, the Mayor of Chester (Mr. Charles Brown), Mr. R. A. Yerburgh, M.P., and Mr. George A. Dickson, Local Secretary.

The officers of the Society present included Mr. Ernest Clarke, Secretary; Dr. Fream, Editor of the Journal; Dr. Voelcker, Consulting Chemist; and Mr. Cecil Warburton, Zoologist.

In the body of the tent there was a crowded attendance of members.

Vote of Thanks to the Mayor and Corporation of Chester.

The PRESIDENT, in opening the proceedings, said he had the honour of calling upon His Royal Highness the Prince of Wales to be kind enough to propose the first resolution on the agenda paper.

H.R.H. the PRINCE OF WALES then rose and said:—Your Grace, my Lords, Ladies, and Gentlemen,—You have paid me the compliment of asking me to move the first resolution, which I have great pleasure in doing. It is, "That the best thanks of the Society are due, and are hereby tendered, to the Mayor and Corporation of Chester, for their cordial reception of the Society." As a very old mem-

ber of the Society, I am only too glad to be the spokesman on this occasion, and to tender our thanks to the Mayor and Corporation for having given us every possible assistance towards making this Meeting a success. I am particularly pleased to be asked to propose this resolution as holding the title of Earl of Chester, of which I am very proud. (Cheers.) I am glad to propose this vote of thanks to the Mayor and Corporation, and have little doubt that the Show will be a great success in every respect. (Cheers.)

Mr. J. BOWEN-JONES said that as Senior Steward of Stock he had been asked to second the vote of thanks which had been moved by His Royal Highness, and he could endorse emphatically every word that had fallen from the Prince's lips. Some twelve months ago, as one of the members of the Inspection Committee, he came to Chester, and found the Mayor then as heartily determined to make the Meeting a success, if they visited Chester, as he had since proved himself to be. He felt that the thanks of the Society were in every way due both to the Mayor and the Corporation of Chester for the earnestness with which they had taken up the movement, and for the way in which they had carried it into effect. It was in a great measure to their exertions that the great success of the Meeting would be due.

The vote having been carried by acclamation,

The MAYOR OF CHESTER (Mr. Charles Brown), on behalf of the Corporation, thanked the meeting most earnestly for the resolution which they had so unanimously passed. They had been very pleased that the Society should meet at Chester that year. From the time that they first heard of the decision of the Council the Corporation had endeavoured as far as possible to make the Meeting a success. They had been seconded very heartily by the citizens generally, by those in the county, and also by their good friends in North Wales. Five-and-thirty years ago the Society's Meeting at Chester proved a great success in every sense of the word, and he hoped that the present occasion would prove equally successful to the Society.

Vote of Thanks to Local Committee.

Sir JACOB WILSON said he had been deputed to move the next resolution, which was, "That the best thanks of the Society are due, and are hereby tendered, to the Local Committee for their exertions to promote the success of the Meeting." He thought that when those who were present had had an opportunity of examining the contents of that vast expanse of shedding, they would agree with him that they were abundantly justified in passing that resolution. He dared say that a large majority of those who entered the yard simply accepted the situation as if those sheds and their contents had been dropped from the clouds. Little did they know the exertions and anxiety caused to many to produce the result now presented to them. Before the Society could take its work in hand, a great deal devolved upon the Local Committee in order to make matters more agreeable and satisfactory to all concerned. When he heard complaints, not unnatural probably, from exhibitors in regard to the rings in which their animals were shown, he would like to plead with them to have a little generosity for those who had done their best. Every Showyard was not like a billiard table, and much of the land in their country was laid in ridges and furrows. If they knew the thousands of pounds that had been expended upon the ground, they would not be quite so lavish in their criticisms. Everybody had done their best, and the Local Committee above all. He supposed that now he must be regarded as one of the old fogies of the Society; but he was not ashamed to belong to that party, because he had had the privilege of being present at two Shows at Chester. There were probably not many present who were at the Meeting in 1858. But there were certain matters connected with that Show which he should never forget. Particularly did he remember that wonderful show of cheese, which he then thought he should never see equalled again. There was also a grand show of Shorthorns on that occasion. In one class of yearling

heifers an exhibitor showed not less than ten heifers. Mr. Chandos-Pole-Gell—whom they were all glad to see there so active upon the present occasion—mentioned the phenomenon to the late Mr. Richard Booth, who replied, "Well, perhaps one good 'un may lick the whole lot." Yorkshire, with one "good 'un," did beat Lancashire on that occasion. Five-and-thirty years had passed, and they again found themselves at Chester under very different auspices. The classic ground of the Roodee could no longer accommodate them. Formerly they confined themselves to a few classes which had now multiplied to an enormous extent. In addition to that, they found bees and poultry and other outcomes of "advanced civilisation" exhibited in the Showyard. They found, above all, the Dairy Department, the success of which was in no small degree due to the interest which his Grace and many other liberal landlords had taken in developing as a specialty of the district. They saw a Working Dairy, which gave instruction in the newest developments of the dairying industry. He only mentioned those things to show them how matters had developed since the Society's last visit, and how thoroughly dependent they were upon the energy and exertions of their local friends. He would not be doing his duty if he did not express their special appreciation of the exertions bestowed upon that work by the Local Secretary, Mr. George Dickson. (Cheers.) He had heard of the best Mayor for agricultural purposes, but they had certainly had the best Local Secretary for agricultural purposes at Chester. (Hear, hear.)

Mr. ROWLANDSON, as Steward of Implements, seconded the resolution, saying he did so most cordially, because he had not only acted as Steward of Implements, but also as Steward at the Sheep-shearing Competition. He did not know what the Society would have done without the assistance of the Local Committee, and without the assistance of Mr. Dickson. He (Mr. Rowlandson) would specially like to refer to the services rendered by Mr. Dickson in regard to arranging for the sheep and everything connected with the exhibition.

The resolution having been carried unanimously,

The PRESIDENT put the usual inquiry from the chair as to whether any Governor or Member had any remarks to make or suggestions to offer for the consideration of the Council.

Suggestions of Members.

Mr. SAMUEL KIDNER complained that on Monday morning he and other exhibitors of stock, who were members, were not allowed to enter the Showyard until nine o'clock, whilst other exhibitors, who were not members, had been allowed to do so.

The PRESIDENT explained that the rule was that on Monday the Showyard opened at nine o'clock in the morning, and that there was no admission for anyone before that hour, except for exhibitors of implements. He promised that the matter complained of should be inquired into.

Vote of Thanks to Retiring President.

The DUKE OF RICHMOND then moved, "That the best thanks of the Society are due, and are hereby tendered, to his Grace the Duke of Westminster, K.G., for his services as President during the past year." He considered it to be a twofold privilege to be allowed to propose that resolution. First of all, because he thought it was a very honourable post to be selected to move a resolution of that kind—the thanks of the Society to the President of the Society; secondly, and more especially, because he had had the privilege of knowing the Duke himself very intimately for a great number of years—in point of fact, he thought probably a greater number than his Grace would care for him to recall. There were several heads under which he might introduce the retiring President to their notice. He might introduce him as a patron of the turf, who carried out that national and manly sport in a manner which was a very excellent example to others who joined in it. The Duke patronised the turf for the purpose of upholding their great national pastime, and also for the purpose of improving the breed of that noble animal—the thoroughbred horse of this country. He did it with that view,

and not with the view, as unfortunately in some cases, of tnrning the horse into a great gambling machine. As a great landowner in London he conferred enormous benefits upon the commnnity. In his own connty of Chester he was famous in every good work, in building churches, cottages, and farmsteads. And these, he was sorry to say, were not the times in which many landlords could afford to do mnch in that way. He was well and truly respected in his native county, and his (the Duke of Richmond's) idea was, and always had been, that when a man was truly respected and beloved in that part of the world where he passed the greater part of his life, they might depend upon it that there could not be anything very wrong in him. Many of the members were aware that the Society had attained so great a size that their house in Hanover Square was not large enough for the business to be carried on, and the interest which the retiring President showed in agriculture was manifested by this, that when the house and premises adjoining No. 12 Hanover Square came into the market, the Duke, with Sir Walter Gilbey, guaranteed the sum of 70,000*l.* in order that these premises should not pass out of their hands. (Cheers.) These, with the other things he had mentioned, showed the interest the Duke had taken in the affairs of the Society. He thonght they would all agree with him that the Duke had acted during his life—and he had no doubt that he would continue to act during the rest of his life, which they all trusted would be a long one—in carrying out that precept which had been handed down throngh many generations: "Whatsoever thy hand findeth to do, do it with thy might."

Mr. JOHN WOOD, as an old member of the Society, was very proud and pleased to second the resolution which had been moved by his Grace the Duke of Richmond.

The motion was then put by the SECRETARY, and carried unanimonsly amid loud cheers.

The PRESIDENT, in reply, said he had to thank his old friend the Duke of Richmond for the much too kind words which he had used in proposing this resolution. Anyone coming to this country, not knowing the depression which obtained throughout England, and especially in the South of England, would, upon visiting that Show, hardly imagine that that depression and distress existed. It was satisfactory to know that the Show was excellent, certainly in quantity, but, which was much more important, in quality also. This, he thought, showed that nnder depressing and adverse circumstances the farmers and landowners of England could still hold their heads above water, and contribute very efficiently to the snccess of such a great show as they had before them. He had not formerly been very much connected with the Society, except as a member for many years. His life of office had been all too short, because those who were really the workers in the Society had shown him so much kindness. It was a sort of hereditary principle in the conduct of the affairs of the Society that pleasantness and good-humour should make the wheels run smoothly and without difficulty, which was more than a good many societies could say. He would henceforth be placed in a position of comparative obscurity, to form one of the glorious roll of Past Presidents. He still hoped, however, to be of some little use, though in a humble way, with regard to the purchase of their new head-quarters. He had to thank His Royal Highness the Prince of Wales and His Royal Highness Prince Christian for giving them their conntenance, and thus contributing to the great success of the Show. In handing over the headship of the Society to the Duke of Devonshire, he felt that he was handing it to one of illustrious name and family, who, though engaged in somewhat arduous warfare at the present time, would, they hoped, be able to spare some of his time and ability to the interests of that great Society. He would have less compunction in dying officially at the end of that week, as the Society would have so worthy a successor at its head as the Duke of Devonshire.

President for 1893.

Mr. CHANDOS-POLE-GELL then moved, "That his Grace the Duke of

Devonshire, K.G., do take the chair as President after the conclusion of the present Meeting." He said the duty placed in his hands gave him great pleasure to perform. He was more especially interested in coming to Chester, as there was held the first Show of the Royal Agricultural Society that he ever attended. He little thought then that he should be placed in so prominent a position as to appear before the meeting that day. Since that time he found he belonged to that party to which Sir Jacob Wilson had so gracefully alluded as the "old fogey" party. Still, he hoped that there was a certain amount of life yet left in it. The reason he had been appointed to move the resolution was that he was a Derbyshire man, and next year they were to have one of their most eminent Derbyshire men as President of the Royal Agricultural Society. To say anything as to the merits of their future President would not be becoming; it was a subject that would take too long to dilate upon. He moved, therefore, "That his Grace the Duke of Devonshire take the chair as President after the conclusion of the present Meeting."

Mr. T. STIRTON had great pleasure in seconding the resolution. He was sure it would give great satisfaction to all the members to have the Duke of Devonshire at the head of that large and important Society.

The motion having been carried,

The DUKE OF DEVONSHIRE, who was received with loud cheers, returned his sincere thanks for the honour which they had done him in electing him to be President of the Society for the ensuing year. For some reasons he regretted that the Meeting next year was to be held in a part of the country with which he was not directly connected, and he was afraid that it would not be in his power either personally or through his tenants to give much assistance to the Annual Meeting of the Society. But it did happen that he was officially connected with the University of Cambridge, where their next show was to be held, and the University of Cambridge, he need hardly say, was, through its Colleges, who were considerable landowners, very much interested in the prosperity of agriculture, and in the success of that Society. It therefore might appear not altogether unfitting that in his official capacity as Chancellor of that University he should be President next year. And it was rather a curious coincidence that his father, who once had the honour of being President of that Society, was President in the year when the Show was held at the city of the other great English University, viz. Oxford. He thought that, in justice to the University over which he was the head, he ought to remind them that she was not only taking an interest in the prosperity of agriculture as owning property, but she was commencing to devote (and he hoped would continue to do so) her great educational powers to the improvement of agricultural education. He thought, looking to the earnestness with which the subject was being taken up in some quarters at Cambridge, they were only paying a very proper compliment in visiting the town which was the seat of the University. There was one other point to which he might refer, especially in connection with the remarks that were made by his friend the Duke of Richmond. He was glad to hear, from the way in which his observations were received, that that Society did not altogether ignore or condemn the sport of racing. He might remind them that the next Show was going to be held in the neighbourhood of the head-quarters of racing in England. And he had very little doubt that if the Show were held, as he supposed it would be, at the same period of the year as they were then assembled, and if the members of the Society liked to prolong their stay at Cambridge into the following week, they would see an excellent exhibition of what he might call a most interesting class of live stock. (Laughter.) He had not the slightest doubt that they would receive as hearty a welcome at the hands of the Jockey Club, who reigned supreme at Newmarket, as they would from the Municipal and University authorities of the town of Cambridge. He begged to thank them very sincerely for the honour which they had conferred upon him. (Cheers.)

The proceedings then terminated.

CHESTER MEETING.

JUNE 17 TO 23, 1893.

PRESIDENT:

THE DUKE OF WESTMINSTER, K.G.,
Eaton Hall, Chester.

OFFICIALS:

Honorary Director.

The Hon. CECIL T. PARKER, Eccleston, Chester.

Stewards of Live Stock.

J. BOWEN-JONES, Ensdon House, Montford Bridge, Salop.
E. V. V. WHEELER, Newnham Court, Tenbury, Worcestershire.
C. W. WILSON, Rigmaden Park, Kirkby Lonsdale, Westmoreland.
P. ALBERT MUNTZ, M.P., Dunsmore, Rugby.

Stewards of Implements.

PERCY E. CRUTCHLEY, Sunninghill Lodge, Ascot (for Mr. D. PIDGEON).
S. ROWLANDSON, Newton Morrell, Darlington.
Sir J. L. E. SPEARMAN, Bart., Llansannor Court, Cowbridge, Glam.

Steward of Dairying, Poultry, and Produce.

ALFRED DARBY, Little Ness, Shrewsbury.

Steward of Forage.

ALFRED ASHWORTH, Tabley Grange, Knutsford, Cheshire.

Stewards of Finance.

G. H. SANDAY, Langdale Lodge, Clapham Park, Surrey.
Sir J. H. THOROLD, Bart., Syston Park, Grantham.

Secretary.

ERNEST CLARKE, 12 Hanover Square, London, W.

JUDGES OF IMPLEMENTS.

Self-Binding Harvesters.

WILLIAM ANDERSON, C.E., D.C.L., F.R.S., Lesney House, Erith.
MASON COOKE, The Lawns, near Ely.
JAMES EDWARDS, Belmont, Flax Bourton, Bristol.

Sheep-Shearing Machines.

WILLIAM ANDERSON, C.E., D.C.L., F.R.S., Lesney House, Erith.
ALFRED J. SMITH, Rendlesham Woodbridge.

Miscellaneous Implements.

MASON COOKE, The Lawns, near Ely.
JAMES EDWARDS, Belmont, Flax Bourton, Bristol.

JUDGES OF STOCK, &c.

(As finally corrected.)

HORSES.

Hunters.—*Classes* 1, 3, 5, 6, & 7.

D. L. DIXON-BROWN, Unthank Hall, Haltwhistle, Carlisle.
JAMES HOPE, Eastbarns, Dunbar, N.B.

Hunters.—*Classes* 2, 4, 8, 9, & 10.

R. A. BARKLEY, Palgrave Priory, Diss, Norfolk.
LORD WILLOUGHBY DE BROKE, Kineton House, Warwick.

Cleveland Bays, Coach Horses, and Harness Horses and Ponies.
Classes 11–14; 26 & 27.

COL. BARLOW, Hasketon, Woodbridge, Suffolk.
JOHN KIRBY, Burton Fields, Stamford Bridge, Yorks.

Hackneys.—*Classes* 15–21.

JAMES GRIGGS, South Creake, Fakenham, Norfolk.
ALEXANDER MORTON, Gowan Bank, Darvel, N.B.

Ponies and Welsh Mountain Ponies.
Classes 22–25.

JOHN HILL, Felhampton Court, Church Stretton, Salop.
OWEN J. WILLIAMS, Cefn, St. Asaph, R.S.O.

Shire and Agricultural.
Classes 28–34 & 47–49.

HENRY SMITH, The Grove, Cropwell Butler, near Nottingham.
C. W. TINDALL, Brocklesby Park, Lincolnshire.

Clydesdales.—*Classes* 35–41.

J. M. MARTIN, Auchendennan, Balloch, N.B.
JOHN KERR, Red Hall, Wigton.

Suffolks.—*Classes* 42–46.

WILLIAM BIDDELL, The Hall, Lavenham, Suffolk.
JAMES TOLLER, Blaxhall, Wickham Market.

CATTLE

Shorthorn.—*Classes* 50–56.

C. R. LYNN, Stroxton, Grantham.
J. C. TOPPIN, Musgrave Hall, Skelton, Penrith.

Hereford.—*Classes* 57–63.

AARON ROGERS, The Rodd, Presteign.
A. P. TURNER, The Leen, Pembridge.

Devon and Sussex.—*Classes* 64–75.

T. A. ABBOTT, Old Paddockhurst, Worth, Crawley.
W. S. PERRY, Whiteraw, Lew Down, Devon.

Welsh.—*Classes* 76–82.

J. ROBERTS, Well House, Chester.
J. WILLIAMS, Gwernhefin, Bala.

Red Polled.—*Classes* 83–88.

T. BROWN, Marham Hall, Downham Market.
FRED. SMITH, Warren Hill, Woodbridge.

Aberdeen-Angus.—*Classes* 89–92.

R. WALKER, Altyre, Forres, N.B.
G. WILKEN, Waterside of Forbes, N.B

Galloway and Ayrshire.
Classes 93–98.

W. GRAHAM, Hawksdale, Carlisle.
A. MONTGOMERY, Nether Hall, Castle Douglas, N.B.

Jersey.—*Classes* 99–104.

W. ASHCROFT, Layhams Farm, Hayes, Kent.
S. H. HYDE, Kempton Park, Sunbury.

Guernsey.—*Classes* 105–109.

Hon. & Rev. A. BAILLIE-HAMILTON, Combs, Stowmarket.
C. MIDDLETON, Marton, R.S.O., Yorkshire.

Kerry and Dexter Kerry.
Classes 110–115.

LUKE CHRISTY, Carigeen, Croom, Limerick.

Dairy.
Classes 117–121.

C. MARSHALL, Broomhaugh, Riding-Mill-on-Tyne.
JOHN TREADWELL, Upper Winchendon, Aylesbury.

SHEEP.

Leicester.—*Classes* 122–125.

D. LINTON, Bedale, Yorks.
H. H. STAVELEY, Southburn, Driffield, Yorks.

Cotswold.—*Classes* 126–129.

J. Gay Attwater, Britford, Salisbury.

J. J. Godwin, Troy Somerton, Banbury.

Lincoln.—*Classes* 130–133.

Henry Goodyear, The Austerby, Bourne.

J. R. Kirkham, Biscathorpe, Lincoln.

Oxford Down.—*Classes* 134–137.

W. D. Little, Middleton Stoney, Bicester, Oxon.

S. Treadwell, Windmill Hill, Winchendon, Aylesbury.

Shropshire. (Rams.)
Classes 138–140.

Joseph Beach, The Hattons, Wolverhampton.

M. Williams, Whiston Grange, Albrighton, Wolverhampton.

Shropshire. (Ram Lambs and Ewes.)
Classes 141 *&* 142.

T. F. Cheatle, Dosthill, Tamworth.

John Harding, Norton House, Shifnal.

Southdown.—*Classes* 143–146.

G. M. Sexton, Stone Lodge, Ipswich.

R. R. Verrall, Falmer, Lewes.

Hampshire Down.—*Classes* 147–150.

F. P. Brown, Compton, Newbury.

J. M. Friend, Kimpton Farm, Andover.

Suffolk.—*Classes* 151–154.

J. A. Hempson, Erwarton Hall, Ipswich.

H. Spurling, Princes St., Ipswich.

Wensleydale.—*Classes* 155–157.

A. Ewan, Gooda, Westhouse, Kirkby-Lonsdale.

J. Pickard, Thoresby, Aysgarth Station.

Border Leicester.—*Classes* 158–160.

L. C. Chrisp, Hawkhill, Alnwick.

W. Ford, Fentonbarns, Drem, N.B.

Somerset and Dorset Horned.
Classes 161–163.

H. Mayo, 4 Temple Terrace, Dorchester.

G. R. Pitfield, Eype, Bridport.

Kentish or Romney Marsh.
Classes 164 *&* 165.

J. Noakes, Furnace Farm, Lamberhurst, Kent.

T. Powell, East Lenham, Maidstone.

Cheviot.—*Classes* 166 *&* 167.

T. Elliot, Blackhaugh, Galashiels, N.B.

Wm. Hindmarsh, Ilderton, Wooperton, R.S.O.

Black-faced Mountain.
Classes 168 *&* 169.

J. Clay, Kerchesters, Kelso, N.B.

J. Greenshields, West Town, Lesmahagow, N.B.

Lonk and Herdwick.
Classes 170–173.

R. Hawell, Lonscale, Keswick.

J. Irving, Shap Abbey, Shap.

Welsh Mountain.—*Classes* 174–177.

D. Price, Bulwark House, Brecon.

T. Roberts, Tan-y-fynwent, Aber, Bangor.

PIGS.

White.—*Classes* 178–189.

John Angus, Whitefield, Morpeth.

John Barron, Borrowash, Derby.

Berkshire and Black.
Classes 190–197.

J. A. Sim, Wootton Wawen, Henley-in-Arden.

P. Stevenson, Dingley Grange, Market Harborough.

Tamworth.—*Classes* 198–201.

Lord Moreton, Sarsden House, Chipping Norton.

J. R. Randell, Chadbury, Evesham.

POULTRY.

Classes 202–221 *&* 250–257.

J. W. Ludlow, Vauxhall Road, Birmingham.

Classes 222–237 *&* 258–269.

James Dixon, North Park, Lidgett Green, Bradford.

Classes 238–249, 274–289, *&* 292–295.

D. Bragg, Southwaite Hall, Carlisle.

Classes 270–273; 290 *&* 291.

Edward Brown, 16, Woodberry Grove, London, N.

PRODUCE.

Cheshire Cheese of 1892 make.
Classes 296 *&* 297.

G. W. Oubridge, Town Hall Buildings, Newcastle-on-Tyne.

P. W. Stone, 105 Victoria St., London, S.W.

Cheshire Cheese (Coloured) of 1893 make.—*Classes* 298–300.

R. BATE, The Ash Hill, Tarporley.
R. PEDLEY, Winter House, Winterley, Crewe.

Cheshire Cheese (Uncoloured) of 1893 make.—*Classes* 301–303.

HUGH CAWLEY, Ashley, Cheshire.
HENRY THOMPSON, 41 Leece St., Liverpool.

Other Cheese.—*Classes* 304–313.

GEO. GIBBONS, Tunley Farm, Bath.
JAMES WATSON, Berwick, Shrewsbury.

Soft Cheese.—*Class* 314; **and Butter.**—*Classes* 315–317.

H. A. HOWMAN, Kingsbury, Tamworth.
J. A. STEPHENSON, Greenside, Milton, Carlisle.

Cider and Perry.—*Classes* 318–321.

EUSTACE ELLIOTT, Landulph Hall, Cornwall.
R. NEVILLE GRENVILLE, Butleigh Court, Glastonbury.

Jams and Preserved Fruits.—*Classes* 322–327.

FREDERIC LAURENCE, 8 Somerfield Terrace, Maidstone.

Hives and Honey.—*Classes* 328–345.

REV. J. F. BUCKLE, Bidston Rectory, Birkenhead.
W. B. CARR, Meopham, Kent.
WALTER MARTIN, Wainfleet, Lincs.

COMPETITIONS.

Butter-making.

HENRY A. HOWMAN, Kingsbury, Tamworth.
J. A. STEPHENSON, Greenside, Milton, Carlisle.

Horse-shoeing.

JOHN D. BARFORD, F.R.C.V.S., Above Bar, Southampton.
CLEMENT STEPHENSON, F.R.C.V.S., Sandyford Villa, Newcastle-on-Tyne.

OFFICIAL REPORTER.

W. FREAM, B.Sc., LL.D., 12 Hanover Square, London, W.

AWARDS OF PRIZES AT CHESTER.

ABBREVIATIONS.

I., First Prize. II., Second Prize. III., Third Prize. R. N., Reserve Number. H. C., Highly Commended. Com., Commended.

N.B.—The responsibility for the accuracy of the description, pedigree, or eligibility to compete of the animals mentioned below rests solely with the Exhibitors.

Unless otherwise stated, each Prize Animal in the Classes for Horses, Cattle, Sheep, and Pigs was "bred by Exhibitor."

HORSES.

Thoroughbred Stallions.[1]

BRED AND EXHIBITED BY THE DUKE OF WESTMINSTER, K.G., PRESIDENT OF THE SOCIETY.

A. Bend Or, chestnut, foaled 1877; *s.* Doncaster, *d.* Rouge Rose *by* Thormanby, *g. d.* Ellen Horne *by* Redshank, *g. g. d.* Delhi *by* Plenipotentiary. (*Winner of the Derby*, 1880.)

B. Arklow, bay, foaled 1889; *s.* Bend Or, *d.* Lily Agnes *by* Macaroni, *g. d.* Polly Agnes *by* The Cure, *g. g. d.* Miss Agnes *by* Birdcatcher.

C. Blue Green, brown, foaled 1887; *s.* Cœrulëus, *d.* Angelica *by* Galopin, *g. d.* St. Angela *by* King Tom, *g. g. d.* Adeline *by* Ion.

QUEEN'S PREMIUM STALLIONS.

Winners of the Three Queen's Premiums of £150 *offered by the Royal Commission on Horse Breeding, and the Gold Medals, value* £10 *each, offered by the Chester Local Committee, at the* SPRING SHOW, *held at* THE ROYAL AGRICULTURAL HALL, LONDON, *February* 28 *to March* 3, 1893.

D. Blue Grass, chestnut, foaled 1880; *s.* Pat Molloy, *d.* Amy Farley *by* Planet, *g. d.* Lulu Horton *by* Albion; owners, the EXECUTORS of the late WILLIAM STEEL, Camerton Stud Farm, Workington, bred by A. J. Alexander, Woodburn Stud, Kentucky, U.S.A.

E. Eglamore, chestnut, foaled 1884; *s.* Thurio, *d.* Blair Brae *by* Blair Athol, *g. d.* Molly Carew *by* Wild Dayrell; owner, P. P. PRATT, Bryn-Llithrig Hall, St. Asaph, bred by Charles Perkins.

F. Sam Kheen, bay, foaled 1885; *s.* Khamseen, *d.* Devonia *by* St. Leger, *g. d.* Siluria *by* Caractacus; owner, A. O. HASLEWOOD, The Fairfield Stud, Buxton, bred by C. A. Kemble, East Harptree, Bristol.

[1] Not entered for competition.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Hunters.

No. in Catalogue

Class 1.—*Hunter Mares and Foals, capable of carrying 15 stone and upwards.* [7 entries, 1 absent.]

3 **I.** (£20.)—GILBERT GREENALL, Walton Hall, Warrington, for **Scarlet**, Vol. V., chestnut, foaled 1886 [foal *by* Just-in-Time], bred by Col. Grimston, Beverley; *s.* Lambton.

4 **II.** (£10.)—THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park, Wickham Market, for **Polly Distin**, Vol. V., bay, foaled 1881 [foal *by* Althorp], breeder unknown; *s.* Distin, *d.* Polly Griffiths.

5 **III.** (£5.)—E. S. JACKSON, M.B., Carnforth, for **Kismet**, brown, foaled 1888 [foal *by* The Colonial], bred by T. Thwaites, Coltstones, Warton, Lanc.; *s.* Carthusian.

6 **R. N. & H. C.**—THOMAS MEIN, Burgh-by-Sands, for **Lady Lowther 566.**

Class 2.—*Hunter Mares and Foals, capable of carrying weights between 12 and 15 stone.* [13 entries, none absent.]

14 **I.** (£20.)—R. B. JAMES, Hallsannery, Bideford, for **Goodcroft 187**, bay, foaled 1886 [foal *by* Ruddigore], bred by Capt. W. H. Fife, Gillingham; *s.* King Crafty, *d.* The Good 'Un 130.

9 **II.** (£10.)—JOHN COOPER, Brook Hill, East Haddon, Northampton, for **Nautch Girl**, bay, foaled 1885 [foal *by* Shotesham], bred by H. Houldsworth, Pilmuir, Torquay; *s.* Coltness, *d.* Matilda *by* Solon.

13 **III.** (£5.)—THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park, Wickham Market, for **Gamehen**, bay, foaled 1881 [foal *by* Althorp], bred by T. Jackson, Lisnaboe, co. Meath; *s.* Revolver, *d.* Lightfoot *by* Blackfoot.

20 **R. N. & H. C.**—ROBERT YERBURGH, M.P., for **Forest Lass.**

Class 3.—*Hunter Mares or Geldings up to 15 stone, foaled in 1887 or 1888.*[1] [14 entries, none absent.]

28 **I.** (£20.)—Mrs. C. T. HOARE, Bignell, Bicester, for **Sea Kale**, bay gelding, foaled 1888; *s.* Soulouque, *d.* Seagull, Vol. V., *by* East Coast.

34 **II.** (£10.)—FRANK B. WILKINSON, Blyth Spital, Rotherham, for **Financier**, chestnut gelding, foaled 1888, breeder unknown; *s.* Baron Rothschild, *d. by* Elcot.

27 **III.** (£5.)—SIR HUMPHREY F. DE TRAFFORD, BT., The Flordon Stud Farm, Norfolk, for **Whitewings**, chestnut gelding, foaled 1888, breeder unknown; *s.* Solomon.

32 **R. N. & H. C.**—S. J. LEWIS, Wilcot, Nesscliff, Shrewsbury, for **Pretender.**
Com.—T. R. IRVING, for No. 29, **Milis**; W. C. KEEPING, for No. 30, **Surprise.**

Class 4.—*Hunter Mares or Geldings up to 12 stone, foaled in 1887 or 1888.*[1] [15 entries, 5 absent.]

40 **I.** (£20).—MAJOR LANGLANDS, Longrood, Rugby, for **Burgundy**, brown gelding, foaled 1887, bred by Major Blacker, co. Kildare; *s.* Bacchus.

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[1] Prizes given by the Chester Local Committee.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

42 **II.** (£10.)—HARRY REYNOLDS, Blue Cap Cottage, Sandiway, Northwich, for **Marquis**, chestnut gelding, foaled 1888, breeder unknown; *s.* Normanby.

37 **III.** (£5.)—JOSEPH FINLEY, 46 King Street, Manchester, for bay gelding, foaled 1887, breeder and pedigree unknown.

44 **R. N.**—J. S. STEPHEN, Morland Hall, Penrith, for **Friendship**.

Class 5.—*Hunter Mares or Geldings, foaled in* 1889.[1] [19 entries, 4 absent.]

57 **I.** (£20.)—B. F. DRAGE, Chapel Brampton Grange, Northampton, for **Chatterbox**, chestnut gelding, bred by D. Fraser, Tickford Park, Newport Pagnell; *s.* Brag, *d. by* Zephyrus.

58 **II.** (£10.)—B. F. Drage, for **Miss Peel** 613, bay mare, bred by J. H. Ivens, Daventry; *s.* Hyperion, *d.* Diana 518 *by* General Peel.

55 **III.** (£5.)—R. G. CARDEN, Fishmoyne, Templemore, co. Tipperary, for **Conqueror**, iron-grey gelding; *s.* Lord Gough, *d.* Empress *by* Speculation.

52 **R. N. & H. C.**—JAMES FARMER BOYDELL, Hatton Heath, for **Mystery**.

56 **Com.**—J. S. DARRELL, for **Golden Eagle**.

Class 6.—*Hunter Geldings, foaled in* 1890.[1] [11 entries, 1 absent.]

74 **I.** (£20.)—T. HARRISON, Biggins Hall, Kirkby Lonsdale, for **King of Trumps**, chestnut; *s.* Blue Blood, *d.* Queen of Trumps *by* Lord Hastings.

70 **II.** (£10.)—JOHN BESWICK, Barrow Hall, Chester, for **Sir Michael**, chestnut; *s.* Michael Angelo, *d.* Needle *by* King Lud.

79 **III.** (£5.)—MISS POWELL, Maesgwynne, Carmarthenshire, for **Roderick Dhu**, chestnut; *s.* Snowdoun, *d.* Alice, Vol. V., *by* Christmas Carol.

71 **R. N. & H. C.**—A. J. BROWN, Doncaster, for **Tipperary**, chestnut.

Com.—THOMAS LARGE, for No. 75, **True Blue**; MISS POWELL, for No. 78, **Hope**.

Class 7.—*Hunter Geldings, foaled in* 1891.[1] [17 entries, 4 absent.]

95 **I.** (£20.)—BERNARD WALL, Hazelwood, Coleshill, for **Twilight**, chestnut; *s.* Omer Pacha, *d.* Princess *by* Privateer.

82 **II.** (£10.)—T. A. CORNTHWAITE, Clawthorpe Hall, Westmoreland, for **Huntsman**, brown; *s.* Precentor, *d.* Lilly *by* Carthusian.

87 **III.** (£5.)—W. JINKS, Minshull Vernon, Middlewich, for **Tipy**, roan chestnut, bred by G. JINKS, Cholmondeston Hall, Middlewich; *s.* Lord Maldon.

93 **R. N. & H. C.**—JOSEPH ROBSON, Cockerton, Darlington, for **Pathfinder**.

85 **Com.**—THOMAS DIXON, for **Major**.

Class 8.—*Hunter Fillies, foaled in* 1890. [11 entries, 2 absent.]

97 **I.** (£15.)—JOHN BEACH, Foggy Furze, West Hartlepool, for **Ruby**, bay, bred by Miss A. K. King, Culworth, Banbury; *s.* Ruddigore, *d.* Leila 388 *by* Lothario.

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103 II. (£10.)—JOHN LETT, Cleveland Stud Farm, Rillington, for **Queenie**, bay; *s.* Gordon, *d.* Coquette 310 *by* The Mallard.

104 III. (£5.)—GEORGE MARTON, Muscoates, Kirbymoorside, for **Mischief**, chestnut; *s.* Spendthrift, *d.* Judy 553 *by* King Caradoc.

98 R. N.—F. J. COLERIDGE BOLES, for **Lady Gladys**.

Class 9.—*Hunter Fillies, foaled in* 1891. [13 entries, 2 absent.]

110 I. (£15.)—T. BRADLEY, Uffington, Stamford, for **Stella**, brown; *s.* Havoc, *d.* Sally.

112 II. (£10.)—JOHN DICKINSON, Woodend Farm, Kildale, Grosmont, for **Queen of the May**, Vol. V., bay; *s.* Omega, *d.* Blossom, Vol. V., *by* Baron Cavendish.

109 III. (£5.)—F. J. COLERIDGE BOLES, Baraset, Alveston, Stratford-on-Avon, for **Zest**, bay; *s.* Zeal, *d.* Huntress 355.

119 R. N.—CHARLES MILES, Tatenhill, for **Duchess of Connaught** 527.

Class 10.—*Hunter Fillies, foaled in* 1892. [13 entries, 1 absent.]

122 I. (£15.)—JOHN COOPER, Brook Hill, East Haddon, Northampton, for **Lady Drummond**, chestnut; *s.* Drummond, *d. by* Prince George.

129 II. (£10.)—G. E. B. MUZEEN, Douthwaite Lodge, Kirbymoorside, for **Mandolin**, bay; *s.* Spendthrift, *d.* Madam *by* George Osbaldeston.

131 III. (£5.)—WM. PARKER, Great Stanney Hall, Chester, for **Jubilee**, brown; *s.* The Shah, *d.* Fanny 43 *by* Old Calabar.

133 R. N.—FRANK B. WILKINSON, Blyth Spital, Rotherham, for **Lady Cecil**.

Cleveland Bays.

Class 11.—*Cleveland Bay Stallions, foaled in* 1890 *or* 1891. [9 entries, none absent.]

140 I. (£15.)—F. H. STERICKER, Westgate House, Pickering, for **Brompton Lad** 1244 C.B.S.B., bay, foaled 1890, bred by G. Robinson, Patrick Brompton, Bedale; *s.* Fidius Dius 107, *d.* Wonderful Lass 598 *by* Baron Lambton 585.

136 II. (£10.)—BERT KITCHING, Hungate, Pickering, for **Kitching's Actor** 1284 C.B.S.B., bay, foaled 1891, bred by James Johnstone, Fryup Lealholme; *s.* Prince George 235, *d.* Fanny 50 *by* Barnaby 18.

134 III. (£5.)—FRANCIS P. BAKER, Ingmanthorpe Grange, Wetherby, for **Ingmanthorpe Royalty** 1318 C.B.S.B., bay, foaled 1891, bred by Mr. Wellburn, Fylingdales, Whitby; *s.* Adventure 1130 or Goldsecker 1064, *d.* Blossom 12 *by* Wonderful 359.

141 R. N. & Com.—JOHN WHITE, Appleton Roebuck, for **Appleton Turk**.

139 Com.—GEORGE SCOBY, for **Beadlam Swell**.

Class 12.—*Cleveland Bay Mares and Foals.*
[*No Entry.*]

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Coach Horses.

Class 13.—*Coaching Stallions, foaled in* 1890 *or* 1891.
[6 entries, none absent.]

145 **I.** (£15.)—THOMAS KELSEY, Hook House, Goole, for **Lord Howden**, bay, foaled 1891; *s.* Baron Rothsay 981, *d. by* Cyrus 113.

147 **II.** (£10.)—JOHN LETT, Cleveland Stud Farm, Rillington, for **First Favourite**, bay, foaled 1891, bred by M. Rudsdale, Danby Grosmont, Yorks; *s.* Prince George 367 Y.C.S.B., *d. by* Favourite 581.

144 **III.** (£5.)—JOSEPH A. HOUFE, Skewkirk Hall, Tockwith, Yorks, for **Skewkirk Squire** 2023 Y.C.S.B., bay, foaled 1891; *s.* Baron Rothsay 981, *d.* Skewkirk Swift *by* Stonewall Jackson 457.

146 **R. N. & Com.**—WILLIAM LAKIN, Burgate, Pickering, for **Lord Northdale.**
148 **Com.**—GEORGE SCOBY, for **Beadlam Banker.**

Class 14.—*Coaching Mares and Foals.*
[6 entries, 2 absent.]

150 **I.** (£15.)—THOMAS KELSEY, Hook House, Goole, for **Patience** 118 Y.C.S.B., bay, foaled 1877 [foal *by* Prince Victor, 376]; *s.* Cyrus 113, *d. by* Venture 501.

154 **II.** (£10.)—JOHN WHITE, Appleton Roebuck, Bolton Percy, for **Ainsty Queen** 367 Y.C.S.B., bay, foaled 1889, [foal *by* Knight of the Vale 1799], bred by Thomas Nicholson, Danby Howe, Castleton, Yorks; *s.* Favourite 581, *d.* Nicholson's Fanny 509 *by* General Gordon 182, *g. d. by* Colonel 96.

153 **R. N. & H. C.**—T. RADCLIFFE, Church Aston Manor, for **Wath Belle.**

152 **Com.**—T. RADCLIFFE, for **Hovingham Lass.**

Hackneys.

Class 15.—*Hackney Stallions, foaled in* 1890, *above* 15 *hands.*
[3 entries.]

155 **I.** (£15, & **Champion.**[1])—HALEWOOD STUD CO., Halewood, Liverpool, for **Astonishment 2nd** 3422, chestnut, bred by J. Scott, Clayfield, Pocklington; *s.* Danegelt 174, *d.* Sweet Auburn 3302 *by* Wildfire 1224.

157 **II.** (£10.)—D. R. SOWERBY, 12 Midland St., Hull, for **Gentleman John** 3624, black-brown; *s.* Lord Derby 2nd 417, *d.* Bounce 36 *by* Pride of the Isle 1104.

156 **III.** (£5.)—ALFRED LEWIS, Church Farm Stud, Heacham, Lynn, for **Stylish Shot** 4023, chestnut; *s.* Noble Shot 2200, *d.* Roulette 981 *by* The Gentleman 301.

Class 16.—*Hackney Stallions, foaled in* 1890, *above* 14 *hands, and not exceeding* 15 *hands.* [6 entries, 1 absent.]

158 **I.** (£15.)—J. E. ANDERTON, Breeze Hill, Cadby, Preston, for **Doctor Fred** 4228, chestnut, bred by F. Watson, The Willows, March; *s.* Renown 1887 *d.* Coral Girl 3618 *by* Fireaway Shales 271.

160 **II.** (£10.)—JOHN LETT, Cleveland Stud Farm, Rillington for **Hafas** 4295, chestnut, bred by R. Byas, Thixendale, York; *s.* Lord Swanland 1834, *d.* Vestas 3334 *by* Prickwillow 629.

[1] Gold Medal given by the Hackney Horse Society for the best Hackney Stallion.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

163 **III.** (£5.)—JOSEPH WOOD, Withnell Hall, Chorley, for **Winnal Fireaway** 4082, black; *s.* Fireaway 249, *d.* Heather 674 *by* Confidence 163.

159 **R. N. & H. C.**—A. O. HASLEWOOD, Fairfield Stud, Buxton, for **Charmer**.

162 **H. C.**—B. A. POSFORD, Falkenham, Ipswich, for **Falkenham Maypole**.

Class 17.—*Hackney Stallions, foaled in* 1891.
[19 entries, 6 absent.]

167 **I.** (£15, & **R. N. for Champion.**[1])—ARTHUR FEWSON, Hedon, Hull, for **Hedon Squire** 4306, bay; *s.* Rufus 1343 *d.* Polly 494 *by* Fireaway 249.

172 **II.** (£10.)—CHARLES MITCHELL, Enthorpe House, Market Weighton, for **Enthorpe Prince** 4252, bay; *s.* His Majesty 2513, *d.* Peg 3171 *by* Superior 1410.

176 **III.** (£5.)—T. STEPHENSON, Goodmanham, Market Weighton, for **Goodmanham Squire** 4287, chestnut; *s.* Ganymede 2076, *d.* Sister Susan 3274, *by* Anconeus 887.

178 **R. N. & H. C.**—WALTER WATERHOUSE, for **Success 3rd** 4536.

180 **H. C.**—J. & H. WEBSTER, Starborough Stud Farm, Kent, for **Free Lance**.
Com.—J. N. ANTHONY, for No. 164, **Prince Charlie 5th**; HALEWOOD STUD CO., for No. 170, **Gold Quartz**; HENRY MOORE, for No. 173, **Carnarvon**.

Class 18.—*Hackney Mares and Foals, above* 15 *hands.*
[9 entries, 2 absent.]

186 **I.** (£15, & **Champion.**[2])—EDWARD GREEN, The Moors, Welshpool, Mont., for **Modesty** 1731, chestnut, foaled 1887 [foal *by* Blaze 2nd 2376], bred by H. Moore, Burn Butts, Cranswick, Hull; *s.* Lord Derby 2nd 417, *d.* Snowdrop 324 *by* Denmark 177.

183 **II.** (£10, & **R. N. for Champion.**[2]).—H.R.H. THE PRINCE OF WALES, K.G., Sandringham, for **New York** 1296, chestnut, foaled 1887 [foal *by* Field Marshal 2986], bred by W. Flanders, Mepal, Ely; *s.* Reality 665, *d.* York 370.

190 **III.** (£5.)—WALTER WATERHOUSE, Starborough Stud Farm, Kent, for **Bury Sunflower** 1950, chestnut, foaled 1888 [foal *by* Agility 2799], bred by John Rowell, Bury, Huntingdon; *s.* Rob Roy 1339, *d.* Mermaid 769 *by* Lord Derby 2nd 417.

187 **R. N. & H. C.**—HARRY LIVESEY, Rotherfield, for **Agnes** 3401, black brown.
Com.—SIR HUMPHREY F. DE TRAFFORD, BT., for No. 184, **Ferry Queen**; WM. NEWBURN, JUN., for No. 188, **Lady Jessica**, and No. 189, **Wonder**.

Class 19.—*Hackney Mares and Foals, above* 14 *hands, and not exceeding* 15 *hands.* [11 entries, 1 absent.]

197 **I.** (£15.)—GEORGE JACKSON, Brandwood Ho., King's Heath, Birmingham, for **Minnie** 2308, chestnut, foaled 1888 [foal *by* Connaught 1453], bred by J. Morton, Stow, Downham; *s.* Cadet 1251, *d.* Maudess *by* Hue and Cry Shales 379.

192 **II.** (£10.)—H.R.H. THE PRINCE OF WALES, K.G., Sandringham, for **Constance** 63, chestnut, foaled 1882 [foal by Cadet 1251], bred by E. B. Hamond, Waterden, South Creake, Fakenham; *s.* Cannon Ball 113, *d.* Lady Jane 198 *by* Hurdle.

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[1] Gold Medal given by the Hackney Horse Society for the best Hackney Stallion.
[2] Gold Medal given by the Hackney Horse Society for the best Hackney Mare.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

200 **III.** (£5.)—J. W. TEMPLE, Leyswood, Groombridge, for **Shirley** 2448, chestnut, foaled 1888 [foal *by* Doncaster 2949], bred by C. E. Cooke, Litcham, Swaffham; *s.* Cadet 1251, *d.* Kathleen 447 *by* Cannon Ball 113.

198 **R. N. & H. C.**—HARRY LIVESEY, Rotherfield, for **Lady Alice** 1170, chestnut.

196 **H.C.**—SIR HUMPHREY F. DE TRAFFORD, BT., for **Duchess of Portland.**

Com.—A. C. CARR, for No. 194, **Madame Mojeska**; A. E. W. DARBY, for No. 195, **Maritana**; WALTER WATERHOUSE, for No. 201, **Marion.**

Class 20.—*Hackney Mares or Geldings, above* 14 *hands, up to* 15 *stone, foaled in the year* 1887, 1888, *or* 1889.[1] [2 entries, 1 absent.]

203 **I.** (£15.)—ARTHUR FEWSON, Hedon, Hull, for **Skidby Belle** 6154, brown mare, foaled 1889, bred by Isaac Harrison, Skidby, Hull; *s.* County Gentleman 2026, *d.* Poll 2380 *by* Bounding Willow 95.

Class 21.—*Hackney Mares or Geldings, above* 14 *hands, up to* 12 *stone, foaled in* 1887, 1888, *or* 1889.[1] [13 entries, 2 absent.]

213 **I.** (£15.)—WM. POPE, Cannon House, Downham Market, for **Lady Isabella** 2194, bay mare, foaled 1887, bred by John Rolfe, Carleton Forehoe, Wymondham; *s.* Confidence 158, *d.* Jenny Wren No. 269 Inspected F.S.

215 **II.** (£10.)—T. ROBERTS, 41 Ranelagh St., Liverpool, for **Belle of the Ball,** roan mare, foaled 1888, bred by Mr. Sands, Stody, Norfolk; *s.* Roan Confidence 1133, *d. by* Lord Derby 2nd 417.

210 **III.** (£5.)—C. W. FEWSON, Hedon, Hull, for **The Masher,** bay gelding, foaled 1888, bred by Luke Leake, Elsternwick, Hull; *s.* Danegelt 174, *d.* Marian Hood 4295, *by* Bay President.

205 **R. N. & H. C.**—LADY BROOKE, Dunmow, for **Queen of the Dale.**

216 **H. C.**—MAJOR S. SANDBACH, for **Sovereign.**

211 **Com.**—GILBERT GREENALL, for **Lady Alice 2nd.**

Ponies.

Class 22.—*Pony Stallions, not exceeding* 14 *hands.* [8 entries, 2 absent.]

224 **I.** (£15.)—JOSEPH WOOD, Withnell Hall, Chorley, for **Winnal George** 2440, bay, foaled 1878, bred by C. W. Wilson, Rigmaden Park, Kirkby Lonsdale; *s.* Sir George 778, *d.* Lady Polo *by* Sir George 778.

220 **II.** (£10.)—GEORGE HESMONDHALGH, 29 Dean Road, Bolton, for **Young Express,** bay, foaled 1888, bred by Mr. Thompson, Glanilhon Farm, Gwstre, Rhayader; *s.* Express 3rd, *d* Grey Jane.

225 **III.** (£5.)—C. W. WOOSNAM, Cefnllysgwynne, Builth, for **Hoity Toity,** black, foaled 1891; *s.* Electricity, *d.* Fanny *by* Lampton

222 **R. N. & Com.**—JAMES MCWATERS, Halebank, Widnes, for **Conqueror.**

223 **Com.**—J. HENRY STOCK, M.P., The White Hall, Tarporley, for **Sentinel.**

Class 23.—*Pony Mares and Foals, not exceeding* 14 *hands.* [13 entries.]

228 **I.** (£15.)—SIR HUMPHREY F. DE TRAFFORD, BT., The Flordon Stud Farm, Norfolk, for **Snorer 2456,** bay, foaled 1879 [foal *by* Cassius 2397], bred by C. W. Wilson, Rigmaden Park, Kirkby Lonsdale; *s.* Sir George 778, *d.* The Pet.

[1] Prizes given by the Chester Local Committee.

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229 **II.** (£10.)—SIR HUMPHREY F. DE TRAFFORD, BT., for **Snorer 2nd** 4703, brown, foaled 1887 [foal *by* Cassius 2397], bred by C. W. Wilson, Rigmaden Park, Kirkby Lonsdale; *s.* Sir George 778, *d.* Snorer 2456 *by* Sir George 778.

230 **III.** (£5.)—EDWARD GREEN, The Moors, Welshpool, for **Jessie 3954**, bay, foaled 1885 [foal *by* Blaze 2nd 2376]; *s.* Star of the East 798, *d.* Jenny 5439 *by* Almanza 1617.

226 **R. N. & H. C.**—HARCOURT DAPLYN, for **Norfolk Model** 2358.
H.C.—R. H. P. HUTCHINSON, for No. 232, **Brilliant**; J. W. TEMPLE, for No. 237, **Perfection 2nd**; C. W. WOOSNAM, for No. 238, **Fanny**.

Welsh Mountain Ponies.

Class 24.—*Welsh Mountain Pony Stallions, not exceeding* 12½ *hands.*[1] [2 entries.]

240 **I.** (£10.)—T. ROBERTS, Tan-y-fynwent, Aber Bangor, for **Little Jem**, bay, foaled 1886.

239 **II.** (£5.)—G. O. JONES, Merchlyn, Conway, for **Snow Ball**, white, foaled 1881, bred by Sir L. J. Parry, Bt., Madryn Park.

Class 25.—*Welsh Mountain Pony Mares or Geldings, not exceeding* 12½ *hands.*[1] [19 entries, 1 absent.]

253 **I.** (£10.)—W. J. MILTON, Raby Hall Farm, Bromborough, Birkenhead, for **Blaze**, roan gelding, foaled 1885, bred by J. Boyel, Tattenhall.

242 **II.** (£5.)—G. E. FRANKLIN, St. Leonard's House, Derby, for **Dandy Dick**, roan gelding, foaled 1887, breeder unknown.

250 **R. N. & H. C.**—J. JONES & SONS, Llandudno, for **Y Du Bâch**.
H. C.—A. H. MILTON, for No. 252, **Joey**; JOHN SCHOFIELD, for No. 257, **Dolly**.
Com.—J. JONES & SONS, for No. 249, **Tiny Tim**; J. D. JONES, for No. 251, **Alice Gray**.

Harness Horses and Ponies.

Class 26.—*Harness Mares or Geldings, of any age, above* 14 *hands.*[1] [14 entries.]

272 **I.** (£15.)—JOHN WILSON, Sefton Mews, Liverpool, for **Victory**, bay gelding, foaled 1886, breeder unknown.

271 **II.** (£10.)—WM. POPE, Cannon House, Downham Market, for **Nelly** 2349, bay mare, foaled 1885, bred by John Bealby, Wisbech; *s.* Confidence 158, *d.* Kitty *by* Shales 746.

265 **III.** (£5.)—A. HUNTER, Braehead House, Cathcart, N.B., for **Lady Lofty** 5594, bay mare, foaled 1888, bred by James Coker, Beetley Hall, E. Dereham; *s.* White Stockings 1415, *d.* Beauty 16 *by* Al. 1.

261 **R. N. & H. C.**—SIR HUMPHREY F. DE TRAFFORD, BT., for **Moonlight 4435**.
267 **H. C.**—MRS. T. D. JOHN, for **Young Elegance**.
273 **Com.**—R. WRIGHT, for **His Lordship**.

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[1] Prizes given by the Chester Local Committee.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Class 27.—*Harness Mares or Geldings, of any age, not exceeding* 14 *hands.*[1] [13 entries, 3 absent.]

280 **I.** (**£15.**)—Wm. Pope, Cannon House, Downham Market, for **Magpie** 228, black and white mare, foaled 1878, bred by Mr. Cooke, Litcham; *s.* Confidence 1743, *d.* Spot 237 *by* Premier.

275 **II.** (**£10.**)—Sir Humphrey F. de Trafford, Bt., The Flordon Stud Farm, Norfolk, for **Dorothy Derby** 1081, bay mare, foaled 1887, bred by W. J. Taaffe, Cheadle; *s.* Lord Derby 2nd 417, *d.* Burton Agnes 608 *by* Danegelt 174.

276 **III.** (**£5.**)—A. E. Evans, Bronwylfa Stud Farm, Wrexham, for **Gay Jack** 2480, skewbald gelding, foaled 1886, bred by John Mann, Hempton, Fakenham; *s.* Model 1054, *d.* Hempton Lass No. 260 Inspected F.S.

284 **R. N. & H. C.**—John Wilson, Sefton Mews, Liverpool, for **The Piebald.**

277 **Com.** Gilbert Greenall, Walton Hall, Warrington, for **Valentine.**

Shires.

Class 28.—*Shire Stallions, foaled in* 1890. [15 entries, 2 absent.]

296 **I.** (**£20, & R. N. for Champion.**[2])—T. Lowndes & Son, Rolleston Park, Tutbury, Burton-on-Trent, for **Eastern Harold** 12898, bay, bred by F. Charlesworth, Calwich, Ashbourne; *s.* Harold 3703, *d. by* Premier 2646.

301 **II.** (**£10.**)—Bryan Welch, Leighton Buzzard, for **Bar None Conqueror,** bay, bred by C. T. Part, St. Albans; *s.* Hitchin Duke 9586, *d. by* Hitchin Conqueror 4458.

293 **III.** (**£5.**)—Wm. Hollins, Pleasley Vale, Mansfield, for **Calwich Marksman** 12873, bay, bred by Henry Salt, Snelstone, Ashbourne; *s.* Harold 3703, *d. by* Conway, 3045.

289 **R. N. & H. C.** Cannock Agricultural Co., Ltd., for **Cannock Garfield.**
H. C.—J. A. Barrs, for No. 288, **Nailstone Royal Stamp**; C. E. Galbraith, for No. 291, **Grey Friar**; John Parnell, for No. 299, **Rokeby Rajah.**
Com.—A. P. Heywood-Lonsdale, for No. 292, **Stampedo.**

Class 29.—*Shire Stallions, foaled in* 1891. [17 entries, 6 absent.]

310 **I.** (**£20.**)—A. Grandage, Bramhope, Leeds, for **Nyn Hitchin Duke,** bay, bred by A. Ransom, Hitchin; *s.* Hitchin Duke 9586, *d.* Hitchin Beauty II. 12545 *by* Brailsford Hero 3484.

306 **II.** (**£10.**)—T. Charnock, Hale, Liverpool, for **Coldstream** 13961, black, bred by F. Worthington, Abbey Lawn, Seymour Grove, Manchester; *s.* Blackwatch IV. 6727, *d.* Rixton Queen *by* Eclipse 2571.

305 **III.** (**£5.**)—Cannock Agricultural Co., Ltd., Cannock, for **Cannock Preserver** 13939, bay, bred by Cannock Chase Colliery Co., Walsall; *s.* Cannock Nelson 12885, *d.* Countess 2232 *by* Lincoln's Pride 2611.

316 **R. N. & H. C.**—Mrs. Perry-Herrick, Beau Manor Park, for **Warwick IV.**
H. C.—J. J. Lees, for No. 311, **Pictor Marmion**; P. A. Muntz, M.P., for No. 314, **Thicket Thunder**; A. Nicholson, for No. 315, **Rokeby Friar.**

Class 30.—*Shire Stallions, foaled in* 1892. [17 entries, 4 absent.]

321 **I.** (**£20, & Champion.**[2])—Lord Belper, Kingston Hall, Derby, for **Kingston**

[1] Prizes given by the Chester Local Committee.
[2] Gold Medal given by the Shire Horse Society for the best Shire Stallion.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Harold, late Rokeby Harold, brown, bred by A. C. Rogers, Buckingham; *s.* Harold 3703, *d.* Poppy 5266 *by* Morning Star 1589.

320 **II.** (**£10.**)—J. A. BARRS, Nailstone Stud Farm, Hinckley, for bay, bred by the late Sir W. H. Salt, Bt., Maplewell, Loughborough; *s.* Honest Tom, 5123, *d.* Maplewell Shamrock 5332 *by* Northern King 2635.

319 **III.** (**£5.**)—J. A. BARRS, for **Nailstone Royal Standard**, brown, bred by John Garner, Tachbrook Hill, Leamington; *s.* Hindlip Champion 9584, *d.* Tachbrook Smart *by* Right Sort 2483.

329 **R. N. & H. C.**—J. J. LEES, Woolow, Buxton, for **Woolow Marmion.**
H. C.—T. CHARNOCK, for No. 323, **Seldom Seen**; FRED CRISP, for No. 324, **Somersham Hatherton**; J. WAINWRIGHT, for No. 334.

335 **Com.**—WALTER W. WHIPP, for **Withgill Skipper.**

Class 31.—*Shire Mares and Foals.* [13 entries, 4 absent.]

346 **I.** (**£20.**)—JOHN PARNELL, Rugby, for **Rokeby Fuchsia** 15507, grey, foaled 1887 [foal *by* Rokeby Rajah 13520], bred by W. H. & J. Spalton, Denby, Derby; *s.* Lincolnshire Boy 3188, *d.* Lady Grey 15068 *by* Noble Devonshire 10064.

342 **II.** (**£10.**)—A. B. FREEMAN-MITFORD, C.B., M.P., Batsford Park, Moreton-in-Marsh, for **Melody** 10451, bay, foaled 1888 [foal *by* Hitchin Conqueror, 4458]; *s.* Harold 3703, *d.* Madrigal 6647 *by* Premier 2646.

347 **III.** (**£5.**)—STEPHEN POOL, Poplar House, Earl Shilton, Hinckley, for **Black Lass**, black, foaled 1888 [foal *by* Salisbury 5324]; *s.* Harold 3703, *d.* Diamond 6174 *by* Oxford Blue 1701.

345 **R. N. & H. C.**—P. A. MUNTZ, M.P., Dunsmore, Rugby, for **Dunsmore Bracelet.**
339 **H. C.**—J. E DAVIES, The Old Warps, Warrington, for **P. B.**

Class 32.—*Shire Fillies, foaled in* 1890. [16 entries, 1 absent.]

360 **I.** (**£15, & Champion.**[1])—P. ALBERT MUNTZ, M.P., Dunsmore, Rugby, for **Dunsmore Gloaming** 14655, bay, bred by The Prince of Wales; *s.* Harold 3703, *d.* Glime 4113 *by* Staunton Hero 2918.

359 **II.** (**£10.**)—P. ALBERT MUNTZ, M.P., for **Calwich Empress** 11840, brown, bred by G. Salt, Sheen, Ashbourne; *s.* Harold 3703, *d. by* Royal Albert 1885.

354 **III.** (**£5.**)—LORD EGERTON OF TATTON, Tatton Park, for **Duchess** 14634, bay, bred by T. S. Cullen, Rolleston, Newark; *s.* Carlton Banker 9017, *d.* Madam 15176 *by* Welborn Sweep 2315.

352 **R. N. & H. C.**—J. P. CROSS, for **Catthorpe Manilla.**
357 **H. C.**—H. P. KERSHAW, for **Derby.**
Com.—LORD BELPER, for No. 349, **Princess**; J. WAINWRIGHT, for No. 364, **Mint.**

Class 33.—*Shire Fillies, foaled in* 1891. [14 entries, 1 absent.]

375 **I.** (**£15, & R. N. for Champion.**[1])—P. ALBERT MUNTZ, M.P., Dunsmore, Rugby, for **Dunsmore Cui Bono** 14653, brown, bred by J. Salt, Upper Whittle, Longnor, Buxton; *s.* Regent II. 6316, *d.* Berry *by* Lincolnshire Lad 1364.

367 **II.** (**£10.**)—J. P. CROSS, Catthorpe Towers, Rugby, for **Black Countess** 14073, black, bred by Hall Lowndes, Ellastone, Ashbourne; *s.* Harold 3703, *d. by* Hercules 1022.

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[1] Gold Medal given by the Shire Horse Society for the best Shire Mare or Filly.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

368 **III. (£5.)**—Lord Egerton of Tatton, Tatton Park, for **Aurea 13951**, bay, bred by T. Walsh, Thornton, Poulton-le-Fylde; *s.* Thornton Premier 12551, *d.* Ivy 5030 *by* St. Ives 2919.

373 **R. N. & H. C.**—T. H. Miller, Singleton Park, Lancs., for **Misalliance.**
H. C.—Fred Crisp, for No. 366, **Southgate Black Bess**; C. E. Galbraith, for No. 370, **Guelder Rose**; T. H. Miller, for No. 372; P. A. Muntz, M.P., for No. 374, **Alvaston Rose.**

369 **Com.**—Morris Evans, for **Mill May.**

Class 34.—*Shire Fillies, foaled in* 1892. [35 entries, 13 absent.]

393 **I. (£15.)**—W. W. McGibbon, Rangemore, Burton-on-Trent, for **Forest May,** brown; *s.* Dunsmore Willington Boy 13021, *d.* Forest Jean 10034 *by* Royal Albert 1885.

379 **II. (£10.)**—Lord Belper, Kingston Hall, Derby, for **Black Pearl,** black, bred by W. E. Burrows, Windley Hall, Derby; *s.* Marmion II. 9885, *d.* Choice 6044 *by* Charter 2740.

387 **III. (£5.)**—Lord Egerton of Tatton, Tatton Park, for **Tatton Magnet,** bay, bred by T. Bretherton, Oak Tree Farm, Preston; *s.* Munchausen 6190, *d.* Maria 4253 *by* Cardinal 2407.

400 **R. N. & H. C.**—John Parnell, Rugby, for **Rokeby Hannah.**
H. C.—P. A. Muntz, M.P., for No. 399, **Rokeby Fern**; John Richards, for No. 407, **Rosette.**
Com.—Lord Belper, for No. 380, **Bon Bon**; T. Charnock, for No. 381, **Cautious Lady**; Fred Crisp, for No. 382, **Scarsdale Marabou**; Lord Egerton of Tatton, for No. 386, **Tatton Eclipse**; P. A. Muntz, M.P., for No. 398, **Dunsmore Diadem**; Col. H. Platt, for No. 403, **Madryn Venus.**

Clydesdales.

Class 35.—*Clydesdale Stallions, foaled in* 1890. [6 entries, none absent.]

418 **I. (£20.)**—A. Montgomery, Nether Hall, Castle Douglas, N.B. for **Mac Hugh** 9597, bay, bred by J. Grierson, Stockerton, Kirkcudbright; *s.* Macgregor 1487, *d.* Lily White 4658 *by* Prince Albert 616.

416 **II. (£10.)**—Wm. Graham, Eden Grove, Penrith, for **Sir Harry** 9411, brown, bred by G. Ferguson, Lumphart, Daviot, N.B.; *s.* Royalist 6242, *d.* Pandora 3242 *by* Boydston Boy 111.

419 **III. (£5.)**—T. Smith, Blacon Point Farm, Chester, for **Macvinnie** 9318, bay, bred by J. McCartney, Portmary, Kirkcudbright; *s.* Macgregor 1487, *d.* Culquha Jean 2594 *by* Prince Charlie 629.

415 **R. N. & H. C.**—J. D. Fletcher, for **Prince Albert of Rosehaugh.**

Class 36.—*Clydesdale Stallions, foaled in* 1891. [3 entries.]

422 **I. (£20.)**—T. Smith, Blacon Point Farm, Chester, for **Montrave Kenneth** 9622, brown, bred by John Gilmour, Montrave, Leven, N.B.; *s.* Prince of Albion 6178, *d.* Keepsake 10624 *by* Macgregor 1487.

421 **II. (£10.)**—Lord Polwarth, Mertoun House, St. Boswells, N.B., for **Knight of the Garter** 9564, bay, bred by M. C. Lusk, Airieland, Castle Douglas, N.B.; *s.* Knight o' Lothian 4489, *d.* Shelda of Airieland 9882 *by* Callendar 4901.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

420 **III.** (**£5.**)—LORDS A. AND L. CECIL, Orchardmains, Tunbridge, for **Curfew**, bay; *s.* Claymore 3522, *d.* Campanella 4480 *by* Druid 1120.

Class 37.—*Clydesdale Stallions, foaled in* 1892.[1] [6 entries, 1 absent.]

426 **I.** (**£15.**)—LEONARD PILKINGTON, Cavens, Kirkbean-by-Dumfries, N.B., for **Royal Standard**, bay, bred by W. Robertson, Linkwood, Elgin; *s.* Royalist 6242, *d.* Betsinda 10150 *by* Macgregor 1487.

425 **II.** (**£10.**)—WM. PARK, Brunstane, Portobello, N.B., for **Prince of Brunstane**, bay; *s.* Prince Alexander 8899, *d.* Polly 11556 *by* King of the Forest 1170.

428 **III.** (**£5.**)—T. SMITH, Blacon Point Farm, Chester, for **Montrave President**, bay, bred by John Gilmour, Montrave, Leven, N.B.; *s.* Prince of Albion 6178, *d.* Primrose 9686 *by* Darnley 222.

427 **R. N. & H. C.**—LORD POLWARTH, St. Boswells, N.B., for **Border Knight.**

Class 38.—*Clydesdale Mares and Foals.* [8 entries, 2 absent.]

431 **I.** (**£20.**)—R. & R. PERCIVAL, Burgh-by-Sands, Carlisle, for **Flash Girl**, bay, foaled 1888 [foal *by* Master Lodge], bred by Hunter Bros., Causewayend, Newton Stewart; *s.* Flashwood 3604.

433 **II.** (**£10.**)—T. SMITH, Blacon Point Farm, Chester, for **Lady Peggy** 11603, bay, foaled 1888 [foal *by* Meridian 9323], bred by J. McQueen, Crofts, Dalbeattie; *s.* Master of Blantyre 2283, *d.* Rosie of Crofts 341 *by* Hercules 378.

429 **III.** (**£5.**)—LORDS A. AND L. CECIL, Orchardmains, Tunbridge, for **Cynthia** 11252, bay, foaled 1888 [foal *by* Crown of Royalty 9177]; *s.* Claymore 3522, *d.* Darling 1093 *by* Topsman 886.

434 **R. N. & H. C.**—T. SMITH, Blacon Point Farm, Chester, for **Matilda.**

Class 39.—*Clydesdale Fillies, foaled in* 1890. [9 entries, 1 absent.]

441 **I.** (**£15.**)—LEONARD PILKINGTON, Cavens, Kirkbean-by-Dumfries, N.B., for **Queen of the Roses**, bay, bred by John Gilmour, Montrave, Leven, N.B.; *s.* Prince of Albion 6178, *d.* Moss Rose 6203 *by* Prince Charlie 634.

443 **II.** (**£10.**)—T. SMITH, Blacon Point Farm, Chester, for **Crosby Queen**, brown, bred by R. B. Brockbank, Crosby, Maryport; *s.* Lothian King 6985, *d.* Crosby Lovely 8138 *by* Challenger 1088.

437 **III.** (**£5.**)—LORDS A. AND L. CECIL, Orchardmains, Tunbridge, for **Pride of Auchintoshan**, brown, bred by A. McLachlan, Cuilt, N.B.; *s.* Lord Ailsa 5974, *d.* Jess of Cuilt 8792 *by* His Royal Highness 2165.

440 **R. N. & H. C.**—WM. GRAHAM, Eden Grove, Penrith, for **Crosby Jewel.**

Class 40.—*Clydesdale Fillies, foaled in* 1891. [8 entries, 1 absent.]

449 **I.** (**£15.**)—WM. GRAHAM, Eden Grove, Penrith, for **Royal Rose**, bay, bred by A. Montgomery, Nether Hall, Castle Douglas, N.B.; *s.* Macgregor 1487 *d.* Black Sally 7652 *by* Top Gallant 1850.

446 **II.** (**£10.**)—J. D. FLETCHER, Rosehaugh, Inverness, N.B., for **Alma, bay**; *s.* Cairnbrogie Stamp 4274, *d.* Alice Grey 9632 *by* Springhill Darnley 2429.

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[1] Prizes given by the Chester Local Committee.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

451 **III.** (**£5.**)—LORD POLWARTH, Mertoun House, St. Boswells, N.B., for **Miss Daisy**, bay, bred by R. Wallace, Langbarns, Kirkcudbright; *s.* Knight o' Lothian 4489, *d.* Darling of Upper Senwick 5868 *by* Lorenzo 2262.

452 **R. N. & H. C.**—T. SMITH, Blacon Point Farm, Chester, for **Francesca.**
448 **Com.**—WM. GRAHAM, for **Lothian Queen.**

Class 41.—*Clydesdale Fillies, foaled in* 1892.[1] [11 entries, 1 absent.]

458 **I.** (**£15.**)—WM. GRAHAM, Eden Grove, Penrith, for bay, bred by R. & J. Shennan, Balig, Kirkcudbright; *s.* Patrician 8095, *d.* Bet Macgregor 9071 *by* Macgregor 1487.

461 **II.** (**£10.**)—LEONARD PILKINGTON, Cavens, Kirkbean-by-Dumfries, N.B., for **Fairy Footstep**, bay, bred by M. Arthur, Carlung, West Kilbride, N.B.; *s.* Prince of Carlung 7146, *d.* Fanny II. of Carlung 6937 *by* King of the Forest 1170.

460 **III.** (**£5.**)—ANDREW MCCLELLAND, Glenturk, Wigtown, N.B., for bay; *s.* Top Knot 6360, *d.* Kate Campbell 4786 *by* Prince Imperial 1258.

464 **R. N. & H. C.**—T. SMITH, Blacon Point Farm, Chester, for **Red Rose.**
459 **H. C.**—THE MARQUIS OF LONDONDERRY, K.G.
463 **Com.**—THOMAS SMITH, for **Leezie Lindsay.**

Suffolks.

Class 42.—*Suffolk Stallions, foaled in* 1890. [5 entries, 1 absent.]

465 **I.** (**£20.**)—R. EDGAR, Knight's Hill, Cockfield, Sudbury, for **Hardware** 2249, chestnut, bred by R. Porter, Rushmere; *s.* Wedgewood 1749, *d.* Duchess 2027 *by* Royalty 1339.

466 **II.** (**£10.**)—B. A. POSFORD, Falkenham, Ipswich, for **Crown Derby** 2171, chestnut; *s.* Wedgewood 1749, *d.* Blossom 1248 *by* Royalty 1339.

469 **III.** (**£5.**)—HORACE WOLTON, Newbourn Hall, Woodbridge, for **Chieftain's Champion** 2162, chestnut; *s.* Chieftain 1354, *d.* Pearl 1621 *by* Prince Royal 1338.

Class 43.—*Suffolk Stallions, foaled in* 1891. [5 entries, 2 absent.]

472 **I.** (**£20.**)—I. PRATT, Foxboro' Hall Farm, Melton, Woodbridge, for **Albany** 2301, chestnut, bred by R. Johnson, Colonial College, Hollesley; *s.* Queen's Diadem 1721, *d.* Melbourne 2604 *by* Wantisden Duke 534.

471 **II.** (**£10.**)—THE DUKE OF HAMILTON AND BRANDON, K.T., for **Snowflake** 2309, chestnut; *s.* Wanderer 1463, *d.* Snowdrop 1405 *by* Chieftain 1354.

Class 44.—*Suffolk Mares and Foals.* [6 entries, 2 absent.]

475 **I.** (**£20.**)—R. EDGAR, Knight's Hill, Cockfield, Sudbury, for **Prattle** 2213, chestnut, foaled 1887 [foal *by* Hardware 2249], bred by Caleb Kersey, Framsden; *s.* Cupbearer III. 566, *d.* Brag 1895 *by* Statesman 657.

477 **II.** (**£10.**)—THE DUKE OF HAMILTON AND BRANDON, K.T., for **Valiant** 2051, chestnut, foaled 1886 [foal *by* Bravo 2068], bred by J. Toller, Blaxhall, Wickham Market; *s.* Verger 1550, *d.* Venus 923 *by* Hercules 1167*a*.

479 **III.** (**£5.**)—F. C. LE G. STARKIE, Mitchells, Saffron Walden, for **The Miller's Daughter** 2608, chestnut, foaled 1889 [foal *by* Wedgewood 1749].

[1] Prizes given by the Chester Local Committee.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

bred by M. Biddell, Playford, Ipswich; *s.* Sultan 1727, *d.* Miller 1183 *by* Colonel Snap 1432.

Class 45.—*Suffolk Fillies, foaled in* 1890. [9 entries, 5 absent.]

484 **I.** (£15.)—HARRY SHOWELL, Hill House, Playford, Ipswich, for **Dainty Dolly** 3009, chestnut, bred by A. J. Smith, Rendlesham, Woodbridge; *s.* Wedgewood 1749, *d.* Dorcas 2021 *by* Foxhall 1423.

483 **II.** (£10.)—THE DUKE OF HAMILTON AND BRANDON, K.T., for **Nectar** 2953, chestnut, bred by S. Toller, Letheringham, Wickham Market; *s.* Emperor 1611, *d.* Duchess 928 *by* Prince Imperial 1239.

482 **III.** (£5.)—WM. EVERITT, Levington, Ipswich, for **Belle** 3039, chestnut; *s.* Chieftain 1354, *d.* Brag *by* Rodney 161.

488 **R. N. & H. C.**—W. E. S. AND P. H. WILSON, Hadleigh, for **Matchet** 2982.

Class 46.—*Suffolk Fillies, foaled in* 1891. [7 entries, 3 absent.]

492 **I.** (£15.)—THE DUKE OF HAMILTON AND BRANDON, K.T., for **Pilgrimage** 3217, chestnut; *s.* Wanderer 1463, *d.* Depper 1350 *by* Wantisden Duke 534.

496 **II.** (£10.)—A. J. SMITH, Rendlesham, Woodbridge, for **Minstrel Maid** 3161, chestnut; *s.* Minstrel Boy 1759, *d.* Maude 1495 *by* Field Marshal 1106.

495 **III.** (£5.)—A. J. SMITH, for **Guinea Gold** 3234, chestnut, bred by the Exors. of the late S. Wolton, Butley Abbey; *s.* Wedgewood 1749, *d.* Smart 1763 *by* Chieftain 1354.

491 **R. N. & H. C.**—DUKE OF HAMILTON & BRANDON, K.T., for **Memory 3108.**

Agricultural Horses.[1]

Class 47.—*Agricultural Geldings, foaled in* 1889, *sired by a Stallion registered in the Shire Horse Stud Book.*[1] [3 entries.]

499 **I.** (£15.)—JOSEPH B. HILL, Smethwick Hall, Congleton, for **Ploughboy,** black, bred by Mrs. Waller, Woodhall, Lincs., *s.* Old Fashion 5248.

498 **II.** (£10.)—J. B. HILL, for **Briton,** chestnut, bred by J. D. Lawson, Sutton-on-Forest, Easingwold; *s.* Rule Britannia 8136, *d. by* Bar None 2388.

497 **R. N. & H. C.**—JOSEPH BEECROFT, for **King of the Shires.**

Class 48.—*Agricultural Geldings, foaled in* 1890, *sired by a Stallion registered in the Shire Horse Stud Book.*[1] [5 entries.]

504 **I.** (£15.)—LORD WANTAGE, K.C.B., V.C., Lockinge Wantage, for **The Druid,** red-roan, bred by N. Jenkins, Bishton, Newport, Mon.; *s.* Kilsby Champion 6005.

502 **II.** (£10.)—C. MURLESS, Wynnstay Arms Hotel, Wrexham, for **Picton's Pride,** bay, bred by G. Denson, Picton Hall, Chester; *s.* England's Pride III. 9305, *d.* Diamond *by* Britain's Wonder 3491.

501 **R. N. & H. C.**—G. MORETON, Kinderton Hall, Middlewich, for bay.
H. C.—J. B. HILL, for No. 500, **Jim**; C. MURLESS, for No. 503, **Statesman.**

[1] Prizes given by the Chester Local Committee.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Class 49.—*Agricultural Geldings, foaled in* 1891, *sired by a Stallion registered in the Shire Horse Stud Book.* [5 entries, 1 absent.]

506 **I.** (**£15.**)—C. COXON, Elford Park, Tamworth, for **Elford Victor**, roan; *s.* Hatherton 4443, *d.* Elford Blossom *by* Ploughboy.

509 **II.** (**£10.**)—WM. PARKER, The Pigeon House, Handley, Chester, brown; *s.* Castern Warrior 6999.

508 **R. N.**—JOSEPH B. HILL, Smethwick Hall, Congleton, for **Drayman.**

CATTLE.

Shorthorns.

Class 50.—*Shorthorn Bulls, calved in* 1888, 1889, *or* 1890. [16 entries, 3 absent.]

516 **I.** (**£15, & Champion, £20.**[2])—THE EARL OF FEVERSHAM, Duncombe Park, Helmsley, for **New Year's Gift** 57796, roan, born Jan. 1, 1888, bred by Lord Lovat, Beaufort Castle, Beauly, N.B.; *s* Bannockburn 49035, *d.* Louisa *by* Duke of Beaufort 38122.

524 **II.** (**£10, & R. N. for Champion.**[2])—H. WILLIAMS, Moor Park, Harrogate, for **Major** 59419, red & white, born Jan. 23, 1889, bred by H.M. the Queen; *s.* Field Marshal 47870, *d.* Molly Lind 2nd *by* Goldfinder 47967.

525 **III.** (**£5.**)—J. D. WILLIS, Bapton Manor, Codford, for **Count Lavender** 60545, roan, born Mar. 3, 1889, bred by W. Duthie, Tarves, N.B.; *s.* Norseman 56233, *d.* Sweet Lavender *by* Earl of March 33807.

510 **R. N. & H. C.**—HER MAJESTY THE QUEEN, Windsor, for **Fairfax.**

519 **H. C.**—JOHN HANDLEY, Green Head, Milnthorpe, for **St. Clair** 61742.

Com.—THE MARQUESS OF BUTE, K.T., for No. 514, **Unionist**; G. HARRISON, for No. 520, **Lord Boycott**; G. F. KING, for No. 521, **Blair Athol**; LORD POLWARTH, for No. 522, **Bridegroom.**

Class 51.—*Shorthorn Bulls, calved in* 1891. [21 entries, 2 absent.]

535 **I.** (**£15.**)—WM. GRAHAM, Eden Grove, Penrith, for **Fairy King** 62570, roan, born Mar. 1, bred by the Duke of Northumberland; *s.* Royal Arthur 59806, *d.* Fairy Rosebud *by* King Hal 49808.

528 **II.** (**£10.**)—WM. ATKINSON, Overthwaite, Milnthorpe, for **Asterisk** 62094, roan, born Mar. 26, bred by A. M. Gordon, Newton, Insch, N.B.; *s.* Star of Morning 58189, *d.* Actress *by* Actor 45840.

526 **III.** (**£5.**)—HER MAJESTY THE QUEEN, Windsor, for **Red Rover** 63192, red, born June 1; *s.* Napoleon 59523, *d.* Rose of Donnie *by* Bannockburn 49035.

538 **R. N. & H. C.**—R. AND W. HENDERSON, for **Buccaneer** 62235.

H. C.—R. STRATTON, for No. 544, **Hornblower**; R. THOMPSON, for No. 545, **British Cheer.**

Com.—J. D. FLETCHER, for No. 533, **Samson**; EVAN JONES, for No. 539, **Hopeful**; LORD POLWARTH, for No. 542, **Royal Sovereign**; J. RICHMOND, for No. 543, **Bashful Boy**; J. D. WILLIS, for No. 546, **Prince Stephen.**

Class 52.—*Shorthorn Bulls, calved in* 1892. [16 entries, 1 absent.]

550 **I.** (**£15.**)—JOHN HANDLEY, Green Head, Milnthorpe, for **Royal Harbinger**

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[1] Prizes given by the Chester Local Committee.

[2] Given by the Shorthorn Society for the best Male Shorthorn exhibited in Classes 50–56.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

(vol. xxxix.), roan, born Jan. 7; *s.* Duke of Fife 58805, *d.* Lady Percy 2nd *by* Golden Hind 2nd 57392.

560 **II.** (**£10.**)—J. D. WILLIS, Bapton Manor, Codford, for **Czarowitz** (vol. xxxix.), red & little white, born Jan. 13; *s.* Count Lavender 60545, *d.* Crown Princess *by* Golden Crown 54370.

548 **III.** (**£5.**)—P. A. & G. T. EVANS, Sherlowe, Wellington, Salop, for **Sherlowe Duke** (vol. xxxix.), roan, born May 13; *s.* Oxford Duke de Breos 2nd 59557, *d.* Wild Eyes of Sherlowe *by* Earl of Thorndale 57250.

554 **R. N. & H. C.**—DUKE OF NORTHUMBERLAND, for **Prince Arthur.**
H. C.—J. HARRIS, for No. 551, **Oxford Duke of Calthwaite 19th**; THE DUKE OF PORTLAND, for No. 557, **Donor.**
Com.—F. B. OWEN, for No. 555, **Jumbo**; LORD WROTTESLEY, for No. 562, **Golden Baron.**

Class 53.—*Shorthorn Cows* (*in-milk or in-calf*), *calved before* 1890.[1] [8 entries, 4 absent.]

568 **I.** (**£15.**)—LORD POLWARTH, Mertoun House, St. Boswells, N.B., for **Wave of Loch Leven** (vol. xxxviii. p. 557), red & white, born Feb. 14, 1886, in-milk, calved May 4, 1893; *s.* King David 43417, *d.* Wave of Pacific *by* Rapid Rhone 35205.

563 **II.** (**£10.**)—C. W. BRIERLEY, The Lydiates, Brimfield, Herefordshire, for **Softlaw Rose** (vol. xxxviii. p. 272), red & white, born May 10, 1886, calved July 17, 1893, bred by J. Scott, Softlaw East Mains, Kelso, N.B.; *s.* Prince Charming 50197, *d.* Fairnington Rose *by* Mountain Prince 61343.

566 **III.** (**£5.**)—E. ECROYD, Lowhouse, Armathwaite, Cumberland, for **Armathwaite Butterfly 5th** (vol. xxxviii. p. 358), red, born Oct. 24, 1888, in-milk, calved Jan. 4, 1893; *s.* Duke of Oxford 72nd 51143, *d.* Armathwaite Butterfly 2nd *by* Baron Eden 50804.

567 **R. N. & H. C.**—G. HARRISON, Underpark, Lealholm, for **Forest Rose.**

Class 54.—*Shorthorn Heifers* (*in-milk or in-calf*), *calved in* 1890. [11 entries, 2 absent.]

580 **I.** (**£15, & R. N. for Champion.**[2])—ROBERT THOMPSON, Inglewood, Penrith, for **Margaretta Millicent** (vol. xxxvii. p. 685), roan, born Oct 3, in-calf; *s.* Beau Champion 56930, *d.* Marguerite Millicent *by* Royal Baron 50351.

577 **II.** (**£10.**)—EDWARD ECROYD, Lowhouse, Armathwaite, Cumberland, for **Armathwaite Rose** (vol. xxxix.), roan, born Sept. 18, in-milk, calved Apr. 8, 1893; *s.* Duke of Chatsworth 3rd 57185, *d.* Well Heads Rose 13th *by* Duke of Holker 38153.

573 **III.** (**£5.**)—C. W. BRIERLEY, The Lydiates, Brimfield, Herefordshire, for **Rosedale Georgie** (vol. xxxviii. p. 270), red & white, born Jan. 6, in-milk, calved Jan. 30, 1893; *s.* Martinet 59455, *d.* Jubilee Georgie *by* Uncle Ben 47184.

576 **R. N. & H. C.**—DAVID COOPER, Bainesse, Catterick, for **Lady Agnes.**
H. C.—C. W. BRIERLEY, for No. 571, **Princess**; ROBERT THOMPSON, for No. 581, **Marie Millicent.**

Class 55.—*Shorthorn Heifers, calved in* 1891. [24 entries, 7 absent.]

600 **I.** (**£15, & Champion, £20.**[2])—RICHARD STRATTON, The Duffryn, Newport,

[1] The Prizes in the "In-Milk or In-Calf" Classes are awarded subject to the animals complying with the Society's regulations as to calving.
[2] Given by the Shorthorn Society for the best Female Shorthorn exhibited in Classes 50–56.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Mon., for **Timbrel 23rd**, roan, born Mar. 26; *s.* Medallion 56175, *d.* Timbrel 12th (vol. xxxvii. p. 668) *by* Victor 52297.

595 **II.** (**£10.**)—G. HARRISON, Underpark, Lealholm, Grosmont, for **Warfare** (vol. xxxviii. p. 419), roan, born Jan. 20, bred by S. Campbell, Kinellar, N.B.; *s.* First Consul 57314, *d.* Roan Rosebud 2nd *by* Gravesend 46461.

603 **III.** (**£5.**)—J. D. WILLIS, Bapton Manor, Codford, for **Jessamine** (vol. xxxviii. p. 676), red, born Apr. 13; *s.* Captain of the Guard 58596, *d.* Japonica *by* General Gourko 39922.

582 **R. N. & H. C.**—HER MAJESTY THE QUEEN, Windsor, for **Bouquet.**

H. C.—HER MAJESTY THE QUEEN, for No. 583, **Rhoda**; C. W. BRIERLEY, for No. 587, **Rosedale Minerva**; EDWARD ECROYD, for No. 591, **Armathwaite Butterfly 10th**; J. D. WILLIS, for No. 602, **Cerastes.**

Com.—T. M. CROOK, for No. 590, **Waterloo Lady 8th**; WM. GRAHAM, for No. 592, **Laurestina 37th**; LORD POLWARTH, for No. 598, **Wave Mist**; HENRY WILLIAMS, for No. 601, **Rhoda.**

Class 56.—*Shorthorn Heifers, calved in* 1892. [23 entries, 6 absent.]

611 **I.** (**£10.**)—THE MARQUESS OF BUTE, K.T., Cardiff Castle, for **Welsh Maid**, roan, born Apr. 1; *s.* Unionist 60093, *d.* Royal Butterfly's Duchess 7th (vol. xxxv. p. 423) *by* Baron Oxford 3rd 42737.

627 **II.** (**£5.**)—J. D. WILLIS, Bapton Manor, Codford, for **Sensation** (vol. xxxix.), red, born Mar. 5; *s.* Count Lavender 60545, *d.* Seraphina 2nd *by* Field Marshal 47870.

625 **R. N. & H. C.**—ROBERT THOMPSON, Inglewood, Penrith, for **Sweet Shape.**

H. C.—VISCOUNT DE VESCI, for No. 612, **Soldier 5th**; LORD POLWARTH, for No. 622, **Bridal Robe**, and No. 623, **Windsor's Queen.**

Com.—HER MAJESTY THE QUEEN, for No. 606, **Nosegay**; C. W. BRIERLEY, for No. 610, **Rosedale Snowflake 2nd**; J. D. WILLIS, for No. 626, **Jilt.**

Herefords.

Class 57.—*Hereford Bulls, calved in* 1888, 1889, *or* 1890. [2 entries.]

629 **I.** (**£15.**)—J. H. ARKWRIGHT, Hampton Court, Leominster, for **Rose Cross 2nd** 14865, born Jan. 21, 1889; *s.* Iroquois 3rd 13147, *d.* Curley 23rd *by* Rose Cross 7237.

630 **II.** (**£10.**)—A. E. HUGHES, Wintercott, Leominster, for **Albion** 15027, born Jan. 5, 1890, bred by N. F. Moore, Sutton, Hereford; *s.* Bruce 13646, *d.* Milenda *by* Recorder 7205.

Class 58.—*Hereford Bulls, calved in* 1891. [7 entries, 2 absent.]

632 **I.** (**£15.**)—THE EARL OF COVENTRY, Croome Court, Worces., for **Corydon**, born Jan. 28; *s.* Rare Sovereign 10499, *d.* Chaplet *by* Adonis 10926.

631 **II.** (**£10.**)—J. H. ARKWRIGHT, Hampton Court, Leominster, for **Happy Hampton** 16097, born Jan. 22; *s.* Hilarity 8734, *d.* Pearl 9th *by* Good Boy 7668.

635 **III.** (**£5.**)—H. W. TAYLOR, Showle Court, Ledbury, for **Astrakhan** 15833, born Feb. 2; *s.* Cavalier 9682, *d.* Echo *by* Franklin 6961.

H. C.—HENRY HAYWOOD, for No. 633, **Principal**; JAMES WATSON, for No. 637, **Captain Grove.**

Class 59.—*Hereford Bulls, calved in* 1892. [11 entries, 2 absent.]

643 **I.** (**£15.**)—A. E. HUGHES, Wintercott, Leominster, for **Lead-on** (vol. xxiv.), born Mar. 31; *s.* Seabreeze 14153, *d.* Lofty *by* Rudolph 6660.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

648 **II.** (**£10.**)—WM. TUDGE, Leinthall, Ludlow, for **Silurian** (vol. xxiv.), born Feb. 16; *s.* Excelsior 13778, *d.* Togus *by* Auctioneer 5194.

638 **III.** (**£5.**)—J. H. ARKWRIGHT, Hampton Court, Leominster, for **Pearl Cross**, born Feb. 9; *s.* Rose Cross 2nd 14865, *d.* Pearl 5th *by* Conjuror 5264.

642 **R. N. & H. C.**—T. FENN, Stonebrook House, Ludlow, for **Downton Model.**
639 **H. C.**—THE EARL OF COVENTRY, for **Myro**; **Com.** for Nos. 640, **Rabelais**, & 641, **Reveller.**

Class 60.—*Hereford Cows* (*in-milk or in-calf*), *calved before* 1890. [7 entries, 1 absent.]

650 **I.** (**£15.**)—THOMAS FENN, Stonebrook House, Ludlow, for **Bravura** (vol. xviii. p. 281), born May 17, 1886, in-milk, calved Feb. 8, 1893, bred by the Earl of Coventry; *s.* Good Boy 7668, *d.* Bertha *by* Commander 4452.

651 **II.** (**£10.**)—THOMAS FENN, for **Downton Hermia** (vol. xxi. p. 340), born Mar. 24, 1889, in-milk, calved May 6, 1893; *s.* Bourton 11005, *d.* Hermia *by* Defender 5866.

653 **III.** (**£5.**)—THE EARL OF LISBURNE, Crosswood, Aberystwith, for **Wild Cherry** (vol. xxi. p. 468), born Feb. 19, 1889, in-milk, calved Dec. 20, 1892, bred by A. R. Boughton Knight, Downton Castle, Ludlow; *s.* Lord Derby 11410, *d.* Brockton Cherry *by* Brockton 6324.

654 **R. N. & H. C.**—FREDK. PLATT, Barnby Manor, Newark, for **Pet** (vol. xx.).
Com.—THE EARL OF COVENTRY, for No. 649, **Ranee**; THOMAS FENN, for No. 652, **Fine Lady.**

Class 61.—*Hereford Heifers* (*in-milk or in-calf*), *calved in* 1890. [2 entries.]

657 **I.** (**£15.**)—RICHARD GREEN, The Whittern, Kington, for **Perilla** (vol. xxii. p. 385), born Jan. 8, in-milk, calved Jan. 22, 1893; *s.* Whittern Grove 10843, *d.* Miss Perfection *by* Lord Wilton 4740.

656 **II.** (**£10.**)—COL. BRIDGFORD, C.B, Kinnersley, Hereford, for **Sybil**, born Jan. 10, in-milk, calved Jan. 6, 1893; *s.* Torro 7313, *d.* Dairymaid *by* Ruby 6659.

Class 62.—*Hereford Heifers, calved in* 1891. [8 entries, none absent.]

663 **I.** (**£15.**)—R. EDWARDS, The Sheriffs, Kington, for **Cocoon**, born May 3; *s.* Shaftesbury 11676, *d.* Sheriffs Collina *by* Magnet 8873.

664 **II.** (**£10.**)—R. GREEN, The Whittern, Kington, for **Rachel** (vol. xxiii. p. 251), born Feb. 9, bred by G. Child, Pembridge; *s.* Cleveland 13696, *d.* Lydia *by* Warrior True 10804.

658 **III.** (**£5.**)—HER MAJESTY THE QUEEN, Flemish Farm, Windsor, for **Pearl**, born Apr. 30; *s.* Luminary 13951, *d.* Pet *by* Hotspur 7028.

659 **R. N. & H. C.**—COL. BRIDGFORD, Kinnersley, Hereford, for **Princess 2nd.**
660 **H. C.**—THOMAS CLAYTON, Castle Bromwich, for **Buxom.**
Com.—THOMAS CLAYTON, for No. 661, **Pearl 2nd**; THE EARL OF COVENTRY, for No. 662, **Varnish 2nd**; N. F. MOORE, for No. 665, **Magic.**

Class 63.—*Hereford Heifers, calved in* 1892. [24 entries, 8 absent.]

679 **I.** (**£10.**)—REES KEENE, Llanvihangel Court, Chepstow, for **Blanche Pembridge** (vol. xxiv.), born Jan. 4; *s.* Pembridge 10387, *d.* Blanche 2nd *by* Return 6639.

687 **II.** (**£5.**)—R. O. REES, Bronllys Court, Talgarth, for **Marion** (vol. xxiv.), born Jan. 8; *s.* Lulham 13234, *d.* Mabel *by* Romulus 5543.

677 **R. N. & H. C.**—H. HAYWOOD, Blakemere Ho. Hereford, for **Pretty Promise.**

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

H. C.—The Earl of Coventry, for No. 670, **Geneva**; Thomas Fenn, for No. 674, **Downton Empress 2nd**; N. F. Moore, for No. 682, **Sutton Belle**; H. W. Taylor, for No. 689, **Tweenie**.

Com.—Her Majesty the Queen, for No. 666, **Patricia**; The Earl of Coventry, for No. 671, **Golden Valley**, & No. 672, **Rose**; R. O. Rees, for No. 686, **Dorothy**.

Devons.

Class 64.—*Devon Bulls, calved in* 1888, 1889, *or* 1890. [5 entries, 2 absent.]

694 **I.** (£15.)—Sir Wm. Williams, Bt., Heanton, Barnstaple, for **Pretty Middling** 2859, born Oct. 18, 1889, bred by the late Viscount Falmouth; *s.* Lord Wolseley 2063, *d.* Quadrille 5800 *by* Sirloin 1443.

690 **II.** (£10.)—H. B. Blackburn, Townleigh, Lew Down, for **Star** 2888, born Jan. 29, 1890, bred by John Tremayne, Sydenham, Lew Down; *s.* Duke of Flitton 17th 1544, *d.* Daystar 8779 *by* Bravo 1686.

691 **III.** (£5.)—A. C. Skinner, Pound Farm, Bishop's Lydeard, Som., for **Duke of Pound 16th** 2391, born Nov. 2, 1888; *s.* Bondholder 1905, *d.* Duchess 12th 8984 *by* Lord Currypool 1589.

Class 65.—*Devon Bulls, calved in* 1891. [7 entries, none absent.]

700 **I.** (£15.)—A. C. Skinner, Bishop's Lydeard, Som., for **Compensator** 2942, born May 31; *s.* Baron Golsoncott 4th 2193, *d.* Crape 4th 9830 *by* Lord Currypool 1589.

698 **II.** (£10.)—Col. T. Davison, Copse Hill, Bourton-on-the-Water, Glos., for **Lord Bourton** 3000, born Oct. 25, bred by the late W. H. Punchard, Bourton Hall, Totnes; *s.* Lord Wolseley 2063, *d.* Lady Julia 7432.

696 **III.** (£5.)—Alfred Bowerman, Capton, Williton, Taunton, for **Starlight**, born Jan. 18, bred by John Tremayne, Sydenham, Lew Down; *s.* Baron Golsoncott 5th 2339, *d.* Daystar 8779 *by* Bravo 1686.

701 **R. N. & H. C.**—P. Horden Tamlyn, Boode Ho., Braunton, for **Welcombe**.

699 **Com.**—E. Mucklow, Whitstone Head, Holsworthy, for **Gay Man**.

Class 66.—*Devon Bulls, calved in* 1892. [9 entries, 1 absent.]

705 **I.** (£10.)—A. C. Skinner, Bishop's Lydeard, Som., for **Lord Punchard** 3148, born Jan. 14, bred by Exors. of W. H. Punchard, Bourton Hall, Totnes; *s.* Lord Wolseley 2063, *d.* Lady Jane 10373 *by* Champion 1696.

702 **II.** (£5.)—Col. T. Davison, Copse Hill, Bourton-on-the-Water, Glos., for **Garnet**, born Apr. 15; *s.* Lord Wolseley 2063, *d.* Lady 10th 9125 *by* Lord Clyst 2021.

710 **R. N. & H. C.**—Sir Wm. Williams, Bt., for **Pretty Middling 3rd**, and **Com.** for No. 709, **Pretty Middling 2nd**.

Class 67.—*Devon Cows or Heifers (in-milk or in-calf), calved before or in* 1890. [5 entries.]

714 **I.** (£15.)—Sir Wm. Williams, Bt., Heanton, Barnstaple, for **Flame 4th** 11891, born May 26, 1890, in-milk, calved Jan. 5, 1893; *s.* Captain 2204, *d.* Flame *by* Duke of Flitton 17th 1544.

713 **II.** (£10.)—E. J. Stanley, M.P., Quantock Lodge, Bridgwater, for **Moss Rose 15th** 11757, born Apr. 4, 1890, in-calf; *s.* Tempter 2nd 2153, *d.* Moss Rose 12th 9864 *by* Royal Sam 2122.

711 **R. N. & H. C.**—Her Majesty the Queen, Windsor, for **Buttercup**.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

715 **H. C.**—Sir Wm. Williams, Bt., for **Graceful 2nd.**
712 **Com.**—A. C. Skinner, for **Duchess 29th.**

Class 68.—*Devon Heifers, calved in* 1891. [3 entries.]

717 **I.** (£15.)—A. C. Skinner, Bishop's Lydeard, Som., for **Fancy 17th** 12430, born Jan. 25; *s.* General Gordon 1974, *d.* Fancy 7th 8991 *by* Lord Currypool 1589.

718 **II.** (£10.)—E. J. Stanley, M.P., Quantock Lodge, Bridgwater, for **Princess Margaret** 12461, born Apr. 8; *s.* Baronet 1897, *d.* Princess 9099 *by* General Colley 1564.

716 **R. N. & H. C.**—E. Mucklow, Whitstone Head, Holsworthy, for **Lady Ida.**

Class 69.—*Devon Heifers, calved in* 1892. [7 entries, 1 absent.]

725 **I.** (£10.)—Sir Wm. Williams, Bt., Heanton, Barnstaple, for **Fiction 5th** 13191, born Jan. 13; *s.* Pretty Middling 2859, *d.* Fiction 2nd *by* Foreman 2nd 1969.

720 **II.** (£5.)—Her Majesty the Queen, Flemish Farm, Windsor, for **Poppy** (vol. xvi.), born June 15; *s.* Daisy's Dumpling 1933, *d.* Pink 12th 10416 *by* Viscount 1477.

719 **R. N. & H. C.**—Her Majesty the Queen, Windsor, for **Dahlia.**
722 **H. C.**—E. Mucklow, for **Whitstone Rosewater.**
724 **Com.** Sir Wm. Williams for **Fancy 8th.**

Sussex.

Class 70.—*Sussex Bulls, calved in* 1888, 1889, *or* 1890. [6 entries, 2 absent.]

727 **I.** (£15.)—W. S. Forster, Gore Court, Maidstone, for **Gondolier** 1001, born Apr. 19, 1889; *s.* Careful 741, *d.* Tidy *by* Barton.

728 **II.** (£10.)—J. Godman, Park Hatch, Godalming, for **Goldlink** 1099, born Mar. 1, 1890; *s.* Gold 815, *d.* Noble Lady 2911 *by* Napoleon 3rd 396.

726 **R. N.**—Finlay Campbell, Brantridge Park, Balcombe, for **Sam.**

Class 71.—*Sussex Bulls, calved in* 1891. [6 entries, 2 absent.]

735 **I.** (£15.)—J. S. Hodgson, Lythe Hill Farm, Haslemere, for **Headley** 1201, born Jan. 22; *s.* Dog Daisy 1112, *d.* Young Emily 2737 *by* Oxford 304.

732 **II.** (£10.)—The Earl of Derby, Birtley, Witley, Godalming, for **Gladiator** 1171, born Feb. 15, bred by the late Earl of Derby; *s.* Jubilee 826, *d.* Gladsome 3rd 4008 *by* Oxford 2nd 771.

733 **R. N. & H. C.**—J. Godman, Park Hatch, Godalming, for **Lord Noble.**

Class 72.—*Sussex Bulls, calved in* 1892. [4 entries, none absent.]

738 **I.** (£10.)—The Earl of Derby, Birtley, Witley, Godalming, for **Beacon** 1247, born Apr. 28, bred by the late Earl of Derby; *s.* Dog Daisy 1112, *d.* Brawny 4685 *by* Fitzgerald 3rd 749.

741 **II.** (£5.)—J. Godman, Park Hatch, Godalming, for **King John 2nd** 1260, born Feb. 17; *s.* King John 1100, *d.* Noble Lady 5th 4419 *by* Nobleman 707.

739 **R. N.**—The Earl of Derby, for **Proud Prince** 1249.

Class 73.—*Sussex Cows or Heifers* (*in-milk or in-calf*), *calved before or in* 1890. [5 entries, none absent.]

744 **I.** (£15.)—The Earl of Derby, Birtley, Witley, Godalming, for **Lady**

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Napier 2nd 5185, born July 27, 1890, in-milk, calved Feb. 3, 1893, bred by C. T. Lucas, Horsham; *s.* Lover 1149, *d.* Lady Napier 5184 *by* Earl of Magdala 2nd 585.

746 **II.** (**£10.**)—J. GODMAN, Park Hatch, Gadalming, for **Comely 19th** 5070, born Jan. 10, 1890, in-milk, calved Jan. 24, 1893; *s.* Nobleman 707, *d.* Comely 9th 3682 *by* Goldboy 541.

745 **R. N. & H. C.**—W. S. FORSTER, Gore Court, Maidstone, for **Blackeyes.**

Class 74.—*Sussex Heifers, calved in* 1891. [4 entries, none absent.]

749 **I.** (**£15.**)—W. S. FORSTER, Gore Court, Maidstone, for **Foxglove** 5484, born Jan. 20; *s.* Oxford Duke 1st 840, *d.* Rosemary 4381 *by* Careful 741.

748 **II.** (**£10.**)—W. S. FORSTER, for **Crown Princess** 5483, born Feb. 27; *s.* Mikado 705, *d.* Princess 2nd 3325 *by* Pacific 514.

750 **R. N.**—J. GODMAN, Park Hatch, Godalming, for **Gentle 15th.**

Class 75.—*Sussex Heifers, calved in* 1892. [6 entries, 2 absent.]

755 **I.** (**£10.**)—J. GODMAN, Park Hatch, Godalming, for **Dahlia 8th** 5900, born Jan. 16; *s.* King John 1100, *d.* Dahlia 7th 4736 *by* Oxford Duke 708.

754 **II.** (**£5.**)—W. S. FORSTER, Gore Court, Maidstone, for **Flo** 5879, born Jan. 1; *s.* Gondolier 1001, *d.* Wadhurst Marigold 5050 *by* Lord Charles.

751 **R. N. & H. C.**—J. C. BUCKWELL, Staplecross, for **Ewhurst Girl 4th.**

Welsh.

Class 76.—*Welsh Bulls, calved in* 1888, 1889, *or* 1890. [8 entries, none absent.]

759 **I.** (**£15, & Champion, £21.**[1])—LORD HARLECH, Glyn, Talsarnan, for **Master Tom** 236, born Jan. 4, 1889; *s.* Tichborne 160, *d.* Rosebud 257 *by* Black Prince 4.

758 **II.** (**£10.**)—LORD HARLECH, for **David ap Jevan ap Einion** 234, born June 23, 1890; *s.* Jevan 158, *d.* Moss Rose 696 *by* Yuysfaig 161.

760 **III.** (**£5.**)—J. JONES & SONS, Llandudno, for **Sir Feirionydd** 248, born Mar. 4, 1890, bred by R. Jones, Cefntirmynach, Bala; *s.* Jack, *d.* Rhyd-y-fen.

761 **R. N. & H. C.**—J. JONES & SONS, Llandudno, for **Y Tlws Du** 167.

757 **H. C.**—EVAN EVANS, Maesmynach, Llanbyther, for **Roger.**

Com.—COL. HENRY PLATT, for No. 762, **Llywarch O' Fadryn**; G. ROBERTS, for No. 763, **Bodvel Duke**; R. & S. WILLIAMS, for No. 764, **Ambrose.**

Class 77.—*Welsh Bulls, calved in* 1891. [10 entries, 1 absent.]

772 **I.** (**£15, & R. N. for Champion.**[1])—W. E. OAKELEY, The Plâs, Tan-y-Bwlch, for **Rhaiadr Du** 257, born Jan. 7; *s.* Latimer 188, *d.* Keturah 739 *by* Harlech 96.

768 **II.** (**£10.**)—LORD HARLECH, Glyn, Talsarnan, for **Sir Robert,** born Jan. 22; *s.* Tichborne 160, *d.* Tulip 482 *by* Cipher 11.

766 **III.** (**£5.**)—R. M. GREAVES, Wern, Tremadoc, for **Brenhin Morfa** 233, born Jan. 3; *s.* Ulundi 238, *d.* Morwyn Morfa *by* Einion 92.

767 **R. N. & H. C.**—LORD HARLECH, Glyn, Talsarnan, for **Prince Randolph.**

[1] Champion Cup given by the Chester Local Committee for the best Welsh Bull.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Com.—D. EVANS-HUGHES, for No. 765, **Caswallon**; THOMAS JONES, for No. 771, **Chatham**.

Class 78.—*Welsh Bulls, calved in* 1892. [8 entries, 1 absent.]

777 **I.** (**£10.**)—LORD HARLECH, Glyn, Talsarnan, for **Kaffir**, born Jan. 3 *s.* Ulundi 238, *d.* Peggy 479 *by* Cipher 11.

781 **II.** (**£5.**)—COL. HENRY PLATT, Gorddinog, Llanfairfechan, for **Puritan** (vol. v.), born Feb. 29; *s.* Cromwell 194, *d.* Eleanor 2nd 755 *by* Bromfield 191.

780 **R. N. & H. C.**—W. E. OAKELEY, The Plâs, Tan-y-Bwlch, for **Welsh Fusileer**.
Com.—H. ELLIS, for No. 775, **Cemaes Fawr**; MAJOR S. SANDBACH, for No. 782, **Lord Salisbury**.

Class 79.—*Welsh Cows (in-milk or in-calf), calved before* 1890. [8 entries, 1 absent.]

786 **I.** (**£15, & R. N. for Champion.**[1])—COL. HENRY PLATT, Gorddinog, Llanfairfechan, for **Blodwen 2nd** 751, born Mar. 4, 1889, in-milk, calved Mar. 22, 1893; *s.* Bromfield 191, *d.* Blodwen *by* Grand Duke 22.

787 **II.** (**£10.**)—COL. HENRY PLATT, for **Cromlech 2nd** 753, born Aug. 11, 1889, in-calf; *s.* Bromfield 191, *d.* Cromlech 331 *by* Black Boy 76.

785 **III.** (**£5.**)—W. E. OAKELEY, The Plâs, Tan-y-Bwlch, for **Gem** 738, born Jan. 18, 1888, in-calf; *s.* Harleeh 96, *d.* Jewel 549.

783 **R. N. & H. C.**—R. M. GREAVES, Wern, Tremadoc, for **Gwernen**.
Com.—THOMAS ROBERTS, for No. 789, **Bella 3rd**; SIR HENRY WIGGIN, BT., for No. 790, **Martha**.

Class 80.—*Welsh Heifers (in-milk or in-calf), calved in* 1890.[2] [7 entries.]

796 **I.** (**£15 & Champion £21.**[1])—COL. HENRY PLATT, Gorddinog, Llanfairfechan, for **Bechan 2nd** (vol. v.), born Apr. 7, in-calf, bred by H. Ellis, Tairmeibion, Bangor; *s.* Martin, *d.* Bechan *by* Tarw Tanrallt.

792 **II.** (**£10.**)—H. ELLIS, Tairmeibion, Bangor for **Tiny** (vol. v.), born Sept. 26, in-calf; *s.* Martin, *d.* Tanrallt Bach 464 *by* Tairmeibion Bull.

795 **III.** (**£5.**)—W. E. OAKELEY, The Plâs, Tan-y-Bwleh, for **Bog-Myrtle** 734, born Feb. 7, in-milk, calved Apr. 17, 1893; *s.* Baron of Bangor, 185, *d.* Heather Bell 548 *by* Harleeh.

797 **R. N. & H. C.**—THE HON. F. G. WYNN, Glynllifon, for **Glyn Agnes**.

791 **Com.**—H. ELLIS, Tairmeibion, Bangor, for **Elma**.

Class 81.—*Welsh Heifers, calved in* 1891. [13 entries.]

808 **I.** (**£15.**)—COL. HENRY PLATT, Gorddinog, Llanfairfechan, for **Prydferth 2nd** (vol. v.), born Jan. 15, bred by Owen Jones, Ty Mawr, Bodafon, Llanerchymedd, Anglesey; *s.* Bodafon Baronet 292, *d.* Prydferth 519 *by* Cadwaladr 151.

798 **II.** (**£10.**)—EVAN EVANS, Maesmynach, Llanybyther, for **Duchess**, born June 25; *s.* Welsh Duke, *d.* Beauty *by* Granellian.

804 **III.** (**£5.**)—W. JONES, Taihirion, Gaerwen, Anglesey, for **Mona's Maid**, born Jan. 24; *s.* Berw, *d.* Marian *by* Gwilyn 2nd 169.

801 **R. N. & H. C.**—LORD HARLECH, Glyn, Talsarnan.

807 **H. C.**—COL. HENRY PLATT, for **Caroline**.

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[1] Champion Cup given by the Chester Local Committee for the best Welsh Cow or Heifer.
[2] Prizes given by the Chester Local Committee.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Com.—R. M. GREAVES, for No. 799, **Bloden**; and No. 800 **Madoc Maid**; THE HON. F. G. WYNN, for No. 810, **Geinwen.**

Class 82.—*Welsh Heifers, calved in* 1892. [16 entries, none absent.]

821 **I.** (**£10.**)—COL. HENRY PLATT, Gorddinog, Llanfairfechan, for **Enid 2nd** (vol. v.), born Jan. 8, bred by H. Ellis, Tairmeibion, Bangor; *s.* Fron 230, *d.* Enid 674 *by* Cadwaladr 151.

820 **II.** (**£5.**)—W. E. OAKELEY, The Plâs, Tan-y-Bwlch, for **Tiara** (vol. v.), born Jan. 6; *s.* Latimer 188, *d.* Gem 738 *by* Harlech 96.

814 **R. N. & H. C.**—LORD HARLECH, Glyn, Talsarnan.

Com.—H. ELLIS, for No. 812, **Twin**; LORD HARLECH, for No. 813; J. JONES & SONS, for No. 815, **Tlysni Arfôn**; COL. HENRY PLATT, for No. 823, **Mon 3rd.**

Red Polled.

Class 83.—*Red Polled Bulls, calved in* 1888, 1889, *or* 1890. [5 entries, 1 absent.]

831 **I.** (**£15, & R. N. for Champion.**[1])—LORD HASTINGS, Melton Constable, E. Dereham, for **Broadbent** 1721, born Apr. 27, 1889, bred by A. Taylor, Starston Place, Harleston; *s.* Bardolph 977, *d.* Bunch 3905 *by* Passion 714.

829 **II.** (**£10**)—H. P. GREEN, Caistor Hall, Norwich, for **Starlight** 2531, born Dec. 21, 1889, bred by A. Taylor, Starston Place, Harleston; *s.* Bardolph 977, *d.* Buxom 1355 *by* Davyson 3rd 48.

828 **R. N. & H. C.**—J. J. COLMAN, M.P., Carrow Ho., Norwich, for **Jupiter 2380.**

Class 84.—*Red Polled Bulls, calved in* 1891. [3 entries.]

832 **I.** (**£15, & Champion £10.**[1])—J. J. COLMAN, M.P., Carrow House, Norwich, for **Red Prince** 2902, born Feb. 11; *s.* Laureate 1563, *d.* Prize 5077 *by* Cromwell 647.

834 **II.** (**£10.**)—H. P. GREEN, Caistor Hall, Norwich, for **Prince Charming** 2887, born Feb. 23; *s.* Caistor Prince 1473, *d.* Roda 5092 *by* Titus 1089.

833 **R. N. & H. C.**—J. J. COLMAN, M.P., for **Ruby King** 2925, born Feb. 26.

Class 85.—*Red Polled Bulls, calved in* 1892. [4 entries, none absent.]

838 **I.** (**£10.**)—H. P. GREEN, Caistor Hall, Norwich, for **Aster**, born Jan. 31; *s.* Starlight 2531, *d.* Caistor Rose 5305 *by* Combination 1150.

837 **II.** (**£5.**)—J. J. COLMAN, M.P., Carrow House, Norwich, for **The Bard**, born July 12; *s.* Bardolph 977, *d.* Silent Lady 1855 *by* Rufus 188.

836 **R. N.**—LORD AMHERST OF HACKNEY, Didlington Hall, for **Red Letter.**

Class 86.—*Red Polled Cows or Heifers* (*in-milk or in-calf*), *calved before or in* 1890. [9 entries, 2 absent.]

841 **I.** (**£15, & Champion £10.**[2])—J. J. COLMAN, M.P., Carrow House, Norwich, for **Dorena** 6308, born Feb. 26, 1890, in-milk, calved Jan. 22, 1893; *s.* Iago 1025, *d.* Doris 4532 *by* Falstaff 303.

839 **II.** (**£10, & R. N. for Champion.**[2])—LORD AMHERST OF HACKNEY, Didlington Hall, Norfolk, for **Saltarella** 5110, born July 23, 1888, in-milk, calved Oct. 24, 1892, in-calf; *s.* Didlington Davyson 4th 1003, *d.* Satanella 3732 *by* Cortes 645.

[1] Given by the Red Polled Society for the best Red Polled Male animal exhibited.
[2] Given by the Red Polled Society for the best Red Polled Female animal exhibited.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

846 III. (£5.)—Lord Hastings, Melton Constable, E. Dereham, for **Ruperta 2nd** 5935, born Apr. 8, 1889, in-milk, calved Mar. 22, 1892; *s.* Roscoe 559, *d.* Davy 19th 848 *by* Davyson 3rd 48.

840 R. N. & H. C.—Lord Amherst of Hackney, for **Saltarella 3rd**.

Class 87.—*Red Polled Heifers, calved in* 1891. [3 entries.]

850 I. (£15.)—J. J. Colman, M.P., Carrow House, Norwich, for **Rose Alba** 7468, born Jan. 19; *s.* Laureate 1563, *d.* Midsummer Rose 2976 *by* Othello 713.

849 II. (£10.)—J. J. Colman, M.P., for **Banksia Rose** 6960, born Mar. 24; *s.* Iago 1025, *d.* Rosalie 2495 *by* King Charles 329.

848 R. N. & H. C.—Lord Amherst of Hackney, for **Rosetti**.

Class 88.—*Red Polled Heifers, calved in* 1892. [7 entries, 1 absent.]

854 I. (£10.)—H. P. Green, Caistor Hall, Norwich, for **Honeymoon**, born Jan. 8; *s.* Starlight 2531, *d.* Bride Elect 6215 *by* Combination 1150.

851 II. (£5.)—J. J. Colman, M.P., Carrow House, Norwich, for **Jewel 2nd**, born Apr. 21; *s.* Negro 1956, *d.* Jewel 5575 *by* Iago 1025.

857 R. N. & H. C.—Col. A. G. Lucas, Berkhamsted, for **Ashlyns Phyllis**.
852 H. C.—J. J. Colman, M.P., for **Telba**.
856 Com.—Lord Hastings, for **Mermaid**.

Aberdeen Angus.

Class 89.—*Aberdeen Angus Bulls, calved in* 1888, 1889, *or* 1890. [8 entries, 1 absent.]

863 I. (£15.)—Sir G. Macpherson-Grant, Bt., Ballindalloch Castle, N.B., for **Prince Inca** 7844, born Feb. 26, 1889; *s.* Iliad 2843, *d.* Pride of Invereshie 7059 *by* Justice 1462.

859 II. (£10.)—Rev. C. Bolden, Preston Bissett, Buckingham, for **Esmond of Ballindalloch** 8304, born Mar. 1, 1890, bred by Sir G. Macpherson Grant, Bt.; *s.* Iliad 2843, *d.* Edelweiss 5605 *by* Young Viscount 736.

864 III. (£5.)—Clement Stephenson, Sandyford Villa, Newcastle-on-Tyne, for **Cerberus** 8181, born Mar. 20, 1890, bred by J. T. Cathcart, Pitcairlie, N.B.; *s.* Norfolk 3082, *d.* Lady Jane Grey 10065 *by* Monarch 1182.

862 R. N. & H. C.—J. D. Fletcher, Inverness, for **Minotaur of Rosehaugh**.
861 Com.—Claud De Lacy, The Island, Waterford, for **Gay Knight**.

Class 90.—*Aberdeen Angus Bulls, calved in* 1891 *or* 1892. [10 entries, 1 absent.]

873 I. (£15.)—Sir G. Macpherson-Grant, Bt., Ballindalloch Castle, for **Eltham** 9120, born Jan. 16, 1891; *s.* Iliad 2843, *d.* Elegy 7046 *by* Sir Evelyn 2340.

868 II. (£10).—Fred Crisp, White House, New Southgate, for **Gilderoy** 9208, born Mar. 2, 1891, bred by Sir G. Macpherson-Grant, Bt.; *s.* Iliad 2843, *d.* Georgina 2nd of Aberlour *by* Whig 1867.

871 III. (£5.)—The Marquis of Huntly, Aboyne Castle, N.B., for **Elf Prince** 9116, born May 8, 1891, bred by Sir G. Macpherson-Grant, Bt.; *s.* Prince Luca 7844, *d.* Elfin 3795 *by* Elcho 5957.

875 R. N. & H. C.—Nevill Tufnell, Monken Hadley, for **Lord Monken**.
874 Com.—The Earl of Strathmore, Glamis Castle, N.B., for **Kidnapper**.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Class 91.—*Aberdeen Angus Cows or Heifers (in-milk or in-calf), calved before or in* 1890. [7 entries, 1 absent.]

879 **I. (£15.)**—A. Egginton, South Ella, Hull, for **Equality** 11208, born Dec. 6, 1885, in-milk, calved Jan. 26, 1893, bred by Sir G. Macpherson-Grant, Bt.; *s.* Fitz Elcho 2752, *d.* Equity 4671 *by* Judge 1150.

876 **II. (£10.)**—Her Majesty the Queen, Abergeldie Mains, Ballater, N.B., for **Miss Pretty** 12313, born Apr. 30, 1886, in-calf, bred by Col. Ferguson, Pitfour, Mintlaw, N.B.; *s.* Erroll 2723, *d.* Pretty Poll 2nd 5484 *by* Logies Heir 1560.

882 **III. (£5.)**—Sir G. Macpherson-Grant, Bt., Ballindalloch Castle, N.B., for **Eurya** 13708, born May 21, 1888, in-milk, calved Feb. 20, 1893; *s.* Provost 1259, *d.* Eugenie of Ballindalloch 4170 *by* Judge 1150.

878 **R. N.**—Fred Crisp, White House, New Southgate, for **Rose 4th.**

Class 92.—*Aberdeen Angus Heifers, calved in* 1891 *or* 1892. [11 entries, 4 absent.]

890 **I. (£15.)**—Major M. H. Lambert, Widdrington, Acklington, for **Professional Beauty 2nd** (vol. xviii.), born May 7, 1891, bred by E. Liddell, Newton-by-the-Sea; *s.* Ember 7498, *d.* Beauty 21st of Easter Tulloch 14182 *by* Constable of France 2032.

892 **II. (£10.)**—Clement Stephenson, Sandyford Villa, Newcastle-on-Tyne, for **Spinet** 19856, born Jan. 11, 1892; *s.* Albert Edward 7293, *d.* Spink 7516 *by* Lord Chancellor 1782.

888 **III. (£5.)**—The Marquis of Huntly, Aboyne Castle, N.B., for **St. Aimee** 18062, born March 29, 1891; *s.* Paris 1473, *d.* St. Agnes 13839 *by* Frederick the Great 4680.

884 **R. N. & H. C.**—Rev. C. Bolden, for **Pride of Preston 4th.**
893 **Com.**—Nevill Tufnell, for **Valery.**

Galloways.

Class 93.—*Galloway Bulls, calved in* 1888, 1889, *or* 1890. [2 entries.]

895 **I. (£15.)**—Leonard Pilkington, Cavens, Kirkbean, Dumfries, for **Henry of Tarbreoch** 4847, born Jan. 31, 1888, bred by J. Cunningham, Tarbreoch, Dalbeattie; *s.* Harden 1151, *d.* Miss Wallace 2nd 5368 *by* Chilcarroch 2296.

894 **II. (£10.)**—James Cunningham, Tarbreoch, Dalbeattie, for **Camp Follower** 5042, born Feb. 6, 1889, bred by T. Biggar & Sons, Chapelton, Dalbeattie, N.B.; *s.* Chinaman, 4154, *d.* Caprice 4th 10090 *by* Corporal 1838.

Class 94.—*Galloway Bulls, calved in* 1891 *or* 1892. [5 entries, 1 absent.]

900 **I. (£15.)**—Leonard Pilkington, Cavens, Kirkbean, Dumfries, for **Cedric 2nd of Tarbreoch** 5483, born Jan. 20, 1891, bred by J. Cunningham, Tarbreoch, Dalbeattie; *s.* Lucky Times 3058, *d.* Tarbreoch Lizzie 3rd 9680 *by* Harden 1151.

897 **II. (£10.)**—T. Biggar & Sons, Chapelton, Dalbeattie, for **Clan Alpine 2nd** 5486, born Mar. 24, 1891, bred by J. Cunningham, Tarbreoch, Dalbeattie; *s.* Royal Liberty 4140, *d.* Lady Stanley 13th *by* Scottish Borderer 669.

896 **III. (£5.)**—The Earl of Ancaster, Normanton Park, Stamford, for **Randall** 5504, born Jan. 12, 1891, bred by B. & J. Shennan, Balig, N.B.; *s.* Crown Jewel 4853, *d.* Tidy of Balig 22nd 11089 *by* Galileo 4275.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Class 95.—*Galloway Cows or Heifers* (*in-milk or in-calf*), *calved before or in* 1890. [8 entries, 2 absent.]

905 **I.** (£15.)—JAMES CUNNINGHAM, Tarbreoch, Dalbeattie, for **Scottish Queen** 11524, born June 22, 1889, in-milk, calved Apr. 30, 1893; *s.* Harden 1151, *d.* Lizzie 4th of Breckonhill 8945 *by* Scottish Borderer 669.

908 **II.** (£10.)—LEONARD PILKINGTON, Cavens, Kirkbean, Dumfries, for **Tidy 5th of Drumlanrig**, born Apr. 11, 1890, in-milk, calved Feb. 4, 1893, bred by the Duke of Buccleuch; *s.* Bosphorus 4693, *d.* Tidy of Drumlanrig *by* Mackintosh 2646.

907 **III.** (£5.)—SIR ROBERT JARDINE, BT., Castlemilk, Lockerbie, for **Dewdrop of Castlemilk** 11959, born May 3, 1890, in-calf; *s.* Merle of Tarbreoch 4855, *d.* Jenny Duke 2nd of Castlemilk 5499 *by* Beaconsfield 1344.

904 **R. N. & H. C.**—J. CUNNINGHAM, for **Madonna 2nd of Tarbreoch** 11056.
Com.—THE COUNTESS OF CARLISLE, for No. 901, **Celestia 2nd of Tarbreoch**, and No. 902, **Lady Stanley 21st of Tarbreoch.**

Class 96.—*Galloway Heifers, calved in* 1891 *or* 1892. [9 entries, 1 absent.]

912 **I.** (£15.)—JAMES CUNNINGHAM, Tarbreoch, Dalbeattie, for **Isabel of Tarbreoch** 12552, born Mar. 26, 1891; *s.* Lucky Times 3058, *d.* Dora 2nd of Tarbreoch 10429 *by* Harden 1151.

914 **II.** (£10.)—SIR R. JARDINE, BT., Castlemilk, Lockerbie, for **Lady Vaudeville of Castlemilk** 12936, born Apr. 10, 1891; *s.* Merle of Tarbreoch 8455, *d.* Vaudeville 2nd of Closeburn 11033 *by* Dictator of Balig 3845.

917 **III.** (£5.)—LEONARD PILKINGTON, Cavens, Kirkbean, Dumfries, for **May Queen of Tarbreoch** 13120, born Jan. 28, 1892, bred by J. Cunningham, Tarbreoch, Dalbeattie; *s.* Royal Liberty 4140, *d.* Scottish Queen 11524 *by* Harden 1151.

915 **R. N. & H. C.**—SIR R. JARDINE, BT., for **Mabel of Castlemilk.**
910 **Com.**—THE COUNTESS OF CARLISLE, for **Lady Stanley 22nd of Naworth.**

Ayrshire.

Class 97.—*Ayrshire Bulls, calved in* 1890, 1891, *or* 1892. [3 entries.]

919 **I.** (£10.)—LEONARD PILKINGTON, Cavens, Kirkbean, Dumfries, for **Royal Stewart**, white & brown, born Apr. 16, 1891, bred by R. Montgomery, Lessnessock, Ochiltree, N.B.; *s.* Lord Glencairn 1818, *d.* Nora 7853 *by* Lord Randolph 1499.

920 **II.** (£5.)—SIR MARK J. STEWART, BT., M.P., Southwick, Dumfries, for **Risk Hine of Southwick**, white & dark brown spots, born Feb. 20, 1892, bred by D. Mair, Craig Brae, Coylton; *s.* Here am I 1794.

918 **R. N. & H. C.**—LEONARD PILKINGTON, for **Field Marshal.**

Class 98.—*Ayrshire Cows or Heifers* (*in-milk or in-calf*). [4 entries, 1 absent.]

921 **I.** (£10.)—SIR MARK J. STEWART, BT., M.P., Southwick, Dumfries, for **Stately of Southwick**, brown & white, born Feb. 1, 1891, in-calf; *s.* Hover a Blink of Drumjoan 892, *d.* Stately 7887 *by* Torcross 637.

921 **II.** (£5.)—LEONARD PILKINGTON, Cavens, Kirkbean, Dumfries, for **Betty**, white & brown, born Apr. 1891, in-calf, bred by Sir Mark J. Stewart, Bt.,

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

M.P.; *s.* Blooming Heather 1918, *d.* Betty of Southwick 5892 *by* Hover a Blink of Drumjoan 892.

922 **R. N. & H. C.**—LEONARD PILKINGTON, for **Brown Duchess.**

Jerseys.

N.B.—In the Jersey Classes, the number inserted within brackets after the name of an animal indicates the number of such animal in the Island Herd Book. A number without brackets indicates that the animal is registered in the English Jersey Herd Book.

Class 99.—*Jersey Bulls, calved in* 1889, 1890, *or* 1891. [25 entries, 8 absent.]

943 **I.** (£15.)—LORD ROTHSCHILD, Tring Park, for **Flora's Lad** 4098, dark grey, born Apr. 26, 1891; *s.* Fan's Lad 3265, *d.* Flora 6th (vol. v. p. 344) imported, *by* Diomed 2382.

925 **II.** (£10.)—JAMES BLYTH, Wood House, Stansted, for **Distinction's Pride** 4060, fawn, born Feb. 25, 1890, bred by F. J. Noel, St. Martin's, Jersey; *s.* Hillside Lad 3369, *d.* Distinction (5519), F.S.H.C.

935 **III.** (£5.)—GILBERT GREENALL, Walton Hall, Warrington, for **Rosa's Fortescue 2nd** 4352, brown, born Jan. 4, 1891, bred by the Rev. E. G. Renouf, St. Martin's, Jersey; *s.* Rosa's Fortescue 4351, *d.* Chance Aster (3540) P.S.C. *by* Chancery 3167.

934 **R. N. & H. C.**—SIR R. GRAHAM, BT., Norton Conyers, Ripon, for **Chief.**
H. C.—JAMES BLYTH, for No. 926, **Goldfinder**; CAPT. THE HON. T. S. BRAND, R.N., for No. 928, **Spartan**; H. J. CORNISH, for No. 930, **Bismarck**; LORD ROTHSCHILD, for No. 944, **Spot's Lad**; MRS. E. SWAN, for No. 946, **Grey Lad**; LORD TREVOR, for No. 948, **Rosalie's Columbus.**
Com.—MRS. MCINTOSH, for No. 940, **Bounce**; W. PARKIN-MOORE, for No. 942, **Bob**; R. TANFIELD, for No. 947, **Standard 2nd**; J. WATSON, for No. 949, **Gomer.**

Class 100.—*Jersey Bulls, calved in* 1892. [33 entries, 5 absent.]

973 **I.** (£10.)—R. J. POPE, Beresford Manor, Plumpton, Lewes, for **Devotion's Lad**, bronze fawn, born Mar. 1, bred by J. C. Grandin, St. Owen's, Jersey; *s.* Distinction's Pride 4060, *d.* Devotion 6th (3261) P.S.H.C. *by* The Bard 2212.

965 **II.** (£5.)—GILBERT GREENALL, Walton Hall, Warrington, for **Little Gem** (1828) P.S.H.C., grey, born Mar. 7, bred by E. Hubert, St. Owen's, Jersey; *s.* Golden Pink 4130, *d.* Devotion 2nd (1358) P.S.H.C. *by* Cicero 1444.

955 **R. N. & H. C.**—H. J. CORNISH, Thornford, Sherborne, for **Golden Prince.**
H. C. JAMES BLYTH, for No. 950, **Victoria's Pink**; W. E. BUDGETT, for No. 953, **Duke of Cornwall**; J. R. CORBETT, for No. 954, **Butter Boy**; SIR R. GRAHAM, BT., for No. 963, **Dog Rose**, and No. 964, **Tiger Lily**; THE MAISONNETTE DAIRY CO., for No. 972, **Maisonnette Importance**; LORD ROTHSCHILD, for No. 975, **Pontorson's Boy**, and No. 976, **Spot's President**; MRS. E. E. STARKIE, for No. 978, **Fair Fay.**
Com.—CAPT. THE HON. T. S. BRAND, R.N., for No. 952, **Brelade's Boy**; WM. DAVIES, for No. 958, **Hawthorn**; T. L. FITZ-HUGH, for No. 960, **Mars**; P. H. FOWLER, for No. 961, **Blackie**; MRS. E. E. STARKIE, for No. 979, **The Monk.**

Class 101.—*Jersey Cows (in-milk), calved before or in* 1889. [23 entries, 9 absent.]

1000 **I.** (£15.)—LORD ROTHSCHILD, Tring Park, Herts, for **Oxford Dahlia**

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

(2588) P.S.H.C., fawn & white, born Feb. 8, 1887, in-milk, calved Apr. 2, 1893, bred by J. P. Marett, St. Saviour's, Jersey; *s.* Sultan's Cicero 3839, *d.* Oxford Daisy (6816) F.S.H.C.

1001 **II.** (£10.)—LORD ROTHSCHILD, for **Pontorson** (vol. v. p. 596), grey, born Apr. 12, 1885, in-milk, calved May 9, 1893, bred by J. Gallois, St. Clement's, Jersey; *s.* Happy Cetewayo 2499, *d.* Congo (1135) P.S.C. *by* Le Boulevard 1748.

1003 **III.** (£5.)—MRS. E. E. STARKIE, Mitchells, Saffron Walden, for **Flora's Pearl** (3688) P.S.H.C., fawn & white, born Mar. 2, 1889, in-milk, calved Apr. 1, 1893, bred by C. De Gruchy, Trinity, Jersey; *s.* Standard 3825, *d.* Flora's Pride (954) P.S.C. *by* Forget-me-Not 1595.

1002 **R. N. & H. C.**—LORD ROTHSCHILD, for **Regina's Sultana.**
H. C.—H. J. CORNISH, for No. 986, **Rival's Julia 2nd**; J. W. CROOKES, for No. 988, **Black Bess 2nd**, and No. 989, **Juliette**; GILBERT GREENALL, for No. 992, **Miranda**; MRS. C. MCINTOSH, for No. 995, **Jubilee Star.**
Com.—J. W. CROOKES, for No. 990, **Light of Grouville 2nd**; GILBERT GREENALL, for No. 991, **Lady of the Lake 4th.**

Class 102.—*Jersey Cows (in-milk), calved in* 1890.
[18 entries, 4 absent.]

1016 **I.** (£15.)—GILBERT GREENALL, Walton Hall, Warrington, for **Daisy of the Valley**, brown, born Feb. 19, in-milk, calved Apr. 12, 1893, bred by J. C. Le Sueur, St. Saviour's, Jersey; *s.* Count Wolseley 3191, *d.* Beauty of Ogden (3563) F.S.H.C.

1008 **II.** (£10.)—J. R. CORBETT, More Place, Betchworth, for **Stargazer C.** (vol. v. p. 686), light fawn, born May 18, in-milk, calved May 19, 1893; *s.* Franciscan 2449, *d.* Stargazer 4th *by* Baron Betchworth 1331.

1023 **III.** (£5.)—MRS. E. E. STARKIE, Mitchells, Saffron Walden, for **Grouville's Fancy** (vol. v. p. 336), whole grey, born May 20, in-milk, calved June 5, 1893, bred by J. Blyth, Wood House, Stansted; *s.* Grouville's Champion 3346, *d.* Fancy's Daisy *by* Khiva 3427.

1020 **R. N. & H. C.**—LORD ROTHSCHILD, Tring Park, Herts, for **Belle.**
H. C.—WM. ALEXANDER, JUN., for No. 1007, **Thoughtful 2nd**; H. J. CORNISH, for No. 1009, **Cosy**; LORD ROTHSCHILD, for No. 1021, **Crocus.**
Com.—FOWLER & DE LA PERRELLE, for No. 1014, **Mimouse 3rd**; GILBERT GREENALL, for No. 1017, **Juanita.**

Class 103.—*Jersey Heifers (in-milk or in-calf), calved in* 1891.
[26 entries, 5 absent.]

1048 **I.** (£15.)—MRS. E. E. STARKIE, Mitchells, Saffron Walden, for **Granddaughter**, dark brown, born Apr. 7, in-milk, calved Feb. 21, 1893, bred by E. G. de la Perrelle, St. Helier's, Jersey; *s.* Sir William 2nd 3810, *d.* Daughter (2912) P.S.C. *by* Volunteer 2983.

1035 **II.** (£10.)—FOWLER & DE LA PERRELLE, Southampton, for **Golden Stream 4th**, brown, born Mar. 13, in-milk, calved May 24, 1893, bred by F. Ahier, Jersey; *s.* Golden Lad 3324, *d.* Golden Stream (5687) F.S.H.C.

1047 **III.** (£5.)—RICHARD J. POPE, Bercsford Manor, Plumpton, Lewes, for **Bellona 5th**, grey fawn, born Mar. 2, in-milk, calved Apr. 19, 1893, bred by J. Godeaux, Trinity, Jersey; *s.* Golden Lad 3324, *d.* Bellona 3rd (874) P.S.C. *by* Napier 2nd 1841.

1034 **R. N. & H. C.**—PERCIVAL H. FOWLER, Watford, for **Fan.**
H.C.—W. ALEXANDER, JUN., for No. 1025, **Wings 3rd**; S. Baxendale, for No. 1026, **Tamarisk**; J. R. CORBETT, for No. 1028, **Mab**; P. H.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

FOWLER, for No. 1032, **Belle Madeline 2nd** DE LA PERRELLE, for No. 1036, **Lucy 6th**; GILBERT GREENALL, for No. 1040, **Surprise**; MRS. C. MCINTOSH, for No. 1042, **Primrose Wonder**; MRS. E. E. STARKIE, for No. 1049, **Oakleaf.**

Com.—FOWLER & DE LA PERRELLE, for No. 1037, **Poppy**; The MAISONNETTE DAIRY CO., for No. 1044, **Maisonnette Sunset**; G. W. PALMER, M.P., for No. 1046, **Lady Elmhurst 2nd.**

Class 104.—*Jersey Heifers, calved in* 1892. [27 entries, 9 absent.]

1073 **I.** (**£10.**)—LORD ROTHSCHILD, Tring Park, Herts, for **Wigton 5th**, grey, born Apr. 16; *s.* Pandora's Boy 3619, *d.* Wigton 2nd (vol. v. p. 750) imported, *by* Count Wolseley 3191.

1074 **II.** (**£5.**)—MRS. E. E. STARKIE, Mitchells, Saffron Walden, for **Marotte**, whole colour, born May 19, bred by St. John's College, Cambridge; *s.* Rosa's Wonder 3728, *d.* Mamie (vol. v. p. 501) *by* Castor 3154.

1072 **R. N. & H. C.**—LORD ROTHSCHILD, Tring Park, Herts, for **Jessamine.**

H. C.—W. E. BUDGETT, for No. 1050, **Rose of Weston 4th**; H. J. CORNISH, for No. 1054, **Classic**; J. W. CROOKES, for No. 1057, **Summer Number**; SIR H. F. DE TRAFFORD, BT., for No. 1059, **Rosy June**; GILBERT GREENALL, for No. 1060, **Daisy's Bonnet**, and No. 1062, **Wonder's Queen**; G. W. PALMER, M.P., for No. 1069, **Bijou 3rd**; LORD ROTHSCHILD, for No. 1071, **Gloire de Dijon**; MRS. E. E. STARKIE, for No. 1075, **Matinale**; W. G. M. TOWNLEY, for No. 1076, **Butterfly Queen.**

Com.—THE HON. MRS. CECIL HOWARD, for No. 1065, **Hermosa.**

Guernseys.

Class 105.—*Guernsey Bulls, calved in* 1889, 1890, *or* 1891. [10 entries, 3 absent.]

1078 **I.** (**£15.**)—THE EXPRESS DAIRY CO., LTD., Finchley, for **Alexander the Great**, 706 R.G.A.S., orange fawn & white, born Oct. 30, 1889, bred by Col. Le Mottie, Le Vanquieder, Guernsey; *s.* Claude 375, *d.* Alexandra 3rd.

1084 **II.** (**£10.**)—JULIAN STEPHENS, Grove House, Finchley, for **May Boy** 346, red & white, born May 3, 1889; *s.* Excelsior 8th 138, *d.* Mayflower 230 *by* Stanley 96, R.G.A.S.

1080 **III.** (**£5**).—SIR F. A. MONTEFIORE, BT., Worth Park, Crawley, for **Lord Worth** 341, fawn & white, born Sept. 9, 1889; *s.* Archibald 442 P.S., R.G.A.S., *d.* Beauty 3rd 1700 P.S., R.G.A.S.

1079 **R. N.**—GEORGE LONG, Ogbourne, St. Andrew, Marlborough, for **Oriole.**

Class 106.—*Guernsey Bulls, calved in* 1892. [7 entries, none absent.]

1089 **I.** (**£10.**)—W. A. GLYNN, Seagrove, Ryde, I.W., for **Tommy 4th** 592, orange fawn & white, born June 18; *s.* The General 444, *d.* Amelia 1223.

1092 **II.** (**£5.**)—JULIAN STEPHENS, Grove House, Finchley, for **Adonis** 525, red & white, born Sept. 11; *s.* May Boy 346, *d.* Muriel 1132 *by* Climax 14.

1087 **R. N.**—WM. DAVIES, Bollington, Altrincham, for **Starling.**

Class 107.—*Guernsey Cows or Heifers* (*in-milk*), *calved before or in* 1890. [10 entries, 1 absent.]

1099 **I.** (**£15.**)—SIR F. A. MONTEFIORE, BT., Worth Park, Crawley, for **Marguerite des Fauxcennaries** 1382, fawn & white, born Aug. 2, 1887,

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

in-milk, calved Apr. 16, 1893; bred by T. Martin, Fauxcennaries, St. Andrew's, Guernsey; *s.* Billy, *d.* Marguerite des Fauxcennaries 1996 G.H.B.

1101 **II.** (**£10.**)—JULIAN STEPHENS, Grove House, Finchley, for **Muriel** 1132, orange fawn & white, born Sept. 12, 1886, in-milk, calved Sept. 11, 1892, bred by H. Abrahams, Bronet, St. Peter's Port, Guernsey; *s.* Climax 14, *d.* Whitey 1603 G.H.B.

1098 **III.** (**£5.**)—SIR F. A. MONTEFIORE, Bt., Worth Park, Crawley, for **Fortuna** 758, fawn & white, born Apr. 18, 1886, in-milk, calved Apr. 3 1893; bred by A. Rintoul, jun., London; *s.* Hopeful 25, *d.* Blossom 21.

1096 **R. N. & H. C.**—W. A. GLYNN, for **Amelia**, & **H. C.** for No. 1097, **Favourite 11th.**

Class 108.—*Guernsey Heifers, calved in* 1891. [15 entries, 1 absent.]

1107 **I.** (**£15.**)—P. H. FOWLER, Watford, for **Star 6th** 3159 P.S., R.G.A.S., fawn & white, born Feb. 25, bred by G. Torode, Bourg, Forest, Guernsey; *s.* Sir Presto 530 P S., R.G.A.S., *d.* Star 5th 1183 P.S., R.G.A.S., *by* Sir Jasper 166 F.S.

1109 **II.** (**£10.**)—W. A. GLYNN, Seagrove, Ryde, I.W., for **Fisky 4th,** orange fawn & white, born Mar. 15; *s.* Calais Chief 457, *d.* Fisky 357.

1105 **III.** (**£5.**)—P. H. FOWLER, Watford, for **Chardine 2nd** 3177 P.S., R.G.A.S., fawn, born Jan. 3, bred by T. Ogier, Gigands, St. Sampson's, Guernsey; *s.* Lord Strangford 2nd 566 P.S., R.G.A S., *d.* Chardine 1889 F.S., R.G.A.S.

1114 **R. N. & H. C.**—COL. H. W. SHAKERLEY, Fairlight, Hastings, for **Phebe.**
H. C.—P. H. FOWLER, for No. 1106, **Rose of the Chêne**; FOWLER & DE LA PERRELLE, for No. 1108, **Lucy Rose**; T. P. TAYLOR, for No. 1117, **Oasis 6th.**
Com.—JULIAN STEPHENS, for No. 1116, **Muriel 4th.**

Class 109.—*Guernsey Heifers, calved in* 1892. [12 entries, 2 absent.]

1127 **I.** (**£10.**)—COL. H. W. SHAKERLEY, Fairlight, Hastings, for **Doxa** 2125, red, born May 23; *s.* King Dandy 408, *d.* Lilla 1953.

1120 **II.** (**£5.**)—THE EXPRESS DAIRY CO., LTD., Finchley, for heifer, orange fawn & white, born Apr. 12; *s.* Royal Champion 435, *d.* Swissville Lass 1737.

1129 **R. N. & H. C.**—H. C. STEPHENS, Finchley, for **Citron Blossom 7th.**
H. C.—THE EXPRESS DAIRY CO., LTD., for No. 1119, **Polly 7th**; SIR H. TICHBORNE, Bt., for No. 1130, **Rosalba 5th.**
Com.—W. A. GLYNN, for No. 1122, **Favourite 16th**; A. P. HEYWOOD-LONSDALE, for No. 1123, **Shavington Vesta.**

Kerries.

Class 110.—*Kerry Bulls, calved in* 1890, 1891, *or* 1892. [10 entries, 1 absent.]

1134 **I.** (**£10, & R. N. for Champion.**[1])—THE MARQUIS OF LANSDOWNE, Bowood, Calne, for **O'Dugan**, born Feb. 4, 1892, bred by Viscount de Vesci; *s.* Gort Admiral 140, *d.* Lady Georgina *by* Feale 8.

1138 **II.** (**£5.**)—J. ROBERTSON, Hatton, Warwick, for **Royal Windsor** 1840, born 1890, breeder unknown.

1135 **R. N. & H. C.**—THE MARQUIS OF LANSDOWNE, for **Pat O'Hara.**

[1] Given by the Kerry and Dexter Kerry Society for the best animal in Classes 110–112.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Class 111.—*Kerry Cows (in-milk or in-calf), calved before or in* 1890. [9 entries, 1 absent.]

1145 **I. (£10, & Champion, £10 10*s.*[1])**—THE MARQUIS OF LANSDOWNE, Bowood, Calne, for **Enda** 368, born about 1887, in-milk, calved Apr. 3, 1893, breeder unknown.

1148 **II. (£5.)**—J. ROBERTSON, Hatton, Warwick, for **Shamrock**, born 1889, in-milk, calved Apr. 23, 1893, breeder unknown.

1142 **R. N. & H. C.**—R. HEYWOOD, Mayfield, Victoria Park, Manchester.
1146 **Com.**—J. ROBERTSON, La Mancha, Malahide, Co. Dublin, for **Mistletoe.**

Class 112.—*Kerry Heifers, calved in* 1891 *or* 1892.[2] [10 entries, none absent.]

1150 **I. (£10.)**—C. ADEANE, Babraham Hall, Cambridge, for **Blarney**, born July 3, 1892; *s.* Blackamoor, *d.* Denham Dinah 302.

1153 **II. (£5.)**—THE MARQUIS OF LANSDOWNE, Bowood, Calne, for **Colleen 2nd** 1246, born Feb. 22, 1891, bred by Viscount de Vesci; *s.* Feale 8, *d.* Colleen 250 *by* Desmond.

1151 **R. N. & H. C.**—MAJOR S. C. HICKMAN, R.A., Fenloe, for **Gort Belle.**
Com.—MAJOR S. C. HICKMAN, R.A., for No. 1152, **Gort Moll**; G. F. ROMIEU, for No. 1158, **Carnation.**

Dexter Kerries.

Class 113.—*Dexter Kerry Bulls, calved in* 1890, 1891, *or* 1892. [7 entries, 1 absent.]

1160 **I. (£10.)**—LORD ASHBURTON, The Grange, Alresford, for **The Admiral** 1580, born Aug. 7, 1890, bred by R. Barter, St. Ann's Hill, Cork; *s.* Block, *d.* Arnot.

1161 **II. (£5.)**—F. H. BAXENDALE, Framfield Place, Framfield, for **Kidmore Paradox 2nd** 59, born Jan. 6. 1890, bred by Martin J. Sutton, Kidmore Grange, Oxon; *s.* Paradox 18, *d.* Silene 189.

1162 **R. N. & H. C.**—H. D. D. BETTERIDGE, Drayton, Berks, for **Sambo.**
Com.—JAS. ROBERTSON for No. 1164, **Stormlight**; HAROLD SWITHINBANK, for No. 1166, **Denham Fergus.**

Class 114.—*Dexter Kerry Cows (in-milk or in-calf), calved before or in* 1890. [7 entries, none absent.]

1171 **I. (£10.)**—JAMES ROBERTSON, Hatton, Warwick, for **First Love**, born 1890, in-milk, calved May 13, 1893, breeder unknown.

1167 **II. (£5.)**—LORD ASHBURTON, The Grange, Alresford, for **Mavourneen** 1151, born 1886, bred by the Marquis of Conyngham, calved July 19, 1893.

1173 **R. N. & H. C.**—HAROLD SWITHINBANK, Denham Ct., for **Denham Negress**

Class 115.—*Dexter Kerry Heifers, calved in* 1891 *or* 1892.[2] [5 entries, none absent.]

1175 **I. (£10.)**—JAMES ROBERTSON, Hatton, Warwick, for **Nemophila**, born 1891, breeder unknown.

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[1] Given by the Kerry and Dexter Kerry Society for the best animal in Classes 110-112.
[2] Prizes given by the Chester Local Committee.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

1174 **II.** (£5.)—H. D. D. BETTERIDGE, Drayton, St. Leonard's, Berks, for **Dote**, born Feb. 7, 1891; *s.* Billy 2, *d.* Dote 1st.

1176 **R. N. & H. C.**—JAMES ROBERTSON, La Mancha, Malahide, for **Sorrell.**

DAIRY CATTLE.

Class 116.—*Dairy Cows, yielding the largest quantity of Butter by practical test of the Churn.* [33 entries, 8 absent.]

Class 116a.—*Cows, of* 1100*lb. or over, live weight.*

1201 **I.** (£15.)—C. A. PRATT, Rushford, Evesham, for **Dowager 3rd** (Shorthorn), roan, born Feb. 1887, in-milk, calved Apr. 19, 1893.

1200 **II.** (£10.)—C. A. PRATT, for **Dairymaid** (Shorthorn), roan, born May, 1885, in-milk, calved Jan. 23, 1893.

1190 **III.** (£5.)—GEORGE CHURCH, Willington, Bedford, for **Fancy** (Shorthorn & Red Polled Cross), blue roan, born July 28, 1888, in-milk, calved Mar. 30, 1893.

1191 **R. N.**—GEORGE CHURCH, for **Number One** (Shorthorn).

Class 116b.—*Cows, under* 1100*lb., live weight.*

1205 **I.** (£15.)—MRS. E. SWAN, Stonefield, Lincoln, for **Mayblossom** (Jersey), fawn, born May 1, 1888, in-milk, calved Apr. 24, 1893, bred by E. Dupré, St. Peter's, Jersey; *s.* Carlo 3rd 817 P.S., I.H.B., H.C., *d.* Lowlands Daisy 2336 I.H.B.

1211 **II.** (£10)—REV. S. H. WILLIAMS, Great Linford Rectory, Newport Pagnell, for **Tiny 3rd** (vol. v. p. 716) (Jersey), fawn, born Mar. 3, 1886, in-milk, calved May 21, 1893, bred by the late Rev. T. Benthall, Willen, Bucks; *s.* Feramorz 1584, *d.* Tiny *by* Coxcomb 198.

1184 **III.** (£5, & **Champion**, £25.[1])—JAMES BLYTH, Wood House, Stansted, for **Graceful Maid** 7746 I.H.B.H.C. (Jersey), fawn, born Mar. 17, 1887, in-milk, calved May 15, 1893, bred by P. L. Mottée, St. Owen's, Jersey; *s.* Bobby 3rd 697 I.H.B., *d.* Lovely Sylvia 6513 I.H.B.

1182 **R. N.**—SALISBURY BAXENDALE, Ware, for **Chestnut 2nd** (Jersey).

1181 **R. N. for Champion.**[1]—SALISBURY BAXENDALE, for **Bella** (Jersey).

Class 117.—*Dairy Cows, in-milk, whose last calf was born more than three months before the first day of the Show* (i.e. *before March* 19, 1893).[2] [11 entries, none absent.]

1220 **I.** (£20.)—WM. HOLLINS, Pleasley Vale, Mansfield, for **Dairy Maid** (Shorthorn), roan, born about 1888, in-milk, calved Feb. 2, 1893, supposed breeder A. Metcalfe-Gibson, Ravenstonedale.

1219 **II.** (£15.)—LORD EGERTON OF TATTON, Tatton Park, for Shorthorn, red, age unknown, in-milk, calved Mar. 14, 1893, breeder unknown.

1218 **III.** (£10.)—T. M. CROOK, Stanley Grange, Hoghton, Preston (Shorthorn), roan, born about 1886, in-milk, calved Jan. 26, 1893, breeder unknown.

1217 **R. N. & H. C.**—GEORGE COOKE, Claylcy Hall, Chester, for **Lavender 18th. Com.**—SALISBURY BAXENDALE, for No. 1213, **Poppy**; G. F. BYFORD, for No. 1214; GEO. CHURCH, for No. 1215, **Nancy**, and No. 1216, **Peacock.**

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[1] Given by the English Jersey Cattle Society for the Cow in Classes 116*a* and 116*b* yielding the largest quantity of butter in proportion to her live weight.

[2] Prizes given by the Chester Local Committee.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Class 118.—*Dairy Cows, in-milk, whose last calf was born within three months of the first day of the Show* (i.e. *on or after March* 19, 1893).[1] [13 entries, none absent.]

1227 **I.** (**£20.**)—T. M. CROOK, Stanley Grange, Hoghton, Preston, for Shorthorn, roan, born about 1888, in-milk, calved May 23, 1893, breeder unknown.

1232 **II.** (**£15.**)—JOHN HOWARD, Paget Hall, Gargrave, for **Daisy** (Shorthorn Cross), roan, born about 1888, in-milk, calved June 10, 1893, breeder unknown.

1224 **III.** (**£10.**)—C. W. BRIERLEY, The Lydiates, Brimfield, Herefordshire, for **Rosa** (Shorthorn), roan, born about 1884, in-milk, calved May 27, 1893, breeder unknown.

1233 **R. N. & H. C.**—JAMES KENDAL, Oddingley, Droitwich, for **Morwenna 3rd.** **H. C.**—SALISBURY BAXENDALE, for No. 1223, **Ethel**; LORD EGERTON OF TATTON, for No. 1228, **Slavey.**

Class 119.—*Dairy Cows* (*in-milk*), *calved in* 1890.[1] [6 entries, none absent.]

1240 **I.** (**£20.**)—JOHN HOWARD, Paget Hall, Gargrave, for **Molly** (Cross-bred), roan, born Jan. 29, in-milk, calved June 5, 1893.

1239 **II.** (**£15.**)—J. HARRIS, Calthwaite Hall, Carlisle, for **Oxford Duchess of Calthwaite 12th** (Shorthorn), roan, born Mar. 30, in-milk, calved Apr. 30, 1893; *s.* Thorndale Duke of York 60063, *d.* Underley Oxford *by* Grand Duke 31st 38374.

1237 **III.** (**£10.**)—T. M. CROOK, Stanley Grange, Hoghton, Preston, for Shorthorn, roan, born Aug. 24, in-milk, calved May 8, 1893, bred by John Crook, Stanley Grange.

1238 **R. N.**—P. A. & G. T. EVANS, Wellington, Salop, for **Roden Princess.**

Class 120.—*Dairy Heifers* (*in-calf*), *calved in* 1891.[1] [9 entries, none absent.]

1243 **I.** (**£15.**)—C. W. BRIERLEY, The Lydiates, Brimfield, Herefordshire, for **Rosedale Prudence** (vol. xxxviii. p. 27) (Shorthorn), roan, born Sept. 13, in calf; *s.* Weal King's Farewell 60159, *d.* Prudent *by* Acropolis 47316.

1250 **II.** (**£10.**)—A. E. WARD, Ivy Lea, Sale, for **Princess Alice** (Shorthorn), roan, born Jan. 16, in-calf, bred by R. & G. Harrison, Underpark, Lealholm, Grosmont.

1246 **III.** (**£5.**)—T. M. CROOK, Stanley Grange, Hoghton, Preston, for **Mintholme Star** (Shorthorn), roan, born Oct. 9, in-calf; *s.* Barrington Surmise 2nd 60343, *d.* Fairstar 11th *by* Winsome Duke 2nd 53875.

1242 **R. N.**—E. K. BICKLEY, The Fields, Ellesmere.

Class 121.—*Dairy Heifers, calved in* 1892.[1] [17 entries, 1 absent.]

1259 **I.** (**£15.**)—GEORGE HARRISON, Underpark, Lealholm, Grosmont, for **Rosalind** (vol. xxxix.) (Shorthorn), roan, born Jan. 15; *s.* Prince Magnus 56333, *d.* White Rose *by* Duke of Rainton 5th 39778.

1252 **II.** (**£10.**)—C. W. BRIERLEY, The Lydiates, Brimfield, Herefordshire, for **Primrose 3rd** (Shorthorn), roan, born Feb. 14, bred by J. Scott, Softlaw East Mains, Kelso; *s.* Duke of Albemarle 3rd 58776, *d.* Primrose *by* Prince William 59706.

[1] Prizes given by the Chester Local Committee.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

1260 **III.** (£5.)—W. HOLLINS, Pleasley Vale, Mansfield, for **Bally** (Shorthorn), red & white, born Feb. 10; *s.* Gay Lad.

1253 **R. N. & H. C.**—THE MARQUESS OF BUTE, K.T., **Minstrel Girl** (Shorthorn).
H. C.—E. K. BICKLEY, for No. 1251; A. E. WARD, for No. 1267, **Rosedale Frances.**
Com.—T. TOPHAM, for No. 1264, **Beauty 2nd**, and No. 1266, **Tulip.**

SHEEP.

Leicesters.

Class 122.—*Leicester Two-Shear Rams.* [8 entries, 1 absent.]

1268 **I.** (£10.)—G. HARRISON, Underpark, Lealholm, Yorks, born Mar. 1891.
1273 **II.** (£5.)—E. F. JORDAN, Eastburn, Driffield, born Mar. 1891.
1271 **R. N. & H. C.**—T. H. HUTCHINSON, & **H. C.** for No. 1272, born Mar. 1891.
1269 **Com.**—G. HARRISON, born Mar. 1891.

Class 123.—*Leicester Shearling Rams.* [14 entries, 2 absent.]

1276 **I.** (£15) & 1277 **II.** (£10.)—G. HARRISON, Underpark, Lealholm, Yorks, born Mar. 1892.

1279 **III.** (£5.)—T. H. HUTCHINSON, Manor House, Catterick, born Mar. 1892.

1282 **R. N. & H. C.**, & 1281 **H. C.**—E. F. JORDAN, Eastburn, born Mar. 1892.
1278 **Com.**—G. HARRISON, born Mar. 1892.

Class 124.—*Pens of Three Leicester Ram Lambs.* [6 entries, none absent.]

1291 **I.** (£10.)—G. HARRISON, Underpark, Lealholm, Yorks, born Mar. 1893.
1293 **II.** (£5.)—MASKILL & STRICKLAND, Brandsby, Easingwold, born Mar. 1893.

1292 **R. N. & H. C.**—T. H. HUTCHINSON, Catterick, born Mar. 1893.

Class 125.—*Pens of Three Leicester Shearling Ewes, of the same Flock.* [8 entries, none absent.]

1297 **I.** (£15.)—G. HARRISON, Underpark, Lealholm, Yorks, born Mar. 1892.
1299 **II.** (£10.)—E. F. JORDAN, Eastburn, Driffield, born Mar. 1892.
1298 **III.** (£5.)—G. HARRISON, Underpark, Lealholm, Yorks, born Mar. 1892.
1300 **R. N. & H. C.**—E. F. JORDAN, born Mar. 1892.
H. C.—MRS. PERRY-HERRICK, for No. 1302, & **Com.** for No. 1303.

Cotswolds.

Class 126.—*Cotswold Two-shear Rams.* [8 entries, none absent.]

1305 **I.** (£10.)—R. GARNE, Aldsworth, Northleach, for **Royal Warwick**, born Jan. 1891; *s.* Prince 282, *d. by* Paragon 268.
1307 **II.** (£5.)—R. JACOBS, Signett Hill, Burford, born Feb. 1891.
1306 **R. N. & H. C.**—R. GARNE, Aldsworth, Northleach, born Feb. 1891.
Com.—J. MADDOCKS, for No. 1308, **Young Donal**; R. SWANWICK, for No. 1311.

Class 127.—*Cotswold Shearling Rams.* [15 entries, none absent.]

1321 **I.** (£15.)—R. JACOBS, Signett Hill, Burford, born Feb. 1892.
1319 **II.** (£10.)—T. R. HULBERT, North Cerney, Cirencester, born Mar. 1, 1892; *s.* Acrobat.

1315 **III.** (£5.)—R. GARNE, Aldsworth, Northleach, born Jan. 1892.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

1325 **R. N. & H. C.**—RUSSELL SWANWICK, R. A. C. Farm, born Feb. 1892.
H. C.—R. JACOBS, for No. 1320; R. SWANWICK, for No. 1326.
Com.—G. BAGNALL & SON, for No. 1314; R. GARNE, for No. 1316.

Class 128.—*Pens of Three Cotswold Ram Lambs.* [7 entries, 2 absent.]

1328 **I. (£10) & 1329 II. (£5.)**—R. GARNE, Aldsworth, Northleach, born Jan. & Feb. 1893.
1331 **R. N. & H. C.**, & 1332 **H. C.**—R. JACOBS, Signett Hill, born Feb. 1893.
1333 **Com.**—R. SWANWICK, born Feb. 1893.

Class 129.—*Pens of Three Cotswold Shearling Ewes of the same Flock.* [12 entries, 3 absent.]

1343 **I. (£15), 1344 II. (£10), & 1345 III. (£5.)**—R. SWANWICK, R. A. C. Farm, Cirencester, born Feb. 1892.
1337 **R. N. & H. C.**—R. GARNE, Aldsworth, Northleach, born Jan. or Feb. 1892.
H. C.—G. BAGNALL & SON, for No. 1334; R. GARNE, for No. 1338; T. R. HULBERT, for No. 1340.
Com.—G. BAGNALL & SON, for No. 1335; T. R. HULBERT, for No. 1339.

Lincolns.

Class 130.—*Lincoln Two-Shear Rams.* [8 entries, 2 absent.]

1347 **I. (£10.)**—H. DUDDING, Riby Grove, Grimsby, for **Partney Champion** 780, born about Mar. 6, 1891, bred by N. Needham, Huttoft, Lincs.; *s.* Riby Royal 375.
1352 **II. (£5.)**—R. WRIGHT, Nocton Heath, Lincoln, for **Fifth Lincoln**, born Feb. or Mar. 1891; *s.* Royal Nottingham 389.
1353 **R. N. & H. C.**—R. WRIGHT, for **Second Lincoln** 838.
1348 **H. C.**—H. DUDDING, for **Riby Champion.**
1349 **Com.**—JOHN PEARS, Mere, Lincoln, for **Uncle Sam.**

Class 131.—*Lincoln Shearling Rams.* [16 entries, 3 absent.]

1364 **I. (£15.)**—H. SMITH, JUN., The Cottage, Cropwell Butler, Nottingham.
1369 **II. (£10.)**—R. WRIGHT, Nocton Heath, Lincoln, born Feb. or Mar. 1892.
1366 **III. (£5.)**—H. SMITH, JUN., The Cottage, Cropwell, Butler, for **Absolute**, born Feb., 1892; *s.* Abbot 1, *d. by* Lord Willoughby.
1368 **R. N. & H. C.**—R. WRIGHT, born Feb. or Mar. 1892.
H. C.—H. DUDDING, for No. 1358; JOHN PEARS, for No. 1362, and **Com.** for No. 1363.

Class 132.—*Pens of Three Lincoln Ram Lambs.* [5 entries.]

1370 **I. (£10.)**—H. DUDDING, Riby Grove, Grimsby, born about Feb. 25, 1893.
1374 **II. (£5.)**—R. WRIGHT, Nocton Heath, Lincoln, born Feb. or Mar. 1893.
1371 **R. N. & H. C.**—HENRY DUDDING, born about Feb. 25, 1893.
1372 **H. C.**—JOHN PEARS. 1373 **Com.** JOHN WESTROPE.

Class 133.—*Pens of Three Lincoln Shearling Ewes, of the same Flock.* [7 entries, 3 absent.]

1375 **I. (£15.)**—H. DUDDING, Riby Grove, Grimsby, born abt. Feb. 25, 1892.
1379 **II. (£10.)**—JOHN PEARS, Mere, Lincoln, born Feb. 1892.
1376 **III. (£5.)**—HENRY DUDDING, born Feb. 25, 1892.
1378 **R. N. & H. C.**—G. T. MELBOURN, born Mar. 1892; *s* Nocton King 286.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Oxford Downs.

Class 134.—*Oxford Down Two-shear Rams.* [9 entries, 2 absent.]

1387 **I.** (**£10.**)—J. C. EADY, Irchester Grange, Wellingborough, for **Irchester Royalty**, born Feb. 12, 1891; *s.* Testerton Royalty 966, *d. by* Irchester Comet 691.

1383 **II.** (**£5.**)—A. BRASSEY, Heythrop Park, Chipping Norton, for **Heythrop Prince**, born Jan. 15, 1891; *s.* Woodstock 1018, *d. by* Aylesbury 174.

1382 **R. N. & H. C.**—G. ADAMS, Pidnell, Faringdon, for **Royal**.

1389 **Com.**—W. A. SHAFER, Middletown, Ohio, U.S.A.

Class 135.—*Oxford Down Shearling Rams.* [16 entries, 7 absent.]

1393 **I.** (**£15.**)—A. BRASSEY, Heythrop Park, Chipping Norton, for **Heythrop Prince 2nd**, born Jan. 14, 1892; *s.* Woodstock 1018, *d. by* Aylesbury 174.

1394 **II.** (**£10.**)—A. BRASSEY, for **The Earl**, born Jan. 20, 1892; *s.* Nobby 709, *d. by* Sir Charles 467.

1398 **III.** (**£5.**)—J. T. GREEN, Hunton Bridge Farm, King's Langley, born Jan. 29, 1892; *s.* Langley 3rd 1168.

1391 **R. N. & H. C.**—G. ADAMS, for **Balfour**, & **H. C.** for No. 1392, **Salisbury**.

Class 136.—*Pens of Three Oxford Down Ram Lambs.* [5 entries, 1 absent.]

1410 **I.** (**£10**) & 1409 **II.** (**£5.**)—ALBERT BRASSEY, Heythrop Park, Oxon, born Jan. 1893.

1408 **R. N. & Com.**—G. ADAMS, & **Com.** for No. 1407.

Class 137.—*Pens of Three Oxford Down Shearling Ewes, of the same Flock.* [11 entries, 3 absent.]

1414 **I.** (**£15.**)—A. BRASSEY, Heythrop Park, Chipping Norton, Oxon, born Jan. 1892; *ss.* Woodstock 1018 & Winchendon Case 988.

1412 **II.** (**£10.**)—G. ADAMS, Pidnell, Faringdon, born Jan. 9, 12, & 13, 1892; *s.* Burser 2nd 587, *d. by* Oxford Baron 713.

1418 **III.** (**£5.**)—JOHN C. EADY, Irchester Grange, Wellingborough, born Feb. 14, 1892; *s.* Treadwell's No. 8 of 1891 1306, *d. by* Irchester Comet 691.

1417 **R. N. & H. C.**—BARON F. J. DE ROTHSCHILD, M.P., Aylesbury.

1420 **H. C.**—J. T. GREEN, Hunton Bridge Farm, King's Langley.

Com.—G. ADAMS, for No. 1413; J. C. EADY, for No. 1419; W. A. SHAFER, for No. 1422.

Shropshires.

Class 138.—*Shropshire Two-shear Rams.* [30 entries, 5 absent.]

1425 **I.** (**£10, & Champion, £5.**[1])—A. S. BERRY, Gt. Barr, Birmingham, born Mar. 1891.

1436 **II.** (**£5.**)—JOHN HARDING, Norton House, Shifnal, born Feb. 1891.

1413 **R. N. & H. C.**—A. E. MANSELL, Harrington Hall, Salop, born Mar. 1891.

H. C.—MRS. BARRS, for No. 1424; A. S. BERRY, for Nos. 1426 & 1427; A. BRADBURNE, for No. 1428; C. L. CAMPBELL, for No. 1430, **Glewstone Stockwell**; T. FENN, for Nos. 1432 & 1433; W. KIRKHAM, for No. 1438; G. LEWIS, for No. 1440.

Com.—J. HARDING, for No. 1435; G. LEWIS, for No. 1441; A. E. MANSELL, for No. 1442; A. TANNER, for No. 1451.

[1] Gold Medal given by the Shropshire Sheep Breeders' Association for the best Shropshire Ram in Classes 138 and 139.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Class 139.—*Shropshire Shearling Rams.* [80 entries, 13 absent.]

1485 **I.** (£15, & **R. N. for Champion.**[1])—REPRESENTATIVES OF LATE G. GRAHAM, The Oaklands, Birmingham, born Feb. 1892, bred by the late G. Graham.

1501 **II.** (£10.)—A. E. MANSELL, Harrington Hall, Salop, born Mar. 1892.

1464 **III.** (£5.)—T. & S. BRADBURNE, Astwood Hill, Redditch, born Mar. 10, 1892; *s.* Lord Kington 6203.

1504 **R. N. & H. C.**—T. S. MINTON, born Feb. or Mar. 1892.

H. C.—MRS. M. BARRS, for Nos. 1455 & 1456; J. BOWEN-JONES, for No. 1461; A. BRADBURNE, for No. 1463; D. BUTTAR, for No. 1471; R. P. COOPER, for No. 1477; REPRESENTATIVES OF LATE G. GRAHAM, for No. 1486; JOHN HARDING, for No. 1488; W. F. INGE, for Nos. 1489 & 1490; WM. KIRKHAM, for No. 1492; G. LEWIS, for No. 1494; P. A. MUNTZ, M.P., for No. 1507; E. NOCK, for No. 1512; H. TOWNSHEND, for No. 1530.

Com.—D. BUTTAR, for No. 1472; C. F. CLARK, for No. 1475, **Perton Royal**; J. HARDING, for No. 1487; J. L. NAPER, for Nos. 1510 & 1511; H. C. G. PARKER, for No. 1515; R. H. STUBBER, for No. 1523; R. THOMAS, for No. 1525; WM. THOMAS, for No. 1529; H. TOWNSHEND, for No. 1531.

Class 140.—*Pens of Five Shropshire Shearling Rams, of the same Flock.*[2] [22 entries, 4 absent.]

1533 **I.** (£20.)—MRS. M. BARRS, Odstone Hall, Atherstone, born Mar. 1892.

1543 **II.** (£15.)—J. HARDING, Norton House, Shifnal, born Feb. & Mar. 1892.

1542 **III.** (£5.)—REPRESENTATIVES OF LATE G. GRAHAM, The Oaklands, Birmingham, born Feb. 1892, bred by late G. Graham.

1546 **R. N. & H. C.**—A. E. MANSELL, Harrington Hall, Salop, born Mar. 1892.

H. C.—A. S. BERRY, for No. 1534; J. BOWEN-JONES, for No. 1536; T. & S. BRADBURNE, for No. 1538; D. BUTTAR, for No. 1540; T. F. CHEATLE, for No. 1541; W. F. INGE, for No. 1544; G. LEWIS, for No. 1545.

Com.—T. MEARES, for No. 1547; T. S. MINTON, for No. 1548; H. C. G. PARKER, for No. 1550.

Class 141.—*Pens of Three Shropshire Ram Lambs.* [21 entries, 2 absent.]

1566 **I.** (£10.)—A. E. MANSELL, Harrington Hall, Shifnal, born Feb. 1893.

1555 **II.** (£5.)—A. BRADBURNE, Hammerwich Place, Lichfield, born about Feb. 25, 1893; *s.* Bonnie Ranger.

1558 **R. N. & H. C.**—T. & S. BRADBURNE, Astwood Hill, Redditch.

H. C.—A. E. MANSELL, for No. 1565; H. C. G. PARKER, for No. 1567.

Com.—WM. KIRKHAM, for No. 1562; A. TANNER, for No. 1574.

Class 142.—*Pens of Three Shropshire Shearling Ewes, of the same Flock.* [36 entries, 8 absent.]

1587 **I.** (£15.)—T. FENN, Stonebrook Ho., Ludlow, born about Mar. 15, 1892

1599 **II.** (£10.)—J. L. NAPER, Loughcrew, Oldcastle, born Mar. 1892.

1577 **III.** (£5.)—MRS. M. BARRS, Odstone Hall, Atherstone, born Mar. 1892.

1588 **R. N. & H. C.**—REPRESENTATIVES OF LATE G. GRAHAM, Oaklands.

H. C.—MRS. M. BARRS, for No. 1576; J. BOWEN-JONES, for No. 1580; T. & S. BRADBURNE, for No. 1583; W. F. INGE, for No. 1590; E. NOCK, for No. 1600.

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[1] Gold Medal given by the Shropshire Sheep Breeders' Association for the best Shropshire Ram in Classes 138 and 139.

[2] Prizes given by the Chester Local Committee.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Com.—A. S. BERRY, for No. 1578; WM. KIRKHAM, for No. 1592; T. S. MINTON, for No. 1597; A. TANNER, for No. 1607.

Southdowns.

Class 143.—*Southdown Two-Shear Rams.* [20 entries, 4 absent.]

1618 I. (£10.)—J. J. COLMAN, M.P., Carrow House, Norwich, born Feb. 1891.
1623 II. (£5.)—THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park, Wickham Market, born Feb. 27, 1891.
1617 **R. N. & H. C.**—H. L. C. BRASSEY, Preston Hall, Aylesford.
1620 **H. C.**—E. ELLIS. 1613 **Com.**—H.R.H. THE PRINCE OF WALES, K.G.

Class 144.—*Southdown Shearling Rams.* [33 entries, 2 absent.]

1658 I. (£15.)—THE DUKE OF RICHMOND AND GORDON, K.G., Goodwood, born Feb. 1892.
1647 II. (£10.)—THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park, born Feb. 25, 1892.
1641 III. (£5.)—J. J. COLMAN, M.P., Carrow House, Norwich, born Feb. 1892.
1633 **R. N. & H. C.**—H.R.H. THE PRINCE OF WALES, K.G., born Mar. 1892.
H. C.—E. ELLIS, for No. 1644; THE DUKE OF RICHMOND AND GORDON, K.G., for No. 1659; WM. TOOP, for No. 1663.

Class 145.—*Pens of Three Southdown Ram Lambs.* [14 entries, 2 absent.]

1665 I. (£10.)—H.R.H. THE PRINCE OF WALES, K.G., Sandringham, born Mar. 1893.
1677 II. (£5.)—PAGHAM HARBOUR CO., Selsey, Chichester, born abt. Feb. 10, '93.
1678 **R. N. & H. C.**—W. TOOP, Aldingbourne, Chichester, born abt. Feb. 1, 1893.
H. C.—J. J. COLMAN, M.P., for No. 1670; E. ELLIS, for No. 1671.
Com.—J. S. HODGSON, for No. 1676.

Class 146.—*Pens of Three Southdown Shearling Ewes, of the same flock.* [17 entries, 2 absent.]

1679 I. (£15.)—H.R.H. THE PRINCE OF WALES, K.G., Sandringham, born Mar. 1892.
1684 II. (£10.)—J. J. COLMAN, M.P., Carrow House, Norwich, born Feb. 1892.
1694 III. (£5.)—SIR WILLIAM THROCKMORTON, BT., Buckland, Farringdon, born Feb. 1892.
1687 **R. N. & H. C.**—THE DUKE OF HAMILTON AND BRANDON, K.T., born Feb. 1892.
H. C.—JAS. BLYTH, for No. 1681; J. S. HODGSON, for No. 1689.
Com.—WM. EVERITT, for No. 1686; THE DUKE OF RICHMOND AND GORDON, K.G., for No. 1693.

Hampshire Downs.

Class 147.—*Hampshire Down Two-Shear Rams.* [3 entries, 2 absent.]

1697 I. (£10.)—HENRY LAMBERT, Babraham, Cambridge, born Jan. 1891.

Class 148.—*Hampshire Down Shearling Rams.* [11 entries, 1 absent.]

1708 I. (£15.)—W. NEWTON, Crowmarsh Battle, Wallingford, born Jan. 1892.
1705 II. (£10.)—F. R. MOORE, Littlecott, Upavon, Marlborough, born Jan. 1892.
1703 III. (£5.)—H. LE ROY LEWIS, Westbury Park, Petersfield, for **Cabul**, born Jan. 1892; *s.* Brookfeild 531.
1707 **R. N.**—W. NEWTON, Crowmarsh Battle, Wallingford, born Jan. 1892.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Class 149.—*Pens of Three Hampshire Down Ram Lambs.* [13 entries, 4 absent.]

1718 **I.** (£10.)—WM. NEWTON, Crowmarsh Battle, Wallingford, born Jan. 1893.
1715 **II.** (£5.)—HENRY LAMBERT, Babraham, Cambridge, born Jan. 1893.
1717 **R. N. & H. C.**—F. R. MOORE, Littlecott, Upavon, born Jan. 1893.
1712 **H. C.**—JOHN BARTON, & Com. for No. 1711.

Class 150.—*Pens of Three Hampshire Down Shearling Ewes, of the same flock.* [6 entries, none absent.]

1726 **I.** (£15.)—WM. NEWTON, Crowmarsh Battle, Wallingford, born Jan. 1892.
1723 **II.** (£10.)—H. LE ROY LEWIS, Westbury Pk., Petersfield, born Jan. 1892.
1728 **III.** (£5.)—PROF. WRIGHTSON, College of Agriculture, Downton, born Jan. 15 & 20, 1892.
1724 **R. N. & H. C.**—F. R. MOORE, Littlecott, Upavon, born Jan. 1892.

Suffolks.

Class 151.—*Suffolk Two-Shear Rams.* [2 entries.]

1730 **I.** (£10.) & 1729 **II.** (£5.)—J. SMITH, The Grange, Walton, Ipswich, born Feb. 1891.

Class 152.—*Suffolk Shearling Rams.* [6 entries, none absent.]

1732 **I.** (£15.)—THE EARL OF ELLESMERE, Stetchworth Park, Newmarket, for **Don Carlos of Stetchworth 3rd** 2412, born Feb. 1892.
1735 **II.** (£10.)—J. SMITH, The Grange, Walton, Ipswich, born Feb. 1892.
1733 **III.** (£5.)—THE EARL OF ELLESMERE, Stetchworth Park, Newmarket, for **Don Carlos of Stetchworth 4th** 2413, born Feb. 1892.
1734 **R. N. & Com.**—HENRY LINGWOOD, Needham Market, for **Wait-a-bit.**

Class 153.—*Pens of Three Suffolk Ram Lambs.* [4 entries, none absent.]

1740 **I.** (£10.)—J. SMITH, The Grange, Walton, Ipswich, born Feb. 1893.
1739 **II.** (£5.)—H. LINGWOOD, The Chestnuts, Needham Market, born Feb. 1893; *s.* Wait-a-bit 2736.
1738 **R. N.**—THE EARL OF ELLESMERE, Stetchworth Park, born Feb. 1893.

Class 154.—*Pens of Three Suffolk Shearling Ewes, of the same flock.* [6 entries, none absent.]

1745 **I.** (£15.)—H. LINGWOOD, The Chestnuts, born Feb. & Mar. 1892; *ss.* Rifleman III. & Alderman 1101.
1742 **II.** (£10.)—THE EARL OF ELLESMERE, Stetchworth Park, Newmarket, born Feb. 1892.
1746 **III.** (£5.)—J. SMITH, The Grange, Walton, Ipswich, born Feb. 1892.
1743 **R. N. & Com.**—THE EARL OF ELLESMERE, Stetchworth Pk., born Feb. 1892.

Wensleydales.

Class 155.—*Wensleydale Shearing Rams.* [20 entries, 4 absent.]

1753 **I.** (£10.)—JOHN HEUGH, Mudd Fields, Bedale, born Mar. 1892; *s.* Ruffler 77, *d. by* Carperby 2nd.
1766 EXORS. OF LATE T. WILLIS, Carperby, Yorks, born Mar. 1892, bred by late T. Willis; *s.* Lord of the Valley 109, *d. by* Thorsby 72.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

1754 **R. N. & H. C.**—J. HEUGH, born Mar. 1892.
1759 **H.C.**—WM. RHODES, for **Ideal.**
Com.—R. RAW, for No. 1757; WM. RHODES, for No. 1758, **Harold.**

Class 156.—*Pens of Three Wensleydale Ram Lambs.*
[5 entries, 1 absent.]

1767 **I.** (£10.)—JOHN HEUGH, Mudd Fields, Bedale, born Feb., 1893; *s.* Eton 326, *d. by* Royal Windsor.

1769 **II.** (£5.)—WM. RHODES, Lundholme, Westhouse, Kirkby Lonsdale, born Mar. 14, 26, & 28, 1893; *s.* Wellington or Matchless, *ds. by* Swinethwaite 71, Excelsior 24, & Sterling 69.

1770 **R. N. & H. C.**—J. O. TROTTER, Holtby Grange, Bedale, born Mar. 1893.

Class 157.—*Pens of Three Wensleydale Shearling Ewes, of the same flock.* [7 entries, 1 absent.]

1776 **I.** (£10.)—WM. RHODES, Lundholme, Westhouse, Kirkby Lonsdale, born Mar. 25, 1892; *ss.* Baronet 8, and Titanic 136, *ds. by* Westward Ho 79, Trojan 75, & Ajax 3.

1773 **II.** (£5.)—JOHN HEUGH, Mudd Fields, Bedale, born Mar. 1892; *s.* Doncaster 244, *d. by* Thorsby 1st 94.

1777 **R. N. & H. C.**—EXORS. OF LATE T. WILLIS, Manor House, Carperby.
Com.—JOHN HEUGH, for No. 1772; T. J. OTHER, for No. 1774.

Border Leicesters.

Class 158.—*Border Leicester Rams, Two-Shear and Upwards.*
[8 entries, none absent.]

1779 **I.** (£10.)—THE RT. HON. A. J. BALFOUR, M.P., Whittinghame, N.B., born Mar. 1889.

1780 **II.** (£5.)—THE RT. HON. A. J. BALFOUR, M.P., born Mar. 1891.
1786 **R. N. & H. C.**, & 1785 **H. C.**—THOMAS WINTER, Sherburn, York.

Class 159.—*Border Leicester Shearling Rams.*
[19 entries, 1 absent.]

1787 **I.** (£10) & 1788 **II.** (£5.)—THE RT. HON. A. J. BALFOUR, M.P., born Mar. 1892.

1801 **R. N. & H. C.**, & 1803 **H. C.**—JOHN TWENTYMAN, Wigton.

Class 160.—*Pens of Three Border Leicester Shearling Ewes, of the same flock.* [7 entries, 1 absent.]

1806 **I.** (£10) & 1807 **II.** (£5.)—THE RT. HON. A. J. BALFOUR, M.P., born Mar. 1892.

1808 **R. N. & H. C.**—DAVID COOPER, Bainesse, Catterick, born Mar. 15, 1892.
1811 **H. C.**—J. TWENTYMAN, Wigton, born Mar. 1892.

Somerset and Dorset Horned.

Class 161.—*Somerset and Dorset Horned Shearling Rams.*
[4 entries, none absent.]

1816 **I.** (£10) & 1815 **II.** (£5.)—S. KIDNER, Bickley, born Dec. 1891.
1813 **R. N. & Com.**—W. J. CULVERWELL, Durleigh Farm, Bridgwater.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."

Class 162.—*Pens of Three Somerset and Dorset Horned Ram Lambs, dropped after Dec.* 1, 1892. [5 entries, 1 absent.]

1819 **I.** (£10) & 1820 **II.** (£5.)—W. C. GROVES, Whitcombe, Dorchester, born Dec. 1892; *s.* Whitcombe No. 12350, *d. by* Whitcombe Major 93.

1818 **R. N. & Com.**—W. J. CULVERWELL, Durleigh Farm, born Dec. 15, 1892.

Class 163.—*Pens of Three Somerset and Dorset Horned Shearling Ewes, of the same flock.* [3 entries.]

1823 **I.** (£10) & 1822 **II.** (£5.)—W. J. CULVERWELL, Durleigh Farm, Bridgwater, born Dec. 25, 1891.

1824 **R. N. & H. C.**—SAMUEL KIDNER, Bickley, Milverton, born Dec. 1891.

Kentish or Romney Marsh.

Class 164.—*Kentish or Romney Marsh Shearling Rams.* [2 entries.]

1826 **I.** (£10.)—C. J. G. HULKES, Pettings House, Ash, Kent, for **Lanercost**, born Apr. 5, 1892; *s.* Energy.

1825 **R. N.**—C. J. G. HULKES, for **Kisber**, born Apr. 3, 1892; *s.* Hampton

Class 165.—*Pen of Three Kentish or Romney Marsh Shearling Ewes, of the same flock.* [1 entry. No award.]

Cheviot.

Class 166.—*Cheviot Shearling Rams.* [3 entries.]

1828 **I.** (£10.)—J. T. DODD, Riccarton, Newcastleton, N.B., born Apr. 1892, bred by J. Robson, Newton, Bellingham.

1830 **II.** (£5.) & 1829 **R. N. & Com.**—JOHN ROBSON, Newton, Bellingham, Northumberland, born Apr. 1892.

Class 167.—*Pens of Three Cheviot Shearling Ewes, of the same flock.* [2 entries.]

1831 **I.** (£10.) & 1832 **R. N.**—JOHN ROBSON, Newton, Bellingham, Northumberland, born Apr. 1892.

Black-Faced Mountain.

Class 168.—*Black-Faced Mountain Shearling Rams.* [7 entries, 2 absent.]

1833 **I.** (£10.)—T. DARGUE, Burneside Hall, Kendal, born Apr. 15, 1892.
1838 **II.** (£5.)—JOHN ROBSON, Newton, born Mar. 30, 1892.
1839 **R. N.**—JOHN ROBSON, born Mar. 25, 1892.

Class 169.—*Pens of Three Black-faced Mountain Shearling Ewes, of the same flock.* [4 entries, none absent.]

1843 **I.** (£10.)—JOHN ROBSON, Newton, Bellingham, born Apr. 1892.
1840 **II.** (£5.)—WM. GRAHAM, Eden Grove, Penrith, born Mar. 1892.

Lonk.

Class 170.—*Lonk Shearling Rams.* [4 entries, 1 absent.]

1846 **I.** (£10.)—WALTON BROS., Rawtenstall, Lancs, born Mar. 1892.
1845 **II.** (£5.)—B. A. PARKER, Church View, Trawden, Lancs, born Mar. 1892, bred by J. Blackburn, Holin Hall, Trawden.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

1847 **R. N. & Com.**—H. W. Worsley-Taylor, Q.C., for **Hero of Longridge.**

Class 171.—*Pen of Three Lonk Shearling Ewes, of the same flock.* [3 entries.]

1848 **I.** (**£10.**)—Benjamin Dobson, Carr House, Asquith, Otley, born about Mar. 15, 1892, bred by J. Blackburn, Trawden, Lancs.

1850 **II.** (**£5.**)—Walton Bros., Rawtenstall, Lancs, born Mar. 1892.
1849 **R. N. & H. C.**—Benjamin Dobson, born Mar. 15, 1892.

Herdwick.

Class 172.—*Herdwick Shearling Rams.* [11 entries, none absent.]

1857 **I.** (**£10.**)—Lord Muncaster, Muncaster Castle, Carnforth, for **Fell Ranger**, born Apr. 25, 1892, bred by Tom Newby, Muncaster Head, Cumberland.

1852 **II.** (**£5.**)—H. C. Howard, Greystoke Castle, Penrith, born Apr. 1892.
1851 **R. N. & H. C.**—John Dove, Rydal Farm, Ambleside, born Apr. 1892.
1856 **H. C.**—Wm. Leathes, for **Snowdon.**

Class 173.—*Pen of Three Herdwick Shearling Ewes, of the same flock.* [7 entries, 1 absent.]

1862 **I.** (**£10.**)—John Dove, Rydal Farm, Ambleside, born Apr. 1892.
1865 **II.** (**£5.**)—William Leathes, Wern Fawr, Ruthin, born Mar. 2, 11, & 20, 1892.

1864 **R. N. & H. C.**—H. C. Howard, Greystoke Castle, Penrith, born Apr. 1892.

Welsh Mountain.

Class 174.—*Welsh Mountain Rams, Two-Shear and Upwards.*[1] [8 entries, 1 absent.]

1871 **I.** (**£10.**)—J. Jones & Sons, Llandudno, for **Tywysog Arfon**, born Mar. 12, 1891; *s.* Brenhin y defaid.

1870 **II.** (**£5.**)—J. Jones & Sons, Llandudno, for **Brenhin y defaid**, born Mar. 10, 1889; *s.* Brenhin Cymru.

1874 **R. N. & H. C.**—Owen Price, Nantyrharn, Cray, Brecon, for **Swansea Boy.**
1872 **H. C.**—J. Jones & Sons. 1876 **Com.**—W. E. Williams, for **Twmy-Nant.**

Class 175.—*Welsh Mountain Shearling Rams.* [9 entries, 1 absent.]

1882 **I.** (**£10.**)—Godfrey Parry, Carrog, Corwen, born Mar. 9, 1892.
1879 **II.** (**£5.**)—J. Jones & Sons, Llandudno, for **Llêw Dinerth**, born May 4, 1892; *s.* Brenhin y defaid.

1881 **R. N. & H. C.**—Godfrey Parry, Carrog, Corwen, born Mar. 10, 1892.
1877 **Com.**—J. Marshall Dugdale.

Class 176.—*Pens of Three Welsh Mountain Ewes, Two-Shear and Upwards, of the same flock.*[1] [6 entries, none absent.]

1888 **I.** (**£10.**)—Godfrey Parry, Carrog, Corwen, born about Mar. 14, 1891.
1887 **II.** (**£5**) & 1886 **R. N.**—J. Jones & Sons, Llandudno, ages various.
1891 **Com.**—W. E. Williams, for **Megan, Betty**, and **Modrib.**

[1] Prizes given by the Chester Local Committee.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Class 177.—*Pens of Three Welsh Mountain Shearling Ewes, of the same flock.* [7 entries, none absent.]

1895 **I.** (£10.)—GODFREY PARRY, Carrog, Corwen, born about Mar. 14, 1892.
1894 **II.** (£5) & 1893 **R. N. & H. C.**—J. JONES & SONS, Llandudno, born Apr. 1892; *s.* Brenhin y defaid.

PIGS.

Large White Breed.

Class 178.—*Large White Boars, farrowed in* 1892. [4 entries, 1 absent.]

1902 **I.** (£10.)—RALPH SNEYD, Keele, Newcastle, Staffs, for **Welford**, born Mar. 31, 1892; *s.* Wonder, *d.* Buttercup *by* Andrew 461.

1900 **II.** (£5.)—DENSTON GIBSON, Metchley, Edgbaston, for **Metchley Count**, born Apr. 17, 1892; *s.* Metchley King 2321, *d.* Metchley Queen Bee 3312 *by* Duke 1263.

1899 **R. N.**—DENSTON GIBSON, Metchley, Edgbaston, for **Metchley Baron**.

Class 179.—*Pens of Three Large White Boar Pigs, farrowed in* 1893. [3 entries, 1 absent.]

1905 **I.** (£10.)—DENSTON GIBSON, Metchley, Edgbaston, born Jan. 8, 1893, bred by J. Ashforth, Dronfield, Sheffield; *s.* Scarsdale (vol. ix.), *d.* Dronfield Princess 3082 *by* Duke of Windsor 1269.

1904 **R. N.**—DENSTON GIBSON, born Jan. 10, 1893; *s.* Metchley King 2321.

Class 180.—*Large White Breeding Sows, farrowed before or in* 1892. [10 entries, 2 absent.]

1910 **I.** (£10.)—DENSTON GIBSON, Metchley, Edgbaston, for **Jessica** 2374, born Sept. 30, 1888, in-pig; *s.* Birmingham 673, *d.* Joan 2378 *by* Cardiff 1245.

1915 **II.** (£5.)—THE GUARDIANS OF PRESCOT UNION, Prescot, for **Whiston XI.** 3552, born July 27, 1890, in-pig; *s.* Prescot 1377, *d.* Whiston Baroness 1866 *by* Jupiter 527.

1914 **III.** (£3.)—JOSEPH NUTTALL, Longfield, Heywood, for **Whiston IX.** 3548, born Sept. 14, 1889, bred by the Guardians of Prescot Union; *s.* Ben III. 927, *d.* Princess 1308 *by* Pride of Apperley.

1908 **R. N. & Com.**—J. CASHMORE, JUN., Warwick, for **Worsley Baroness III.**
1912 **Com.**—DENSTON GIBSON, for **Metchley Queen Bee**.

Class 181.—*Pens of Three Large White Sow Pigs, farrowed in* 1893. [3 entries.]

1918 **I.** (£10.)—DENSTON GIBSON, Metchley, Edgbaston, born Jan. 5, 1893; *s.* Metchley King 2321, *d.* Metchley Judy 3298 *by* Duke 1263.

1917 **II.** (£5.)—DENSTON GIBSON, born Jan. 8, 1893; *s.* Duke 1263, *d.* Joan 2378 *by* Cardiff 1245.

1916 **R. N. & Com.**—FRANK ALLMAND, Wrexham.

Middle White Breed.

Class 182.—*Middle White Boars, farrowed in* 1892. [3 entries.]

1920 **I.** (£10.)—A. C. TWENTYMAN, Castlecroft, Wolverhampton, for **Castle-**

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

croft Deacon, born Jan. 4, 1892; *s.* Young Juan 1551, *d.* Rosy 2718 *by* Silver King 603.

1921 **II.** (£5.)—A. C. TWENTYMAN, for **Castlecroft Dreamer**, born Mar. 3, 1892 *s.* Castlecroft King 1515, *d.* Fiz 4176 *by* German Baron 825.

1919 **III.** (£3.)—DENSTON GIBSON, Metchley, Edgbaston, for **Metchley Lad**, born Jan. 16, 1892; *s.* Metchley Dandy (vol. ix.), *d.* Metchley Moselle 4190 *by* Sailor III. 1541.

Class 183.—*Pens of Three Middle White Boar Pigs, farrowed in* 1893.
[3 entries.]

1923 **I.** (£10.)—DENSTON GIBSON, Metchley, born Jan. 5, 1893; *s.* Prince of Worsley IV. 1533, *d.* Metchley Moselle 4190 *by* Sailor III. 1541.

1922 **II.** (£5.)—DENSTON GIBSON, born Jan. 15, 1893; *s.* Prince of Worsley IV. 1533, *d.* Metchley Madeline 4188 *by* Sailor III. 1541.

1924 **R. N.**—JOSEPH NUTTALL, Longfield, Heywood, born Jan. 9, 1893.

Class 184.—*Middle White Breeding Sows, farrowed before or in* 1892.
[5 entries.]

1927 **I.** (£10.)—THE GUARDIANS OF PRESCOT UNION, for **Whiston Medium** 3656, born Sept. 24, 1888, in-pig, bred by Philip Ascroft, Rufford, Ormskirk; *s.* Boswell II. 817, *d.* Gem II. 1372 *by* Peter 185.

1925 **II.** (£5.)—DENSTON GIBSON, Metchley, Edgbaston, for **Metchley Moselle** 4190, born Nov. 20, 1890, in-pig, bred by F. A. Walker Jones, Little Mollington, Chester; *s.* Sailor III. 1541, *d.* Elfrida III. 2662 *by* Punchinello 391.

1928 **III.** (£3.)—A. C. TWENTYMAN, Castlecroft, Wolverhampton, for **Castlecroft Marigold**, born June 18, 1891, in-pig; *s.* Young Juan 1551, *d.* Rosy 2718 *by* Silver King 603.

1929 **R. N. & H. C.**—A. C. TWENTYMAN, for **Fairy**.

1926 **Com.**—JOSEPH NUTTALL.

Class 185.—*Pens of Three Middle White Sow Pigs, farrowed in* 1893.
[3 entries.]

1932 **I.** (£10.)—A. C. TWENTYMAN, Castlecroft, Wolverhampton, born Jan. 6, 1893; *s.* Bruce 2451, *d.* Castlecroft Marigold *by* Young Juan 1551.

1931 **II.** (£5.)—JOSEPH NUTTALL, Longfield, Heywood, born Jan, 9, 1893; *s.* Rector 1537, *d.* Lucy 4820 *by* Prince of Worsley II. 1529.

1930 **III.** (£3.)—DENSTON GIBSON, Metchley, Edgbaston, born Jan. 15, 1893 *s.* Prince of Worsley IV. 1533, *d.* Metchley Madeline 4188 *by* Sailor III. 1541.

Small White Breed.

Class 186.—*Small White Boars, farrowed in* 1892.
[6 entries, 1 absent.]

1937 **I.** (£10.)—DENSTON GIBSON, Metchley. Edgbaston, for **Metchley Toy**, born June 1, 1892, bred by the Guardians of Prescot Union; *s.* Prescot Toy II. 2475, *d.* Whiston Toy II, 4216 *by* Prescot Toy 2099.

1935 **II.** (£5.)—THE HON. D. P. BOUVERIE, Coleshill House, Highworth, born July 16, 1892; *s.* Royal Doncaster 2477, *d.* Coleshill Catherine *by* Prince 1135.

1936 **R. N. & Com.**—THE HON. D. P. BOUVERIE.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Class 187.—*Pens of Three Small White Boar Pigs, farrowed in* 1893. [2 entries.]

1939 **I.** (£10.)—THE HON. D. P. BOUVERIE, Coleshill House, Highworth, born Jan. 6, 1893; *s.* Prescott 2897, *d.* Princess Pearl 3676 *by* Prince Pearl 1137.

1940 **II.** (£5.)—THE HON. D. P. BOUVERIE, born Jan. 7, 1893; *s.* Prescott 2897, *d.* Shaftesbury 3678 *by* Prince 1135.

Class 188.—*Small White Breeding Sows, farrowed before or in* 1892. [8 entries, 3 absent.]

1946 **I.** (£10.)—JOSEPH MUSSON, Whiston, Prescot, born Mar. 25, 1892, in-pig, bred by the Guardians of Prescot Union; *s.* Prescot Toy II. 2475, *d.* Whiston Toy 3686 *by* Roger II. 875.

1945 **II.** (£5.)—DENSTON GIBSON, Metchley, Edgbaston, for **Whiston Toy II.** 4216, born Jan. 2, 1891, in-pig, bred by the Guardians of Prescot Union; *s.* Prescot Toy 2099, *d.* Whiston Toy 3686 *by* Roger II. 875.

1942 **III.** (£3.)—THE HON. D. P. BOUVERIE, Coleshill House, Highworth, for **Coleshill Dot** 4826, born Oct. 2, 1891, in-pig; *s.* Coleshill Farmer 2093, *d.* Lady Rodney 3674 *by* Rodney 873.

1943 **R. N. & H. C.**—DENSTON GIBSON, for **Metchley Royal**, and **Com.** for No. 1944, **Metchley Toy.**

Class 189.—*Pens of Three Small White Sow Pigs, farrowed in* 1893. [2 entries.]

1949 **I.** (£10.)—THE HON. D. P. BOUVERIE, Coleshill House, Highworth, born Jan. 6, 1893; *s.* Prescott 2897, *d.* Princess Pearl 3676 *by* Prince Pearl 1137.

1950 **II.** (£5.)—THE HON. D. P. BOUVERIE, born Jan. 7, 1893; *s.* Prescott 2897, *d.* Shaftesbury 3678 *by* Prince 1135.

Berkshire Breed.

Class 190.—*Berkshire Boars, farrowed in* 1892. [15 entries, 6 absent.]

1961 **I.** (£10, **& R. N. for Champion.**[1])—WM. PINNOCK, Littleworth House, Wantage, for **Manor Poem N.** 3908, born Mar. 24, 1892; *s.* Windsor's Supreme 2814, *d.* Wantage Poetess B. 3337 *by* Longstop 2819.

1960 **II.** (£5.)—WM. PINNOCK, for **Manor Poem M.** 3907, born Mar. 24, 1892; *s.* Windsor's Supreme 2814, *d.* Wantage Poetess B. 3337 *by* Longstop 2819.

1954 **III.** (£3.)—A. E. W. DARBY, Little Ness, Shrewsbury, for **Philo**, born Jan. 21, 1892; *s.* Big Ben 2204, *d.* Persephone 2496 *by* May Hill 1519.

1951 **R. N. & H. C.**—T. H. ATKINS, Solihull Lodge, Shirley, for **Marmaduke.**

1955 **H. C.**—SIR H. F. DE TRAFFORD, BT., for **Flordon Earl.**

Class 191.—*Pens of Three Berkshire Boar Pigs, farrowed in* 1893. [9 entries, 1 absent.]

1967 **I.** (£10.)—A. E. W. DARBY, Little Ness, Shrewsbury, born Jan. 14, 1893; *s.* Big Ben 2204, *d.* Papaver 3817 *by* Attempt 2789.

1971 **II.** (£5.)—JAMES W. KIMBER, Fyfield Wick, Abingdon, born Mar. 2, 1893; *s.* Lord Ormonde 3546, *d.* Wicked Queen *by* Windsor's Supreme 2814.

[1] Given by the British Berkshire Society for the best animal exhibited in Classes 190 and 192.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

1974 **III.** (**£3.**)—Russell Swanwick, R. A. C. Farm, Cirencester, born Jan. 21 & 29, 1893; *ss.* Ray & Notty 3653, *ds.* Sallie DLXXXVI. 3664 *by* Lord Curzon 2012 & Sallie DLXXVI. 2766 *by* Phœbus 1055.

1970 **R. N. & H. C.**—Col. J. Blandy Jenkins, Kingston, Abingdon.

1969 **H. C.**—Sir H. F. de Trafford, Bt.

Com.—A. E. W. Darby, for No. 1966; Sir H. F. de Trafford, for 1968.

Class 192.—*Berkshire Breeding Sows, farrowed before or in* 1892. [25 entries, 4 absent.]

1987 **I.** (**£10, & Champion £10.**[1])—Edney Hayter, Whitchurch, Hants, for **Highclere B.** 4164, born Sept. 5, 1891, in-pig, bred by E. Burbidge, South Wraxhall, Bradford-on-Avon; *s.* Ransome 2675, *d.* Rhoda 4163 *by* Sarum 1257.

1998 **II.** (**£5.**)—Russell Swanwick, R. A. C. Farm, Cirencester, for **Sallie DCLXXVI.**, born Feb. 21, 1892, in-pig; *s.* Prince Imperial 2171, *d.* Sallie CCCCXXVI. 2176 *by* Phœbus 1055.

1978 **III.** (**£3.**)—James Blyth, Wood House, Stansted, born **Jan. 14, 1891,** in-pig, bred by Sir H. F. de Trafford, Bt.; *s.* Barton Royal 3499, *d.* Lancashire Queen 3496 *by* Esau 1884.

1976 **R. N. & H. C.**—C. A. Barnes, Solesbridge, Herts, for **Duchess XXXVI.**

H. C.—J. W. Kimber, for No. 1993, **Warwick Lass**; Wm. Pinnock, for No. 1994, **Manor Poem B**; R. Swanwick, for No. 1996, **First Choice X.**

Com.—T. H. Atkins, for No. 1975, **Shirley Wynne**; A. E. W. Darby, for No. 1980, **Pavetta**; Sir H. F. de Trafford, for No. 1982, **Flordon Queen**; Col. J. Blandy Jenkins, for No. 1990, **Amy Robsart.**

Class 193.—*Pens of Three Berkshire Sow Pigs, farrowed in* 1893. [12 entries, 2 absent.]

2003 **I.** (**£10.**)—Sir H. F. de Trafford, Bt., The Flordon Stud Farm, Norfolk, born Jan. 11 & 21, 1893, *s.* Tavistock 3750, *ds.* Barton Regina 3508 *by* Tring Premier and Barton Princess 3501 *by* Cestrian Duke 2402.

2006 **II.** (**£5.**)—Col. J. Blandy Jenkins, Kingston, Abingdon, born Jan. 7 & 15, 1893; *ss.* Windsor's Supreme 2814 & Waterloo (vol. ix.), *ds.* Cleopatra II. 2816 *by* Lad of the Manor 1893 & Queen Bernice 3268 *by* Sir Edwin 2572.

2000 **III.** (**£3.**[2])—T. H. Atkins, Solihull Lodge, Shirley, Birmingham, born Jan. 7, 1893, bred by C. A. Hanbury, Belmont, East Barnet; *s.* Emperor of Belmont 4062, *d.* Empress of Belmont *by* Fred 2005.

2008 **H. C.**—Wm. Pinnock, Wantage.

Com.—A. E. W. Darby, for No. 2001; Alfred Greenall, for No. 2004, **Grappenhall Poppy, Grappenhall Pansy,** & **Grappenhall Violet**; R. Swanwick, for No. 2009, **Sallie DCXCVI., Sallie DCCVI.,** & **Sallie DCCXVI.**

Any Other Black Breed.

Class 194.—*Boars, farrowed in* 1892. [4 entries, none absent.]

2015 **I.** (**£10.**)—G. Pettit, Friston, Saxmundham, born June 1, 1892, small black; *s.* Duke 915, *d.* Primrose 2124.

2012 **II.** (**£5.**)—The Duke of Hamilton and Brandon, K.T., Easton Park, Suffolk, for **Kingdom**, born Feb. 10, 1892, small black; *s.* Emperor 1197, *d.* Topsy 1066 *by* Blackbird.

[1] Given by the British Berkshire Society for the best animal exhibited in Classes 190 and 192.

[2] As to the disqualification of the animals to which the Third Prize in Class 193 was originally awarded, see page xciii.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

2013 **R. N. & H. C.**—THE DUKE OF HAMILTON AND BRANDON, KT., for **Peter.**

Class 195.—*Pens of Three Boar Pigs, farrowed in* 1893.
[3 entries, 1 absent.]

2017 **I.** (**£10.**)—G. PETTIT, Friston, Saxmundham, born Jan. 4, 1893, small black; *s.* Duke 915, *d.* Primrose 2124.

2016 **R. N. & H. C.**—THE DUKE OF HAMILTON AND BRANDON, K.T.

Class 196.—*Breeding Sows, farrowed before or in* 1892. [3 entries.]

2020 **I.** (**£10.**)—THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park, Suffolk, for **The Nun**, born May 10, 1887, in-pig, small black; *s.* Tommy 455, *d.* Gipsy 614 *by* Robert the Devil.

2019 **II.** (**£5.**)—THE DUKE OF HAMILTON AND BRANDON, K.T., for **Eugene**, born Aug. 21, 1889, in-pig, small black; *s.* Dartmoor 913, *d.* Empress 612 *by* Robert the Devil.

2021 **R. N. & H. C.**—G. PETTIT, Friston, Saxmundham.

Class 197.—*Pens of Three Sow Pigs, farrowed in* 1893. [3 entries.]

2023 **I.** (**£10.**)—G. PETTIT, Friston, Saxmundham, born Jan. 4, 1893, small black; *s.* Duke 915, *d.* Primrose 2124.

2022 **II.** (**£5.**)—THE DUKE OF HAMILTON AND BRANDON, K.T., Easton Park, Suffolk, born Jan. 3, 1893, small black; *s.* Emperor 1197, *d.* Eugene *by* Dartmoor 913.

2024 **R. N.**—G. PETTIT, born Jan. 7, 1893, small black.

Tamworth Breed.

Class 198.—*Tamworth Boars, farrowed in* 1892.
[10 entries, none absent.]

2031 **I.** (**£10.**)—J. H. JORDAN, Clifford Hill, Stratford-on-Avon, for **Hohenzollern**, born Jan. 23, 1892; *s.* Wallace II. 1661, *d.* Princess Royal *by* Royal Winner 1633.

2030 **II.** (**£5.**)—J. JONES & SONS, Llandudno, for **Dinarth Confidence**, born May 28, 1892; *s.* Dinarth Goldfinch, *d. by* Gun Hill Prince 1591.

2034 **III.** (**£3.**)—D. W. PHILIP, Whitacre, Coleshill, for **Whitacre Goldfinder**, born June 14, 1892; *s.* Goldfinch 2505, *d.* Grand Duchess 3744 *by* Gun Hill Prince 1591.

2027 **R. N. & H. C.**—J. A. HERBERT, Llanarth Ct., Raglan, for **Llanarth Hero.**
2025 **Com.**—T. CLAYTON, for **Castle Bromwich William.**

Class 199.—*Pens of Three Tamworth Boar Pigs, farrowed in* 1893.
[7 entries, 1 absent.]

2038 **I.** (**£10.**)—ROBERT IBBOTSON, Knowle, Warwickshire, born Jan. 2, 1893; *s.* Lord Salisbury 2533, *d.* Knowle Ruby 2024 *by* Samuel 427.

2036 **II.** (**£5.**)—THOMAS CLAYTON, Castle Bromwich, born Jan. 4, 1893; *s.* Lord Burleigh 2527, *d.* Castle Bromwich Empress 4234 *by* Goldfinch 2505.

2039 **III.** (**£3.**)—ROBERT IBBOTSON, born Jan. 13, 1893; *s.* Lord Salisbury 2533, *d.* Knowle Rosalind 4286 *by* Dorridge Champion 1573.

2035 **R. N. & H. C.**—T. CLAYTON, born Jan. 8, 1893; *s.* Lord Burleigh 2527.
2037 **Com.**—EGBERT DE HAMEL, Middleton Hall, Tamworth.

[Unless otherwise stated, each prize animal named below was "bred by exhibitor."]

Class 200.—*Tamworth Breeding Sows, farrowed before or in* 1892. [11 entries, 2 absent.]

2045 **I.** (£10.)—ROBERT IBBOTSON, Knowle, Warwickshire, for **Knowle Favorite** 4276, born Aug. 15, 1890, in-pig; *s.* Lord Warwick 2181, *d.* Rosa 2894 *by* Monarch 1613.

2051 **II.** (£5.)—THOMAS TOMPSON, Holt Hall, Whitacre, Birmingham, born Dec. 30, 1891, in-pig; *s.* Uncle John 2245, *d.* Quality II. 3856 *by* Coral 1567.

2048 **III.** (£3.)—W. H. MITCHELL, Elmdene, Kenilworth, for **Elmdene Mabel**, born Mar. 8, 1892, in-pig; *s.* Elmdene King 2141, *d.* Drayton Princess 2800 *by* Sambo II. 895.

2046 **R. N. & H. C.**—ROBERT IBBOTSON, for **Knowle Rosalind.**
2052 **Com.**—THOMAS TOMPSON.

Class 201.—*Pens of Three Tamworth Sow Pigs, farrowed in* 1893. [7 entries, 1 absent.]

2059 **I.** (£10.)—D. W. PHILIP, The Ashes, Whitacre, Coleshill, born Jan. 3, 1893; *s.* Lord Burleigh 2527, *d.* Whitacre Countess 4378 *by* Gun Hill Prince 1591.

2054 **II.** (£5.)—THOMAS CLAYTON, Castle Bromwich, born Jan. 7, 1893; *s.* Lord Burleigh 2527, *d.* Castle Bromwich Christine 4230 *by* Gun Hill Reliance 2155.

2058 **III.** (£3.)—ROBERT IBBOTSON, Knowle, Warwickshire, born Jan. 24, 1893; *s.* Lord Salisbury 2533 *d.* Knowle Favorite 4276 *by* Lord Warwick 2181.

2056 **R. N. & H. C.**—EGBERT DE HAMEL, Middleton Hall, Tamworth.
Com.—THOMAS CLAYTON, for No. 2055; J. A. HERBERT, for No. 2057.

POULTRY.

By "Cock," "Hen," "Drake," "Duck," "Gander," and "Goose" are mean birds hatched before January 1st, 1893; and by "Cockerel," "Pullet," "Young Drake," and "Duckling" are meant birds hatched in 1893, before June 1st.

FOWLS.

Dorkings.

Class 202.—*Coloured Dorking Cocks.* [12 entries, 1 absent.]

4 **I.** (30*s.*)—JAMES CRANSTON, Nunwood, Dumfries, N.B.
8 **II.** (15*s.*)—ARTHUR C. MAJOR, Park Farm, Ditton, Langley, Bucks. 2 years old.
11 **III.** (10*s.*)—LEONARD PILKINGTON, Cavens, Kirkbean, Dumfries.
7 **R. N. & H. C.**—MRS. T. W. L. HIND, The Hollins, Kendal.
H. C.—MRS. ALFRED ASHWORTH, for No. 2; G. E. B. MUZEEN, for No. 10.

Class 203.—*Coloured Dorking Hens.* [14 entries, none absent.]

19 **I.** (30*s.*)—ARTHUR C. MAJOR, Park Farm, Ditton, Langley, Bucks. 4 years old.
23 **II.** (15*s.*)—HERBERT REEVES, Emsworth, Hants. Mar. 1891.
21 **III.** (10*s.*)—G. E. B. MUZEEN, Douthwaite Lodge, Kirby Moorside. 1891.
17 **R. N. & H. C.**—JAMES CRANSTON, Nunwood, Dumfries, N.B.

H. C.—T. Brocklebank, for No. 15; Miss Murray, for No. 20; G. E. B. Muzeen, for No. 22; Herbert Reeves, for No. 24.

Class 204.—*Coloured Dorking Cockerels.* [9 entries, 2 absent.]

29 **I.** (30*s.*)—Andrew Crichton, Glamis, N.B.
28 **II.** (15*s.*)—James Cranston, Nunwood, Dumfries, N.B.
33 **III.** (10*s.*)—Herbert Reeves, Emsworth, Hants. Jan.
35 **R. N. & H. C.**—T. & J. Woodward, Clotton, Tarporley. Feb. 10.
34 **H. C.**—Herbert Reeves. Jan.

Class 205.—*Coloured Dorking Pullets.* [10 entries, 4 absent.]

44 **I.** (30*s.*)—Herbert Reeves, Emsworth, Hants. Jan.
38 **II.** (15*s.*)—James Cranston, Nunwood, Dumfries, N.B.
45 **III.** (10*s.*)—T. & J. Woodward, Clotton, Tarporley. Feb. 10.
43 **R. N. & H. C.**—Herbert Reeves, Emsworth, Hants. Jan.
H. C.—Master W. Berry, for No. 36; T. Brocklebank, for No. 37.

Class 206.—*Silver Grey Dorking Cocks.* [9 entries, 3 absent.]

51 **I.** (30*s.*)—Arthur C. Major, Park Farm, Ditton, Langley. 2 years old.
48 **II.** (15*s.*)—James Cranston, Nunwood, Dumfries, N.B.
49 **III.** (10*s.*)—O. E. Cresswell, Morney Cross, Hereford. 1892.
53 **R. N. & H. C.**—Herbert Reeves, Emsworth, Hants. Mar. 1890.
47 **H. C.**—H. & T. Armstrong, High Low Hall, Whitehaven.

Class 207.—*Silver Grey Dorking Hens.* [11 entries, none absent.]

55 **I.** (30*s.*)—James Blundell, Ream Hills, Kirkham, Lancs. 3 years old.
59 **II.** (15*s.*)—Arthur C. Major, Park Farm, Ditton, Langley. 2 years old.
57 **III.** (10*s.*), & 58 **R. N. & H. C.**—O. E. Cresswell, Morney Cross, Hereford. 1891.
64 **H. C.**—Dr. G. C. Searle, Burton House, Brixham. 1891.

Class 208.—*Silver Grey Dorking Cockerels.* [8 entries, 2 absent.]

70 **I.** (30*s.*)—Herbert Reeves, Emsworth, Hants. Jan.
73 **II.** (15*s.*)—Lady Wilson, Chillingham Barns, Belford. Jan. 11.
69 **III.** (10*s.*)—Herbert Reeves, Emsworth, Hants. Jan.
66 **R. N.**—Hon. Florence Amherst, Didlington Hall, Brandon, Norfolk.

Class 209.—*Silver Grey Dorking Pullets.* [8 entries, none absent.]

78 **I.** (30*s.*)—Herbert Reeves, Emsworth. Hants. Jan.
77 **II.** (15*s.*)—James Cranston, Nunwood, Dumfries, N.B.
79 **III.** (10*s.*)—Herbert Reeves, Emsworth, Hants. Jan.
81 **R. N. & H. C.**—Lady Wilson, Chillingham Barns, Belford. Feb.
H. C.—Hon. Florence Amherst, for No. 74; James Blundell, for No. 76; J. M. Stockbridge, for No. 80.

Class 210.—*White or any other variety Dorking Cocks.* [5 entries.]

84 **I.** (30*s.*)—J. Pettipher, Woodway House, Banbury. White.
82 **II.** (15*s.*)—O. E. Cresswell, Morney Cross, Hereford. White. 1890.
86 **III.** (10*s.*)—Rev. R. S. S. Woodgate, Pembury Hall, Tunbridge Wells. White. 1892.
83 **R. N. & H. C.**—O. E. Cresswell, Morney Cross, Hereford. White. 1892.
85 **H. C.**—J. A. Slatter, Somerton, Banbury. Cuckoo.

Class 211.—*White or any other variety Dorking Hens.* [5 entries, none absent.]

87 **I.** (30*s.*) & 88 **II.** (15*s.*)—O. E. Cresswell, Morney Cross, Hereford. White. 1892.

91 **III.** (10*s.*)—Rev. R. S. S. Woodgate, Pembury Hall, Tunbridge Wells. White. 1891
89 **R. N.**—Joseph Pettipher, Woodway House, Banbury. White.

Class 212.—*White or any other variety Dorking Cockerels.*
[2 entries.]

92 **I.** (30*s.*)—Herbert Reeves, Emsworth, Hants. White. Jan.
93 **II.** (15*s.*)—Rev. R. S. S. Woodgate, Pembury Hall, Tunbridge Wells. White. Jan. 4.

Class 213.—*White or any other variety Dorking Pullets.*
[No entry.]

Game.

Class 214.—*Old English Game Cocks.* [25 entries, none absent.]

96 **I.** (30*s.*)—John Brough, 22 London Road, Carlisle.
95 **II.** (15*s.*)—Edward Barnes, Fern Bank, Godalming. 1891.
117 **III.** (10*s.*)—J. W. Simpson, Sun Inn, Bootle, *viâ* Carnforth. Mar. 1891.
107 **R. N. & H. C.**—Thomas Law, Park Gate, Wigton. Mar. 1, 1892.
H. C.—H. Atkinson, for No. 94; John Brough, for No. 97; Charles Hall, for No. 100; Rev. H. W. Hutton, for No. 105; Little & Barnes, for No. 109; R. de Courcy Peele, for No. 112.

Class 215.—*Old English Game Hens.* [16 entries, 1 absent.]

128 **I.** (30*s.*)—James Nixon, Front St., Brampton, Cumberland.
129 **II.** (15*s.*)—R. de Courcy Peele, Batchcott, Ludlow. Over 2 years.
120 **III.** (10*s.*)—John Brough, 22 London Road, Carlisle.
133 **R. N. & H. C.**—J. W. Simpson, Bootle, *viâ* Carnforth. July 1891.
H. C.—John Brough, for No. 121; Rev. H. W. Hutton, for No. 123; N. James, for No. 124; G. F. Saul, for No. 130.

Class 216.—*Old English Game Cockerels.* [10 entries, none absent.]

137 **I.** (30*s.*)—John Brough, 22 London Road, Carlisle. Jan. 12.
144 **II.** (15*s.*)—J. W. Simpson, Bootle, *viâ* Carnforth. Jan. 4.
141 **III.** (10*s.*)—I. W. Messenger, Mill Hill Mill, Whitehaven. Jan. 3.
138 **R. N. & H. C.**—John Brough, 22 London Road, Carlisle. Feb. 1.
H. C.—John Carr, for No. 140; J. W. Simpson, for No. 143.

Class 217.—*Old English Game Pullets.* [7 entries, none absent.]

145 **I.** (30*s.*)—John Brough, 22 London Road, Carlisle. Jan. 12.
148 **II.** (15*s.*)—Little & Barnes, Applegarth, Abbey Town, Silloth. Jan. 5.
147 **III.** (10*s.*)—Thomas Law, Park Gate, Wigton. Jan. 4.
146 **R. N. & H. C.**—John Brough, 22 London Road, Carlisle. Feb. 1.
151 **H. C.**—J. W. Simpson, Bootle, *viâ* Carnforth. Jan. 9.

Class 218.—*Indian Game Cocks.* [7 entries, none absent.]

152 **I.** (30*s.*)—Wm. Brent, Clampit Farm, Callington. Over 1 year.
156 **II.** (15*s.*)—H. Paynter, Carvoda Lezant, Callington. Over 10 mths.
155 **III.** (10*s.*)—A. H. Hawkey, Wadebridge, Cornwall. 2 years old.
157 **R. N. & H. C.**—Ernest Strike, Hawks Tor View, Launceston.
154 **H. C.**—James Frayne, Pipers Pool, Launceston.

Class 219.—*Indian Game Hens.* [11 entries, none absent.]

167 **I.** (30*s.*)—Henry Paynter, Carvoda Lezant, Callington, Cornwall.

162 **II.** (15*s.*)—F. P. ELLIS, Windhill Lodge, Bishop's Stortford. Over 1 year.
160 **III.** (10*s.*)—WM. BRENT, Clampit Farm, Callington. Over 1 year.
164 **R. N. & H. C.**—JAMES FRAYNE, Pipers Pool, Launceston.
H. C.—JOHN FRAYN, for No. 163 ; E. STRIKE, for No. 169.

Class 220.—*Indian Game Cockerels.* [8 entries, none absent.]

171 **I.** (30*s.*)—J. EDWARDS, Callington, Cornwall. Jan. 16.
174 **II.** (15*s.*)—JAMES FRAYNE, Pipers Pool, Launceston. Jan.
177 **III.** (10*s.*)—MRS. C. RADFORD, Winkleigh, Devon.
170 **R. N. & H. C.**—WM. BRENT, Clampit Farm, Callington.
176 **H. C.**—TOM HAWKEY, Wadebridge, Cornwall. Jan.

Class 221.—*Indian Game Pullets.* [11 entries, none absent.]

183 **I.** (30*s.*)—JAMES FRAYNE, Pipers Pool, Launceston. Jan.
184 **II.** (15*s.*)—A. H. HAWKEY, Wadebridge, Cornwall.
185 **III.** (10*s.*)—TOM HAWKEY, Wadebridge, Cornwall. Jan.
188 **R. N. & H. C.**—T. WEBSTER, Higher Bore St., Bodmin. Jan. 3.
178 **H. C.**—WM. BRENT, Clampit Farm, Callington.

Houdans.

Class 222.—*Houdan Cocks.* [6 entries, 1 absent.]

192 **I.** (30*s.*)—J. P. W. MARX, Old Basford, Nottingham. 1891.
194 **II.** (15*s.*)—S. W. THOMAS, Glasfryn, Cockett, Swansea. Over 1 year.
191 **III.** (10*s.*)—F. GABITAS, Old Windsor, Berks. Over 1 year.
189 **R. N. & H. C.**—J. H. BRODRICK, The Dales, Longbridge, Northfield, Worc

Class 223.—*Houdan Hens.* [7 entries, none absent.]

197 **I.** (30*s.*)—F. GABITAS, Old Windsor. Berks. Over 1 year.
198 **II.** (15*s.*)—MRS. C. HILL, Tovil House, Maidstone. 1892.
195 **III.** (10*s.*)—J. W. COOK, Lincoln. 1891.
201 **R. N. & H. C.**—FRANCIS VALPY, St. Helier's, Jersey. Mar. 1892.

Class 224.—*Houdan Cockerels.* [4 entries, none absent.]

203 **I.** (30*s.*)—MRS. C. HILL, Tovil House, Maidstone. 4 months.
204 **II.** (15*s.*) & 205 **III.** (10*s.*)—JONATHAN HILL, Bridgend Mills, Lostwithiel. Feb. 23.

Class 225.—*Houdan Pullets.* [4 entries, none absent.]

206 **I.** (30*s.*)—MRS. C. HILL, Tovil House, Maidstone. 4 months.
208 **II.** (15*s.*)—JONATHAN HILL, Bridgend Mills, Lostwithiel. Feb. 23.
207 **III.** (10*s.*)—JONATHAN HILL, Bridgend Mills, Lostwithiel. Feb. 23.

Other French Breeds.

226.—*Cocks.* [5 entries.]

210 **I.** (30*s.*)—J. H. BRODRICK, The Dales, Longbridge, Worcs. Crêvecœur.
213 **II.** (15*s.*)—FRANCIS VALPY, St. Helier's, Jersey. La Flèche. June 1891.
211 **III.** (10*s.*)—J. H. BRODRICK, The Dales, Longbridge, Worcs. Crêvecœur.
212 **R. N. & H. C.**—S. W. THOMAS, Glasfryn, Cockett. Crêve. Over 1 year.
214 **H. C.**—FRANCIS VALPY, St. Helier's, Jersey. La Flèche.

Class 227.—*Hens.* [5 entries, none absent.]

216 I. (30*s.*)—S. W. Thomas, Glasfryn, Cockett, Swansea. Crêve. Over 1 yr.
215 II. (15*s.*)—J. H. Brodrick, The Dales, Longbridge, Worcs. Crêvecœur.
218 III. (10*s.*)—Francis Valpy, St. Helier's, Jersey. La Flèche. Mar. 1892.

Class 228.—*Cockerels.* [2 entries.]

220 I. (30*s.*) & 221 II. (15*s.*)—Francis Valpy, St. Helier's, Jersey. La Flèche. Feb. 5.

Class 229.—*Pullets.* [2 entries.]

222 I. (30*s.*) & 223 II. (15*s.*)—Francis Valpy, St. Helier's, Jersey. La Flèche. Feb. 5.

Brahmas.

Class 230.—*Brahma Cocks.* [13 entries, 3 absent.]

233 I. (30*s.*)—Arthur E. Ward, Broad Road, Sale, Cheshire. Over 2 years.
232 II. (15*s.*)—S. W. Thomas, Glasfryn, Cockett, Swansea. Over 1 year.
230 III. (10*s.*)—E. Scammell, Hilperton, Trowbridge, Wilts. 1888.
236 R. N.—Joseph Wood, Withnell Hall, Chorley.

Class 231.—*Brahma Hens.* [15 entries, 1 absent.]

240 I. (30*s.*)—C. J. Else, Bullbridge, Ambergate, Derby. Mar. 1891.
239 II. (15*s.*)—Rev. Harold Burton, Fauls Vicarage, Whitchurch, Salop.
242 III. (10*s.*)—E. Linnell, Redstone Wood, Red Hill. 2 years.
251 R. N. & H. C.—Joseph Wood, Withnell Hall, Chorley.
H. C.—The Countess of Aberdeen, for No. 237; G. E. B. Muzeen, for No. 244; A. E. Ward, for No. 248.

Class 232.—*Brahma Cockerels.* [7 entries, none absent.]

253 I. (30*s.*)—Mrs. A. Campbell, Rose Villa, Uley, Dursley. Jan. 3.
255 II. (15*s.*)—G. W. Henshall, Urmston, Manchester.
258 III. (10*s.*)—Arthur E. Ward, Broad Road, Sale. Feb. 10.
252 R. N.—Dr. P. L. Benson, The Elms, Steeple Claydon, Winslow. Jan. 10.

Class 233.—*Brahma Pullets.* [9 entries, 2 absent.]

264 I. (30*s.*)—Mrs. A. Campbell, Rose Villa, Uley, Dursley. Jan. 3.
261 II. (15*s.*)—Dr. P. L. Benson, The Elms, Steeple Claydon, Winslow. Jan. 2.
263 III. (10*s.*)—Rev. Harold Burton, Fauls Vicarage, Whitchurch, Salop. Feb. 8.
267 R. N. & H. C.—Arthur E. Ward, Sale, & H. C. for No. 266. Feb. 12.

Cochins.

Class 234.—*Cochin Cocks.* [16 entries, 2 absent.]

270 I. (30*s.*)—Mrs. S. R. Harris, Meneage Street, Helston.
276 II. (15*s.*)—George H. Procter, Flass House, Durham. 1891.
281 III. (10*s.*)—Arthur E. Ward, Broad Road, Sale, Cheshire. Over 2 years.
277 R. N. & H. C.—George H. Procter, Flass House, Durham. 1891.
H. C.—J. Partington, for No. 275; J. A. Slatter, for No. 279; T. Stretch, for No. 280; J. Wood, for No. 283.

Class 235.—*Cochin Hens.* [10 entries, none absent.]

286 **I.** (30*s.*)—Mrs. S. R. Harris, Meneage Street, Helston.
290 **II.** (15*s.*) George H. Procter, Flass House, Durham. 1891.
292 **III.** (10*s.*)—Thomas Stretch, Vine Cottage, Ormskirk.
288 **R. N. & H. C.**—J. Partington, Malkins Wood, Boothstown. 2 years old.
H. C.—J. A. Slatter, for No. 291; J. Wood, for No. 293.

Class 236.—*Cochin Cockerels.* [6 entries, 2 absent.]

298 **I.** (30*s.*)—J. H. Nicholls, Tangier House, Lostwithiel. Jan. 3.
299 **II.** (15*s.*)—Thomas Stretch, Vine Cottage, Ormskirk. Jan. 19.
294 **III.** (10*s.*)—Mrs. Fanny Glover, Dock Cottages, Birkenhead. Mar. 2.

Class 237.—*Cochin Pullets.* [4 entries, 2 absent.]

303 **I.** (30*s.*)—Thomas Sowerby, Cleethorpe, Grimsby. Jan. 20.
302 **II.** (15*s.*)—J. H. Nicholls, Tangier House, Lostwithiel. Jan. 3.

Langshans.

Class 238.—*Langshan Cocks.* [23 entries, 3 absent.]

315 **I.** (30*s.*)—P. Marsh, 5 Fairfield Place, Bedminster, Bristol. 3 years
326 **II.** (15*s.*)—Wm. Williams, Dean Lane, Bedminster, Bristol. Over 1 yr.
314 **III.** (10*s.*)—Marsden & Wallbank, Waddington, Clitheroe. Mar. 20, 1892.
318 **R. N. & H. C.**—Abel Neild, Longfield Lane, Poulton-le-Fylde. 1892.
H. C.—P. Marsh, for No. 316; C. Seabrooke, for No. 320; H. Wallis, for No. 324.
Com.—Wm. Cade, for No. 304.

Class 239.—*Langshan Hens.* [15 entries, 1 absent.]

334 **I.** (30*s.*)—Abel Neild, Longfield Lane, Poulton-le-Fylde. 1892.
338 **II.** (15*s.*)—Charles Seabrooke, The Echoes, Grays, Essex. Over 1 yr.
337 **III.** (10*s.*)—Edmund Procter, Cantsfield, Kirkby Lonsdale.
340 **R. N. & H. C.**—H. R. Willett, Whitchurch, Bristol. 11 months.
332 **H. C.**—P. Marsh. 328 **Com.**—Wm. Chambers.

Class 240.—*Langshan Cockerels.* [11 entries, none absent.]

346 **I.** (30*s.*)—E. Procter, Cantsfield, Kirkby Lonsdale. Jan. 5.
348 **II.** (15*s.*)—Dr. G. C. Searle, Burton House, Brixham. Jan. 2.
350 **III.** (10*s.*)—F. Tandy, The Bricklands, Sandhurst Road, Gloucester. Jan. 4.
344 **R. N. & H. C.**—A. G. Phillips, The Rosery, Long Ashton, Bristol. Jan. 2.
347 **H. C.**—J. L. Roby, South View, Chorley. Jan.

Class 241.—*Langshan Pullets.* [13 entries, none absent.]

363 **I.** (30*s.*)—J. W. Walker, Upton Lodge, Henley-on-Thames. Jan. 6.
361 **II.** (15*s.*) & 362 **III.** (10*s.*)—F. Tandy, The Bricklands, Sandhurst Road, Gloucester. Jan. 4.
359 **R. N. & H. C.**—John L. Roby, South View, Chorley. Jan.
364 **H. C.**—J. W. Walker, Upton Lodge, Henley-on-Thames. Jan. 16.
Com.—A. G. Phillips, for No. 357; E. Procter, for No. 358.

Wyandottes.

Class 242.—*Wyandotte Cocks.* [17 entries, 4 absent.]

381 **I.** (30*s.*)—W. A. Spencer, Chelmscote, Shipston-on-Stour. May 1892.

369 **II.** (15*s.*)—C. BUTCHER, Maeshendre, Glasbury, Brecon. 1891.
371 **III.** (10*s.*)—MRS. FRANKLIN, Syston Old Hall, Grantham. 1892.
370 **R. N. & H. C.**—W. EVERINGTON, Weasenham, Swaffham. 1892.
374 **H. C.**—H. MAIDMENT, Randylands, Brampton. May 6, 1892.
Com.—ABBOT BROS, for Nos. 366 & 367.

Class 243.—*Wyandotte Hens.* [12 entries, 4 absent.]

385 **I.** (30*s.*)—REV. FREDERIC COOKE, Yeaton House, Shrewsbury. 1891.
391 **II.** (15*s.*)—REV. H. V. H. PERCY, Moreton Say Rectory, Market Drayton.
383 **III.** (10*s.*)—ABBOT BROS., Hingham, Norfolk. 1892.
392 **R. N.**—MRS. SANDFORD, Sandford, Whitchurch, Salop. Apr. 1892.

Class 244.—*Wyandotte Cockerels.* [15 entries, 3 absent.]

397 **I.** (30*s.*)—W. BEESON, 69 Plantation Road, Oxford. Jan. 2.
402 **II.** (15*s.*)—MRS. FRANKLIN, Syston Old Hall, Grantham. Jan.
401 **III.** (10*s.*)—P. A. FARRER, Eccles, Attleborough. Feb.
404 **R. N. & H. C.**—GEORGE HOLMES, Ambergate, Derby. Jan. 10.
H. C.—ABBOT BROS., for Nos. 395 & 396; M. WOOTTEN, for No. 409.

Class 245.—*Wyandotte Pullets.* [21 entries, 4 absent.

422 **I.** (30*s.*)—MRS. E. H. LANDON, Upper Bullingham, Hereford.
429 **II.** (15*s.*)—J. W. SCOTT, Bilton, Harrogate, Yorks. Jan.
418 **III.** (10*s.*)—MISS S. GRAHAM, Arthuret Rectory, Longtown. Jan. 28.
428 **R. N.**—MRS. SANDFORD, Sandford, Whitchurch, Salop. Jan. 1.
Com.—G. PARKER, for No. 423; PEARSON BROS., for No. 424.

Plymouth Rocks.

Class 246.—*Plymouth Rock Cocks.* [10 entries, 1 absent.]

440 **I.** (30*s.*)—J. W. E. SMITH, 274 Marsh Lane, Bootle, Liverpool. May 1892.
432 **II.** (15*s.*)—J. W. ADLINGTON, Kirk Langley, Derby.
433 **III.** (10*s.*)—MISS ANNE BURROW, Buckstone House, Carnforth. Apr. 22, 1892.
434 **R. N.**—W. EVERINGTON, Weasenham, Swaffham, Norfolk. 1892.

Class 247.—*Plymouth Rock Hens.* [15 entries, 1 absent.]

442 **I.** (30*s.*)—J. W. ADLINGTON, Kirk Langley, Derby.
447 **II.** (15*s.*)—P. A. FARRER, Eccles, Attleborough. Over 1 year.
444 **III.** (10*s.*) & 445 **R. N. & H. C.**—R. BUTTERFIELD, Nafferton Hall, Driffield. Over 2 years.
H. C.—THE COUNTESS OF ABERDEEN, for No. 441; L. PILKINGTON, for No. 453.
Com.—J. C. BRANGWIN, for No. 443; REV. F. LLOYD, for No. 451.

Class 248.—*Plymouth Rock Cockerels.* [12 entries, 1 absent.]

467 **I.** (30*s.*)—W. SLATER, Bigland House, Silverdale, Carnforth. Jan. 12.
457 **II.** (15*s.*)—G. W. BRACKEN, Killington, Sedbergh, Yorks. Jan. 7.
462 **III.** (10*s.*)—P. A. FARRER, Eccles, Attleborough. Feb.
458 **R. N. & H. C.**—G. W. BRACKEN. 461 **H. C.**—W. EVERINGTON.

Class 249.—*Plymouth Rock Pullets.* [10 entries, 2 absent.]

473 **I.** (30*s.*)—P. A. FARRER, Eccles, Attleborough. Feb.
469 **II.** (15*s.*)—J. W. ADLINGTON, Kirk Langley, Derby. Jan. 22.
477 **III.** (10*s.*)—W. SLATER, Bigland House, Silverdale, Carnforth. Jan. 12.
468 **R. N.**—ABBOT BROS. 471 **Com.**—ROBERT BUTTERFIELD.

Minorcas.

Class 250.—*Minorca Cocks.* [12 entries, none absent.]

484 **I.** (30*s.*)—A. G. PITTS, The Firs, Highbridge, Som. Apr. 1892.
480 **II.** (15*s.*)—WM. CHAMBERS, 27 Armitage Road, Rugeley. May 1892.
483 **III.** (10*s.*)—A. G. PITTS, The Firs, Highbridge, Som. Apr. 1892.
489 **R. N. & H. C.**—H. R. WILLETT, Whitchurch, Bristol. 11 months.
H. C.—ARTHUR LINDLEY, for No. 482; W. H. STOYEL, for No. 487.

Class 251.—*Minorca Hens.* [16 entries, none absent.]

493 **I.** (30*s.*)—FURSLAND BROS., Connaught Villa, Bridgwater. 1891.
499 **II.** (15*s.*)—A. G. PITTS, The Firs, Highbridge, Som. Apr. 1892.
497 **III.** (10*s.*)—A. LEWIS, Cornhill, Bridgwater.
496 **R. N. & H. C.**—J. H. KNOWLES-MORGAN. Over 1 year.
H. C.—R. BUTTERFIELD, for No. 491; J. LEWIS, for No. 498; A. G. PITTS, for No. 500; H. R. WILLETT, for No. 505.

Class 252.—*Minorca Cockerels.* [10 entries, 2 absent.]

509 **I.** (30*s.*)—J. H. KNOWLES-MORGAN, Carter's Green, W. Bromwich. Jan. 4.
507 **II.** (15*s.*)—J. W. CROSSMAN, Holly Bank, Nafferton, Hull. Jan. 2.
510 **III.** (10*s.*)—A. LEWIS, Cornhill, Bridgwater. Jan. 28.
514 **R. N.**—JOHN TAYLOR, Lees Farm, Malpas. Feb. 14.

Class 253.—*Minorca Pullets.* [9 entries, 3 absent.]

520 **I.** (30*s.*)—J. H. KNOWLES-MORGAN, Carter's Green, W. Bromwich. Jan. 4.
517 **II.** (15*s.*)—J. W. CROSSMAN, Holly Bank, Nafferton, Hull. Jan. 2.
516 **III.** (10*s.*)—ABBOT BROS., Hingham, Norfolk.
522 **R. N.**—EDWARD NELSON, Warham, Wells, Norfolk. Jan.

Andalusians.

Class 254.—*Andalusian Cocks.* [8 entries, 1 absent.]

531 **I.** (30*s.*)—ROBERT KEEN, Rothbury, Northumberland. Apr. 19, 1892.
532 **II.** (15*s.*)—THOMAS PATERSON, Grey Stone, Carlisle. Apr. 1892.
527 **III.** (10*s.*) & 528 **R. N. & H. C.**—D. BUTTERFIELD, 3 Laythorpe Ter. E. Morton, Bingley. 2 yrs. old & 13 months.

Class 255.—*Andalusian Hens.* [10 entries, none absent.]

539 **I.** (30*s.*)—W. F. LE BOUTILLIER, St. Helier's, Jersey. 1890.
540 **II.** (15*s.*)—G. S. OLDHAM, Sherrington, Newport Pagnell, Bucks.
535 **III.** (10*s.*)—D. BUTTERFIELD, 3 Laythorpe Ter., E. Morton, Bingley. 3 yrs.
538 **R. N. & H. C.**—W. F. LE BOUTILLIER, St. Helier's, Jersey. 1890.
H. C.—REV. E. R. O. BRIDGEMAN, for No. 534; Y. J. FIELDEN, for No. 537.

Class 256.—*Andalusian Cockerels.* [6 entries, 2 absent.]

548 **I.** (30*s.*)—REV. J. H. B. WOLLOCOMBE, Lamerton Vicarage, Tavistock. Jan.
547 **II.** (15*s.*)—REV. J. H. B. WOLLOCOMBE, Lamerton Vicarage. Jan.
544 **III.** (10*s.*)—D. BUTTERFIELD, 3 Laythorpe Ter., E. Morton, Bingley. Jan. 2.
546 **R. N.**—J. H. HAWORTH, Love Clough, Rawtenstall. Jan. 2.

Class 257.—*Andalusian Pullets.* [6 entries, 1 absent.]

553 **I.** (30*s.*)—DR. G. C. SEARLE, Burton House, Brixham. Feb. 20.
554 **II.** (15*s.*)—REV. J. H. B. WOLLOCOMBE, Lamerton Vicarage. Jan.
550 **III.** (10*s.*) & 551 **R. N.**—DAVID BUTTERFIELD, E. Morton, Bingley.

Leghorns.

Class 258.—*Leghorn Cocks.* [9 entries, 2 absent.]

559 **I.** (30*s.*)—Mrs. A. C. Lister-Kay, Burley Manor, Ringwood, Hants. 1892.
560 **II.** (15*s.*)—H. & A. P. Simpson, 266 Nottingham Road, Ilkeston. 1892.
562 **III.** (10*s.*)—Wade Bros., 58 Kirkgate, Silsden, Yorks.
561 **R. N. & H. C.**—W. H. Smith, Cullingworth, Bradford.
H. C.—James England, for No. 556; Charles Heath, for No. 557.

Class 259.—*Leghorn Hens.* [7 entries, none absent.]

564 **I.** (30*s.*)—John Berry, 40 Aireview Street, Silsden, Yorks.
568 **II.** (15*s.*)—W. H. Smith, Cullingworth, Bradford.
565 **III.** (10*s.*)—Mrs. A. C. Lister-Kay, Burley Manor, Ringwood, Hants. 1892.
570 **R. N. & H. C.**—R. H. Wilmot, The Chase Farm, Ambergate. Mar. 16, 1892.

Class 260.—*Leghorn Cockerels.* [13 entries, 3 absent.]

582 **I.** (30*s.*)—Wm. Smith, 73 Bolton Road, Silsden, Yorks. Jan. 3.
572 **II.** (15*s.*)—R. Butterfield, Nafferton Hall, Driffield. Feb.
573 **III.** (10*s.*)—G. F. Higginson, Granville House, Tenbury. Jan. 4.
583 **R. N. & H. C.**—Watkin Watkins, Shotton Hall, Shrewsbury. Jan. 12.
H. C.—John Berry, for No. 571; C. W. Kellock, Jun., for No. 574; C. Sant, for No. 579; Mrs. Sinkins, for No. 581.

Class 261.—*Leghorn Pullets.* [15 entries, none absent.]

597 **I.** (30*s.*)—Wade Bros., 58 Kirkgate, Silsden. Jan. 10.
589 **II.** (15*s.*)—Mrs. A. C. Lister-Kay, Burley Manor, Ringwood, Hants. Jan.
595 **III.** (10*s.*)—Wm. Smith, 73 Bolton Road, Silsden, Yorks. Jan. 3.
588 **R. N. & H. C.**—Mrs. A. C. Lister-Kay, Burley Manor, Ringwood. Jan.
H. C.—Briggs & Haigh, for No. 584; R. Butterfield, for No. 585.

Hamburghs.

Class 262.—*Hamburgh Cocks, any variety.* [10 entries, 1 absent.]

607 **I.** (30*s.*)—W. H. Smith, Cullingworth, Bradford. 1892.
606 **II.** (15*s.*)—John Ridley, Peakfield Farm, Frosterley, Durham.
605 **III.** (10*s.*)—J. Rawnsley, Langley Farm, Bingley, Yorks.
608 **R. N. & H. C.**—W. H. Smith, Cullingworth, Bradford. 1892.
H. C.—Rev. S. Ashwell, for No. 599; A. Harrowing, for No. 600; C. A. Kemball, for No. 602.

Class 263.—*Hamburgh Hens, any variety.* [10 entries, none absent.]

609 **I.** (30*s.*)—T. C. Heath, Colridge, Staffordshire. 1892.
616 **II.** (15*s.*)—W. H. Smith, Cullingworth, Bradford. 1892.
614 **III.** (10*s.*)—J. Rawnsley, Langley Farm, Bingley, Yorks.
617 **R. N. & H. C.**—W. H. Smith, Cullingworth, Bradford. 1892.
H. C.—A. L. Mercer, for No. 613; John Ridley, for No. 615; J. Tyrer, for No. 618.

Class 264.—*Hamburgh Cockerels, any variety.* [7 entries, none absent.]

621 **I.** (30*s.*)—T. C. Heath, Colridge, Staffordshire.
622 **II.** (15*s.*)—M. Jackson, Silsden, Yorks (Gold Pencilled). Feb. 9.
623 **III.** (10*s.*)—C. A. Kemball, Earl's Acre, Plymouth. Jan. 14.
624 **R. N. & H. C.**—W. H. Smith, Cullingworth, Bradford.
H. C.—W. Glossop, for No. 620; W. H. Smith, for No. 625.

Class 265.—*Hamburgh Pullets, any variety.* [5 entries, none absent.]

628 I. (30*s.*)—C. A. KEMBALL, Earl's Acre, Plymouth. Jan. 6.
626 II. (15*s.*)—T. B. BURNETT, The Grange, Freshfield, Liverpool (Silver Spangled). Jan. 20.
629 III. (10*s.*)—W. H. SMITH, Cullingworth, Bradford.
627 R. N.—W. GLOSSOP, Ambergate, Derby (Silver Spangled). Jan. 1.

Any Other Recognized Breed.[1]

Class 266.—*Cocks.* [10 entries, none absent.]

636 I. (30*s.*)—J. PARTINGTON, Malkins Wood, Boothstown, Manchester (Polish). 1 year.
633 II. (15*s.*)—JOHN FRAYN, St. Stephen's, Launceston (Malay). 1892.
639 III. (10*s.*)—MRS. RICKETTS, Knighton Vicarage, Radnorshire (Yokohama). 1891.
638 R. N. & H. C.—J. RAWNSLEY, Langley Farm, Bingley, Yorks (Polish).
H. C.—W. COOK, for No. 632; JOHN HILL, for No. 634; L. PILKINGTON, for No. 637; JOHN RIDLEY, for No. 640.

Class 267.—*Hens.* [11 entries, 2 absent.]

646 I. (30*s.*)—J. PARTINGTON, Malkins Wood, Boothstown, Manchester (Polish). 2 years.
649 II. (15*s.*)—J. RAWNSLEY, Langley Farm, Bingley, Yorks (Polish).
651 III. (10*s.*)—JOHN RIDLEY, Peakfield Farm, Frosterley, Durham (Polish).
650 R. N. & H. C.—MRS. RICKETTS (Yokohama). Apr. 1892.
H. C.—W. COOK, for No. 643; J. PARTINGTON, for No. 647; L. PILKINGTON, for No. 648.

Class 268.—*Cockerels.* [5 entries, none absent.]

656 I. (30*s.*)—J. RAWNSLEY, Langley Farm, Bingley, Yorks (Polish).
655 II. (15*s.*)—S. H. HYDE, Kempton Park, Sunbury-on-Thames (Spanish). Jan. 5.
653 III. (10*s.*)—F. HARVEY, North St., Lostwithiel (Spanish). Jan. 14.

Class 269.—*Pullets.* [5 entries, 1 absent.]

660 I. (30*s.*)—S. H. HYDE, Kempton Park, Sunbury-on-Thames (Spanish). Jan. 5
659 II. (15*s.*)—R. HAWKINS, Seaham, Seaham Harbour (Malay). Feb. 10.
657 III. (10*s.*)—W. COOK, Orpington House, St. Mary Cray (Orpington) Jan. 11.

Table Fowls.

Class 270.—*Pair of Cockerels of* 1893, *of any Pure Breed.* [6 entries, 2 absent.]

667 I. (30*s.*)—LADY WILSON, Chillingham Barns, Belford (Dorking). Jan.
662 II. (15*s.*)—WM. BRENT, Clampit Farm, Callington (Indian Game).
665 R. N.—HERBERT REEVES, Emsworth, Hants (Dorking). Jan.

Class 271.—*Pair of Pullets of* 1893, *of any Pure Breed.* [7 entries, none absent.]

674 I. (30*s.*)—LADY WILSON, Chillingham Barns, Belford (Dorking). Jan. 11
671 II. (15*s.*)—JAMES FRAYNE, Pipers Pool, Launceston (Indian Game). Jan.
672 III. (10*s.*)—HERBERT REEVES, Emsworth, Hants (Dorking). Jan.
668 R. N.—J. W. ADLINGTON, Kirk Langley, Derby (Black Plymouth Rock). Feb. 28.

[1] Bantams excepted.

Class 272.—*Pair of Cockerels of* 1893, *of a First Cross from any Pure Breeds.* [16 entries, 5 absent.]

690 **I.** (30*s.*)—Lady Wilson, Chillingham Barns, Belford (Indian Game & Dorking). Feb. 6.
676 **II.** (15*s.*)—R. Arthur, Torbryan Rectory, Newton Abbot (Indian Game & Langshan). Jan. 28.
689 **III.** (10*s.*)—Lady Wilson, Chillingham Barns, Belford (Indian Game & Dorking). Feb. 6.
675 **R. N. & H. C.**—Hon. Florence Amherst (Indian Game & Dorking). Mar.
H. C.—Miss M. Dolben, for No. 680; Wm. Hambly, for No. 684; James Lloyd, for No. 686.

Class 273.—*Pair of Pullets of* 1893, *of a First Cross from any Pure Breeds.* [13 entries, 1 absent.]

699 **I.** (30*s.*)—Wm. Hambly, Cutlinwith, St. Germans (Dorking & Wyandotte). Jan. 10.
703 **II.** (15*s.*)—Lady Wilson, Chillingham Barns, Belford (Indian Game & Dorking). Feb. 6.
691 **III.** (10*s.*)—J. W. Adlington, Kirk Langley, Derby (Plymouth Rock & Langshan). Mar. 2.
693 **R. N. & H. C.**—R. Arthur, Newton Abbot (Indian Game & Langshan). Jan. 28.
H. C.—Hon. Florence Amherst, for No. 692; Master W. Berry, for No. 694; P. B. Govett, for No. 698; James Lloyd, for No. 700.

DUCKS.

Aylesbury.

Class 274.—*Aylesbury Drakes.* [3 entries.]

704 **I.** (30*s.*)—J. Rawnsley, Langley Farm, Bingley, Yorks.
705 **II.** (15*s.*)—Wm. Weston, 31 Mount Street, Aylesbury.
706 **III.** (10*s.*)—H. R. Willett, Whitchurch, Bristol. Over 1 year.

Class 275.—*Aylesbury Ducks.* [4 entries.]

707 **I.** (30*s.*)—J. Rawnsley, Langley Farm, Bingley, Yorks.
710 **II.** (15*s.*) & 709 **III.** (10*s.*)—H. R. Willett, Whitchurch, Bristol. Over 1 yr.
708 **R. N.**—Wm. Weston, 31 Mount Strect, Aylesbury.

Class 276.—*Aylesbury Young Drakes.* [10 entries, none absent.]

716 **I.** (30*s.*)—H. Rodwell, 22 California, Aylesbury. 3 months.
719 **II.** (15*s.*)—Wm. Weston, 31 Mount Street, Aylesbury.
711 **III.** (10*s.*)—Edward Barnes, Fern Bank, Godalming. March.
720 **R. N. & H. C.**—H. R. Willett, Whitchurch, Bristol. 2 months.
712 **H. C.**—J. D. Goy. 714 **Com.**—H. Hicks.

Class 277.—*Aylesbury Ducklings.* [9 entries, none absent.]

721 **I.** (30*s.*)—E. Barnes, Fern Bank, Godalming. Mar.
723 **II.** (15*s.*)—A. Harrowing, Larpool Hall, Whitby. Jan. 23.
724 **III.** (10*s.*)—H. Hicks, South Street, Bedminster, Bristol. Mar. 24.
729 **R. N. & H. C.**—H. R. Willett, Whitchurch, Bristol. 2 months.
728 **H. C.**—Wm. Weston. 722 **Com.**—J. D. Goy.

Rouen.

Class 278.—*Rouen Drakes.* [9 entries, none absent.]

734 **I.** (30*s.*)—J. Partington, Malkins Wood, Boothstown, Manchester. 1 yr.

733 **II.** (15*s.*)—J. PARTINGTON, Malkins Wood, Boothstown, Manchester. 1 yr
737 **III.** (10*s.*)—T. WAKEFIELD, Lowton, Newton-le-Willows. 2 years old.
736 **R. N. & H. C.**—R. J. SERGEANT, Thornton Abbey, Ulceby. 2 years old.

Class 279.—*Rouen Ducks.* [7 entries, none absent.]

742 **I.** (30*s.*)—J. PARTINGTON, Malkins Wood, Boothstown, Manchester. 1 yr.
741 **II.** (15*s.*)—J. PARTINGTON, Malkins Wood, Boothstown, Manchester. 2 yrs.
739 **III.** (10*s.*)—W. BYGOTT, JUN., Rye Hill House, Ulceby. May 1890.
740 **R. N.**—F. P. ELLIS, Windhill Lodge, Bishop's Stortford. Over 1 year.
744 **Com.**—H. R. WILLETT, Whitchurch, Bristol. Over 1 year.

Class 280.—*Rouen Young Drakes.* [4 entries, none absent.]

746 **I.** (30*s.*)—HON. SYBIL AMHERST, Didlington Hall, Brandon, Norfolk.
749 **II.** (15*s.*)—DAVID GARTON, Golborne, Newton-le-Willows. Apr. 1.
748 **III.** (10*s.*)—W. BYGOTT, JUN., Rye Hill House, Ulceby. Jan. 10.
747 **R. N.**—W. BYGOTT, JUN., Rye Hill House, Ulceby. Jan. 5.

Class 281.—*Rouen Ducklings.* [4 entries.]

750 **I.** (30*s.*)—HON. SYBIL AMHERST, Didlington Hall, Brandon, Norfolk.
752 **II.** (15*s.*)—W. BYGOTT, JUN., Rye Hill House, Ulceby. Jan. 20.
751 **III.** (10*s.*)—W. BYGOTT, JUN., Rye Hill House, Ulceby. Jan. 5.
753 **R. N.**—DAVID GARTON, Goltorne, Newton-le-Willows. Apr. 1.

Pekin.

Class 282.—*Pekin Drakes.* [7 entries, none absent.]

759 **I.** (30*s.*)—H. R. WILLETT, Whitchurch, Bristol. Over 1 year.
757 **II.** (15*s.*)—EDWARD SHAW, Plâs Wilmot, Oswestry. Apr. 1892.
754 **III.** (10*s.* & 755 **R. N.**)—THOMAS ALLEN, Crookwood Farm, Devizes. 1891.

Class 283.—*Pekin Ducks.* [5 entries, none absent.]

762 **I.** (30*s.*)—HERBERT GRIFFITHS, "The Rake," Hawarden, Chester.
765 **II.** (15*s.*)—JOHN V. WILLIAMSON, Derwen Hall, Corwen. Over 1 year.
761 **III.** (10*s.*)—THOMAS ALLEN, Crookwood Farm, Devizes. 1891.
763 **R. N.**—H. R. WILLETT, Whitchurch, Bristol. Over 1 year.

Class 284.—*Pekin Young Drakes.* [4 entries, 1 absent.]

767 **I.** (30*s.*)—THOMAS F. HORSLEY, South Grove, Highgate, N. Mar. 28.
766 **II.** (15*s.*)—HON. SYBIL AMHERST, Didlington Hall, Brandon, Norfolk.
769 **III.** (10*s.*)—A. G. PHILLIPS, The Rosery, Long Ashton, Bristol. March.

Class 285.—*Pekin Ducklings.* [3 entries, 1 absent.]

770 **I.** (30*s.*)—HON. SYBIL AMHERST, Didlington Hall, Brandon, Norfolk.
772 **II.** (15*s.*)—A. G. PHILLIPS, The Rosery, Long Ashton, Bristol. March.

Any Other Useful Breed.

Class 286.—*Drakes.* [3 entries.]

775 **I.** (30*s.*) & 774 **II.** (15*s.*)—LADY WILSON, Chillingham Barns, Belford (Cayuga). 1892.

773 **III.** (10*s.*)—HON. SYBIL AMHERST, Didlington Hall, Brandon, Norfol (Cayuga). 1892.

Class 287.—*Ducks.* [1 entry.]

776 1. (30*s.*)—Lady Wilson, Chillingham Barns, Belford (Cayuga). 1892.

Class 288.—*Young Drakes.* [3 entries.]

779 **I.** (30*s.*)—Lady Wilson, Chillingham Barns, Belford (Cayuga).
777 **II.** (15*s.*)—Hon. Sybil Amherst, Didlington Hall, Norfolk (Cayuga).
778 **III.** (10*s.*)—Wm. Parker, Gt. Stanney Hall, Sutton, Chester (Indian Runner). Apr. 11.

Class 289.—*Ducklings.* [3 entries.]

782 **I.** (30*s.*)—Lady Wilson, Chillingham Barns, Belford (Cayuga).
780 **II.** (15*s.*)—Hon. Sybil Amherst, Didlington Hall, Norfolk (Cayuga).
781 **III.** (10*s.*)—Wm. Parker, Gt. Stanney Hall, Sutton, Chester (Indian Runner). Apr. 11.

Table Ducklings.

Class 290.—*Pair of Ducklings of* 1893, *of any Pure Breed.* [8 entries, none absent.]

784 **I.** (30*s.*)—Herbert Griffiths, "The Rake," Hawarden, Chester (Aylesbury). Apr. 18.
787 **II.** (15*s.*)—Harry Rodwell, 22 California, Aylesbury (Aylesbury) 8 weeks old.
790 **III.** (10*s.*)—H. G. Weston, Mount Street, Aylesbury, Bucks (Aylesbury).
783 **R. N. & H. C.**—Edward Barnes, Fern Bank, Godalming (Aylesbury). Apr.
789 **H. C.**—H. G. Weston (Aylesbury).

Class 291.—*Pair of Ducklings of* 1893, *of a First Cross from any Pure Breeds.* [8 entries, 1 absent.]

794 **I.** (30*s.*)—Herbert Griffiths, "The Rake," Hawarden, Chester (Aylesbury & Pekin). Apr. 18.
798 **II.** (15*s.*)—H. G. Weston, Mount Street, Aylesbury (Aylesbury & Pekin).
793 **III.** (10*s.*)—H. T. Goodenough, 1 Belgrave Villas, Slough (Aylesbury & Pekin). Apr. 16.
792 **R. N.**—Mrs. Birch, The Vicarage, Kirk Hammerton, York (Aylesbury & Pekin). Apr. 11.

Geese.

Class 292.—*Ganders.* [10 entries, 1 absent.]

802 **I.** (£2.)—John Kerr, Red Hall, Wigton (Toulouse).
806 **II.** (£1.)—R. J. Sergeant, Thornton Abbey, Ulceby Junction (Embden). 2 years old.
808 **III.** (10*s.*)—H. R. Wilkinson, Turley Castle, Market Drayton (Embden). 5 years old.
800 **R. N. & H. C.**—E. H. Cruttenden (Chinese). Apr. 1892.
H. C.—Miss F. Mitford, for No. 803; Mrs. H. Pickworth, for No. 804.
805 **Com.**—C. W. Preston.

Class 293.—*Geese.* [6 entries, 1 absent.]

811 **I.** (£2.)—John Kerr, Red Hall, Wigton (Toulouse).
813 **II.** (£1.)—C. W. Preston, Llwyn Ynn Hall, Ruthin (Embden). Apr. 15, 1892.
814 **III.** (10*s.*)—Edward Shaw, Plâs Wilmot, Oswestry (Toulouse). Apr. 1891.
809 **R. N.**—Hon. Sybil Amherst, Didlington Hall, Norfolk (Embden).
810 **Com.**—E. H. Cruttenden, Borras Farm, Gresford, Denbigh (Chinese).

Turkeys.

Class 294.—*Turkey Cocks.* [12 entries, none absent.]

815 **I.** (£2.)—Abbot Bros., Hingham, Norfolk. 1892.

820 **II.** (£1.)—E. KENDRICK, Weeford House, Lichfield (Bronze). 1891.
824 **III.** (10*s.*)—MRS. WILLIAMS, Hawkestone Hotel, Shrewsbury (Canadian Bronze). Over 1 year.
826 **R. N. & H. C.**—LADY WILSON, Chillingham Barns (Mammoth Bronze).
H. C.—HON. SYBIL AMHERST, for No. 816; H. T. GOODENOUGH, for No. 819; J. V. WILLIAMSON, for No. 825.
823 **Com.**—J. THONGER.

Class 295.—*Turkey Hens.* [10 entries, 1 absent.]

827 **I.** (£2.)—ABBOT BROS., Hingham, Norfolk. 1892.
831 **II.** (£1.)—EDWARD KENDRICK, Weeford House, Lichfield (Bronze). Over 1 year.
835 **III.** (10*s.*) & 836 **R. N. & H. C.**—LADY WILSON, Chillingham Barns, Belford (Mammoth Bronze). 1891.
H. C.—HON. SYBIL AMHERST, for No. 828; J. THONGER, for No. 833; W. WILLIS-HARRIS, for No. 834.
830 **Com.**—H. T. GOODENOUGH.

FARM AND DAIRY PRODUCE OF THE UNITED KINGDOM.

Cheshire Cheese.[1]

Class 296.—*Three Cheshire Cheeses (coloured or uncoloured), of not less than 60lb. each, made in* 1892.[1] [62 entries.]

31 **I.** (£25, & **Champion** £100.[2])—THOMAS HOULBROOKE, Calveley Farm, Tarporley.
31 **Maker's Prize** (£3,[3] & **Champion** £10.[3])—MRS. HOULBROOKE, Calveley Farm, Tarporley.
46 **II.** (£15.)—RICHARD MULLOCK, Guy Lane Farm, Waverton, Chester.
57 **III.** (£10.)—CHARLES F. SIMPSON, Tiverton Hall, Tarporley.
32 **IV.** (£5.)—WM. HOULBROOKE, Brooklands, Wettenhall, Winsford.
30 **R. N. & H. C.**—SAMUEL HOLLAND, Woodhey Hall, Nantwich.
H. C.—JOHN MINSHALL, for No. 43; MRS. MULLOCK, for No. 45; R. PICKERING, for No. 50; T. SHAW, for No. 54; H. SIDDORN, for No. 56; MRS. WILLIAMSON, for No. 62.
Com.—E. CHEERS, for No. 15; E. GOULDBOURN, for No. 27; JOHN JONES, for No. 36; WM. LEE, for No. 41; JOHN LLOYD, for No. 42; JOHN STOKES, for No. 58.

Class 297.—*Three Cheshire Cheeses (coloured or uncoloured), of not less than 30lb. and under 60lb. each, made in* 1892.[1] [46 entries.]

85 **I.** (£25, & **R. N. for Champion.**[2])—THOMAS HOULBROOKE, Calveley Farm, Tarporley.
86 **II.** (£15.)—WM. HOULBROOKE, Brooklands, Wettenhall, Winsford.
101 **III.** (£10.)—CHARLES F. SIMPSON, Tiverton Hall, Tarporley.
78 **IV.** (£5.)—HUGH R. DUTTON, Spurstow Lower Hall, Tarporley.
104 **R. N. & H. C.**—HUGH S. WALLEY, Bickerton Hall, Malpas.
H. C.—JOHN HARTSHORN, for No. 84; W. J. MACKENZIE, for No. 92; WM. PARKER, for No. 99; JOB PEPLER, for No. 100; MRS. R. WILLETT, for No. 105; J. WRIGHT, for No. 108.

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[1] Prizes given by the Chester Local Committee.
[2] Given by the Chester Local Committee for the best Three Cheshire Cheeses exhibited.
[3] A Prize of £3 was given by the Chester Local Committee to the maker of the First Prize Cheeses in each of the Cheshire Cheese Classes, as well as a prize of £10 to the maker of the Champion Cheeses. No maker was, however, eligible for more than one Class Prize.

Com.—J. BOUGHEY, for No. 65; G. DENSON, for No. 75; W. J. DUTTON, for No. 82; WM. MOORE, for No. 93; G. MOSFORD, for No. 94; R. MULLOCK, for No. 97.

Class 298.—*Three Coloured Cheshire Cheeses, of not less than* 60*lb. each, made in* 1893.[1] [91 entries.]

149 **I.** (£25.)—THOMAS HOULBROOKE, Calveley Farm, Tarporley.
114 **II.** (£15.)—JOSEPH ANKERS, Cholmondeley, Whitchurch, Salop.
171 **III.** (£10.)—JOHN MULLOCK, The Pits Farm, Malpas.
152 **IV.** (£5.)—JOHN JACKSON, Chowley Oak Farm, Handley, Chester.
181 **R. N. & H. C.**—THOMAS PRINCE, Prince's Farm, Tattenhall, Chester.
H. C.—T. BRERETON, for No. 121; JOHN DUTTON, for No. 137; R. FEARNALL, for No. 142; T. GREENWAY, for No. 144; VISCOUNT HILL, for No. 147; S. JONES, for No. 159.
Com.—J. ALLWOOD, for No. 110; B. DUTTON, for No. 135; WM. PARKER, for No. 178; WM. PYM, for No. 182; JOHN STOKES, for No. 189; HENRY WILLIS, for No. 199.

Class 299.—*Three Coloured Cheshire Cheeses, of not less than* 40*lb. each, and under* 60*lb., made in* 1893.[1] [67 entries.]

239 **I.** (£25.)—THOMAS HOULBROOKE, Calveley Farm, Tarporley.
257 **II.** (£15.)—GEORGE PLATT, Oak Tree Farm, Eaton, Tarporley.
238 **III.** (£10.)—VISCOUNT HILL, Hawkstone, Shrewsbury.
221 **IV.** (£5.)—RICHARD COOPER, Ridley Hill, Tarporley.
243 **R. N. & H. C.**—JOHN JONES, The Wychough, Malpas.
H. C.—JOSEPH ANKERS, for No. 201; WM. COOKSON, for No. 219; A. DAVIES, for No. 224; H. R. DUTTON, for No. 227; H. LEA, for No. 245; MISS JANE SHEEN, for No. 260.
Com.—T. BRERETON, for No. 208; S. CHARLESWORTH, for No. 216; E. CHEERS, for No. 217; B. DUTTON, for No. 226; R. FEARNALL, for No. 233; H. WILLIS, for No. 266.

Class 300.—*Three Coloured Cheshire Cheeses, of under* 40*lb. each, made in* 1893.[1] [35 entries.]

268 **I.** (£20.)—JOSEPH ANKERS, Cholmondeley, Whitchurch, Salop.
268 **Maker's Prize** (£3.)—MRS. ANKERS, Cholmondeley, Whitchurch, Salop.
284 **II.** (£10.)—THOMAS HOULBROOKE, Calveley Farm, Tarporley.
300 **III.** (£5.)—MRS. E. WILLIAMSON & SON, Wallstone Farm, Chorley, Nantwich.
277 **IV.** (£3.)—RICHARD COOPER, Ridley Hill, Tarporley.
285 **R. N. & H. C.**—JAMES HULME, Kenwick Lodge, Ellesmere, Salop.
H. C.—T. GREENWAY, for No. 282; WM. PYM, for No. 295; SYLFAEN DAIRY SCHOOL, for No. 298; WM. TOFT, for No. 299; H. WILLIS, for No. 301.
Com.—I. A. BROWN, for No. 271; WM. COOKSON, for No. 275; H. E. COOPER, for No. 276; R. DUTTON, for No. 279.

Class 301.—*Three Uncoloured Cheshire Cheeses, of not less than* 50*lb. each, made in* 1893.[1] [86 entries.]

359 **I.** (£25.)—GEORGE MOSFORD, Tattenhall, Chester.
359 **Maker's Prize** (£3.)—ALICE MOSFORD, Tattenhall, Chester.
387 **II.** (£15.)—HENRY WILLIS, Ridley Farm, Tarporley.
312 **III.** (£10.)—THOMAS BOOTH, Hargrave Hall, Chester.
337 **IV.** (£5.)—PETER DUTTON, Hodfield Hall, Huxley, Chester.
360 **R. N. & H. C.**—MRS. MARY MULLOCK, Poulton, Wrexham.
H. C.—T. H. CALDECOTT, for No. 316; J. CALLWOOD, for No. 317;

[1] Prizes given by the Chester Local Committee.

T. GREENWAY, for No. 347; MRS. NUNNERLEY, for No. 363; WM. PARKER, for No. 364.
Com.—I. A. BROWN, for No. 315; SYLFAEN DAIRY SCHOOL, for No. 382; R. D. WALLEY, for No. 384.

Class 302.—*Three Uncoloured Cheshire Cheeses, under* 50*lb. each, made in* 1893.[1] [53 entries.]

440 **I.** (£25.)—HENRY WILLIS, Ridley Farm, Tarporley.
440 **Maker's Prize** (£3.)—EDGAR WILLIS, Ridley Farm, Tarporley.
406 **II.** (£15.)—JOHN DUTTON, Swanley Hall, Nantwich.
423 **III.** (£10.)—MRS. MARY MULLOCK, Poulton, Wrexham.
411 **IV.** (£5.)—R. FEARNALL, Lea Hall, Aldford, Chester.
418 **R. N. & H. C.**—THOMAS HOULBROOKE, Calveley Farm, Tarporley.
H. C.—H. DODD, for No. 402; P. DUTTON, for No. 407; J. GERRARD, for No. 414; G. MOSFORD, for No. 421; W. SADLER, for No. 432; MISS JANE SHEEN, for No. 434; T. T. WALLEY, for No. 439.
Com.—H. E. COOPER, for No. 399; JOHN GILLETT, for No. 415; JOHN HOBSON, for No. 417; J. NICHOLAS, for No. 425; T. NUNNERLEY, for No. 426; T. SADLER, for No. 431; J. SUMNER, for No. 435.

Class 303.—*Three Uncoloured Cheshire Cheeses, under* 40*lb. each, made in* 1893.[1] [33 entries.]

472 **I.** (£20.)—HENRY WILLIS, Ridley Farm, Tarporley.
470 **II.** (£10.)—SYLFAEN DAIRY SCHOOL, Welshpool.
461 **III.** (£5.)—JOHN LEA, Moss Farm, Harthill, Tattenhall, Chester.
447 **IV.** (£3.)—T. CHARLESWORTH, Baddington, Nantwich.
456 **R. N. & H. C.**—THOMAS GREENWAY, Burton Farm, Tarporley.
H. C.—R. D. ALLWOOD, for No. 441; I. A. BROWN, for No. 443; C. W. FRANCIS, for No. 454; MRS. M. RUTTER, for No. 466; J. SUMNER, for No. 469.
Com.—S. CHARLESWORTH, for No. 446; R. COOPER, for No. 449; T. DUTTON, for No. 452; J. JACKSON, for No. 458; A. O. LAKIN, for No. 460; E. WOODWARD, for No. 473.

Cheddar Cheese.

Class 304.—*Three Cheddar Cheeses, of not less than* 50*lb. each, made in* 1892. [8 entries.]

476 **I.** (£10.)—T. C. CANDY, Woolcombe, Cattistock, Dorset.
480 **II.** (£5.)—S. J. MARTIN, Waddon Farm, Lamyatt, Evercreech, Bath.
479 **III.** (£3.)—JOHN HILLARD, Church Farm, Charlton Musgrove, Wincanton.
481 **R. N. & H. C.**—N. J. SIMS, Mitford, Shipston-on-Stour.
475 **H. C.**—BLACKMORE VALE DAIRY CO., LTD., Lydlinch, Blandford.
477 **Com.**—HENRY CANNON, Mitton, Clevedon, Evercreech, Bath.

Class 305.—*Three Cheddar Cheeses, of not less than* 50*lb. each, made in* 1893. [12 entries.]

492 **I.** (£10.)—N. J. SIMS, Mitford, Shipston-on-Stour.
484 **II.** (£5.)—T. C. CANDY, Woolcombe, Cattistock, Dorset.
488 **III.** (£3.)—H. FRANCIS, Malkin Hill Farm, Horsington, Bath.
482 **R. N. & H. C.**—BLACKMORE VALE DAIRY CO., LTD., Lydlinch, Blandford.
Com.—HENRY CANNON, for No. 485; S. J. MARTIN, for No. 490; MRS. W. T. S. TILLEY, for No. 493.

Class 306.—*Three Stilton Cheeses, made in* 1892. [10 entries.]

496 **I.** (£5.)—MRS. CHARLOTTE FAIRBROTHER, Beeby, Leicester.

[1] Prizes given by the Chester Local Committee.

499 **II.** (£3.)—H. MORRIS, Manor Farm, Saxelby, Melton Mowbray.
494 **III.** (£2.)—JOHN BAKER, Willoughby-on-the-Wolds, Loughborough.
502 **R. N. & H. C.**—WILLIAM S. WALPOLE, Twyford, Melton Mowbray.
500 **Com.**—JOHN SMITH, Gaddesby, Leicester.

Class 307.—*Three Stilton Cheeses, made in* 1893. [9 entries.]

509 **I.** (£5.)—H. MORRIS, Manor Farm, Saxelby, Melton Mowbray.
506 **II.** (£3.)—MRS. CHARLOTTE FAIRBROTHER, Beeby, Leicester.
511 **III.** (£2.)—JOHN H. WALE, Burton Bandalls, Loughborough.
508 **R. N. & H. C.**—ANDREW W. HURST, Hungarton, Leicester.

Other Varieties of Cheese.

Class 308.—*Three Double Gloucester Cheeses, made in* 1893. [7 entries.]

517 **I.** (£5.)—JOHN HILLARD, Church Farm, Charlton Musgrove, Wincanton.
513 **II.** (£3.)—BLACKMORE VALE DAIRY CO., LTD., Lydlinch, Blandford.
516 **III.** (£2.)—WILLIAM GILMAN, Cheese Factory, Rocester, Staffs.
518 **R. N. & H. C.**—MRS. W. T. S. TILLEY, North Wootton, Shepton Mallet.
519 **Com.**—WM. VAUGHAN, Doublegates Farm, Bushley, Tewkesbury.

Class 309.—*Three Leicester Cheeses, made in* 1893. [4 entries.]

521 **I.** (£5.)—HENRY GOODALL, Gunby Farm, Ashby-de-la-Zouch.
522 **II.** (£3.)—JOHN HARRISON, Pailton, Rugby,
523 **III.** (£2.)—T. VARNAM, Rectory Farm, Appleby, Atherstone.

Class 310.—*Three North Wilts Loaf Cheeses, made in* 1893. [4 entries.]

524 **I.** (£5.)—BLACKMORE VALE DAIRY CO., LTD., Lydlinch, Blandford.
527 **II.** (£3.)—MRS. W. T. S. TILLEY, North Wootton, Shepton Mallet.
526 **III.** (£2.)—CHARD BUTTER & CHEESE FACTORY, Chard, Som.

Class 311.—*Three Lancashire Toasting Cheeses, made in* 1893. [4 entries.]

529 **I.** (£5.)—JOHN GILLETT, Moss House, Gt. Plumpton, Kirkham, Lancs.
530 **II.** (£3.)—MATTHEW KIRKHAM, Ballam, Lytham, Lancs.
528 **III.** (£2.)—JOHN CROOK, Poplar Grove, Kirkham, Lancs.

Class 312.—*Three Cheeses, not eligible for any of the previous Classes, made in* 1893. [14 entries.]

540 **I.** (£5.)—H. FRANCIS, Malkin Hill Farm, Horsington, Bath. (Loaf Cheddar.)
537 **II.** (£3.)—HY. CANNON, Mitton, Clevedon, Evercreech, Bath. (Loaf Cheddar.)
533 **III.** (£2.)—BLACKMORE VALE DAIRY CO., LTD., Lydlinch, Blandford. (Loaf Cheddar.)
545 **R. N. & Com.**—MRS. W. T. S. TILLEY, North Wootton. (Loaf Cheddar.)

Class 313.—*Three Small Cheeses, under 2lb. weight each.* [5 entries.]

549 **II.** (£2.)—C. C. TUDWAY, Walcombe Dairy, Wells, Som.

Soft Cheese.

Class 314.—*Three Cream Cheeses.* [18 entries.]

566 **I.** (£3.)—CHARLES C. TUDWAY, Walcombe Dairy, Wells, Somerset.
558 **II.** (£2.)—HENRY GOODALL, Gunby Farm, Ashby-de-la-Zouch.
554 **III.** (£1.)—E. J. DAVIES, Haywardsend, Stonehouse, Glos.
561 **R. N. & Com.**—MRS. IBBOTSON, The Hawthorns, Knowle, Warwickshire.

Butter.

Class 315.—*Two pounds Fresh Butter, slightly salted, made up in pounds.* [98 entries.]

591 (£5.)—THE COUNTESS OF CRAWFORD, Haigh Hall, Wigan.
614 (£5.)—JOSEPH GROCOTT, Chapel Chorlton, Newcastle, Staffs.
633 (£5.)—MRS. T. H. MILLER, Singleton Park, Poulton-le-Fylde, Lancs.
646 (£5.)—LORD ROTHSCHILD, Tring Park, Tring.
584 (£3.)—CHARD BUTTER FACTORY, Chard, Som.
593 (£3.)—LT.-COL. JOHN F. CURTIS-HAYWARD, Quedgeley, Gloucester.
609 (£3.)—MRS. ELIZABETH FRANCE, Spurstow, Bunbury, Tarporley.
616 (£3.)—JOSEPH HANSON, Botham Hall Farm, Huddersfield.
596 (£1.)—MRS. ARTHUR DEANE, Minster House, Winchester.
598 (£1.)—GEORGE DODGE, Moat House, Steeple Claydon, Winslow.
650 (£1.)—HENRY SHEPHERD, Redhill, Wrington, Som.
659 (£1.)—EDWARD WADHAM, Millwood, Dalton-in-Furness.
661 **R. N. & H. C.**—DR. HERBERT WATNEY, Buckhold, Pangbourne.
649 **Com.**—A. H. SAVORY, Aldington Manor, Evesham.

Class 315a.—*Two pounds Fresh Butter, slightly salted, made from Milk drawn from Cows other than Channel Islands, or Cows crossed with the Channel Islands Breeds.*[1] [95 entries.]

703 (£5.)—TOM EMERY, Elm Tree Farm, Portbury, Bristol.
711 (£5.)—JOSEPH GROCOTT, Chapel Chorlton, Newcastle, Staffs.
712 (£5.)—R. W. HANBURY, M.P., Castern Hall Farm, Ashbourne.
731 (£5.)—MRS. T. H. MILLER, Singleton Park, Poulton-le-Fylde, Lancs.
713 (£3.)—JOSEPH HANSON, Botham Hall Farm, Huddersfield.
714 (£3.)—ROBERT HEATH, Woodhouse Farm, Biddulph, Congleton.
757 (£3.)—JOHN WILLIAMS, Regilbury Park, Winford, Bristol.
758 (£3.)—MICHAEL J. WILLIAMS, North Hill Farm, Chew Stoke, Bristol.
686 (£1.)—CHARD BUTTER FACTORY, Chard.
690 (£1.)—EDWIN COOKSON, Poulton, Wrexham.
716 (£1.)—MRS. ROBERT IBBOTSON, The Hawthorns, Knowle, Warwickshire.
737 (£1.)—HARRIET PICKERING, Old Hall Farm, Poulton, Wrexham.
734 **R. N. & H. C.**—MRS. MARY MULLOCK, Poulton, Wrexham.
Com.—J. MARSHALL DUGDALE, for No. 698; R. LEWIS, for No. 725.

Class 316.—*One Keg or other Package of Salt Butter, not less than 14lb. and under 40lb. in weight.* [25 entries.]

770 **I.** (£5.)—EDWIN COOKSON, Poulton, Wrexham.
762 **II.** (£3.)—LT.-COL. WM. J. ALEXANDER, Acton House, Poyntz-Pass, Newry.
782 **III.** (£2.)—MRS. JOB PEPLER, Aldersey, Chester.
765 **R. N. & H. C.**—JAMES BLYTH, Wood House, Stansted, Essex.
766 **Com.**—H. W. BUDDICOM, Penbedw Hall, Mold.

Class 317.—*One Keg or other Package of Salt Butter, not less than 40lb. in weight.* [7 entries.]

790 **I.** (£5.)—G. C. CORNER, Murkey Hill, Middleton Tyas, Richmond, Yorks.
792 **II.** (£3.)—MRS. T. FAULKNER, Norbury, Whitchurch, Salop.
791 **III.** (£2.)—MRS. CATHERINE DAVIES, Pontfaen Farm, Rhuddlan, Flints.

[1] Prizes given by the Chester Local Committee.

CIDER AND PERRY.

Class 318.—*Cask of not less than* 18, *and not more than* 30, *gallons of Cider, made in the Autumn of* 1892. [7 entries.]

794 **I.** (£5.)—W. HENRY BATTING, St. Cyres, Exeter.
798 **II.** (£3.)—HENRY THOMSON, Southends, Newent, Gloucestershire.
797 **III.** (£2.)—THOMAS LANGFORD, Rudford, Gloucester.
796 **R. N. & Com.**—W. GAYMER & SON, Banham, Attleborough, Norfolk.

Class 319.—*One Dozen Bottles of Cider, made in the Autumn of* 1892. [7 entries.]

807 **I.** (£5.)—JOHN H. WOOTTON, Byford, Hereford.
801 **II.** (£3.)—W. HENRY BATTING, St. Cyres, Exeter.
806 **III.** (£2.)—JOHN H. WOOTTON, Byford, Hereford.
804 **R. N.**—HENRY THOMSON, Southends, Newent, Gloucestershire.

Class 320.—*One Dozen Bottles of Cider, made in any year before* 1892. [6 entries.]

811 **I.** (£5.)—HENRY THOMSON, Southends, Newent, Glos.
813 **II.** (£3.)—JOHN H. WOOTTON, Byford, Hereford.
810 **III.** (£2.)—THOMAS LANGFORD, Rudford, Gloucester.
812 **R. N. & Com.**—JOHN C. WATERMAN, Baltonsborough, Bridgwater.

Class 321.—*One Dozen Bottles of Perry.* [4 entries.]

814 **I.** (£5.)—E. BOSLEY & Co., Lyde, Hereford.
815 **II.** (£3.)—THOMAS LANGFORD, Rudford, Gloucester.
817 **III.** (£2) & **R. N.** 816.—HENRY THOMSON, Southends, Newent, Glos.

JAMS AND PRESERVED FRUITS.

Class 322.—*Collection of Whole Fruit Jams.* [5 entries.]

821 **I.** (£3.)—LAMB BROS., Richhill, Armagh.
818 **II.** (£2.)—BRITANNIA FRUIT PRESERVING CO., LTD., Tiptree Heath Jam Works, Kelvedon.
820 **III.** (£1.)—GRANGER'S FRUIT PRESERVING CO., The Vineyards, Ely.
822 **R. N. & Com.**—T. G. TICKLER, Hope Street, Great Grimsby.

Class 323.—*Collection of Bottled Fruits.* [4 entries.]

826 **I.** (£3.)—JOHN WEAVER, Little Heath, Christleton, Chester.
825 **II.** (£2.)—T. G. TICKLER, Hope Street, Great Grimsby.
824 **III.** (£1.)—GRANGER'S FRUIT PRESERVING CO., The Vineyards, Ely.
823 **R. N.**—BRITANNIA FRUIT PRESERVING CO., LTD., Tiptree Heath Jam Works, Kelvedon.

Class 324.—*Collection of Preserved Fruits for Dessert Purposes.* [1 entry.]

827 **I.** (£3.)—BRITANNIA FRUIT PRESERVING CO., LTD., Tiptree Heath Jam Works, Kelvedon.

Class 325.—*Collection of Preserved Peas, French Beans, Tomatoes, and Mushrooms, for Cooking purposes.* [No entry.]

Class 326.—*Collection of Dried or Evaporated Fruits and Vegetables for Cooking purposes.* [No entry.]

Class 327.—*Best Air-tight Receptacle for Jams, Preserved Fruits, Vegetables, &c., suitable for domestic purposes.* [No entry.]

HIVES, HONEY, AND BEE APPLIANCES.[1]

Class 328.—*Collection of Hives and Appliances.* [4 entries.]

830 **I.** (£5.)—W. P. MEADOWS, Syston, Leicester.
828 **II.** (£2 10*s.*)—W. DIXON, 5 Beckett Street, Leeds.
H. C.—GEORGE ROSE, for No. 829; C. T. OVERTON, for No. 831.

Class 329.—*Observatory Hive stocked with Bees and Queen.* [3 entries.]

832 **I.** (£1 10*s.*)—W. DIXON, 5 Beckett Street, Leeds. Price £4.
834 **II.** (£1.)—C. T. OVERTON, Crawley, Sussex. Price £2 5*s.*

Class 330.—*Frame-hive for General Use, unpainted.* [9 entries.]

840 **I.** (£1.)—C. REDSHAW, South Wigston, Leicester. "W. B. C. Hive." Price £1 4*s.*
842 **II.** (15*s.*).—G. NEIGHBOUR & SON, 127 High Holborn, W.C. Price £1 4*s.*
837 **III.** (10*s.*)—W. P. MEADOWS, Syston, near Leicester. Price £1 1*s.*

Class 331.—*Frame-hive for Cottager's Use, unpainted.* [6 entries.]

848 **I.** (£1.)—C. REDSHAW, South Wigston, Leicester. "Birkenhead Heather Hive." Price 10*s.* 6*d.*
847 **II.** (15*s.*)—C. REDSHAW, South Wigston. "Royal Doncaster Hive." Price 12*s.* 6*d.*
849 **III.** (10*s.*) GEO. NEIGHBOUR & SON., 127 High Holborn, W.C. Price 15*s.*
845 **H. C.**—W. P. MEADOWS, Syston, Leicester. Price 12*s.* 6*d.*

Class 332.—*Honey Extractors.* [4 entries.]

850 **I.** (15*s.*)—W. P. MEADOWS, Syston, Leicester. "Raynor Extractor." Price £1 10*s.*
851 **II.** (10*s.*)—W. P. MEADOWS, Syston, Leicester. "New Guinea Extractor." Price £1 1*s.*

Class 333.—*Pair of Section Racks, completely fitted for use and interchangeable.* [6 entries.]

856 (First and Second Prizes equally divided.) **I.** (12*s.* 6*d.*)—C. REDSHAW, South Wigston, Leicester. "W. B. S. Section Boxes." Price 8*s.* 6*d.*
859 (First and Second Prizes equally divided.) **I.** (12*s.* 6*d.*)—GEO. NEIGHBOUR & SON, 127 High Holborn, W.C. Price 8*s.* 6*d.*
854 **III.** (5*s.*)—W. P. MEADOWS, Syston, Leicester. Price 4*s.*
858 **H. C.**—J. TREBBLE, Romansleigh, South Molton. Price 7*s.*

Class 334.—*Rapid Feeders.* [6 entries.]

861 **I.** (10*s.*)—W. P. MEADOWS, Syston, Leicester. Rapid Feeder for Frame Hives. Price 3*s.*
865 **II.** (5*s.*)—GEO. NEIGHBOUR & SON, 127 High Holborn, W.C. Price 2*s.*
H. C.—W. P. MEADOWS, for No. 860; C. REDSHAW, for No. 864.

Class 335.—*Bingham Smoker, of British Manufacture.*[2] [7 entries.]

869 **I.** (15*s.*)—C. T. OVERTON, Crawley, Sussex. Price 3*s.* 6*d.*
868 **II.** (10*s.*)—W. P. MEADOWS, Syston, Leicester. (A copy of the American.) Price 3*s.* 6*d.*
872 **H. C.**—GEO. NEIGHBOUR & SON, 127 High Holborn, W.C. Price 4*s.* 6*d.*

Class 336.—*Twelve Sections of Comb Honey, gathered* 1893. [13 entries.]

881 **I.** (£1.)—WILLIAM WOODLEY, World's End, Newbury.
885 **II.** (10*s.*)—T. J. DURRANT, 25 Gordon Road, Sevenoaks.
875 **III.** (5*s.*) REV. G. W. BANCKS, Durham House, Green St. Green, Dartford.

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[1] Prizes given by the British Bee-Keepers' Association.
[2] Prizes given by Mr. T. W. Cowan.

Class 337.—*Six Sections of Comb Honey, gathered* 1893. [15 entries.]

898 **I.** (£1.)—W. WOODLEY, World's End, Newbury.
887 **II.** (10*s.*)—E. C. R. WHITE, Woodford Mill, Salisbury.
899 **III.** (5*s.*)—R. GREEN, Rainham, Sittingbourne.
886 **Com.**—CAPT. ORD, Fornham House, Bury St. Edmunds.

Class 338.—*Run or Extracted Honey, gathered* 1893. [19 entries.]

902 **I.** (£1.)—E. C. R. WHITE, Woodford Mill, Salisbury.
908 **II.** (10*s.*)—SAMUEL CARTWRIGHT, Shawbury, Salop.
910 **III.** (5*s.*)—J. H. WOOTTON, Byford, Hereford.
H. C.—CAPT. ORD, for No. 901; C. R. PIGOTT, for No. 904.

Class 339.—*Twelve Sections of Comb Honey, gathered before or in* 1892. [5 entries.]

923 **I.** (£1.)—W. WOODLEY, World's End, Newbury.
924 **II.** (10*s.*)—W. P. MEADOWS, Syston, Leicester.
920 **III.** (5*s.*)—REV. G. W. BANCKS, Green St. Green, Dartford.

Class 340.—*Three Shallow Frames of Comb Honey, for Extracting, gathered* 1893. [6 entries.]

925 **I.** (£1.)—CAPT. W. S. ORD, Fornham House, Bury St. Edmunds.
930 **II.** (10*s*)—J. H. WOOTTON, Byford, Hereford.
929 **III.** (5*s.*)—GEORGE WELLS, Aylesford, near Maidstone.

Class 341.—*Run or extracted Honey, gathered before or in* 1892. [7 entries.]

934 **I.** (£1.)—GEORGE HEAD, Winkfield, near Windsor.
932 **II.** (10*s.*)—OWEN ROBERTS, The Lodge, Rowton Grange, Chester.
935 **III.** (5*s.*)—W. SELLS, Uffington, Stamford.
937 **Com.**—H. WOOD, Paradise, Lichfield.

Class 342.—*Granulated Honey.* [4 entries.]

940 **II.** (10*s.*)—MISS J. COOPER, St. Nicholas Square, Leicester.
939 **III.** (5*s.*)—ETHEL CHESTER, Waltham, Melton Mowbray.

Class 343.—*Best and most Attractive Display of Honey.* [5 entries.]

944 **I.** (£2 10*s.*)—W. WOODLEY, World's End, Newbury.
942 **II.** (£1 10*s.*)—W. DIXON, 5 Beckett Street, Leeds.
946 **III.** (10*s.*)—R. GREEN, Rainham, Sittingbourne.

Class 344.—*Any Practically Useful Invention connected with Bee-keeping introduced since* 1891. [5 entries.]

Silver Medal of British Bee-Keepers' Association.

950 H. P. LANGDON, East Constable, Franklin Co., New York, U.S.A. Device for preventing the swarming of bees.

Bronze Medal of British Bee-Keepers' Association.

949 GEORGE WELLS, Aylesford, Maidstone. Perforated Division Board for two-queen system. Price 2*s.* 6*d.*

Class 345.—*Most Interesting and Instructive Exhibit of any kind connected with Bee-culture not mentioned in the foregoing Classes, to which Prizes have not been previously awarded.* [6 entries.]

Silver Medal of British Bee-Keepers' Association.

955 NEWTON & Co., 3 Fleet Street, E.C. Lantern slides on bees and bee-culture.
956 C. REDSHAW, South Wigston, Leicester. The Rietsche Hand Press for foundation making, with accessories. Price £2.

IMPLEMENTS.

Class 1.—*Self-Binding Harvesters.* [23 entries, 14 withdrawn.]

No. in Implement Catalogue.

5172 **I.** (**£50.**)—R. HORNSBY & SONS, LTD., Grantham. ("Improved No. B.") Price £45.

4031 / 5171 Second and Third Prizes equally divided. (**£25.**)—The MASSEY-HARRIS CO., LTD., 54 & 55 Bunhill Row, London, E.C. (Open end.) Price £45.

(**£25.**—R. HORNSBY & SONS, LTD., Grantham. ("Improved No. A.") Price £45.

Class 2.—*Sheep-shearing Machines worked by power.* [2 entries.]

5253 **I.** (**£20.**)—BURGON & BALL, Sheffield. Price £10.

Class 3.—*Sheep-shearing Machines (other than ordinary shears) worked by hand or foot.* [1 entry. No award.]

Silver Medals.

Awarded for Articles entered as "New Implements for Agricultural or Estate Purposes."

No. in Implement Catalogue.

600 TURNER & CROKER, 38 St. James's Road, Liverpool: for improved Lift-out Gully Trap.

1045 GEORGE COTTON & CO., LTD., Willaston, Crewe: for Revolving Seed Sower for Clover and Rye-grass (Patent).

3096 J. H. DUNCAN, 39 Coleman Street, London, E.C.: for Churn, manufactured by Disc Churn Company.

5069 RANSOMES, SIMS & JEFFERIES, LTD., The Orwell Works, Ipswich: for Potato Planter, new double row, Miles & Arter's Patent.

5113 JAMES & FREDERICK HOWARD, Britannia Iron Works, Bedford: for Straw Trusser for working in combination with a Threshing Machine, with Patent Automatic Straw Conveyor.

BUTTER-MAKING COMPETITIONS.

Class 1.—*Open to the United Kingdom.* [17 entries.]

8 **I.** (**£6.**)—MISS HARRIETTE M. JOSEPH, Blythwood Dairy, Stansted.
1 **II.** (**£4.**) MISS KATHERINE M. ARMSTRONG, Hendre, Bach, Abergele.
3 **III.** (**£3.**)—WILLIAM A. CHAPPELL, Burlton, Shrewsbury.
15 **IV.** (**£2.**)—THOMAS SMITH, 89 Fountain Street, Manchester.
4 **V.** (**£1.**)—MISS FRANCES COLE, The Dairy Home Farm, Tring.
2 **R. N. & Com.**—MISS MARY E. BEVIN, Sutton-in-the-Elms, Rugby.
6 **Com.**—GEORGE C. CORNER, Murkey Hill, Middleton Tyas, Yorks.
7 **Com.**—MISS ELIZABETH HUGHES, Plas Llanynys, Denbigh.

Class 2.—*Female Members of a Farmer's Family not in Service or Working for Wages.* [37 entries.]

27 **I.** (**£6.**)—MRS. ELIZA EVANS, Castern Hall, Ilam, Ashbourne.
48 **II.** (**£4.**)—MISS AGNES A. WALKER, Ockington Dymock, Gloucester.
38 **III.** (**£3.**)—MISS MARY LEWIS, Llandigwynett, Pembroke.
30 **IV.** (**£2**)—MISS JENNIE HOUGHTON, Broadleys, Denbigh.
29 **V.** (**£1.**)—MISS L. E. HAGUE, Walkers Heath, Gawsworth, Macclesfield.
40 **R. N. & H. C.**—MISS MARY E. LLOYD, Brook House, Denbigh.
51 **H. C.**—MISS MARGARET WILLIAMS, Plas-y-Ward, Ruthin.
20 **Com.**—MRS. M. A. CAMBRIDGE, High Hall, Blymhill, Shifnal.
21 **Com.**—MISS ELIZABETH CHURCH, Willington, Bedford.
22 **Com.**—MRS. FANNY CORNER, Murkey Hill, Middleton Tyas, Yorks.
25 **Com.**—MISS S. A. H. DIGWOOD, The Chesterfields, Feckenham, Redditch.
36 **Com.**—MISS ANNIE KNOWLES, Latus Hall, Goosnargh, Preston.
46 **Com.**—MISS ALICE M. STRATTON, Carew Newton, Pembroke.
52 **Com.**—MISS MARY E. WILLIAMS, Pentre Clawdd, Ruabon.
53 **Com.**—MRS. ALICE H. WILMOT, The Chase Farm, Ambergate.

Class 3.—*Dairymaids and others residing in the Society's District G., consisting of the Counties of Chester, Lancaster, Anglesey, Carnarvon, Denbigh, Flint, Merioneth, and Montgomery. (Open only to those who have not been Prize Winners at previous Country Meetings of the Royal Agricultural Society.)* [11 entries.]

59 **I.** (£6.)—Miss Naomi Hughes, Plas Newydd, Llandegla, Mold.
60 **II.** (£4.)—Miss Eleanor E. Jones, Bodfeirig, Aberffraw, Anglesey.
61 **III.** (£3.)—Miss Annie Parry, Clawdd Offa, Northop, Flints.
55 **IV.** (£2.)—Miss Margaret Chappell, Wardle Hall, Nantwich.
63 **V.** (£1.)—Miss Eliza E. L. Scott-Walker, 22 Derwent Road, Stoneycroft, Liverpool.
64 **R. N. & H. C.**—Miss Ada Stanier, Marthall, Knutsford.
58 **Com.**—Miss Maggie O. Hughes, Pant-y-Ffrith, Glan Conway.
65 **Com.**—Miss Elizabeth Williams, Hardings Lane Farm, Sandbach.

Class 4.—*Dairymaids and others, being Residents in Cheshire or North Wales, who have taken Instruction since January* 1, 1892, *for a week or more in any of the following Dairy Schools:—Worleston, Macclesfield, Bangor, Denbigh, or Welshpool.*[1] [20 entries.]

75 **I.** (£6.)—Miss Mary E. M. Jones, Penbedw House, Ruabon.
79 **II.** (£4.)—Miss Annie F. Leathes, Wern Fawr, Ruthin.
84 **III.** (£3.)—Miss Edith Spencer, The Well House, Handley, Chester.
72 **IV.** (£2.)—Miss Cecily Griffiths, Marton Dairy Institute, Chelford.
70 **V.** (£1.)—Miss Edith A. Glenn, Marton Dairy Institute, Chelford.
76 **R. N. & H. C.**—Miss May Kellett, Plas Newydd Farm, Ruthin.
80 **H. C.**—Miss Pattie Lewis, Red Lion Farm, Weston, Crewe.

Champion Class.—*Prize Winners in Classes* 1–4.

1. (£5, & **Society's Silver Medal**).—Miss K. M. Armstrong, Hendre, Bach, Abergele.
60. **R. N.**—Miss E. E. Jones, Bodfeirig, Aberffraw, Anglesey.

HORSESHOEING COMPETITIONS.

Class 1.—*Hunters.* [15 entries.]

13 **I.** (£6.[2])—James Rimmer, Hillfoot Road, Woolton, nr. Liverpool.
4 **II.** (£4.)—Alexander Gifford, 2 Boughton, Chester.
12 **III.** (£3.)—Henry Rayton, 33 Regent Street, Blackburn.
3 **IV.** (£2.)—James Edwards, Gorstage Green, Weaverham, nr. Northwich.
1 **V.** (£1.)—John Davenport, Belmont Smithy, nr. Northwich.

Class 2.—*Agricultural Horses.* [12 entries.]

25 **I.** (£6.[2])—Thomas E. Rowe, Acton Station, Weaverham, nr. Northwich.
19 **II.** (£4.)—John Hassall, Dig Lane, Acton, Nantwich.
26 **III.** (£3.)—Joseph Spoors, Bangor Icycoed, Wrexham.
21 **IV.** (£2.)—Richard Johnson, 3A King Street, Southport.
17 **V.** (£1.)—Harry Gornall, Christleton, Chester.
18 **H. C.**—John Groves, 70 Low Hill, Liverpool.

[1] Prizes given by the Chester Local Committee.
[2] Given by the Worshipful Company of Farriers, in addition to the Freedom of their Guild.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

Proceedings of the Council.

WEDNESDAY, NOVEMBER 1, 1893.

THE RIGHT HON. SIR M. W. RIDLEY, BART., M.P. (TRUSTEE), IN THE CHAIR.

Present:—

Trustees.—Gen. Viscount Bridport, Earl Cathcart, Mr. John Dent Dent, Lord Egerton of Tatton, Col. Sir Nigel Kingscote, K.C.B., Right Hon. Sir M. W. Ridley, Bart., M.P.

Vice-Presidents.—H.R.H. Prince Christian, K.G., Mr. H. Chandos-Pole-Gell, Sir Walter Gilbey, Bart., Lord Moreton, Sir J. H. Thorold, Bart., Mr. Charles Whitehead.

Other Members of Council.—Mr. G. M. Allender, Mr. J. H. Arkwright, Mr. J. Bowen-Jones, Lord Prougham and Vaux, Mr. J. A. Caird, Mr. Charles Clay, Mr. F. S. W. Cornwallis, M.P., Earl of Coventry, Mr. Percy E. Crutchley, Lieut.-Col. J. F. Curtis-Hayward, Mr. Alfred Darby, Mr. J. Marshall Dugdale, Mr. W. Frankish, Mr. Hugh Gorringe, Mr. Anthony Hamond, Mr. James Hornsby, Mr. Joseph Martin, Mr. T. H. Miller, Mr. P. A. Muntz, M.P., Mr. R. Neville-Grenville, Hon. Cecil T. Parker, Mr. Albert Pell, Mr. J. E. Ransome, Mr. S. Rowlandson, Mr. G. H. Sanday, Mr. A. J. Smith, Mr. Henry Smith, Mr. E. W. Stanyforth, Mr. R. Stratton, Mr. Martin J. Sutton, Mr. Garrett Taylor, Mr. John Tremayne, Mr. R. A. Warren, Mr. E. V. V. Wheeler, Mr. C. W. Wilson.
Professor Brown, C.B.

Officers.—Mr. Ernest Clarke, Secretary; Dr. Fream, Editor of the Journal; Dr. J. Augustus Voelcker, Consulting Chemist; Professor J. B. Simonds, Consulting Veterinary Surgeon; Mr. Wilson Bennison, Surveyor.

The following members of the Cambridge Local Committee were also present:—Mr. Charles Bidwell, Mr. C. F. Cunliffe Foster, Rev. E. H. Morgan, Mr. J. O. Vinter, the Town Clerk (Mr. J. E. L. Whitehead), and Mr. R. Peters (Secretary of the Local Committee).

Apologies for non-attendance were received from the Duke of Devonshire, K.G. (President), the Duke of Westminster, K.G., Viscount Emlyn, Sir J. L. E. Spearman, Bart., Sir Jacob Wilson, Mr. Alfred Ashworth, Mr. Joseph Beach, Mr. Charles Howard, Mr. Dan. Pidgeon, and Mr. Joseph Terry.

Sir NIGEL KINGSCOTE said that the President, who had been present at the House Committee on the previous day, regretted his inability to preside on that occasion, in consequence of an important meeting of the Royal Commission on Labour, of which he was Chairman. As their ex-President (the Duke of Westminster) was also unable to be present in consequence of indisposition, which confined him to the house, he (Sir Nigel) moved that Sir Matthew Ridley take the chair.

Election of New Members.

The minutes of the last monthly meeting of the Council, held on July 26, having been approved, and those of the Special Council, held on August 2, having been confirmed, the election of the following thirty-seven members was proceeded with:—

ARNOLD, H. F. J. Coape..Wolvey Hall, Hinckley.
BAKER, F.. Peckforton Manor, Birkdale.
BAMFORD, S. B...Hawthornden Manor, Uttoxeter.
BARKER, J. E., Q.C...Brooklands, Bakewell.
BELLOW, E...Colaba Lodge, Leominster.
BENNETT, L. W...The Grauge, Pulham St. Mary.
BERNEY, A. H...Toler Lodge, Wimborne.
CLARK, A. G...Camfield Place, Hatfield.
CLOSE, J. B...Shelford House, Little Shelford.
CRAWLEY, Robt...Stockwood, Luton.
DUNCAN, D. J. R...Kilmux, Leven, N.B.
EDWARDS, J. H...West Hoyle, Hoylake, Cheshire.
ELGER, L. G...Caldecote, St. Neots.
ELLICE, E.C...Park Dale, Battle.
ELLIOT, Mrs...Queen Charlton, Somerset.
ELLIS, J. E...Board School House, Ferrybridge, Yorks.
EVEREST, A. W...Upper Hale, Farnham.
FOWLER, J...Eagleseliff Junction, Yarm.
GREENE, W. R...Nether Hall, Bury St. Edmunds.
HARDY, Laurence, M.P...Sandling Park, Hythe.
HOUNSELL, F...Coombe Farm, Little Cheney, Dorchester.
JONES, T. R...Church Street, Llanwrst.
KENWORTHY, J. W...Castle Hill, Kelsall.
KNAPTON, F...Coleby, Doncaster.
LAMBTON, C. A...Brownslade, Pembroke.
MITCHELL, P...Manor Farm, Beddington, Croydon.
NORRISH, E. C...Gays, Sandford, Crediton.
PARTON, T...Weston Hall, Crewe.
PLATT, John..The Oaklands, Timperley.
PRICE, T. W. D...Hoo, Rochester.
SCOTT, Hy. D...Langley Burrell, Chippenham.
SIM, H. A...Indian Civil Service, Madras.
SIMPSON, T. F...The Rowans, Surbiton.
TIDNAM, H. A...3, North Brink, Wisbeech.
TURNER, G...Steam Plough Works, Leeds.
WESTCAR, C. W. Prescott..Strode Park, Herne, Kent.
WILSON, Robin..Bibbiano, Buonconvento, Siena, Italy.

Finance.

Sir NIGEL KINGSCOTE (Chairman) reported that the accounts for the period ended October 28, 1893, as certified by the Society's accountants, showed that the total receipts for that period were 18,160*l.* 2*s.* 9*d.*, and the expenditure 19,243*l.* 4*s.* 11*d.* The balance at the Bankers' on October 28, allowing for cheques outstanding, was 2,776*l.* 4*s.* 8*d.*, besides 5,000*l.* on deposit. Accounts amounting in all to 1,746*l.* 13*s.* 4*d.* had been passed, and were recommended for payment. In view of the numerous instances from time to time brought to their notice of members who joined the Society for one year only, in order to secure members' privileges of exhibiting animals, &c., at reduced rates for a particular show, and who subsequently had to be struck off the register after many ineffectual attempts to obtain further subscriptions, the Committee recommended to the Stock Prizes Committee the addition of a regulation in the Cambridge prize-sheet to the following effect:—"That, in order to be entitled to exhibit at the Country Meetings at members' rates, a member must have been on the register for at least a year prior to the date of entry, or (if a new member) must have paid his subscription for the current year and for a year in advance."

Financial Result of the Chester Meeting.

Sir NIGEL KINGSCOTE said that as there were several items both of receipts and expenditure in connection with the Chester Meeting still outstanding, it had not yet been thought desirable finally to close the accounts of that Meeting; but the Council would be interested to know that the approximate result was a profit of 2,400*l.* In view of the fact that the Society offered some 800*l.* more in prizes at Chester than at the Meeting held the previous year at Warwick, and that the entries were considerably larger, thus involving increased expenses for showyard works, administration, judges, forage, &c., this result must be considered eminently satisfactory. (Hear, hear.) The accounts would shortly be submitted to the auditors, and a report thereon presented to the general meeting of members to be held next month.

House.

Sir NIGEL KINGSCOTE (Chairman) said that the Committee had had under continuous attention during the recess the arrangements in connection with the Society's acquisition of Harewood House, and had held three formal meetings, at which a great variety of matters had been discussed. The outcome of their deliberations was contained in the following report, of which he begged to move the adoption:—

Report of the House Committee.

1. The Committee beg to report that since the last ordinary meeting of the Council on July 26 they have held three meetings for

the settlement of various matters connected with the Society's acquisition of Harewood House.

2. It will be in the recollection of the Council that at the meeting on July 26 the Committee recommended that an issue of 40,000*l.* of the Harewood House Debenture Stock should be made, 37,000*l.* of which was to be devoted to paying the purchase money of Harewood House, and 3,000*l.* for "other incideutal capital expenditure."

3. As it appears likely that the expenses in connection with the acquisition of the site will be less than was anticipated, and that the Society will be able to discharge these expenses out of its current balance, the Committee have decided, upon reconsideration, that it will be sufficient to raise 37,000*l.* on security of Harewood House, being the sum which its purchase has actually cost the Society. They accordingly recommend that for the present, at all events, no more than 37,000*l.* Stock be issued.

4. They have the pleasure to report that applications for this amount of Stock have been already received, and that practically all the payments due in respect thereof have been made. They recommend, therefore, that the list of applications be now closed.

5. Out of the receipts on the Harewood House account the Committee have been enabled to pay the whole of the purchase money for the property, and to repurchase all the Consols borrowed temporarily for the purpose from the General Reserve Fund, which is now, therefore, restored to its full amount of 30,000*l.*

6. In addition to the amounts already announced as donations for the acquisition of Harewood House, Mr. Charles Whitehead has made a gift of 100*l.* to the fund. The thanks of the Society are due to Mr. Whitehead for his generosity in this matter.

7. The alterations to Harewood House have now been for some time in hand, and are progressing satisfactorily.

(Signed) NIGEL KINGSCOTE, Chairman.

October 31, 1893.

Sir NIGEL KINGSCOTE added that, as the Council were aware, the Duke of Westminster and Sir Walter Gilbey had generously taken upon themselves the responsibility of adapting the existing fabric of Harewood House so as to meet the Society's requirements; and the alterations were now in progress under their direction. There were, however, several matters connected with the fittings, electric lighting, and the like, which the Society itself would have to consider, and it would probably be convenient that a small Sub-Committee should be appointed to confer with the Duke and Sir Walter, so that the Society's works in connection with the internal arrangements should be proceeded with, as far as possible, contemporaneously with the structural alterations, and any necessary action taken in the intervals, when the Council could not be formally consulted. He had reason to believe that this course met with the entire concurrence of the Duke and Sir Walter, and it would have the double advantage of saving both time and expense.

The Hon. CECIL T. PARKER said he was sure that the Duke of Westminster (who greatly regretted his inability to be present that day) would willingly assent to the course proposed, and he suggested that the Sub-Committee should consist of Sir Nigel Kingscote and Sir Matthew Ridley. Mr. DENT seconded the motion, which was unanimously adopted, and Sir WALTER GILBEY expressed the great pleasure that it would give him to co-operate with the Sub-Committee.

Harewood House Debenture Stock.

Upon the motion of Sir NIGEL KINGSCOTE, seconded by the Hon. CECIL T. PARKER, the Society's Seal was authorised to be affixed to certificates of the Harewood House Debenture Stock in the names of 122 proprietors; and the affixing of the Seal in accordance with the bye-laws was attested on each certificate by the signatures of Sir Matthew Ridley as Chairman, of Sir Nigel Kingscote as Trustee, and of Mr. Ernest Clarke as Secretary.

Journal.

Earl CATHCART (Chairman) reported that Part III. of Vol. IV. of the Journal was published on September 30, and duly issued to the members of the Society. The Committee recommended the payment of various accounts for literary contributions, printing, &c. The fifth edition of the Society's Text-book on Agriculture had now been published, and a reprint in pamphlet form of Mr. Whitehead's article on Hop Cultivation, appearing in Vol. IV., Part II., of the Society's Journal had also been issued. Various presentations to the Library had been reported, and the thanks of the Council were ordered to be sent to the donors. A number of suggestions for articles and notes in the Journal had been considered, and directions given to

the Editor as to the contents of the next number.

Inspection of Farms.

Earl CATHCART said they were very much indebted to Mr. Bowen-Jones for having acted as the Society's Commissioner in the inspection of the farms in Cheshire and North Wales, and for his admirable report thereon in the Journal. This was the first of the new series of Farm Reports, and it was a great thing to have had that series inaugurated by so able a man as Mr. Bowen-Jones.

Books for the Library.

Earl CATHCART added that it was very much to be hoped that if members, in going through their libraries, should find old books bearing upon agricultural history and practice, they would be so good as to remember the new house, where the Society would have room for them on its shelves.

Chemical.

Mr. WARREN reported that the Committee, having considered the provisions of the Fertilisers and Feeding Stuffs Act, passed in the present Session of Parliament, considered it very desirable that the work of the Chemical Committee and of Dr. Voelcker's position as Consulting Chemist should be reconsidered, and the Committee proposed to report more fully on the whole subject to the December or February Council. In the meantime the Committee were of opinion that Dr. Voelcker should be free to accept such duties under the new Act as might seem convenient to him. In the Woburn Sub-Committee, the feeding experiments with bullocks and sheep, as proposed to be carried out, had been approved, the chief point being to test how straw chaff could best be used with different mixtures. It was decided that the experiments in green manuring should be repeated.

Seeds and Plant Diseases.

Mr. WHITEHEAD (Chairman) reported that the Committee had considered the question of prizes for grain and mustard seed at the Cambridge Meeting of 1894, which was referred to them by the Council at their last meeting, and the Committee had drawn up a schedule of such prizes for consideration. Dr. Voelcker had submitted the following preliminary report upon the replies received to the Society's circular letter of inquiry into the disease of anbury, or "finger-and-toe," in turnips, and upon the investigations which he had made in regard thereto:—

PRELIMINARY REPORT UPON INQUIRY INTO ANBURY, OR "FINGER-AND-TOE," IN TURNIPS.

In all 194 replies have been received from forty-one different counties, the largest numbers being twenty-six from Yorkshire, fifteen from Northamptonshire, and thirteen from Shropshire. A number of the replies give information of no definite character, and it is in a comparatively few cases that the simultaneous occurrence on the same farm of a field affected always by anbury, and one not liable to the disease, has been recorded. The general opinion is in favour of the disease being most prevaleut in dry seasons, though some hold the reverse opinion, and others maintain that season has nothing to do with it. Of all the cures which have been tried the best results are attributed to lime, chalk, marl, or gas-lime. But while some regard these as positive cures, a not inconsiderable number report that they have tried them all without any success; others that lime at best alleviates, but does not cure the disease. While in Lincolnshire generally lime is regarded as a cure, there are parts of Northamptonshire where the universal reply is that it is often of no use, but that much depends on the kind of soil, and that where the lias comes, "finger-and-toe" never appears, while where there is no lias even lime will not effect a cure. Of other remedies, the only other one in at all general use is salt. Apart from special applications, the best way of preventiug the recurrence of disease is stated very generally to be to avoid the growing of turuip crops at too short intervals between one another. Other suggestions are—to avoid tailing the crop on the ground, and to avoid the use of acid superphosphates, while in some cases the application of strong nitrogenous top-dressings to push the crop on has been found useful. Throughout Cheshire the disease seems hardly known, and in Northumberland it is considered that a dressing of six to seven tons of lime per acre will keep off "finger-and-toe" absolutely for from fifteen to twenty years or more, according to the nature of the land.

(Signed) J. AUGUSTUS VOELCKER.

The inquiry was still proceeding, and the results, when completed, would be published in the Society's Journal. Mr. Carruthers had obtained a quantity of spores of the plasmodiophora with which to carry out

his proposed experiments upon the influence on the fungus of mineral additions to the soil. As soon as those spores were ripe, the experiments would be proceeded with in his laboratory.

Prizes for Grain and Mustard Seed at Cambridge.

Mr. WHITEHEAD said, with regard to the prizes for seed corn, that the matter had been discussed upon the previous day, in accordance with the resolution passed at the last meeting of the Council. But there was not a very keen desire in the Committee that these prizes should be offered, considering the extraordinary nature of the summer, and the consequent probable scarcity of fine samples. The schedule had been prepared exactly on the same lines as that at Windsor, and not on the more extended lines proposed by those who originally suggested these prizes for next year. It had been proposed that the prizes should be offered for different varieties of grain; but the Committee felt that it was hopeless to attempt to offer prizes for separate varieties, as they differed so much under different circumstances of cultivation and treatment. It was considered by the Committee that the prizes for seed-corn would be given by the Cambridge Local Committee. That morning the representatives of the Local Committee rather doubted as to whether funds were now available for the purpose. The question as to whether the prizes would be provided by the Local Committee had therefore been referred back to them.

Anbury, or "Finger-and-Toe," in Turnips.

Mr. STRATTON asked whether the Committee considered that their labours were concluded with regard to the inquiry into the causes or remedies of anbury, or "finger-and-toe," in turnips, or whether experiments would be tried or were in process of being tried with the view to the discovery of some remedy for the disease. It appeared to him that the result of the inquiry left the matter in the same condition as before, which was absolutely unsatisfactory.

Mr. WHITEHEAD replied that the report of the Committee that day was only a preliminary one, as it was considered that the information in their possession should be published at once, in order that it might be possible for some of the suggested remedies —the application of gas-lime, for instance—to be tried this season. At the present time Dr. Voelcker had a large number of replies to the Society's circular letter of inquiry He was further considering the question, and he hoped to publish a report in an early number of the Journal. The inquiry was by no means concluded, and the Consulting Botanist was carrying out experiments with regard to the propagation of spores from one turnip to another.

Earl CATHCART understood that the Committee intended to prosecute their inquiries until definite conclusions could be arrived at.

Veterinary.

Sir JOHN THOROLD (Chairman) presented the following report from Professor Brown :—

PLEURO-PNEUMONIA.—Since the last meeting of the Committee another outbreak of this disease has been discovered in the vicinity of London, on premises at Cricklewood, in the occupation of a dairyman and cow-dealer. The existence of the disease was reported on September 26, when several of the cows on the premises were ill, one of which actually died of the disease before the order for slaughter could be obtained. Of the thirty-seven cattle on the premises, no less than ten were more or less affected with the disease in different stages, plainly indicating that it must have existed among them for some time. The owner, being a dealer, had sold cattle to several people in the London district; these, numbering 156, were traced and slaughtered. Some of the diseased cows in this outbreak were traced to Derby and Nottingham, and 144 cattle with which they had previously been in contact were traced and slaughtered.

SWINE FEVER.—The last published weekly return relating to this disease shows some decrease as compared with preceding weeks, and is below the weekly average since the beginning of the year. In the week ended October 21 there were thirty-two fresh outbreaks and 165 swine attacked. The weekly average for the first forty-two weeks this year has been fifty outbreaks and 263 attacked.

ANTHRAX.—According to recent returns this disease is still increasing. In the week ending October 14 there were fifteen fresh outbreaks reported, and forty-one animals attacked. The weekly average for the forty-two weeks of this year has been ten outbreaks and twenty-three animals attacked.

RABIES.—This disease has increased very

much this year as compared with last. There have been sixty-five cases in forty-two weeks this year, as compared with twenty-three in the corresponding period of last year.

The question of experiments into the disease of abortion in cattle had come again under consideration, and the Committee recommended that a letter be written to the President of the Board of Agriculture to call his attention to the serious losses which are caused by contagious abortion in cattle, and to urge that the Board of Agriculture would, without delay, take up the question of inquiry into this disease, as it was understood that the investigations into tuberculosis had now been concluded. The committee recommended that prizes be given for horse-shoeing competitions at Cambridge upon the same lines as last year, but that the horses to be shod be Roadsters in Class 1 and Agricultural Horses in Class 2. They proposed that a lecture on horse-shoeing should be given during the time of the show, as in previous years. The Committee recommended the appointment of Mr. R. S. Reynolds, M.R.C.V.S., of Municipal Buildings, Dale Street, Liverpool, as the Society's Provincial Veterinary Surgeon for the South-Western Division of Lancashire. Professor McFadyean reported that he had paid a visit to Northumberland for the purpose of investigating the outbreak of louping-ill in that county, and that the investigation was still proceeding. Professor McFadyean had also presented the following reports (*a*) upon the employment of "tuberculin" as an aid to the diagnosis of tuberculosis in cattle, and (*b*) upon an investigation into deaths of animals upon Lord Cawdor's estate in Pembrokeshire :—

(*a*) "TUBERCULIN" AS AN AID TO THE DIAGNOSIS OF TUBERCULOSIS.

On October 3 a visit was paid by Professor McFadyean to Althorp Park, Northamptonshire, to inspect a herd of Jerseys belonging to Lord Spencer. A few cases of tuberculosis had recently occurred in the herd, and, with a view to discovering which of the remaining animals were affected, they were tested with "tuberculin." The result indicated that every animal in the herd, with one doubtful exception, was the subject of tuberculosis. To test the accuracy of this indication a yearling heifer and a cow were killed, and the post-mortem revealed tuberculous disease in each. Since then twenty other animals, being all the remaining members of the herd, with the exception before mentioned, have been killed, and in every instance tuberculous lesions were discovered in some part of the body.

(*b*) OUTBREAK ON LORD CAWDOR'S ESTATE IN PEMBROKESHIRE.

On July 26 last Professor Penberthy proceeded to Pembrokeshire in order to investigate an outbreak of disease among the cattle on a farm belonging to the Earl of Cawdor. From the tenant of the farm and from the Society's provincial veterinary surgeon it was ascertained that five or six young cattle had been lost from quarter-ill during the spring, and that between June 3 and July 26 twenty-four other animals (cattle) had died from a disease of an unusual type. Professor Penberthy, on the occasion of his visit, had the opportunity to make a post-mortem examination of a two-year-old steer which had died from this disease on the farm in question, and of several animals that died after a similar illness on other farms in Pembrokeshire. The post-mortem examination in these cases agreed with the description of the symptoms exhibited during life in indicating that the disease was neither anthrax nor quarter-ill, while microscopic examination and experiments went to prove that it was not infectious or transmissible by inoculation. Professor Penberthy came to the conclusion that these animals had died from vegetable poisoning, but the particular plant that was to blame for this was not discovered. Similar cases occurred about the same time in various parts of the country, and in several instances the owners of the animals had independently formed the opinion that the deaths were due to the animals having eaten bracken owing to the scarcity of grass. Experiments since made at the College with bracken gave negative results. Professor Penberthy advised removal of the surviving cattle from the pasture on which the deaths took place, and no similar cases have since occurred. At Professor Brown's request, Mr. Smart, veterinary surgeon of Birkenhead, visited a number of farms in Pembrokeshire on which cattle had died suddenly. In one of these cases the disease was ascertained to have been anthrax, but on the other farms the illness appears to have been of the same nature as that which prevailed on Lord Cawdor's farm. Cases apparently similar to the above occurred in numerous parts of the country during the summer months. In many cases the disease was supposed to be anthrax, and there is some reason to believe that such mistakes may have swollen the anthrax returns during the present year. There is no doubt that, owing to the scarcity of grass, cattle have eaten various injurious plants, which have flourished vigorously owing to the extreme heat.

The Committee gave notice that at their next meeting they would ask for a grant of 600*l.* for the coming year, of which 500*l.* is to be given to the Royal Veterinary College, and 100*l.* to be reserved for general purposes.

Stock Prizes

Mr. SANDAY (Chairman) reported that the following breeding animals, to which prizes were awarded by the judges at Chester, had become disqualified, through not complying with the regulations as to calving or farrowing:—

No. 787, Colonel Platt's Welsh cow "Cromlech 2nd" (awarded Second Prize in Class 79).
No. 1,910, Mr. Denston Gibson's Large White sow "Jessica" (awarded First Prize in Class 180).
No. 1,946, Mr. Joseph Musson's Small White sow (awarded First Prize in Class 188).
No. 2,051, Mr. Thomas Tompson's Tamworth sow (awarded Second Prize in Class 200).

The following were the animals which, in consequence of the above disqualifications, had succeeded to the prizes:—

CLASS 79.

No. 785, Second Prize of 10*l.* to W. E. Oakeley for "Gem" (Third Prize).
No. 783, Third Prize of 5*l.* to R. M. Greaves for "Gwernen" (Reserve Number).

CLASS 180.

No. 1,915, First Prize of 10*l.* to the Prescot Board of Guardians for "Whiston XI." (Second Prize).
No. 1,914, Second Prize of 5*l.* to Joseph Nuttall for "Whiston IX." (Third Prize).
No. 1,908, Third Prize of 3*l.* to John Cashmore, Jun., for "Worsley Baroness III." (Reserve Number).

CLASS 188.

No. 1,945, First Prize of 10*l.* to Denston Gibson for "Whiston Toy II." (Second Prize).
No. 1,942, Second Prize of 5*l.* to Hon. D. P. Bouverie for "Coleshill Dot" (Third Prize).
The reserve number in this class not having qualified, the third prize is cancelled in accordance with the regulations.

CLASS 200.

No. 2,048, Second Prize of 5*l.* to W. H. Mitchell for "Elmdene Mabel" (Third Prize).
No. 2,046, Third prize of 3*l.* to Robert Ibbotson for "Knowle Rosalind" (Reserve Number).

Further letters had been received from Mr. Swan as to the award of the English Jersey Society's champion prize in Classes 116*a* and 116*b* at the Chester Meeting; but as the Council had already decided that the award of the champion prize had been made in accordance with the regulations, the Committee recommended that Mr. Swan be informed that the question could not be reopened. The Committee had considered the prizes proposed to be offered by the Local Committee, and had arranged a preliminary prize-sheet for the Cambridge Meeting, which would be printed and sent out to all members of Council before the December meeting. Offers of champion prizes at the Cambridge Meeting of 15*l.* each for the best Red Polled bull, and for the best Red Polled cow or heifer in the showyard, from the Red Polled Society; of a gold medal for the best animal of the Aberdeen Angus breed, from the Polled Society; and of 20*l.* for the best Suffolk ram, from the Suffolk Sheep Society, had been accepted with thanks.

Implement.

Mr. FRANKISH (Chairman) reported that the draft prize-sheet and regulations for the exhibition and trial of implements at the Cambridge Meeting had been considered and amended, and the Committee recommended that the regulations be reprinted, and a copy sent to each member of Council, with a view to their formal adoption at the December meeting. The regulations for the trials of oil engines at Cambridge had been further considered, and the Committee recommended that in the first trial of the engines one of the well-known brands of oil, *e.g.* Russoline oil, should be used, but that in the second run each exhibitor should be allowed to use any brand of oil he thought proper, the judges to take into consideration the actual market price per gallon at which such brand could be purchased. The Committee approved the recommendations of the Dairy Committee with reference to the classes and prizes for churns at Cambridge.

General Cambridge.

Mr. DENT reported that the Committee had considered the list of prizes proposed to be offered by the Local Committee, with the suggestions thereon of the Stock Prizes Committee and the Dairy Committee, and had referred back certain of the prizes to the Local Committee for further consideration. A proposed schedule of prizes for grain and mustard seed would be considered by the Local Committee, who would report their decision at the December meeting. The Local Committee had nominated as Agent for Lodgings Mr. E. Peters, estate agent, 7 Downing Street, Cambridge.

Showyard Works.

The Hon. C. T. PARKER reported that since the last meeting the Surveyor had cleared away the whole of the Society's plant from Chester, and erected the entrances and stored the whole of the plant at Cambridge. He presented his cash account, showing an expenditure since the last meeting of 162*l.* 7*s.* 3*d.* on account of Chester, and 141*l.* 6*s.* 3*d.* on account of Cambridge. Mr. Bennison had presented a detailed statement of the cost of the various works in the showyard at Chester, from which it appeared that, after deducting the amount realised by sales of materials and received from exhibitors and purveyors, the total cost was 5,630*l.* 1*s.* 1*d.* The Committee recommended the acceptance of the tender of Messrs. English Bros., of Wisbech, for the supply of timber at Cambridge; and of Messrs. Walter Hill and Co.'s tender for advertising and placarding.

Selection.

Earl CATHCART (Chairman) reported that a letter having been received from Mr. Muntz, expressing his desire to retire from the office of Steward of Stock, in view of his Parliamentary and other engagements, the Committee recommended that Lord Brougham and Vaux be appointed a Steward of Stock, in the room of Mr. Muntz, that Mr. Garrett Taylor be appointed a Steward of Stock, that Mr. Stanyforth be appointed a Steward of Implements, and that Mr. Dugdale be nominated as Steward of Dairying, to succeed Mr. Darby after the conclusion of the Cambridge Meeting. The Committee reported with regret the death on the 24th October last of Monsieur Edouard Lecouteux, Editor of the *Journal d'Agriculture Pratique*, who had been an Honorary Member of the Society since 1869.

Death of an Honorary Member.

Earl CATHCART greatly regretted to have to announce to the Council the death of one of the oldest of their honorary members, M. Edouard Michel Lecouteux, Chief Editor of the *Journal d'Agriculture Pratique*, who died at his residence at Cerçay, in France, on October 24, at the age of seventy-three. M. Lecouteux was elected to the honorary membership of the Royal Agricultural Society in April, 1869, on the occasion of the establishment—on the model of that Society—of the Société des Agriculteurs de France, of which he was one of the chief founders and the first Secretary. He was one of the best-known and most distinguished of French agriculturists, and was a great authority on ensilage, on which he had written a standard book.

Education.

Lord MORETON (Chairman) reported that thirty-two candidates from eleven schools had entered for the Society's forthcoming Junior Examination, to be held on November 7 and 8, and that the necessary arrangements for the examination were in progress.

The ten successful candidates at last year's examination having duly complied with the regulations, the Committee recommended the payment of the Scholarships and the despatch of the certificates forthwith. A letter had been read from the Head Master of the Wincanton (Pine House) School, stating that his pupil who gained the fifth scholarship at the Society's last examination had been granted a scholarship of 40*l.* per annum for three years, awarded to him, upon the result of the Society's examination, by the Devon County Council. The Committee recommended that the date for the next Senior Examination be fixed for May 8 to May 12, 1894. They also recommended that Mr. Alfred Ashworth, of Tabley Grange, Knutsford, a Member of the Council, be appointed as the Society's representative Governor upon the Sandbach School Foundation, in accordance with the provisions of the scheme for its administration. The Committee gave notice that at their next meeting they would move for a renewal of their annual grant of 500*l.*

County Council Scholarships.

Lord MORETON drew special attention to the award by the Devon County Council of Scholarships to

Devonshire candidates who had succeeded in passing the Society's Junior Examination. So far as he knew, this was the only case in which a County Council had thought fit to utilise their examination in this way.

Sir JOHN THOROLD remarked that W. Robinson, who gained one of the Society's Junior Scholarships in 1890, had since gained a County Council Scholarship of 50*l.* from the County Council of Kesteven (Lincolnshire).

Dairy.

The Hon. C. T. PARKER (Chairman) reported that the Committee recommended the offer at the Cambridge Meeting of 1894 of prizes for hand-power churns in two classes as follows:—

Class I.—Churns capable of dealing with 10 quarts and upwards of cream —10*l.*, 6*l.*, 4*l.*

Class II.—Churns capable of dealing with from 5 quarts to 10 quarts of cream—5*l.*, 3*l.*, 2*l.*

In both classes the churns not to exceed one-man power (*i.e.* to be worked by one man).

A letter had been read from the English Jersey Cattle Society conveying a resolution of thanks for the very efficient manner in which the butter test was carried out at Chester, and again offering the sum of 25*l.* at the Cambridge Meeting of 1894 for the cow in the classes for dairy cattle yielding the largest quantity of butter in proportion to her live weight. The Committee recommended that the English Jersey Society be cordially thanked for their offer, but informed that the Council regretted that they were unable to accept it this year, in view of the fact that the chemical test had shown itself to be as reliable as the practical test by the churn, and that the Society would be holding trials of churns at Cambridge.

The Committee had agreed upon a schedule of prizes for dairy produce, which they had referred to the Stock Prizes Committee for inclusion in the draft prize-sheet for the Cambridge Meeting. They confirmed the offer as previously announced of the following prizes:—

One keg or other package of butter, not less than 14 lb. and under 40 lb. in weight, 10*l.*, 5*l.*

To be delivered on or before Thursday, February 1, 1894. Entries to close January 1, 1894.

The Committee recommended the acceptance of the prizes for produce proposed to be offered by the Cambridge Local Committee, and they suggested that the Local Committee should be asked to nominate a competent person to demonstrate in the dairy at the show the manufacture of the various cheeses for which their prizes were offered.

Preliminary consideration had been given to the poultry prize-sheet, but the settlement thereof was deferred to the next meeting. A suggestion by the judge of table poultry, that the birds should be killed before despatch to the show, was not considered desirable. Correspondence was read as to the exhibition as "chickens" in the young poultry classes of birds hatched in the previous year, and the Committee recommended that strict instructions be given to the judges to disqualify any bird which in their opinion was ineligible for these classes, owing to its having been hatched before the year of the show.

The Committee recommended that in future entry fees for dairy produce be imposed at the rate of 2*s.* 6*d.* each entry for members, and 5*s.* each entry for non-members. The Committee gave notice that at their next meeting they would move for the renewal of their annual grant of 100*l.*

Country Meeting of 1895.

The SECRETARY reported the receipt of a memorial from the Mayor and Corporation of Darlington, and from a Committee of the town and neighbourhood, asking the Society to hold its Country Meeting of 1895 at Darlington. A large number of memorials from the local authorities of neighbouring towns and other bodies interested in agriculture were also received in support of the application.

Mr. ROWLANDSON, as the member of the Council most closely identified with Darlington, ventured to point out that the invitation to visit that

borough in 1895 was not the first invitation received by the Society. He would remind the Council that this was the fourth time that Darlington had endeavoured to get the show in their borough. They were now in a better position to receive the Royal, and he hoped that if they decided to go to Darlington, not only the ground, but also the numbers attending the show would be satisfactory to the Council. On behalf of the Corporation of Darlington, and on behalf of the Committee, of which he happened to be a member, he could assure the Council that they would do everything in their power to make the Meeting a success. Before he left home he heard that, within a small sum, the amount of 6,000*l.* towards the purposes of the Meeting had been raised.

Mr. DENT said that, as Chairman of the North-Eastern Railway, which served the borough of Darlington, he would like to refer to the satisfaction felt by his Company in meeting with the approbation of the Council as to the way in which they worked the traffic for the shows held at York and Newcastle. It would be their pride and their hope to do equally well if the Society came to Darlington.

Mr. CHANDOS-POLE-GELL having supported the application, the Secretary was instructed to express the best thanks of the Council to the authorities of Darlington for their cordial invitation, and to state that, in accordance with the usual practice, the matter would be further considered at the next meeting of the Council, to be held on December 6, when a Committee of Inspection would be appointed to visit the sites and other accommodation offered.

Miscellaneous.

A letter from Mr. William Smith, as to the Society's trials held at Chelmsford in the year 1856, was read, and the Secretary was instructed to inform Mr. Smith that the Council were unable, at this distance of time, to reopen the matter.

A letter was also received from the *Deutsche Landwirtschafts-Gesellschaft*, expressing thanks for the reception given to their representatives by the Society upon the occasion of a recent visit to England.

Dates of Future Meetings.

The dates of the future Council Meetings of the Session were fixed as follows:—December 6, 1893; February 7, March 7, April 4, May 2, June 6, June 27 (in the Cambridge Showyard), August 1, 1894. It was decided that the General Meeting of members on the Thursday of the Smithfield week (December 7) should be held in the Society's own house at 12 Hanover Square.

The Council then adjourned until Wednesday, December 6, at noon.

WEDNESDAY, DECEMBER 6, 1893.

THE DUKE OF RICHMOND AND GORDON, K.G. (TRUSTEE), IN THE CHAIR.

Present:—

Trustees.—Earl Cathcart, Lord Egerton of Tatton, Col. Sir Nigel Kingscote, K.C.B., Sir. A. K. Macdonald, Bart., Earl of Ravensworth, the Duke of Richmond and Gordon, K.G.

Vice-Presidents.—H.R.H. Prince Christian, K.G., Mr. Chandos-Pole-Gell, Sir Walter Gilbey, Bart., Lord Moreton, Mr. Charles Whitehead.

Other Members of Council.—Mr. J. H. Arkwright, Mr. Alfred Ashworth, Mr. Joseph Beach, Mr. J. Bowen-Jones, Lord Brougham and Vaux, Mr. J. A. Caird, Mr. Charles Clay, Earl of Coventry, Mr. Percy E. Crutchley, Lieut.-Col. J. F. Curtis-Hayward, Mr. Alfred Darby, Mr. J. Marshall Dugdale, Mr. S. P. Foster, Mr. W. Frankish, Mr. Hugh Gorringe, Mr. Anthony Hamond, Mr. James Hornsby, Mr. Charles Howard, Mr. C. S. Mainwaring, Mr. Joseph Martin, Mr. P. A. Muntz, M. P., Mr. R. Neville-Grenville, Hon. Cecil T. Parker, Mr. Albert Pell, Mr. J. Rawlence, Mr. S. Rowlandson, Mr. G. H. Sanday, Mr. W. T. Scarth, Mr. A. J. Smith, Mr. Henry Smith, Sir J. L. E. Spearman, Bart., Mr. E. W. Stanyforth, Mr. R. Stratton, Mr. Martin J. Sutton, Mr. Garrett Taylor, Mr. J. P. Terry, Mr. John Tremayne, Mr. R. A. Warren, Mr. E. V. V. Wheeler, Mr. C. W. Wilson, Sir Jacob Wilson.

Professor Brown, C.B.; Mr. Alex. Cope; Mr. F. W. Wragg, President of the Royal College of Veterinary Surgeons.

Officers.—Mr. Ernest Clarke, Secretary; Dr. Fream, Editor of the Journal; Dr. J. Augustus Voelcker, Consulting Chemist; Mr. Wilson Bennison, Surveyor.

The following members of the Cambridge Local Committee were also present:—The Mayor (Mr. E. H. Parker), Mr. Charles Bidwell, Mr. G. Jonas, Rev. E. H. Morgan, Mr. J. O. Vinter, the Town Clerk (Mr. J. E. L. Whitehead), and Mr. R. Peters (Secretary of the Local Committee).

Apologies for non-attendance were received from the Duke of Devonshire, K.G. (President), the Duke of Westminster, K.G., General Viscount Bridport, G.C.B., Viscount Emlyn, Sir J. H. Thorold, Bart., Mr. John Dent Dent, Mr. T. H. Miller, and Professor J. B. Simonds.

In the unavoidable absence of the President, the Duke of Richmond and Gordon (Trustee) was called to the chair.

Election of New Governor and Members.

The minutes of the last monthly meeting of the Council, held on November 1, having been approved, the election of the following Governor and fifty Members was proceeded with:—

Governor.

CRAVEN, Thomas, J.P., D.L...Woodheyes Park, Ashton-upon-Mersey, Cheshire.

Members.

AIYANGAR, Seshadri..4, Sebu Row's Lane, Siddicutta, Bangalore, Mysore, India.
BATES, L. C...St. Margaret's, Twickenham.
BLACKFORD, J...Carton Farm, Bayton, Cleobury Mortimer.
BOOMER, C. E...Micklebring, Rotherham.
BOURN, W...Rowston, Lincoln.
CHURCH, Lieut.-Col. H. B...Glanbaidon, Abergavenny.
COOKE, J. E...Bringsty, Worcester.
COPE, A. C...4, Whitehall Place, S.W.
CRANSWICK, H...Thorneycroft, Bridlington Quay.
DORMAN, A. J...Rushpool Hall, Saltburn.
DOWSE, J. D. Stretch..14, Welbeck Street, W.
FINNEY, B. B...Gritt Hill, Kyre Parva, Tenbury.
FITZGERALD, R. U. Penrose, M.P...Corkbeg Island, Whitegate, co. Cork.
FORMBY, H. C...Moorfield, Glossop.
GIBSON, J...Quernmore, Bromley.
GLAISYER, E...Leighton Buzzard.
GODSALL, T...The Wood, Suckley, Worcs.

GORRINGE, A. A...Kingston-by-Sea, Brighton.
HANKEY, W. H. A...Wappenham, Northampton.
HARRIS, G. S...31, Montagu Square, Hyde Park, W.
HARTOPP, Miss F. H...Dalby Hall, Melton Mowbray.
HOLLIDAY, H. W..17, Pittville St., Cheltenham.
HOWARD, E. S...Thornbury Castle, Glos.
HUGHES, R...92, Ashley Gardens, S.W.
HUMPHREY, C...Hall Farm, Kirtling, Newmarket.
JUSTLER, W. R...Earls Hall, Cockfield, Suffolk.
JOHNSON, H...Gt. Park Farm, Battle.
JONES, T. B..Holme House, Piercebridge, Darlington.
JONES, T. C...Chilton Moor, Fence Houses.
KEENE, O. R...Woodeote Grove Farm, Wallington.
KENNY, C...Downing College, Cambridge.
MILLER, James..Harrogate.
MONSLEY, T. P...Stackpole, Pembroke.
NORTON, Lieut.-Col. R...Dolcoes Llwyn Hall, Cemmaes, Mont.
PARRY, R. T...Burras Hall, Wrexham.
PAWSEY, W...Cumberland Mills, I. of Dogs, E.
PIKE, J...Castle Thorpe, Stony Stratford.
RIVETT-CARNAC, W. T...Stanton, Shrewsbury.
SAMUELSON, J...48, Castle Street, Liverpool.
SHUFFLEBOTHAM, M., J.P...Stoke Lacey, Bromyard.
SIMONDS, W. Turner..Boston.
STEWARD, Rev. C. J...Somerleyton, Lowestoft.
STOCKTON, O. J...Banbury.
THOMPSON, G...Sutton Marsh, Long Sutton.
THOMPSON, Wm...Layton, Sedgefield.
TULLIBARDINE, Marquis of..Blair Atholl, N.B.
VERNON, W. B. W...Hilton Park, Wolverhampton.
VINTER, J. O...Southfield, Trumpington.
WILKINSON, E. H...Ouston Farm, Chester-le-Street.
WOOD, Samuel H...Moorfield, Glossop.

Finance.

Sir NIGEL KINGSCOTE (Chairman) reported that the accounts for the period ended November 30, 1893, as certified by the Society's accountants, showed that the total receipts for that period were 594*l.* 7*s.* 11*d.*, and expenditure 1,361*l.* 3*s.* 5*d.* The balance at the Bankers' on November 30, allowing for cheques outstanding, was 2,009*l.* 9*s.* 2*d.*, besides 5,000*l.* on deposit. Accounts amounting in all to 3,835*l.* 6*s.* 1*d.* had been passed, and were recommended for payment. The Secretary had submitted a statement of the arrears of subscriptions at the present time, and had been instructed to press for those still outstanding. The Committee had met ten times, and made ten reports during the year.

House.

Sir NIGEL KINGSCOTE (Chairman) reported that the Sub-Committee (Sir Mathew Ridley and himself) appointed at the last Council meeting had had two conferences with Sir Walter Gilbey on November 14 and December 5, and had settled various matters connected with the electric lighting, telephone, electric-bell arrangements, and the like. A memorandum had been executed by the three Trustees of the Harewood House Debenture Stock as to the 2,125*l.* 3*s.* 9*d.* Consols which had been purchased with the 2,100*l.* cash donations to the Society towards the acquisition of Harewood House, and which were to be held as a nucleus of a sinking fund for the redemption of the stock. The question of the disposal of the Society's present premises had been further discussed, and the Society's Surveyor (Mr. Bennison) had been instructed to prepare plans and statements showing how the house could be most profitably utilised. An application for permission to reproduce the portrait of Youatt, belonging to the Society, had been granted. Since their last annual report the Committee had held twenty-six formal meetings (excluding meetings of Sub-Committees), and had made nine reports to the Council.

Journal.

Earl CATHCART (Chairman) reported that the Committee had given further consideration to the question of the appointment by the Society of a Commissioner to visit and report upon selected farms in the district of the Country Meeting of 1894, and decided that such an inspection and report was desirable. The Local Committee would be asked to make a selection of farms for the purpose. Since the last meeting of the Council a reprint of 500 copies had been made of the "Suggestions for Stock Feeding in the Winter of 1893–94," from the last number of the Journal. Of these, 400 copies had been distributed, and there remained in stock close upon 100 copies, which were available for distribution upon payment of the cost of their reprint. An application from the Government of Nova Scotia for permission to reprint the "Suggestions" for free circulation amongst farmers in that Province had been

granted upon the usual terms. Further correspondence had been read as to a lecture by General Cotton on the system of thorough cultivation, as originally practised some fifty years ago upon the Marquis of Tweeddale's estate at Yester, and the Committee had instructed the Secretary to write an official letter to the present Lord Tweeddale, asking him if he would favour the Society with information upon the results of the system as pursued by his predecessor. The Committee had considered a suggestion that prizes should be offered at the Cambridge Meeting for designs for labourers' cottages, but they were of opinion that, taken in conjunction with the recent article on "Cottage Sanitation"—since published in pamphlet form—the question had already been sufficiently dealt with at the two previous competitions at Manchester in 1869 and Cardiff in 1872. A paper in a forthcoming number of the Journal would contain further references to the subject of labourers' cottages (see page 670). Directions had been given to the Editor with regard to the contents of the next number of the Journal, and a variety of suggestions for articles and notes had been considered. The Committee had met nine times and made nine reports.

Chemical.

Mr. WARREN reported that the Chemical Committee had had again under consideration the question of the Fertilisers and Feeding Stuffs Act as it affected the working of the Society's Chemical Department, and he presented their usual quarterly report, which, on the motion of Mr. WARREN, was approved and adopted, and ordered to be published in the Journal (see page 789).

The Annual Report of the Consulting Chemist had been presented, and ordered to be published in the next number of the Journal (see page 803). Dr. Voelcker had also presented statistics of the work done in the Laboratory during the past year, showing that 1,363 analyses for which fees were charged have been made, as against 1,211 in 1892, an increase of 152 cases. The Committee had met eight times, and made eight reports.

Seeds and Plant Diseases.

Mr. WHITEHEAD (Chairman) reported, in reference to the inquiry into finger-and-toe in turnips, that very few replies to the Society's circular letter had been received since the last report of the Committee, and these had not thrown further light upon the subject. It was now proposed that Dr. Voelcker should make a selection from the different returns, and obtain samples in representative cases where, side by side, or at least on the same farm, soils occurred which were affected by finger-and-toe simultaneously with others which were not affected. This would be with a view of ascertaining if there was anything in the chemical constituents of the soils which would account for the difference between them. This investigation would go on side by side with Mr. Carruthers' experiments on the direct effect of certain chemicals and manures upon the growth of seedlings in affected soil, and would necessarily take some considerable time. It was not considered that any more detailed account of the nature of the replies received than that already reported to the Council could with advantage be given at this stage, as it would merely be an enlargement of the general results already recorded, and which had added little to the existing information. As the Local Committee did not see their way to provide the funds for the proposed prizes for grain and mustard seed, the Committee did not recommend that such prizes be offered in connection with the Cambridge Meeting.

With reference to the reported appearance of the Hessian fly in Norway, the Secretary had submitted a report from the Director of Agriculture at Christiania, obtained through the courtesy of the Consul-General of Sweden and Norway, from which it appeared that the insect had never been observed in any part of the Scandinavian Peninsula previous to the last three or four years, when it had done damage to the barley on some farms at Hole, Ringerike, in Norway. The damage done this year

proved to be somewhat slight, only a few barley plants having been attacked by the larvæ; but last year the damage had been considerable, at least a quarter of the plants of a large field of barley having been broken, the ears lying on the ground as if the field had been trampled down by cattle. The damage had been noticed on this farm from the insect for the last three years. As to Sweden, the Board of Agriculture at Stockholm reported that the Hessian fly had never appeared in that country.

The annual report of the Consulting Botanist and the annual report of the Zoologist had been submitted, and the Committee recommended that both reports be published in the next number of the Journal (see pages 813 and 815). The Committee had met eight times, and made eight reports during the year.

Veterinary.

Mr. ASHWORTH reported that a letter had been received from the Farriers' Company, consenting to confer the freedom of their guild and to provide the first prizes in each of the two classes of the Horse-shoeing Competition as before. A letter had been read from Mr. R. S. Reynolds, M.R.C.V.S., of Liverpool, accepting the terms of his appointment as the Society's Provincial Veterinary Surgeon for South-Western Lancashire. Of the 600*l.* granted to the Committee for the year 1893, the sum of 502*l.* 14*s.* had been expended, viz., 500*l.* to the Royal Veterinary College, and 2*l.* 14*s.* for medals to proficients in cattle pathology. The Committee moved for the renewal of their grant of 600*l.* for the year 1894, and that of this sum 500*l.* be allocated to the Royal Veterinary College in aid of the further development of comparative pathology and bacteriology. The Committee had met eight times, and made eight reports. Professor Brown had presented to the Committee the following report:—

PLEURO-PNEUMONIA.—Since the last meeting of the Veterinary Committee another outbreak of this disease was discovered in a London cowshed. On November 6 a cow from this cowshed was sent to the Metropolitan Market, and when slaughtered the same day, in one of the adjacent slaughter-houses, was found affected with pleuro-pneumonia. The whole of the cattle on the premises from which she was sent were slaughtered by order of the Board of Agriculture, and three more were found affected with the disease. An Order has been passed by the Board of Agriculture dealing with the movement of cattle out of the London cowsheds, and another dealing with the movement of cattle out of certain parishes in the County of Middlesex.

SWINE FEVER.—Since the first of last month the Board of Agriculture, under the Swine Fever Act, has been dealing with this disease instead of the local authorities, so far as slaughter and compensation are concerned. It is too early to form any estimate of the progress being made towards eradicating the disease; but, judging from the returns published in the *London Gazette*, the Board is carrying out the slaughter of diseased and in-contact pigs in a very energetic manner. The total number slaughtered in the three weeks ended November 25 was 2,093, of which 2,070 were diseased or in-contact, and twenty-three were slaughtered as suspected, but on post-mortem were found free from the disease.

ANTHRAX.—The returns of this disease still continue abnormally high. In the week ended November 25 there were eighteen fresh outbreaks reported and thirty-one animals attacked. The average for the forty-seven weeks of the present year has been about ten outbreaks and twenty-four animals attacked. This year there have been 499 outbreaks and 1,162 animals attacked, as compared with 249 outbreaks and 550 animals attacked in the corresponding period of last year.

RABIES.—This disease has recently been more prevalent than usual. In the four weeks ended November 25 there were fourteen cases reported. In the corresponding period of last year there were only eight reported.

Stock Prizes.

Mr. SANDAY (Chairman) presented for approval the prize-sheet for stock, poultry, and produce at the Cambridge Meeting, and said that the Committee recommended the acceptance, with thanks, of the following further offers of champion prizes for the Cambridge Meeting[1]:—

Two gold medals for the best Hackney stallion and the best Hackney mare or filly, from the Hackney Horse Society.

Two gold medals for the best Shire stallion and the best Shire mare or filly, from the Shire Horse Society.

Two prizes of 20*l.* each for the best Clydesdale stallion and the best Clydesdale mare or filly, from the Clydesdale Horse Society.

Two prizes of 20*l.* each for the best male and the best female animal in the Shorthorn classes, from the Shorthorn Society.

Two prizes of Ten Guineas each for the best Kerry and the best Dexter Kerry animal, from the Kerry and Dexter Kerry Cattle Society.

[1] For complete list of Champion Prizes, see page cxcix.

A gold medal for the best Shropshire ram in the two-shear and shearling ram classes, from the Shropshire Sheep Breeders' Association.

A letter had been read from the Polo Pony Stud Book Society, asking the Royal Agricultural Society to consider the advisability of dividing the classes for ponies at their future shows into "riding" and "driving" respectively, and further suggesting that a class should be established for riding ponies, mares, stallions, or geldings between 13.2 hands and 14.2 hands suitable for polo. The Committee recommended that the Polo Stud Book Society be informed that the Council cannot make any alteration in the pony classes as already settled. The Committee recommended that the Chairman be empowered to accept any champion prizes from Breed Societies which might be offered before the prize-sheet was printed, and which complied with the regulations of the prize-sheet. The total value of prizes offered at the Cambridge Meeting, exclusive of champion prizes and medals offered by various Breed Societies, would be 5,865*l.*, of which amount 1,022*l.* was contributed by the Cambridge Local Committee (for details see page cxcix). The Committee had met eight times during the year, and made eight reports.

Time for Opening of Showyard.

On the motion for the adoption of this report, Mr. MARTIN drew attention to Instruction 1 to the Stewards, with regard to exhibitors not being allowed to enter the show-ground until 9 a.m. on the morning of the opening or judging day. Last year at Chester some of the exhibitors entered the yard, whilst others were excluded, which caused a great deal of irritation. He said they must remember that nine o'clock was the time for the judges to commence judging, and that exhibitors had no opportunity of getting their animals or implements into trim. He moved: "That all exhibitors of stock and implements be allowed to enter the showyard on Monday at 8 a.m."

Mr. CLAY seconded the motion.

The Hon. C. T. PARKER said that, as Honorary Director of the Showyard, he felt that any alteration in the present rule would cause great inconvenience, and he must, therefore, oppose Mr. Martin's proposition.

Mr. A. J. SMITH supported Mr. Parker's views.

Sir JACOB WILSON said that this rule which it was desired to amend had been in force for many years, and he did not think there was any general desire to alter it, as it was really the only chance that they had of presenting a clean yard to the public with any satisfaction to the Council and members generally. In the interest of all concerned, he thought the present system worked exceedingly well, and that it might be left as it was.

Mr. SANDAY said that he had himself no feeling in the matter, and had no wish to advocate the alteration in view of the expression of opinion from Mr. Parker and Sir Jacob Wilson.

After some further discussion Mr. Martin's amendment was, by leave, withdrawn, and the report of the Committee adopted.

Implement.

Mr. FRANKISH (Chairman) reported that since the last meeting of the Committee the regulations for the exhibition and trial of Implements at the Cambridge Meeting had been re-arranged and re-grouped, and were now presented for approval. In view of the limited area of the Cambridge Showyard, the Committee recommended that the maximum amount of space to be allotted to an exhibitor be limited to 100 feet. The Committee presented their recommendation as to the appointment of judges for the trials of oil-engines and churns at Cambridge. The Committee had met nine times, and made nine reports.

General Cambridge.

Mr. MARTIN reported various alterations in the local prizes which had been agreed to by the Local Committee, who had consented to offer three prizes of 3*l.*, 2*l.*, and 1*l.* for cream (Victoria) cheeses. The Committee recommended that the administrative County of London be added to the list of Counties in the Society's District A.

Showyard Works.

Sir JACOB WILSON (Chairman) reported that the Committee had considered the arrangements for refreshments at the Cambridge Meeting, in connection with plans kindly forwarded by Mr. Marshall Stephenson as to the procedure of the Yorkshire Agricultural Society. The thanks of the Committee were due to Mr. Stephenson for the valuable information given by him. After careful consideration, the Committee recommended that in place of the one open bar for sandwiches and light refreshments advised by them at the last meeting, two such bars be provided, and that there be also one large dining-room, with open bars, on the same plan as that of the Yorkshire Agricultural Society, together with two small dining-rooms, two temperance sheds, and one workmen's shed.

The Committee recommended the acceptance of the tender of Mr. John Unite for the supply of chairs at the Cambridge Meeting on the same terms and conditions as at Chester; and that the offer of Mr. Munsey, of Cambridge, to supply the turret clock and clocks for the several offices in the showyard be accepted with thanks; also that the same arrangements be made for the supply of weighbridges for the Cambridge Meeting as at Chester. The Committee had decided to meet in future at 2.45 p.m., instead of three o'clock. During the year they had met nine times, and made nine reports.

Selection.

Earl CATHCART (Chairman) presented the recommendations of this Committee that the Committee of Inspection for the Country Meeting of 1895 be constituted as follows:—The President, the Earl of Feversham, the Hon. Cecil T. Parker, Sir Joseph Spearman, Bart., Mr. E. V. V. Wheeler, and the Secretary, the Committee to report to the next meeting of Council on February 7. The Committee recommended that the honorary membership of the Society be conferred upon Professor Auguste Chauveau, M.D., LL.D., Inspector General of the Veterinary Department of the French Government, in recognition of his distinguished services to veterinary science as applied to agriculture. The Committee had met seven times during the year, and made seven reports.

Election of an Honorary Member.

Earl CATHCART, in formally moving the election of Professor Chauveau as an Honorary Member, said he had high scientific authority for stating that Professor Chauveau stood pre-eminent as a pathologist, physiologist, and veterinary anatomist, and was eminently worthy of their honorary membership.

Sir NIGEL KINGSCOTE said that he had the greatest possible pleasure in seconding the proposition made by the noble Lord for the election of the distinguished veterinarian, Professor Chauveau, as an Honorary Member of that Society. Their Society had always—and rightly so—been jealous of its honorary membership, bestowing it but rarely, and only upon men of high attainments. In asking Professor Chauveau to associate himself with the Society as one of its honorary members, he (Sir Nigel) felt that the Society would be conferring a distinction upon itself. Professor Chauveau's renown as an investigator was world-wide, and it was only necessary to mention his classical researches on the subject of anthrax to secure for his election an unanimous vote. He had had the pleasure of making Professor Chauveau's personal acquaintance in August, 1891, when he was one of the pillars of the section of the International Congress of Hygiene over which he (Sir Nigel) presided; and he was sure that all those associated with that section would cordially support the proposition of his election as one of their Honorary Members.

Education.

Lord MORETON (Chairman) reported that of the thirty-two candidates from eleven schools who entered for the Society's Junior Examination on the 7th and 8th ultimo, sixteen obtained the number of marks necessary to qualify them for scholarships and certificates, in the event of their complying in the forthcoming year with the conditions

of the examinations. The Committee presented a report on the results of the examination for publication in the Journal (see page 799).

Of the grant of 500*l.* made to them for the year 1893, the Committee had actually expended 375*l.* 8*s.* 11*d.*, as against 362*l.* 13*s.* 10*d.* for the year 1892. To the above sums must, however, be added the cost to the Society of providing life membership to the winners of first-class certificates in the Senior Examination, fourteen in 1893 (at 15*l.* each, 210*l.*), as against eight in 1892 (at 15*l.* each, 120*l.*). The Committee moved for a renewal of their grant of 500*l.* for the year 1894. Having regard to the large number of candidates who now entered for the Society's Senior Examinations, the Committee had discussed at some length the question as to whether the life membership of the Society should in future be conferred upon all winners of first-class certificates. Eventually, it was agreed to recommend that in future life membership of the Society should only be conferred upon the first five winners of first-class certificates, placed in order of merit. This would not affect the four money prizes, which would be awarded as before. The Committee had met seven times during the year, and made seven reports.

Education Life Memberships.

Mr. PELL said that, with reference to that portion of the report which dealt with the education life memberships conferred upon the winners of first-class certificates, whilst he did not in any way wish to discourage educational merit, he desired to draw the attention of the Council to the circumstances connected with these admissions to life membership, which had commenced in 1869, and had extended to the present time. In that period there had been ninety-seven additions of that character made to their membership, which represented (at 15*l.* each) a money loss to the Society of 1,455*l.* The average admissions to life membership during the period mentioned had been about 4 per year. In 1889, however, there were 10 admissions; in 1890, 6; in 1891 and 1892, 8 each year; but during the present year, in which there seemed to be a spring in intellectual activity, there had been no less than 14 admissions. These free life memberships in such numbers constituted a drain upon their finances. Let the Council remember that these were all young men, and that they were all likely to have a lengthened period of existence. It seemed to him that it was a bad principle to commence pensioning young people. It was a feature in the finances of the Society likely to become one of great importance, and they ought to consider the ulterior consequences of the scheme before allowing it to continue longer. He begged to give notice of a motion on the subject, in order to test the view of the Council as to whether (the Education Committee having already resolved to limit the number of education life memberships) they might not go a step further, even to the withdrawal of this form of membership altogether.

Sir NIGEL KINGSCOTE said he had great sympathy with Mr. Pell's proposal, for it should be remembered that the Council gave very substantial money prizes, so that the most successful candidates in the examination were already rewarded.

Mr. FOSTER said that the majority of the Education Committee thought that they were doing away with any abuse that might have existed in the past by reducing the number of life memberships to 5, which was a very fair decision to make. He did not think this matter should be gauged from a financial point of view, and he would therefore support the Committee.

Dairy.

The Hon. CECIL T. PARKER (Chairman) reported that the Committee had again considered and finally revised the prize-sheet for dairy cattle, poultry, produce, and butter-making competitions for the Cambridge Meeting of 1894. They recommended that prizes for dairy cattle be given in two classes, one for milk and the other for butter-producers, as follows:—

Class I.—Cows, in-milk, of any weight, breed or cross, giving the *largest quantity of milk*, provided the milk be, on the average of two milkings, up to the standard adopted by the Society of Public Analysts.

Class II.—Cows, in-milk, of any weight, breed or cross, giving the *greatest weight of butter-fat*, as ascertained by chemical analysis, provided the yield of milk obtained in two milkings be not less than 25 lb.

A letter had been received from the English Jersey Cattle Society, asking for a copy of the chemical analysis, made at Chester, of the milk of the cows in the competition of dairy cattle. The Secretary had been instructed to reply that a note upon the comparative merits of the chemical test and the churn test, as applied to the judging of dairy cattle, and based upon the Chester trials, would shortly appear in the Society's Journal, which would be forwarded to the English Jersey Society (see page 844).

The Committee had reduced the prizes in the poultry department by the omission of separate classes for certain breeds, and by the amalgamation of the chicken classes in certain other breeds for which there had lately been but few entries. The question had been discussed as to an arrangement with the railway companies for the cartage of poultry and produce between the station and the showyard at the Society's Country Meetings, and the Committee recommended the adoption of a draft letter to the companies, prepared by the Secretary, proposing a permanent arrangement, under which in future the Society would undertake the payment at 3*d.* per package each way of the carriage of poultry and produce between the stations and the showyards at the Society's Country Meetings. The Committee reported that during the year 1893 they had expended 69*l.* in prizes for butter-making competitions, and 37*l.* for judges and expenses, or 106*l.* in all, and they moved for the renewal of their annual grant of 100*l.* for the year 1894. The Committee had met eight times, and made eight reports during the year.

Standing Committees for 1894.

The following Standing Committees were appointed for 1894:—Finance, House, Journal, Chemical, Seeds and Plant Diseases, Veterinary, Stock Prizes, Implement, General Cambridge, Showyard Works, Selection, Education, Dairy.

The present members of the various Standing Committees were (with some exceptions) re-appointed to those Committees. The Duke of Westminster was added to the House Committee as an elected member, and Mr. Stanyforth to the Implement Committee. To replace Mr. Ashworth, Mr. Taylor, and Mr. Tremayne, who retired by rotation from the Committee of Selection, the Hon. Cecil T. Parker, Sir Jacob Wilson, and Mr. Alfred Darby were elected.

Committee for Selection of Judges.

On the motion of the Hon. C. T. Parker, seconded by Sir Jacob Wilson, a Committee was appointed to recommend judges of stock, poultry, and produce at the Cambridge Meeting; such Committee to consist of the members of the Stock Prizes Committee and the Stewards of the several departments, and to sit for the first time in February next.

Country Meeting of 1895.

The invitation from the Corporation of Darlington for the holding of the Country Meeting of 1895 was further considered, and was, with the memorials received in support thereof, referred to the Committee of Inspection, with instructions to bring up a report at the next meeting of the Council, to be held on February 7 next.

Date of Next Meeting.

The report from the Council to the General Meeting having been prepared, and various letters and other documents having been laid upon the table, the Council adjourned over the Christmas recess until Wednesday, February 7, 1894.

Proceedings at Half-yearly General Meeting of Governors and Members,

HELD AT THE SOCIETY'S HOUSE, 12 HANOVER SQUARE.

THURSDAY, DECEMBER 7, 1893,

THE DUKE OF DEVONSHIRE, K.G. (PRESIDENT), IN THE CHAIR.

Present:—

Members of Council.—The Earl of Ravensworth, Lord Brougham and Vaux, Lord Moreton, Sir Jacob Wilson, Messrs. John H. Arkwright, Alfred Ashworth, H. Chandos-Pole-Gell, Charles Clay, Lieut.-Col. Curtis-Hayward, Messrs. J. Marshall Dugdale, S. P. Foster, Hugh Gorringe, Anthony Hamond, C. S. Mainwaring, A. J. Smith, Henry Smith, Martin J. Sutton, E. V. V. Wheeler, Charles Whitehead, and C. W. Wilson.

Members.—Sir John Kennaway, Bart., M.P., Professor Brown, C.B., Messrs. Stephen F. Castle, Horace F. Cox, W. Everitt, H. J. Greenwood, Surgeon Lieut.-Colonel Ince, M.D., Messrs. Frederick King, J. Kersley Fowler, B. F. Posford, Edmond Riley, Thomas Stirton, J. Herbert Taylor, John Thornton, John Wrightson, and G. D. Yeoman.

Officers.—Mr. Ernest Clarke, Secretary; Dr. J. Augustus Voelcker, Consulting Chemist.

President's Address.

The PRESIDENT, in opening the proceedings, said that as this was the first occasion on which he had occupied the Presidential chair at a general meeting of Governors and Members of the Society, he desired to take the opportunity of repeating the thanks, expressed by him at the meeting held in the Chester Showyard last June, for the honour which they had conferred upon him in electing him the President of that distinguished and important body. His personal relations with the Society had unfortunately not been of very long duration, nor of a very close and intimate character; but as the successor of his father, who became a Governor of the Society three days after its formation, in 1838, he might at all events claim some association with its work from the very commencement of its history. (Hear, hear.) The members had been asked to meet at 12 Hanover Square that day, because it was probably the last occasion on which a general meeting of the Society would be held within the walls of its old home—a home in which, during the period of over half a century, it had, he hoped, done good service to agriculture, but which had now become too small for its comprehensive and ever-increasing operations. It so happened that his father was President just about the middle of the Society's occupancy of its present house, namely, in 1869–1870, and they would perhaps allow him to give a few comparative figures of that time and the present, as illustrating the progress which the Society had since made.

At a meeting held in that room on December 8, 1869, when his father was in the chair, it was announced that there had been an increase of membership during the past year, and that there was then a total of 5,597 members. To-day he had the pleasure to announce that the total number of members of the Society was 11,219, or more than double.

Omitting the prizes for implements (as these varied according to the circumstances of each year), he found that whilst in December, 1869, it was announced that at the Oxford Meeting of 1870 the total amount of prizes offered would be 3,130*l.*, the Council reported that day that at the Cambridge Meeting next year prizes amounting to 5,660*l.* would be offered, or nearly double. Whilst at Oxford prizes were offered in only 109 classes —24 for horses, 34 for cattle, 32 for sheep, and 19 for pigs—at the Cambridge Meeting next year there would be 319 classes, including 55 for horses, 69 for cattle, 59 for sheep, 24 for pigs, besides 76 for poultry and 36 for produce, which did not appear at all in the Oxford prize-sheet. There would, moreover, be butter-making and horse-shoeing competitions, and a working dairy, features which were unknown in the earlier showyards.

The meeting of December 8, 1869, to which he had referred, was also of some historical importance in the annals of the Society, because it was then that the Council first announced their decision (which had such far-reaching results in the repression of the adulteration of fertilisers and feeding-stuffs) to publish quarterly reports of the Chemical Committee, giving, for the protection of members of the Society, the names of the manufacturers and vendors who had supplied impure and adulterated articles, or who had given to their customers inaccurate descriptions of goods sold.

The energy which the Society had displayed in putting a stop to the adulteration of the articles essential for farming operations was only on a par with its activity in other directions; and he was sure they must all feel that it was bearing a great and useful part in the public institutions in this country. They might hope that, with larger and improved quarters, it might continue to carry on its work in perpetuity for, in the words of their charter, "the general advancement of English agriculture." (Hear, hear.)

Report of Council.

The Report of the Council for the past half-year having been taken as read, the Secretary gave a brief synopsis of its contents (see page 779).

Sir JOHN KENNAWAY, Bart., M.P., in moving the adoption of the report, said he felt sure that he should be expressing the feelings of all the members of the Society in heartily welcoming his Grace the President on the occasion of his occupying the chair at that meeting. (Hear, hear.) The hereditary interest of his Grace's family and his personal sympathy with agriculture were evidenced by his presence there that day. The report had much of encouragement and hope in it. They noticed with sympathy and regret the losses of those who had done excellent work for the Society in the past. Their loss would be felt, but it was satisfactory to find that there were 160 new members to be added to their body. They must congratulate the Society on the permanent home in which it would very shortly be settled, and they were grateful to those by whose munificence the Society was able to secure its new quarters. It was a source of satisfaction to notice the success of the Society's Meeting held at Chester this year, and it was to be hoped that a still better result might be obtained at Cambridge next year. Various matters were referred to in the report as to what legislation had attempted to do for agriculture in the past few years. He thought they might congratulate themselves that they had been able to lay their case before Parliament, and that they had been enabled, very greatly by the exertions of Mr. Chaplin and other members, to place upon the Statute Book measures which would certainly be a great help to them. They were thankful that the Board of Agriculture had been established, and for the passing of the Contagious Diseases (Animals) Act, under which swine fever was now to be dealt with. Those were evidences that agriculture was able to make its voice heard, and he hoped that any other legislation which they might reasonably bring forward would be met as favourably. Agriculturists generally would await with interest the report of the Royal Commission, as to which it was impossible to make any prophecy at the present time. When burdens were

pressing very heavily upon agriculturists, they, as ratepayers, could not but regard with alarm the addition to the rates which was contemplated by the Parish Councils Bill. They could only hope that the benefits anticipated by the promoters of that measure would be realised. All parties would agree that something should be done to give the agricultural labourer an interest in his parish, and induce him to remain to assist in cultivating the land. (Hear, hear.)

Mr. JOHN THORNTON seconded the adoption of the very able and excellent report, one of the best that had been presented to the Members.

The motion was then put to the meeting and carried unanimously.

Election of Auditors.

Mr. THOMAS STIRTON moved, Mr. G. D. YEOMAN seconded, and it was resolved: "That the best thanks of the Society be given to the Auditors (Messrs. C. Gay Roberts, A. H. Johnson, and S. B. L. Druce) for their services, and that they be re-elected for the ensuing year."

Issue of Reports of the Council.

The PRESIDENT having put the usual inquiry as to whether any member present had any remark to make, or suggestion to offer, for the consideration of the Council,

Surgeon-Lieut.-Col. INCE suggested that the reports of the Council should be placed in the members' hands before the meeting was held. This was a grievance which had been mentioned at their meetings more than once before, and he did not know why the Council were unable to comply with what he believed was the universal wish. He should be glad, if it were found practicable, for the report to be placed in the hands of members who might wish to have it a few days before the meeting took place. The only alternatives that occurred to him were that the report should be prepared at the meeting of the Council held in the previous month, or that the Council Meeting should be held a few days before the General Meeting.

Mr. G. D. YEOMAN endorsed the remarks of the last speaker. He had himself made a similar suggestion before, and had intended to bring it up again at that meeting. He understood that the answer of the Council was that the report was only prepared the day before the General Meeting; but perhaps it might be possible to issue beforehand a report, complete as far as possible, adding on the day a fly-leaf containing the latest information. He recognised that it would be an undue tax on the Society to send out the report to all the 11,000 members, but would suggest that any member who wrote a few days beforehand asking for the report might have a copy sent to him.

The PRESIDENT said that he understood that the question raised had been fully discussed before, and that there were practical difficulties in the matter. The question, however, should receive the consideration of the Council.

Lord MORETON mentioned, as one piece of information that could not be included if the report were issued beforehand, the result of the Society's examinations, which were of great interest to members.

Sir JACOB WILSON pointed out that, under Clause 6 of the charter, the winter General Meeting of the Society must be held in December, and by long prescription this meeting had been held on the Thursday of the Smithfield week, the Council meeting to prepare the report being held on the previous day. It was impossible until the December meeting of Council to arrange the details of the prize-sheet for the forthcoming year. and, indeed, one of their Standing Orders required the prize-sheet to be settled at the December meeting. As undoubtedly one of the most interesting and popular features of the report to a very large section of the members was the information given as to the prizes proposed to be offered at the next Country Meeting, he feared it would not give satisfaction to issue in advance a report which did not contain these particulars.

The PRESIDENT said he was reminded that this matter had been considered by the Council on two occasions before, on the suggestion of Mr. Yeoman, and the following were the replies of the Council:—

March 7, 1888.—The Council have given due consideration to the suggestion made by Mr. Yeoman at the December General Meeting that the half-yearly reports of the Council should be issued to members in anticipation of the General Meetings. Looking to the usual attendance at these meetings, the Council could not in any case recommend that the serious expense of printing and posting to each member the half-yearly reports should be incurred. They would point out, moreover, that the December report is only settled by the Council the day before the General Meeting, and could not, therefore, be circulated as proposed. The report to the May meeting is in a somewhat different position. This meeting is directed by Clause 6 of the Charter to be held on May 22 in each year, and the report to be presented at it is, with the exception of the results of the Senior Examination, settled at the Council Meeting on the first Wednesday in that month. If thought well, the report, so far as settled, might be communicated to the agricultural press in anticipation of the meeting, so that it appeared in the papers published a few days before May 22.

June 5, 1889.—As stated in the proceedings of March 7, 1888, the Council could not recommend that the serious expense of printing and posting to every member each half-yearly report should be incurred; but the report at the recent meeting was issued in advance to the agricultural newspapers, and was published in full in at least two of them. On the mornings of the General Meetings the Council-room is available after eleven o'clock to members who may wish to attend and consider the report in anticipation of the public meeting.

The suggestion made by Dr. Ince and Mr. Yeoman should, however, again be laid before the Council for their consideration.

Vote of Thanks to the Chairman.

No other member rising,

Mr. J. KERSLEY FOWLER moved a vote of thanks to the Duke of Devonshire for taking the chair on that occasion, and said the Society must congratulate itself upon having for its President so distinguished a public man as the Duke. Mr. Fowler took occasion to draw attention to the revival of the cultivation of beet and the manufacture of sugar in this country. The results were perfectly astounding, and well merited the study of members.

Mr. EDMOND RILEY seconded the motion, which was carried by acclamation.

The PRESIDENT, in reply, said that he had only again to express his sincere thanks for the compliment paid to him by electing him as President. As he had said at the opening, his connection with the Society was rather of an hereditary than of a personal character; but he hoped that from the experience he should gain during his year of office it might be in his power to be of some service in the future. Although he had no territorial associations with the locality in which the Meeting was to be held next year, he hoped that as Chancellor of the University of Cambridge he might be regarded as not altogether out of place as the President of the Society for the coming year. He trusted that the meeting to be held at Cambridge next June would be as successful and satisfactory in its results as that at Chester this year. (Hear, hear.)

The proceedings then terminated.

NOTICE OF ANNIVERSARY GENERAL MEETING.

Notice is hereby given that the Fifty-fifth Anniversary Meeting of Governors and Members of the Royal Agricultural Society of England will, in accordance with Clause 6 of the Charter, be held on Tuesday, May 22, 1894, at noon, when the half-yearly Report of the Council will be read, and the election of the President, Trustees, and Vice-Presidents, and of twenty-five Members of Council, will take place.

ERNEST CLARKE,
Secretary.

December, 1893.

PRIZE LIST

FOR

CAMBRIDGE MEETING, JUNE 23 to 29, 1894.

Total value of Prizes offered (exclusive of Champion Prizes, Medals, and Cups offered by Breed Societies), £5,865, of which amount £1,022 are contributed by the Cambridge Local Committee.

Last Day for Receipt of Entries of Live Stock, Poultry, and Produce, Tuesday, MAY 1, 1894. (Post Entries at Extra Rates may be tendered up to Saturday, MAY 12, 1894.)

CHAMPION PRIZES.

HORSES.

HACKNEY	Best STALLION	Gold Medal by the Hackney Horse Society. Prize of 20 Guineas by the Local Committee.
	Best MARE or FILLY	Gold Medal by the Hackney Horse Society. Prize of 20 Guineas by the Local Committee.
SHIRE	Best STALLION	Gold Medal by the Shire Horse Society. Prize of 20 Guineas by the Local Committee.
	Best MARE or FILLY	Gold Medal by the Shire Horse Society. Prize of 20 Guineas by the Local Committee.
CLYDESDALE	Best STALLION	Prize of £20 by the Clydesdale Horse Society.
	Best MARE or FILLY	Prize of £20 by the Clydesdale Horse Society.
SUFFOLK	Best STALLION	Prize of 20 Guineas by the Local Committee.
	Best MARE or FILLY	Prize of 20 Guineas by the Local Committee.

CATTLE.

SHORTHORN	Best BULL	Prize of £20 by the Shorthorn Society.
	Best COW or HEIFER	Prize of £20 by the Shorthorn Society.
RED POLLED	Best BULL	Prize of £15 by the Red Polled Cattle Society.
	Best COW or HEIFER	Prize of £15 by the Red Polled Cattle Society.
ABERDEEN ANGUS.	Best BULL, COW, or HEIFER	Gold Medal by the Polled Cattle Society.
KERRY	Best BULL, COW, or HEIFER	Prize of 10 Guineas by the Kerry and Dexter Cattle Society.
DEXTER KERRY.	Best BULL, COW, or HEIFER	Prize of 10 Guineas by the Kerry and Dexter Cattle Society.

SHEEP.

SHROPSHIRE	Best RAM	Gold Medal by the Shropshire Sheep Breeders' Association.
SUFFOLK	Best RAM	Prize of £20 by the Suffolk Sheep Society.

PIGS.

LARGE WHITE	Best BOAR or SOW	Silver Cup value 5 Guineas by the National Pig Breeders' Association.
MIDDLE WHITE	Best BOAR or SOW	Silver Cup value 5 Guineas by the National Pig Breeders' Association.
SMALL WHITE	Best BOAR or SOW	Silver Cup value 5 Guineas by the National Pig Breeders' Association.
TAMWORTH	Best BOAR or SOW	Silver Cup value 5 Guineas by the National Pig Breeders' Association.

HORSES (£1,872).

HUNTERS.

Class		Prizes 1st £	2nd £	3rd £
1	MARE (with foal at foot), up to 15 st. and upwards	20	10	5
2	MARE (with foal at foot), up to between 12 and 15 st.	20	10	5
3	MARE OR GELDING, up to 15 st., foaled in 1890 [1]	20	10	5
4	MARE OR GELDING, up to 12 st., foaled in 1890 [1]	20	10	5
5	FILLY, foaled in 1891	15	10	5
6	FILLY, foaled in 1892	15	10	5
7	FILLY, foaled in 1893	15	10	5

CLEVELAND BAYS AND COACH HORSES.

8	STALLION, foaled in 1891 or 1892	15	10	5
9	MARE (with foal at foot)	15	10	5

HACKNEYS.

10	STALLION, foaled in 1891, above 15 hands	15	10	5
11	STALLION, foaled in 1891, above 14 hands and not over 15 hands	15	10	5
12	STALLION, foaled in 1892	15	10	5
13	STALLION, foaled in 1893	15	10	5
14	MARE (with foal at foot), above 15 hands	15	10	5
15	MARE (with foal at foot), above 14 and not over 15 hands	15	10	5
16	FILLY, foaled in 1891 [1]	15	10	5
17	FILLY, foaled in 1892	15	10	5
18	FILLY, foaled in 1893	15	10	5
19	COLT FOAL, produce of a mare exhibited in Class 14 or 15 [1]	15	10	5[1]
20	FILLY FOAL, produce of a mare exhibited in Class 14 or 15 [1]	15	10	5[1]
21	MARE OR GELDING, above 14 hands, up to 15 stones, foaled in 1888, '89, or '90 [1]	15	10	5
22	MARE OR GELDING, above 14 hands, up to 12 stones, foaled in 1888, '89, or '90 [1]	15	10	5

PONIES.

23	STALLION, not over 14 hds.	15	10	5
24	MARE (with foal at foot), not exceeding 14 hands	15	10	5

HARNESS HORSES AND PONIES.

25	MARE OR GELDING, of any age, above 14 hands [1]	15	10	5
26	MARE OR GELDING, of any age, not over 14 hands [1]	15	10	5

SHIRE.

Class		Prizes 1st £	2nd £	3rd £
27	STALLION, foaled in 1888, 1889, or 1890 [1]	20	10	5
28	STALLION, foaled in 1891	20	10	5
29	STALLION, foaled in 1892	20	10	5
30	STALLION, foaled in 1893	20	10	5
31	MARE (with foal at foot)	20	10	5
32	MARE, foaled before 1891, not with foal at foot, but stinted in 1894 [1]	20	10	5
33	FILLY, foaled in 1891	15	10	5
34	FILLY, foaled in 1892	15	10	5
35	FILLY, foaled in 1893	15	10	5
36	COLT FOAL, produce of a mare exhibited in Class 31 [1]	15	10	5
37	FILLY FOAL, produce of a mare exhibited in Class 31 [1]	15	10	5

CLYDESDALE.

38	STALLION, foaled in 1891	20	10	5
39	STALLION, foaled in 1892	20	10	5
40	MARE (with foal at foot)	20	10	5
41	FILLY, foaled in 1891	15	10	5
42	FILLY, foaled in 1892	15	10	5

SUFFOLK.

43	STALLION, foaled in 1888, 1889, or 1890 [1]	20	10	5
44	STALLION, foaled in 1891	20	10	5
45	STALLION, foaled in 1892	20	10	5
46	STALLION, foaled in 1893	15	10	5
47	MARE (with foal at foot)	20	10	5
48	MARE, foaled before 1891, not with foal at foot, but stinted in 1894 [1]	20	10	5
49	FILLY, foaled in 1891	15	10	5
50	FILLY, foaled in 1892	15	10	5
51	FILLY, foaled in 1893	15	10	5
52	COLT FOAL, produce of a mare exhibited in Class 47 [1]	15	10	5
53	FILLY FOAL, produce of a mare exhibited in Class 47 [1]	15	10	5

AGRICULTURAL.

54	GELDING, foaled in 1890 or 1891 [1]	10	5	3
55	GELDING, foaled in 1890 or 1891, got by a regd. Suffolk Stallion [1]	10	5	3

[1] Offered by the Cambridge Local Committee.

CATTLE (£1,563).

Class		Prizes 1st £	2nd £	3rd £
	SHORTHORN.			
56	Bull, calved 1889, 1890, or 1891	15	10	5
57	Bull, calved in 1892	15	10	5
58	Bull, calved in 1893	15	10	5
59	Bull, calved in 1894 [1]	10	5	–
60	Cow, in-milk or in-calf, calved previously to 1891	15	10	5
61	Heifer, in-milk or in-calf, calved in 1891	15	10	5
62	Heifer, calved in 1892	15	10	5
63	Heifer, calved in 1893	10	7	5
64	Heifer, calved in 1894 [1]	10	5	–
	HEREFORD.			
65	Bull, calved 1889, 1890, or 1891	15	10	5
66	Bull, calved in 1892	15	10	5
67	Bull, calved in 1893	15	10	5
68	Cow, in-milk or in-calf, calved previously to 1891.	15	10	5
69	Heifer, in-milk or in-calf, calved in 1891	15	10	5
70	Heifer, calved in 1892	15	10	5
71	Heifer, calved in 1893	10	7	5
	DEVON.			
72	Bull, calved 1889, 1890, or 1891	15	10	5
73	Bull, calved in 1892	15	10	5
74	Bull, calved in 1893	10	5	–
75	Cow or Heifer, in-milk or in-calf, calved previously to or in 1891	15	10	5
76	Heifer, calved in 1892	15	10	5
77	Heifer, calved in 1893	10	7	5
	SUSSEX.			
78	Bull, calved 1889, 1890, or 1891	15	10	5
79	Bull, calved in 1892	15	10	5
80	Bull, calved in 1893	10	5	–
81	Cow or Heifer, in-milk or in-calf, calved previously to or in 1891	15	10	5
82	Heifer, calved in 1892	15	10	5
83	Heifer, calved in 1893	10	7	5
	WELSH.			
84	Bull, calved 1889, 1890, or 1891	10	5	–
85	Bull, calved in 1892 or 1893	10	5	–
86	Cow, in-milk or in-calf, calved previously to or in 1891	10	5	–
87	Heifer, calved in 1892	10	5	–
88	Heifer, calved in 1893	10	5	–

Class		Prizes 1st £	2nd £	3rd £
	RED POLLED.			
89	Bull, calved 1889, 1890, or 1891	15	10	5
90	Bull, calved in 1892	15	10	5
91	Bull, calved in 1893	10	5	–
92	Cow, in-milk or in-calf, calved previously to 1891	15	10	5
93	Heifer, in-milk or in-calf, calved in 1891	15	10	5
94	Heifer, calved in 1892	15	10	5
95	Heifer, calved in 1893	10	7	5
	ABERDEEN ANGUS			
96	Bull, calved 1889, 1890, or 1891	10	5	–
97	Bull, calved 1892 or 1893	10	5	–
98	Cow or Heifer, in-milk or in-calf, calved previously to or in 1891	10	5	–
99	Heifer, calved in 1892 or 1893	10	5	–
	GALLOWAY.			
100	Bull, calved 1889, 1890, or 1891	10	5	–
101	Bull, calved in 1892 or '93	10	5	–
102	Cow or Heifer, in-milk or in-calf, calved previously to or in 1891	10	5	–
103	Heifer, calved in 1892 or 1893	10	5	–
	AYRSHIRE.			
104	Bull, calved in 1891, 1892, or 1893	10	5	–
105	Cow or Heifer, in-milk or in-calf.	10	5	–
	JERSEY.			
106	Bull, calved in 1890, 1891, or 1892	15	10	
107	Bull, calved in 1893	10	5	–
108	Cow, in-milk, calved previously to or in 1890	15	10	5
109	Cow, in-milk, calved in 1891	15	10	5
110	Heifer, in-milk or in-calf, calved in 1892	15	10	5
111	Heifer, calved in 1893	10	7	5
	GUERNSEY.			
112	Bull, calved in 1890, 1891, or 1892	10	5	–
113	Bull, calved in 1893	10	5	–
114	Cow or Heifer, in-milk, calved previously to or in 1891	10	5	–
115	Heifer, calved in 1892	10	5	–
116	Heifer, calved in 1893	10	5	–

[1] Offered by the Cambridge Local Committee.

CATTLE—*continued.*

KERRY.

Class		Prizes 1st £	2nd £	3rd £
117	Bull, calved in 1891, 1892, or 1893	10	5	–
118	Cow, in-milk or in-calf, calved previously to or in 1891	10	5	–
119	Heifer, calved in 1892 or 1893 [1]	10	5	3

DEXTER KERRY.

120	Bull, calved in 1891, 1892, or 1893	10	5	–
121	Cow, in-milk or in-calf, calved previously to or in 1891	10	5	–
122	Heifer, calved in 1892 or 1893 [1]	10	5	3

DAIRY COWS.

Class		Prizes 1st £	2nd £	3rd £
123	Cow, in-milk, of any weight, breed, or cross, giving the *largest quantity of milk*, on the average of two milkings, up to the standard adopted by the Society of Public Analysts	15	10	5
124	Cow, in-milk, of any weight, breed, or cross, giving the *greatest weight of butter-fat*, as ascertained by chemical analysis, provided the yield of milk obtained in two milkings be not less than 25 lb.	15	10	5

SHEEP (£1,215).

LEICESTER.

125	Two-Shear Ram	10	5	–
126	Shearling Ram	15	10	5
127	Pen of Three Ram Lambs, dropped in 1894	10	5	–
128	Pen of Three Shearling Ewes of the same flock	15	10	5

COTSWOLD.

129–132 Same as for Leicester.

LINCOLN.

133	Two-Shear Ram	10	5	–
134	Shearling Ram	15	10	5
135	Pen of Three Ram Lambs, dropped in 1894	10	5	–
136	Pen of Three Shearling Ewes of the same flock	15	10	5
137	Pen of Three Ewe Lambs, dropped in 1894 [1]	15	10	5

OXFORD DOWN.

138–142 Same as for Lincoln.

SHROPSHIRE.

143–147 Same as for Lincoln.

SOUTHDOWN.

148–152 Same as for Lincoln.

HAMPSHIRE DOWN.

153–157 Same as for Lincoln.

SUFFOLK.

158–162 Same as for Lincoln.

WENSLEYDALE.

163	Two-Shear or Shearling Ram	10	5	–
164	Pen of Three Ram Lambs, dropped in 1894	10	5	–
165	Pen of Three Shearling Ewes of same flock	10	5	–

BORDER LEICESTER.

166	Two-Shear Ram	10	5	–
167	Shearling Ram	10	5	–
168	Pen of Three Shearling Ewes of the same flock	10	5	–

SOMERSET AND DORSET HORN.

169	Shearling Ram	10	5	–
170	Pen of Three Ram Lambs, dropped after Dec. 1, 1893	10	5	–
171	Pen of Three Shearling Ewes of the same flock	10	5	–

KENTISH OR ROMNEY MARSH.

172	Shearling Ram	10	5	–
173	Pen of Three Shearling Ewes of the same flock	10	5	–

CHEVIOT.

174	Two-Shear or Shearling Ram	10	5	–
175	Pen of Three Shearling Ewes, of the same flock	10	5	–

BLACK-FACED MOUNTAIN.

176 & 177 Same as for Cheviot.

LONK.

178 & 179 Same as for Cheviot.

HERDWICK.

180 & 181 Same as for Cheviot.

WELSH MOUNTAIN.

182 & 183 Same as for Kentish or Romney Marsh.

[1] Offered by the Cambridge Local Committee.

PIGS (£432).

Classes		
184—187	Large White	For Prizes see below
188—191	Middle White	
192—195	Small White	
196—199	Berkshire	
200—203	Any Other Black Breed	
204—207	Tamworth	

In each of the above breeds the following prizes will be given:—

	1st	2nd	3rd
	£	£	£
BOAR, farrowed in 1893	10	5	3
PEN OF THREE BOAR PIGS, farrowed in 1894	10	5	3
BREEDING SOW, farrowed previously to or in 1893	10	5	3
PEN OF THREE SOW PIGS, farrowed in 1894	10	5	3

POULTRY (£212).

Prizes are offered for the best Cock, Hen, Cockerel, and Pullet of the following Breeds:—

Classes		s.	s.	s.
208—211	Dorking, Coloured	30	15	10
212 & 213	Dorking, Silver Grey	30	15	10
214 & 215	Dorking, White	30	15	10
216 & 217	Dorking, Silver Grey or White	30	15	10
218—221	Game, Old English	30	15	10
222—225	Game, Indian	30	15	10
226—229	French	30	15	10
230—235	Brahma and Cochin	30	15	10
236—239	Langshan	30	15	10
240—243	Wyandotte	30	15	10
244—247	Plymouth Rock	30	15	10
248—251	Minorca	30	15	10
252—255	Leghorn	30	15	10
256 & 257	Andalusian	30	15	10
258 & 259	Hamburgh	30	15	10
260—263	Any other variety except Bantams	30	15	10

Prizes are offered for the best Drake, Duck, Young Drake, and Duckling of the following Breeds:—

264—267	Aylesbury	30	15	10
268 & 269	Rouen	30	15	10
270-273	Any Other Useful Breed	30	15	10
		£	£	s.
274	Gander	2	1	10
275	Goose	2	1	10
276	Turkey Cock	2	1	10
277	Turkey Hen	2	1	10
	Table Poultry.	s.	s.	s.
278	Pair of Cockerels of 1894, of any pure breed	30	15	10
279	Pair of Pullets, ditto	30	15	10
280	Pair of Cockerels of 1894, 1st cross from pure breeds	30	15	10
281	Pair of Pullets, ditto	30	15	10
	Table Ducklings.			
282	Pair of Ducklings of 1894, of any pure breed	30	15	10
283	Pair of Ducklings of 1894, 1st cross from pure breeds	30	15	10

PRODUCE (£265).

BUTTER.

Class		
284	ONE KEG OR OTHER PACKAGE OF BUTTER, not less than 14 lb. and under 40 lb. in weight. (Entries close Jan. 1, 1894.)	1st 10*l.* 2nd 5*l.*
285	2lb. FRESH BUTTER, slightly salted, made up in pounds	Four of 5*l.* each Four of 3*l.* each Four of 1*l.* each
286	2 lb. FRESH BUTTER, slightly salted, made up in pounds, from milk that has been drawn from cows other than Channel Islands or cows crossed with Channel Islands breeds.	Four of 5*l.* each Four of 3*l.* each Four of 1*l.* each

CHEESE.

		Prizes 1st	2nd	3rd
		£	£	£
287	3 CHEDDAR CHEESES, of not less than 50 lb. each, made in 1894	10	5	3
288	3 CHESHIRE CHEESES, of not less than 40 lb. each, made in 1894	10	5	3
289	3 STILTON CHEESES made in 1894	5	3	2
290	3 CHEESES, of any other British make, made in 1894	5	3	2
291	3 DOUBLE COTTENHAM CHEESES[1]	5	3	2
292	3 CREAM CHEESES (Victoria), under 2lb. weight each[1]	3	2	1
293	CURD & CREAM CHEESES (Double York), under 2 lb. weight each[1]	3	2	1
294	3 CURD CHEESES (Single York), under 2 lb. weight each[1]	3	2	1

CIDER AND PERRY.

295	Cask of CIDER, made 1893	5	3	2
296	One Doz. CIDER, made 1893	5	3	2
297	One Doz. CIDER, made before 1893	5	3	2
298	One Doz. PERRY	5	3	2

JAMS AND PRESERVED FRUITS.

299	WHOLE-FRUIT JAMS	3	2	1
300	BOTTLED FRUITS	3	2	1
301	PRESERVED FRUITS for Dessert	3	2	1

[1] Offered by the Cambridge Local Committee.

PRODUCE—*continued.*

HIVES, HONEY, AND BEE APPLIANCES.

Offered by British Bee-keepers' Association.

Class	Prizes 1st s.	2nd s.	3rd s.
302 Collection of Hives &c..	100	50	–
303 Observatory Hive .	30	20	–
304 Frame Hive . .	20	15	10
305 Do. for Cottagers' use	20	15	10
306 Honey Extractor .	15	10	–
307 Pair of Section Racks	15	10	5
308 Rapid Feeder . .	10	5	–
309 Bingham Smoker .	15	10	–
310 12 Sections of Comb Honey ('94), about 12 lb.	20	10	5
311 6 Sections of Comb Honey ('94), about 6 lb.	20	10	5
312 Run or Extracted Honey ('94), about 12 lb.	20	10	5
313 12 Sections of Comb Honey, '93 or before	20	10	5
314 3 Shallow Frames of Comb Honey, 1894 .	20	10	5
315 Run or Extracted Honey, '93 or before	20	10	5
316 Granulated Honey	20	10	5
317 Display of Honey .	50	30	10
318 Useful Inventions 319 Other Exhibits .	Special Prizes, according to merit.		

IMPLEMENTS (£205).

(Entries close March 31, 1894.)

	1st £	2nd £	3rd £
I. Fixed Oil Engines, of 4 to 8 brake h.p.	50	25	–
II. Portable Oil Engines, of 9 to 16 h.p.	50	25	–
III. Horse-power Machine, for distributing *Bouillie Bordelaise* or other mixture on potatoes	10	–	–
IV. Machine for distributing insecticides and fungicides upon fruit trees and bushes	10	–	–
V. Sheep-dipping Apparatus	5	–	–
VI. Churns capable of dealing with 10 quarts and upwards of cream (not to exceed one man-power)	10	6	4
VII. Churns capable of dealing with from 5 to 10 quarts of cream (not to exceed one man-power)	5	3	2

BUTTER-MAKING COMPETITIONS (£69).

Class 1 (*Tuesday, June* 26). Open to the United Kingdom.

Class 2 (*Wednesday, June* 27). Female Members of a Farmer's family not in service or working for wages.

Class 3 (*Thursday, June* 28). Dairymaids and others residing in the Society's District A.—The Counties of Bedford, Buckingham, Cambridge, Essex, Hertford, Huntingdon, London, Middlesex, Norfolk, Oxford, and Suffolk. (Open only to those who have not been prize-winners at previous Country Meetings of the Society.)

Class 4 (*Thursday, June* 28). Dairymaids and others, being residents in the Isle of Ely or Counties of Cambridge, Suffolk, Norfolk, or Huntingdon. (Open only to those who have not been prize-winners at previous Country Meetings of the Society.) (*Offered by the Cambridge Local Committee.*)

Champion Class (*Friday, June* 29). Open only to prize-winners in above Classes.

Prizes: 1st 6*l.*, 2nd 4*l.*, 3rd 3*l.*, 4th 2*l.*, 5th 1*l.*, in Classes 1, 2, 3, and 4, and 5*l.* and Society's Silver Medal in the Champion Class.

HORSE-SHOEING COMPETITIONS (£32).

(Limited to Shoeing-Smiths in the Society's District A.)

Class 1. Roadsters (*Tuesday, June* 26, and, if required, *Wednesday, June* 27).

Class 2. Agricultural Horses (*Thurs., June* 28, and, if required, *Fri., June* 29).

Prizes: 1st 6*l.*, 2nd 4*l.*, 3rd 3*l.*, 4th 2*l.*, 5th 1*l.*, in each class.

Copies of the detailed Prize Sheet and Regulations (both for Stock and Implements) may be obtained on application to the Secretary of the Society at 12 Hanover Square, London, W.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

Suggestions as to the Purchase of FERTILISERS AND FEEDING STUFFS.

The Fertilisers and Feeding Stuffs Act, 1893 (56 and 57 Vict., ch. 56), which comes into force on January 1, 1894, gives to agriculturists the important protection that the seller must give the purchaser an INVOICE stating the nature of the article sold—such Invoice to have the effect of a warranty that the article is of the quality stated. The provisions of the Act dealing with this matter will be found in Sections 1, 2, 3, and 8 of the Act (which is quoted in full on pages 795–9), and it should be observed that for the further assistance of farmers who may desire to have analyses made of fertilisers or feeding stuffs (and who presumably are not connected with organisations already existing—like the Royal Agricultural Society—which provide for their Members analyses at low rates), Section 4 of the Act requires each County Council to appoint a "District Agricultural Analyst," and Section 5 prescribes the procedure to be adopted on submitting samples to him, in accordance with regulations to be made by the Board of Agriculture.

It will be seen from the Act that proceedings for penalties under Section 3 for offences created by the Act are to be "without prejudice to any civil liability"; and in view of this civil liability, the Royal Agricultural Society has prepared the following Suggestions and Instructions for the guidance of Members of the Society in their general farming transactions, having regard to the ordinary rights and liabilities of vendor and purchaser at common law.

Where, however, it is desired to institute a prosecution for any offence under the Fertilisers and Feeding Stuffs Act, the special procedure prescribed therein should be adopted.

SUGGESTIONS TO PURCHASERS.

In view of the above observations, a purchaser is recommended in all cases to insist on having an **Invoice**, and to see that such Invoice contains the following particulars:—

In the case of **Fertilisers**:

(1) The *name* of the Fertiliser.

(2) Whether the Fertiliser is artificially *compounded* or not.

(3) The *minimum* analysis of the Fertiliser in respect of its principal fertilising ingredients.

In the case of artificially prepared **Feeding Stuffs** for Cattle:

(1) The *name* of the article.

(2) The *description* of the article—whether it has been prepared (*a*) from one substance or seed, or (*b*) from more than one substance or seed.

For example—

(*a*) An invoice describing an article as "Linseed Cake" implies a warranty that the article is pure, *i.e.* is prepared from linseed only; "Cotton Cake" (whether decorticated or undecorticated) and "Rape Cake" (for feeding purposes) would come under a similar category.

Purchasers are reminded that the use of such terms as "95 per cent., "Oil Cake," &c., affords no security against adulteration. The adoption of the Form of Order appended to these suggestions is therefore strongly recommended.

(*b*) In the case of a Compound Cake or Feeding Stuff a vendor is only compelled by the Act to state that it is prepared from more than one substance, and he is not required to specify the particular materials used in its preparation. Purchasers are recommended, therefore, to buy Mixed Feeding Cakes, Meals, &c., with a guaranteed analysis. Any statements in the Invoice as to the component parts of such Mixed Cake or Meal will take effect as a warranty, as also will any statements in an invoice, circular, or advertisement as to the percentages of nutritive and other ingredients in any article sold for use as food for cattle.

Members of the Society are strongly recommended not only to see that the invoices given to them accurately describe the goods they have ordered, but to give all their orders subject to the analysis and report of the Consulting Chemist of the Royal Agricultural Society of England, and to make the following Conditions of Purchase and Sale:—

CONDITIONS OF SALE AND PURCHASE.

Fertilisers.

Raw Bones, Bone Meal, or **Bone Dust** to be guaranteed "PURE," and to contain not less than 45 per cent. of Phosphate of Lime, and not less than 4 per cent. of Ammonia.

Boiled Bones to be guaranteed "PURE," and to contain not less than 55 per cent. of Phosphate of Lime, and not less than 1 per cent. of Ammonia.

Mineral Superphosphate of Lime to be guaranteed to contain a certain percentage of "Soluble Phosphate." [From 25 to 28 per cent. of Soluble Phosphate is an ordinarily good quality.]

Dissolved Bones to be guaranteed to be "made from raw bone and acid only," and to be sold as containing stated minimum percentages of Soluble Phosphate, Insoluble Phosphates, and Ammonia.

Compound Artificial Manures, Bone Manures, Bone Compounds, &c., to be sold by analysis stating the minimum percentages of Soluble Phosphate, Insoluble Phosphates, and Ammonia contained.

Peruvian Guano to be described by that name, and to be sold by analysis stating the minimum percentages of Phosphates and Ammonia.

Sulphate of Ammonia to be guaranteed to be "PURE," and to contain not less than 24 per cent. of Ammonia.

Nitrate of Soda to be guaranteed to contain 95 per cent. pure Nitrate of Soda.

Kainit to be guaranteed to contain 23 per cent. of Sulphate of Potash.

All fertilisers to be delivered in good and suitable condition for sowing.

Feeding Stuffs.

Linseed Cake, Cotton Cake (decorticated and undecorticated), and **Rape Cake** (for feeding purposes), to be pure, *i.e.* prepared *only* from the one kind of seed from which the name is derived. The report of the Consulting Chemist of the Royal Agricultural Society of England to be conclusive as to the "purity" or otherwise of any feeding stuffs.

Mixed Feeding Cakes, Meals, &c., to be sold on a guaranteed analysis.

FORM OF ORDER.

The Society has prepared an Order Form embodying the above suggestions, copies of which Form may be had on application to the Secretary at 12 Hanover Square, London, W. The Order Form is in the following words :—

ORDER FORM.

Address .....

To .....

.....

Date .....

Please supply me for Delivery .....

.....Tons .....Cwt. of .....

At .....per ton.

GUARANTEED to be in accordance with the conditions specified on the back hereof,[1] *relating to this article, and subject to the analysis and report of the Consulting Chemist of the Royal Agricultural Society of England.*

(Signature of Member) .....

[1] NOTE.—The conditions printed on the back of the form are the "Conditions of Purchase and Sale" given on page ccvi.

Instructions for Selecting & Sending Samples for Analysis.

GENERAL RULES.[1]

1. A sample taken for analysis should be fairly *representative of the bulk* from which it has been drawn.

2. The sample should reach the Analyst *in the same condition* as it was at the time when drawn.

FERTILISERS.

When **Fertilisers** are delivered in bags, select four or five of these from the bulk, and either turn them out on a floor and rapidly mix their contents; or else drive a shovel into each bag and draw out from as near the centre as possible a couple of shovelfuls of the manure, and mix these quickly on a floor.

Halve the heap obtained in either of these ways, take one-half (rejecting the other), and mix again rapidly, flattening down with the shovel any lumps that appear. Repeat this operation until at last only some 3 lb. or 4 lb. are left.

From this fill three tins, holding from ½ lb. to 1 lb. each, mark, fasten up, and seal each of these. Send one for analysis, and retain the others for reference.

Or, the manure may be put into glass bottles provided with well-fitting corks: the bottles should be labelled and the corks sealed down. The sample sent for analysis can be packed in a wooden box and sent by post or rail.

[1] For more detailed remarks as to the sampling of fertilisers and feeding stuffs, see JOURNAL, Third Series, Vol. II. No. VIII. December, 1891, pp. 858–863.

When manures are delivered in bulk, portions should be successively drawn from *different parts* of the bulk, the heap being turned over now and again. The portions drawn should be thoroughly mixed, subdivided, and, finally, samples should be taken as before, except that when the manure is coarse and bulky it is advisable to send larger samples than when it is in a finely-divided condition.

FEEDING STUFFS.

Linseed, Cotton, and other Feeding Cakes.—If a single cake be taken, three strips should be broken off right across the cake and from the middle portion of it, one piece to be sent for analysis, and the other two retained for reference. Each of the three pieces should be marked, wrapped in paper, fastened up, and sealed. The piece forwarded for analysis can be sent by post or rail.

A more satisfactory plan is to select four to six cakes from different parts of the delivery, then break off a piece about four inches wide from the middle of each cake, and pass these pieces through a cake-breaker. The broken cake should then be well mixed, and three samples of about 1 lb. each should be taken and kept in tins or bags duly marked, fastened, and sealed as before. One of these lots should be sent for analysis, the remaining two being kept for reference. It is advisable, also, with the broken pieces to send a small strip from an unbroken cake.

Feeding Meals, Grain, &c.—Handfuls should be drawn from the centre of half a dozen different bags of the delivery; these lots should then be well mixed, and three ½-lb. tins or bags filled from the heap, each being marked, fastened up, and sealed. One sample is to be forwarded for analysis and the others retained for reference.

GENERAL INSTRUCTIONS.

Time for taking Samples.—All samples, both of fertilisers and feeding stuffs, should be taken as soon after their delivery as possible, and should reach the Analyst within *ten days* after the delivery of the article. In every case it is advisable that the Analyst's certificate be received before a manure is sown or a feeding stuff is given to stock.

Procedure in the Event of the Vendor wishing Fresh Samples to be Drawn.—Should a purchaser find that the Analyst's certificate shows a fertiliser or feeding stuff not to come up to the guarantee given him, he may inform the vendor of the result and complain accordingly. He should then send to the vendor *one* of the two samples which he has kept for reference. If, however, the vendor should demand that a fresh sample be drawn, the purchaser must allow this, and also give the vendor an opportunity of being present, either in person or through a representative whom he may appoint. In that case three samples should be taken in the presence of both parties with the same precautions as before described, *each* of which should be duly packed up, labelled, and *sealed* by both parties. One of these is to be given to the vendor, one is to be sent to the Analyst, and the third is to be kept by the purchaser for reference or future analysis if necessary.

All samples intended for the Consulting Chemist of the Society should be addressed (postage or carriage prepaid) to Dr. J. AUGUSTUS VOELCKER, 12 Hanover Square, London, W. Separate letters of instruction should be sent at the same time.