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JOURNAL

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JANUARY, 1922.

THE PROGRESS OF BRITISH AGRICULTURE.

THE PRESIDENTIAL ADDRESS OF SIR R. HENRY REW, K.C.B., FOR THE
SESSION 1921-22. DELIVERED TO THE ROYAL STATISTICAL SOCIETY,
NOVEMBER 15, 1921.

IN expressing my thanks to the Society for the honour of re-election to the Presidential Chair for another year, I am glad at the same time to congratulate the Fellows on the satisfactory state of the Society's affairs. In my address last year I referred to the success with which the difficulties of the war-period had been surmounted, and I ventured to assert that the vitality of the Society was unimpaired. The accuracy of this assertion has been confirmed during the past twelve months. In the Report presented by the Council to the 87th Annual General Meeting on June 21 last, it was stated that the total number of Fellows then exceeded that recorded in any of the preceding twenty-five years with only two exceptions, 1902 and 1903.

The most interesting and important domestic event of the past year was the acceptance by H.R.H. The Prince of Wales of the position of Honorary President of the Society, which was occupied by his present Majesty before his accession and by King Edward for nearly thirty years.

Year by year Death takes its toll, and since the opening of the last session we have to deplore the loss of one of our most distinguished Hon. Fellows, Dr. Bodio, who, as President of the International Statistical Institute, was personally known to many of us. Among other losses by death were those of the senior Fellow, Sir E. Galsworthy, who joined the Society in 1852, of Dr. Longstaff, Sir John Macdonell and Dr. T. Sprague.

One of the subjects referred to in my previous address came before the Society in a definite form not long afterwards. The Council in their annual report referred to the publication and presentation of a report on official statistics prepared by a Committee appointed by the Cabinet to enquire into the questions raised in the Petition initiated by a Committee of the Society and laid before the Prime Minister in November, 1919. The Council informed the General Meeting that this report was under their consideration.

After discussion and deliberation the Council in July last adopted the following resolutions :—

1. The Council of the Royal Statistical Society having had under consideration the Report on the Collection and Presentation of Official Statistics, prepared by a Committee appointed by the Cabinet, welcome the recommendation of the Committee that "for the purpose of ensuring more effective co-operation and co-ordination between the different departments in their statistical work, a permanent Consultative Committee of statistical officers should be established." The Council recall the fact that this proposal was made as a tentative measure by the then senior honorary secretary of the Society to a Select Committee of the House of Commons in 1909 (see *R.S.S. Journal*, vol. lxxii, part iv), and they are of opinion that its adoption will be of advantage to the statistical service of the country.

2. In regard to the constitution and powers of the proposed Permanent Committee, the Council are of opinion that individuals or bodies of persons (e.g., this Society) should be permitted to address communications directly to the Committee. The Council recognise that any such communications relating to the statistics of particular Departments would properly be referred, in the first instance, by the Committee for observations to the Department concerned, but they consider that public confidence in the work of the Committee would be increased by an arrangement which would preclude the possibility of their failure to come to the cognizance of the Committee as a whole.

It has not been an invariable rule that a President who is accorded the honour of re-election for a second year has imposed another address from the Chair upon the patience of the Fellows. But during the time when I held the office of honorary secretary, I steadfastly maintained, when consulted on the subject by Presidents who were in this position, that the omission to deliver a second address was, properly speaking, a breach of the orthodox traditions, if not of the written laws, of the Society. I admit that, like Benedick, when I said a re-elected President must deliver a second address, I did not expect to live to be one myself, but the fact that chickens come home to roost does not justify one in wringing their necks.

It would be invidious to say, in further extenuation of my intrusion on your forbearance, that I am following the best examples

among my predecessors, but as last year I laid especial claim to be in the line of direct succession from Sir James Caird and Major Craigie in this Chair, I am warranted in referring to them as among those who have given two Presidential addresses.

Last year I ventured to deal with statistics in their most general aspect. I propose on the present occasion to descend from the general to the particular and to offer a few observations on the progress of British agriculture viewed in the dry light of statistics.

A long association with those who practise the art, and follow the business, of agriculture impels me at the outset to placate the adherents of the creed that "who drives fat cattle must himself be "fat" by admitting that statisticians are not in that sense obese and that statistics will not and cannot tell the whole story. It may be freely acknowledged that the record of agricultural progress reaches beyond figures, and that many influences and tendencies which cannot be expressed numerically have powerfully affected its course.

It may further be conceded that the statistical record is lamentably short in time and defective in scope, and that consequently conclusions based upon it must be lacking in exactitude. It follows that if in the end it is possible to make any deductions from the statistics, they may not possess that degree of precision which the statistician is commonly believed to regard as essential. That belief, it may be observed incidentally, though substantially well-founded, implies a limitation of vision in the economic statistician which is not wholly justified.

To say that some eminent statisticians have been men of imagination may seem to be ambiguous and obviously invites the unregenerate to scoff. But it is perfectly true that just as some of the pioneers in the realm of physical science have been men whose success has been due to their capacity for bringing insight and imagination to bear upon ascertained facts, so in the sphere of statistics it is frequently possible upon very imperfect data to found, with due qualifications, trustworthy generalizations.

Any worker in the field of economic statistics is conscious that oftentimes his most assiduous tillage can only result in a crop of approximations, but he is consoled by the knowledge that an approximation is frequently sufficient for the object in view. How far it is sufficient must be a question of judgment and obviously depends upon what the object is. In this connection I cannot resist the temptation to quote from a recently published book a story which is not new and may not be true. It relates that Babbage, an eminent Fellow of this Society from 1834 to 1871, who is best

known to fame as the inventor of a calculating machine, in reading Tennyson's "The Vision of Sin" was impressed by the verse—

"Fill the cup, and fill the can :
Have a rouse before the morn :
Every moment dies a man,
Every moment one is born."

The inaccuracy of this statement was at once apparent to Mr. Babbage, who wrote to the poet pointing out that if the verse were true the population of the world would be stationary, and that as a matter of statistical fact the birth-rate is slightly in excess of the death-rate. He added: "I would suggest that in the next edition "of your poem you have it read—

" 'For every moment dies a man,
Every moment $1\frac{1}{18}$ is born.' "

"Strictly speaking," he continued, "this is not correct. The "actual figure is a decimal so long that I cannot get it in the line, "but I believe $1\frac{1}{18}$ will be sufficiently accurate for poetry."

It not infrequently happens that in dealing with economic statistics we have to be content with statements which are not precise but are sufficiently accurate for the purpose.

The Society and Agriculture.

During the eighty-seven years of its existence, the Society cannot be accused of neglecting agriculture. Sir James Caird in both his Presidential addresses (1880 and 1881) and in other contributions to the Society's proceedings dealt with subjects relating to the land, and in 1868 and 1869 dealt specifically with agricultural statistics, which at that time had just begun to be collected as the result of action in Parliament. Major Craigie devoted one of his Presidential addresses to the question of food supply, and among his many contributions on agricultural subjects may be especially noted his Papers on "Ten Years' Statistics of British Agriculture" (1880), "Statistics "of Agricultural Production" (1883), and "The Size and Distribu- "tion of Agricultural Holdings" (1887). Among other notable Papers I can only mention Sir Richard Crawford's on "The Food "Supplies of the United Kingdom, France and Germany" (1899), Mr. Wilson Fox's on "Agricultural Wages" (1903), Sir Inglis Palgrave's on "Estimates of Agricultural Losses" (1905), Lord Eversley's on "The Decline in the number of Agricultural "Labourers" (1907), Mr. R. J. Thompson's on "Rents of Agri- "cultural Land" (1907), Mr. R. H. Hooker's on "The Meat Supply"

(1909), Mr. E. H. Godfrey's on "Methods of Crop Reporting" (1910), Mr. J. B. Guild's on "Live Stock and Meat Production "during the War" (1920), and Sir James Wilson's on "The World's Wheat" (1921).

The Reports of the Committee on the Production and Consumption of Meat and Milk (1904) embodied the results of one of the few enquiries on an extensive scale undertaken by the Society, and laid foundations on which the Board of Agriculture subsequently framed a part of their Report on Agricultural Output in connection with the Census of Production Act, 1906.

Early Agricultural Returns.

The first systematic collection of returns of the area under crops and the number of farm live stock began in 1866. In 1864, on the motion of Sir James Caird, the House of Commons passed a resolution in favour of the establishment of official agricultural statistics, and although the motion was carried against the Government of the day, effect was given to it, and the Board of Trade undertook the duty. That the time was more than ripe for the institution of this service is demonstrated by the spasmodic attempts which had been made during the previous thirty-five years to obtain statistical information of the position of agriculture in various localities. In 1831 the magistrates of Norfolk—a county then, as now, foremost in agricultural progress—circulated a schedule of enquiry to 680 persons in the county and elicited a response from nearly two-thirds of them. At a later date the Board of Trade made an experimental enquiry in Bedfordshire, the enquiries being made with the assistance of the clergy. The co-operation of Church and State in statistics does not, however, appear to have been very successful, as returns were obtained from only 27 out of 126 parishes. The enterprise, as well as the optimism, of the bureaucracy of that day, is apparent in the wide scope of this enquiry, the schedule requiring particulars not only of the acreage, gross produce and yield per acre of each crop, but also of the size of the farm, the class of soil and the form of tenure.

In 1845 further attempts were made in selected districts of England, Scotland and Ireland respectively. In Scotland and Ireland the results were satisfactory, but in England, where enquiries were made through Boards of Guardians, the attempt was unsuccessful. In Ireland the failure of the potato crop and the consequent famine impressed upon those responsible for administration that accurate and consecutive information was essential, and a system of national agricultural statistics was established. Parliament remained

indifferent to the subject, and even the recommendation of a Committee of the House of Lords, in 1855, for the compulsory collection of statistics through the Poor Law officials had no effect.

North of the Tweed the East Berwickshire Farmers' Club succeeded in making an agricultural census of their county. No more conclusive evidence can be adduced of the serious importance they attached to the subject than the fact that they conducted the enquiry not only on their own initiative but at their own expense. I rely on the authority of Major Craigie for the statement that the total expense did not exceed five pounds, which proves that the principle of anti-waste was adopted in those days. In 1854 and the two following years national statistics were obtained in Scotland by the Highland and Agricultural Society assisted by a grant from the Exchequer, and in his Paper on "Statistics of Agricultural Production," Major Craigie gives particulars of the enquiries, and summarizes some of the results obtained.

Prior to these various undertakings individuals had attempted to frame estimates of the acreage and production of crops and the extent and utilisation of the cultivated area, as well as of the numbers of live stock. The most noteworthy are those of Gregory King in 1696, published by Davenant in 1698, and of William Couling, laid before a Parliamentary Committee in 1827. The latter estimate did not relate to a particular year, but was founded on personal enquiries carried out between 1796 and 1816, and again in 1824-7, involving journeys of over 50,000 miles.

Agricultural Land.

In attempting to trace, in general outline, the progress of agriculture as recorded in the annual official statistics which began in 1866, I shall confine myself to Great Britain, which, although it comprises a wide diversity of farming conditions, is nevertheless a more homogeneous agricultural unit for this purpose than the United Kingdom.

The total land area of Great Britain, according to the latest measurements, is 56,206,309 acres.

Notwithstanding poetic references to this "tight little island," it is generally recognised that it is in fact somewhat indeterminate at the edges; that our long coast line is in many places subject to constant abrasion or accretion. A few years ago what was then called a "scare" and would now be called a "stunt" was started, based on the unscientific observations of persons who had noticed that the sea was encroaching on the land, especially at or near certain popular seaside resorts. Generalising from limited

data, the public became obsessed with the idea that the country was slowly but surely becoming submerged, and that the waves would in the course of time rule Britannia. A Royal Commission was appointed, and after due enquiry found that the popular view was erroneous.* They reported: "The evidence as regards the total "superficial area gained and lost in recent years on the coasts and "in the tidal rivers of the United Kingdom shows that far larger "areas have been gained by accretion and artificial reclamation "than have been lost by erosion. The most reliable figures that "could be put before us with regard to gain and loss in recent years "were those furnished by the Ordnance Survey Department, which "showed that within a period on the average of about thirty-five "years, looking at area alone without regard to value, about 6,640 "acres have been lost to the United Kingdom, while 48,000 acres "have been gained." This net gain of some 40,000 acres is literally superficial. The additional area of land, in the technical sense, is to be found almost entirely in tidal estuaries, and has been mainly formed by the deposition of sediment brought down by rivers and denuded from the interior districts drained by them. The losses are caused by the wearing away of cliffs and the encroachment of the sea upon areas which in many cases were in economic use. On balance, therefore, though the country has increased in nominal size, the surface available for present use is probably little, if at all larger.

Of this total area of about $56\frac{1}{4}$ million acres it is calculated that about $3\frac{1}{2}$ million (3,537,172) acres are situated above the 1,500 feet level, which may be regarded as marking the limit of economic utilization of the surface in this country. Assuming that the potentially productive surface is approximately $52\frac{3}{4}$ million acres, it may be thus apportioned:—

	Acres.	Acres.
Farmed land, <i>i.e.</i> under crops or permanent grass 		31,246,000
Rough grazings 	13,670,000	
Deer forests 	3,520,000	
	17,190,000	
Deduct land above 1,500 feet level 	3,537,000	
		13,653,000
Woods and plantations 		2,700,000
Urban areas,† roads, railways, mines, &c.		5,070,000
		52,669,000

* Report of Royal Commission on Coast Erosion and Afforestation, 1906–11.

† In England and Wales towns and urban districts (including London and County Boroughs) occupied, in 1921, 4,164,580 acres.

It would thus appear that of the whole surface available in a greater or less degree for productive use, about 90 per cent. is actually so utilised. It should be noted that the "Rough grazings" in this statement are what are now described in the returns as "Mountain, "heath, moor, down, and other rough land used for grazing." About three-fourths of these are in Scotland. The figure for "Deer "forests" I have taken (like that for the extent of land above 1,500 feet) from the Report of the Coast Erosion and Afforestation Commission, and the full description is "Deer forests, or land "devoted exclusively to sport." The whole of this 13½ million acres, outside what is termed cultivated land, supports, in some degree, a stock of food animals—cattle, sheep, deer or grouse—and must accordingly be reckoned as contributing something to the nation's food supplies.

The area with which we are immediately concerned is that described in the returns as the total acreage under crops and grass, which is in effect that land which is actually farmed and parcelled out in agricultural holdings of more than one acre. This farmed or cultivated area in 1921 was returned as 30,869,000 acres.* The total has never purported to be exact, and it varies from year to year. One reason for the variation is that the distinction between permanent pasture and rough grazings cannot always be drawn quite accurately. The rough grazings represent the fringe of cultivation, the

"strip of herbage strown
That just divides the desert from the sown."

For many years the total area of land under cultivation showed comparatively little change. Allowing for some defects in the earliest returns there was a tendency to increase year by year during the "seventies" and "eighties," and the maximum area was returned in 1891 at 32,919,000 acres. Since then, with a slight check in 1916 and 1917, there has been a progressive decline. The shrinkage of the farmed area during the last thirty years is mainly attributable to the insatiable demand of the urban agglomerations of the population for more and more land to occupy. This persistent expansion steadily eats into the available surface of the country, and thus unlovely bricks and mortar displace the kindly fruits of the earth. In the last thirty years the urban population of England and Wales increased by over 9,000,000, while the rural population declined. In 1891, 28 per cent. of the people lived in rural districts, but in 1921 the proportion had fallen to less than 21 per cent.

* In the preceding table the corresponding figure is that for 1920.

It is hardly necessary to remark that in this country the agricultural area cannot extend its boundaries to make good the inroads at its centre. Its margin is fixed by economic pressure not less inexorable than the pressure of population. There are no doubt still possibilities of bringing into productive use certain tracts now waste, and thereby extending the present margin of cultivation. But the day when this process was carried out by private enterprise is past and is not likely to return. If reclamation is effected in the future the large capital outlay involved must fall upon the Exchequer. In the days of national prosperity such outlay would have been a sound investment, but a generation on which the enormous burden of the Great War has fallen, must leave to posterity any serious attempt to increase the cultivable land of the country. In any case the additions which are practicable by this means could not very materially affect the total. A loss which may in two years—as in 1918–20—amount to half a million acres cannot be made good by reclamation. For practical purposes the agricultural land of the country must be regarded as a diminishing quantity.

Utilisation of the Farmed Area.

The largest extent of arable land recorded since the returns were collected was 18,429,000 acres in 1872, and the smallest 14,256,000 acres in 1915. During the war, partly by an appeal to patriotism, partly by the offer of guaranteed prices, and partly by the exercise of compulsory powers under the Defence of the Realm Act, the land under the plough was increased to 15,852,000 acres in 1918, but since then it has again declined, and in 1921 stands at 14,964,000 acres. The record of arable cultivation up to and after the outbreak of war may be concisely shown as follows :—

	Cultivated land (thousands of acres).	Arable (thousands of acres).	Per cent of arable.
Average 1869–78	31,149	18,111	58·1
Average 1905–14	32,126	14,723	45·8
1915	31,834	14,256	44·8
1916	31,850	14,355	45·1
1917	31,858	14,607	45·9
1918	31,749	15,852	49·9
1919	31,499	15,717	49·9
1920	31,246	15,400	49·3
1921	30,869	14,964	48·5

It will be observed that, although there has been a loss of 890,000 acres of arable land since 1918, the proportion of land under the

plough is still substantially greater than in the decade immediately before the war.

The returns of acreage under the various crops afford some indication over a series of years of the changes which have taken place in the farming of arable land. Such changes, however, are very gradual, and are also subject in some degree to seasonal influence. The period 1869–78 begins when the official returns had become fairly established, and ends just before the disastrous year (1879), which is still well remembered as probably the worst season experienced during the nineteenth century, and certainly the worst in living memory. In comparing the crops with those returned in the decade before the war we are necessarily limited to those which were separately distinguished at both periods. The gradual movement in the direction of extending the range of farm crops, and especially of those which forty or fifty years ago were somewhat contemptuously described by farmers as “market garden crops,” but now in many districts come within the ordinary scope of arable farming, cannot therefore be traced for so long a period. From time to time the schedule of enquiry has been extended, and since 1914 it may be regarded as fairly comprehensive of the main crops grown on an extensive scale.

One or two points of interest, however, are suggested by comparing at each period the proportion of the arable land occupied by certain crops.

Crops.	Percentage of total arable.	
	1869–78.	1905–14.
Corn crops (wheat, barley, oats)	47·1	44·1
Beans and peas	4·8	3·1
Potatoes	3·0	3·9
Turnips and swedes	11·7	10·5
Mangold	1·8	3·0
Clovers and rotation grasses	24·0	28·6
Bare fallow	3·5	2·2

The lessened importance of the corn crops is clearly shown, and if wheat be taken separately, the change is still more marked. In the earlier period nearly 19 per cent. of the arable land was devoted to wheat, while in the latter period it occupied slightly more than 12 per cent. The figures for beans and peas mark a change which illustrates the limitation of the statistics as an agricultural record. Under the same name in each case two crops of different economic

significance are included. Beans and peas are mainly, and in the earlier period were almost exclusively, grown and harvested as corn crops for animal food, but they are also, and in the later period extensively, grown and picked green as a vegetable crop. Points not brought out in the above table, the acreages being relatively too small, are a marked increase (over 100 per cent.) in the acreage of cabbage, a great decline in hop-growing, and an extension by 50 per cent. of the acreage of orchards which are mainly on grass land but partly also on arable.

Indications of changes in the management of arable land—*e.g.* the lengthened rotation, the reduction of bare fallow—may be discernible by the practical farmer, but I shall leave them to him.

I do not propose to dwell upon the changes in cropping made during and since the war, which were exceptional and do not necessarily signify any permanent tendency, but it may be noted that in 1915 corn crops occupied 47 per cent. and wheat 16 per cent. of the arable land, and that in 1918 the percentage of wheat was the same, but the percentage of corn crops increased to 53, the acreage of oats being much larger than any previously recorded.

The Yield of Crops.

There is a very prevalent belief that the output of British agriculture had been for some years prior to the war steadily declining, and dogmatic assertions to that effect are not uncommon in works claiming to be authoritative. The reduction of the arable area is an obvious and arresting fact, and as the production from arable land is almost invariably greater than from an equal area of grass land, the inference to the casual observer seems clear that the total output from the farmed area must have been correspondingly reduced. But this overlooks the fact that the smaller arable area may, if devoted to other crops, produce a much greater amount of food than the larger. Thus by substituting potatoes for wheat, about one-fifth the area would give about as large an output of food.

Unfortunately the statistical data for comparing output at different periods are scanty. Official returns of the produce of crops were not collected in Great Britain until 1885, and the returns are restricted to the main crops of the farm. The following is a comparison of the average yields per acre for the ten years for which returns were first available with those for the ten years ending 1920 :—

	Average yield per acre.	
	1885-94.	1911-20.
	bushels.	bushels.
Wheat	29·32	30·75
Barley	33·02	31·53
Oats	38·21	38·67
Beans	26·04	27·41
Peas	25·20	25·02
	tons.	tons.
Potatoes	5·82	6·21
Turnips and swedes	13·09	13·58
Mangold	17·45	18·71
	cwts.	cwts.
Hay: Clover, &c.	28·22	28·90
Permanent grass....	23·86	22·03
Hops	7·71	10·48

It must be admitted that these figures appear somewhat disappointing. Except in wheat, beans, potatoes, mangold, and hops, there is no marked indication of improvement in farming resulting in larger returns per acre. Yet this country possesses the oldest and most famous agricultural experiment station in the world, which for over seventy years has been teaching farmers of all countries. Within the past thirty years not only have many agricultural stations and colleges been established, but many millions of public and private money have been spent in promoting agricultural education and research. The result of this expenditure cannot be said to be very apparent in the statistical records of output. It may be noted that if the yield of the corn crops is expressed in terms of weight, the output of wheat fell by about 100,000 tons, and of wheat, barley and oats, added together, by about 350,000 tons, while the output of potatoes increased by 775,000 tons.

Statistics fail us in the record of the great increase in the cultivation of fruit and vegetables which have largely replaced farm crops. In recent years the agricultural returns have descended to these so-called minor crops, but they are still far from complete. In 1920 were recorded in England and Wales 4,270 acres of celery, 5,541 acres of rhubarb, 12,625 acres of brussels sprouts, 8,823 acres of cauliflower, and 4,450 acres of onions. The acreage of orchards was 222,000 acres, and of small fruit 58,000 acres.

If returns of fruit and vegetables are defective in failing to give any adequate measure of the increase in output which has taken place during the past thirty years, there is a still more intensive form of cultivation for which comparable statistics are practically

non-existent, viz., the growing of crops under glass. The Report on the Agricultural Output of Great Britain, published in 1912, frankly abandoned the attempt to estimate the magnitude of this intensive form of cultivation, but its importance and steady growth are apparent. Mr. R. R. Robbins, President of the National Farmers' Union, in a carefully prepared Paper read before the Agricultural Club in January, 1919, was at considerable pains to collect all the available information as to the increase and present extent of intensive culture, on which he is himself a high authority. He referred to tomatoes, cucumbers, grapes, and rhubarb as instances of crops the cultivation of which, within a comparatively recent period, has increased enormously.

It is possible, at least, to illustrate the point I wish to make by a hypothetical comparison of the produce of an acre of arable land under ordinary farm cultivation and the possible produce of such an acre if it were put under market-garden cultivation. I will take the gross produce for four years as representing a farm rotation, and assume that during that period the "farm" acre is cropped successively with wheat, roots, barley, and clover. Taking the official average yields of these crops, the gross output in four years would be approximately 18 tons, of which about three-fourths would be roots (*i.e.* turnips or swedes). If the same area had been devoted to potatoes, the gross output in four years would be 25 tons, and if it were placed under glass and devoted to tomatoes, the gross output would be from 120 to 140 tons.

This is merely a crude illustration, and it would be necessary for a true comparison to take account of the production of meat and milk from the farm crops, but it may suffice to direct attention to the fact that the simple figures of the reduced arable area cannot properly be used as a measure of reduced output. It is quite possible that the smaller area may, in fact, be giving a much larger output than was obtained from the larger.

Live Stock.

Statistics of crops form only one chapter of the story of the progress of British agriculture. Animal products are as important as vegetable products. The well-worn maxim that man does not live by bread alone has been emphasized by the experience of the war. I have repeatedly protested against the fallacy of calculating the nation's food requirements in terms of wheat, and it ought now to be evident from the experience of Germany that a nation may be starved—or at any rate its spirit crushed—by a shortage of fat almost as effectually as by a shortage of cereals. The belief in wheat

as the sole necessary of life is the more remarkable in the United Kingdom, where large sections of the population (at least up to very recent times) practically subsisted on, in the one case, potatoes and bacon, and, in the other case, oatmeal and milk.

Nevertheless, the familiar statement that we depend for four-fifths of our food requirements on oversea supplies (which would only be true if wheat were our only food) continues to appear in speeches and articles and obtains general credence.

The annual returns show the number of cattle, sheep, and pigs on the farms of the country in June of each year. For cattle and sheep they may be regarded as comprehensive, but in the case of pigs they are admittedly incomplete, as large numbers of these animals are kept on holdings of one acre and less, and by cottagers and others who occupy very little land. This, however, does not affect the comparability of the returns from year to year. The average numbers returned in the ten years 1869–78 and 1912–21 respectively were as follows :—

				1869–78.	1912–21.
				Thousands.	Thousands.
Cattle	....	....	....	5,706	7,145
Sheep	....	....	....	28,664	23,200
Pigs	....	....	....	2,380	2,300

It will be noted that while cattle have increased by 1,439,000, sheep have decreased by 5,464,000, and pigs by 80,000. It is obvious, however, that from the meat supply point of view it is not justifiable to regard cattle, sheep, and pigs as of equal value, and if all are expressed in terms of cattle, it may be roughly reckoned that there was a net gain of about 750,000 beasts.

These figures, as I have mentioned, represent the numbers enumerated on a given date in each year. If, therefore, there has been any marked change in the average duration of life of the animals enumerated, the comparability of the annual returns would be affected. This is a point sometimes overlooked in international comparisons. In countries where oxen are commonly used for draught purposes, an ox may be included in seven or eight annual returns, whereas in this country an ox is fortunate which survives four. That the longevity of cattle and sheep—and I think also of pigs—has been reduced within the past forty years will be generally admitted. The advantages of “early maturity” have been consistently preached, and—what is quite a different matter—the practice has been increasingly adopted. I have no formula for measuring

the change or for correcting the annual returns to allow for it. A slight indication is given by the fact that whereas in 1869–78 the proportion of cows and heifers to the total stock was 38·74 per cent., in 1912–21 it was 40·36. But as the cows and heifers were also affected—though not in the same degree—by the tendency to earlier slaughter, this is an imperfect test. It can only be said in general terms that the returns in the later period represent a larger number of animals born and bred than is represented by the corresponding returns in the earlier period.

The total of various classes of stock, of course, includes animals of all ages and of both sexes, and is affected not only by changes of practice such as those I have mentioned, but also by seasonal and other incidental circumstances. A more satisfactory measure of progress is obtained by comparing the maternal figures of the herds and flocks, or, in other words, the number of the cows, ewes, and sows which represent the most stable factor in the enumeration. Unfortunately, the returns of ewes and sows were not separately obtained until 1893. The following is a comparison of the averages for 1893–1902 and 1912–21 respectively :—

	1893–1902.	1912–21.
	Thousands.	Thousands.
Cows and heifers in milk or in calf 	2,558	2,885
Ewes kept for breeding 	10,050	9,346
Sows kept for breeding 	354	312

Meat Production.

The annual enumeration of the meat-producing animals obviously gives an approximate measure of the quantity of meat, and an increase or decrease in the number of animals denotes an increase or decrease in the meat produced. I have already indicated that over the period covered by the agricultural statistics, *i.e.* in the course of about fifty years, the numbers of meat-producing animals have increased—calculated in terms of cattle—by about 750,000. This would represent, very roughly, an increase in potential meat production of, say, 200,000 tons per annum.

A closer calculation of annual meat supply involves four variable factors : (1) number of births ; (2) number of deaths (other than by slaughter for food) ; (3) number slaughtered for food ; (4) weight of meat per animal slaughtered. In the Report of the Committee on the Production and Consumption of Meat and Milk in the United Kingdom,* a formula was given for calculating from the returns the

* *R.S.S. Journal*, vol. lxxvii, part iii, 1904.

numbers slaughtered for food each year if the birth-rate and natural death-rate are first ascertained. The Committee, on the basis of a fairly extensive enquiry, adopted certain figures, but when a few years later the Board of Agriculture made official enquiries for the Report on Agricultural Output, the figures of birth-rate and mortality-rate were slightly modified.

The annual birth-rate may be regarded as fairly constant over a series of years, but the natural death-rate may be affected by outbreaks of disease. In 1883, for example, nearly half a million animals were attacked by foot-and-mouth disease, and up to the early 'nineties pleuro-pneumonia took a heavy toll annually of the herds of the country. For the past twenty-five years, however, the mortality from epidemic disease has been negligible, and does not, at any rate, affect the comparability of the annual figures.

The most uncertain, and probably the most variable, factor is that of the average carcass weight, but there is, unfortunately, no sufficient statistical evidence to show whether this has increased or decreased. The oldest estimates of weight which can be regarded as trustworthy were made in 1872 by Sir H. Meysey Thompson,* and it is of interest to compare the figures then adopted with those obtained by the Board of Agriculture in 1908. The figures represent average weight of dressed carcass :—

			Cattles.	Calves.	Sheep.	Lambs.	Pigs.
			lbs.	lbs.	lbs.	lbs.	lbs.
1872	....	....	600		72	24	134
1908	....	....	672	98	67	38	160

If these calculations could be accepted as comparable, there had been a substantial increase in the average weight of animals slaughtered in all cases except sheep. During the war, and subsequently, returns from slaughter-houses have provided a broader basis for calculation, but the exceptional conditions, especially in regard to the supply and price of feeding stuffs, preclude us from accepting the carcass weights as representing fairly the present standard of meat output. From figures kindly supplied to me by Mr. J. B. Guild in supplement of the Paper previously mentioned, it appears that in the year 1919-20 the carcass weights arrived at were : cattle, 563 lbs. ; calves, 60 lbs. ; sheep, 52 lbs. ; pigs, 150 lbs. The total production of meat in the United Kingdom for the same period was calculated as 1,185,000 tons. In 1904 the Society's

* *Journal Royal Agricultural Society*, 2nd series, vol. viii.

Committee arrived at a total of 1,245,000 tons. If these figures were fairly comparable, there would appear to have been a reduction in the output due to war conditions of 60,000 tons, or 4·8 per cent. With a recovery in the numbers of stock, and particularly of sheep and pigs, and with larger supplies of, and lower prices for, feeding stuffs, it may reasonably be assumed that the pre-war output has now been restored.

Dairy Produce.

That there has been a progressive and substantial increase in milk production during the past fifty years is unquestionable. An addition to the milking herd (comparing 1869–78 with 1912–21) of nearly 700,000 (32 per cent.) must represent a proportionately larger supply of milk, unless the yield per cow had greatly diminished. If I were to find any statistics purporting to show that the average yield of milk per cow had decreased during the past forty or fifty years, I should carefully abstain from quoting them in the presence of practical men. It is notorious that there has been a widespread substitution of specialised breeds whose lacteal proclivities have been developed on altruistic lines for those old-fashioned varieties which were expected only to provide for the sustenance of their offspring.

The earliest estimates of the yield of milk per cow were those of J. C. Morton, who put the average at about 400 gallons in 1874, and three years later, on reconsideration, put it at 370 gallons. The uncertainty which existed on the subject is exemplified by the fact that in 1885 he reduced his estimate to 294 gallons. Another well-known authority on dairy-farming, Professor Sheldon, estimated the average yield in 1879 at 385 gallons, and in 1889 at 403 gallons.

A Presidential Address being blatantly egotistical, I may be permitted to recall the fact that when in 1892, with much trepidation, I offered my first contribution to the proceedings of the Society, I chose the subject of milk production as one which appeared to me to require closer statistical examination than it had up to that time received. I made somewhat extensive enquiries, in which I was much helped by many farmers and dairymen, and I attempted, for the first time, to correlate the results obtained from producers and consumers respectively.

I digress for a moment to remark that since that maiden effort, I have indulged in many excursions on the wide field of food supply statistics, and I am confirmed in my early belief that no problem in this connection (and many remain to tempt the younger generation) can be satisfactorily solved unless data are independently collected both of production and consumption. It is not sufficient to marshal the figures of estimated home production and ascertained

net imports (if any), and on that basis proclaim the *per capita* consumption. This may suffice in the case of commodities, such as sugar or oranges, which are wholly imported, but in the case of a commodity which is wholly home-grown, or only partly imported, it is necessary to see that the calculation will at least not be inconsistent with such information as is obtainable of the actual consumption of the commodity. It is because this precaution is frequently overlooked that I regard with suspicion many of the head-rates of consumption which may be found so attractively tabulated for many countries in which the statistical service is notoriously incomplete.

To return to our milk. The figure arrived at in 1892 as the average yield per cow was 400 gallons, and it was reckoned that only 90 per cent. of the cows were in milk at any time. The enquiries of the Board of Agriculture in 1908 showed that the average had increased to 550 gallons, but that only 80 per cent. of the cows should be reckoned as in milk at any time. In all cases these figures represent net yield, *i.e.* the quantity available for commercial use after providing for the claims of the calves.

Without relying overmuch on the exactitude of these estimates of average yield, it may be claimed that, coupled with the large increase in the number of cows, they demonstrate that the production of milk has very greatly increased.

I should add that some later calculations are given in a Report,* published in 1919, of a Committee on the Production and Distribution of Milk, which suggested, on not very convincing evidence, that there had been a further increase in milk production up to 1914, and a marked decrease in the years 1915–18. A decrease under war conditions was evident and inevitable, but the report from a statistical point of view was inadequate. It furnished an instance of the omission to correlate the data to which I have referred. Certain returns of consumption were given which, if correct, indicated that only 50 per cent. of the milk produced was sold as such. The Agricultural Output Report showed that in 1908 70 per cent. of the total production was sold as milk. Under war conditions, while the total production of milk was certainly diminished, it is open to doubt whether a larger proportion was made into butter and cheese, both of which were drastically discouraged by the Food Controller.

Conclusion.

It will be apparent that I have not covered the whole field of agricultural production, but I have done so as far as statistics can

* Cmd. 483.

usefully guide us. Indeed I have shown, as I intimated at the outset, that the statistical data are inadequate to prove the case. But I claim that an examination of the statistics, so far as they are available, points to the conclusion that a larger quantity of food was being produced at the outbreak of war than at any previous period. The food was not the same in kind as it was forty or fifty years ago, but it was greater in quantity.

There was no doubt a set-back to food production during the war. By a special effort the amount of cereal food and potatoes was increased, but there was a marked reduction of other kinds of food, meat and milk particularly. Whether the pre-war standard of total output has been regained is doubtful, and there is not sufficient evidence on which to found a considered opinion. That it will be regained—if it has not already been—I have no doubt, in spite of the peculiar difficulties of the present time. Potatoes and pigs, milk and meat, fruit and vegetables, may be produced in place of wheat, and may occupy less land, but the total output of food of some kind will, in my opinion, be maintained.

Opposition to Jeremiah is always unpopular. No doubt my temerity in suggesting that after all British agriculture is holding its own in food production will be stigmatized as optimism. In this Society, however, we care for nothing but the facts, good or bad, pleasant or unpleasant, regardless of the deductions that may be made from them. I am content with having given such facts as are accessible. I believe they point to the conclusion that the output of food has been increased, but I must not be accused of suggesting that it is sufficient or satisfactory. On the contrary, I hold that the agricultural land of this country is capable of producing far more food than it does, and that on a large proportion of it, at the present time, the output is lamentably deficient. British agriculture ought, in my judgment, to produce more food and support more men on the land. The need for both is vital and urgent. If I am not prepared to proclaim the decadence of agriculture, still less am I willing to preach contentment with its present state. Rather would I say that what has been achieved is but the earnest of the things that may, and should, be done.