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AGRICULTURAL STATISTICS AS A BASIS FOR AGRICULTURAL ECONOMIC STUDIES

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IN THE British Isles an agricultural census has been taken annually for a very long period—in Ireland since 1847 and in Great Britain since 1866. Until 1907-08, however, this annual census was largely confined to a simple enumeration of the acreage under the different crops, and the numbers of live stock on farms supplemented by an estimate of the average crop yield per acre of the principal crops which, when applied to the total acreage grown, enabled an estimate of the gross aggregate production of these crops to be made. During the past quarter of a century, however, a very considerable development has taken place both in the amount of information collected through the census and in the subsequent utilization of these data. The impetus for this development came through the passage of the Census of Production Act of 1906. This measure provided for the taking of a periodical census of the output of industry. Agriculture was not included within the scope of the act, but arrangements were made for the collection of certain information additional to that obtained by the annual agricultural returns so that an estimate of the output of the agricultural industry might also be made.

The basic purpose of the industrial census is to arrive at the net output of the different trades covered by the enquiry. "Particulars relating to the output" of the trade or business carried on was prescribed in the act as one of the main questions regarding which information was required and it was also provided that "in order to enable the Board of Trade to compile, as far as practicable, statistics of the net value of production without duplication, the prescribed particulars as to output may include particulars as to the aggregate estimated value of the materials used and the total amount paid to contractors for work given out to them."

The normal data provided by the industrial Census of Production in respect of each trade has thus been as follows:

1. The selling value (at works) of the goods made by the firm supplying returns.
2. The cost of materials purchased.

3. The amount paid for work given out.
4. The net output of the trade, arrived at by deducting items 2 and 3 from item 1.
5. The number of persons engaged in the trade.
6. The motive power used in the trade.

The primary object of the industrial census is to arrive at "net output," which represents the value of the commodities which have been produced, or the work performed, by each industry, after the cost of the materials necessary for that production has been deducted. The net output thus constitutes the fund available for the remuneration of the various factors of production in the form of rents, wages, and profits while it is out of this fund also that rates and taxes are paid. The conception of net output is indeed essential from the point of view of the industrial census for only on the basis of net output is it possible to compare the productivity of different industries. Accordingly, in presenting the results of the industrial census it has been usual to show the value of the net output per man for each trade included within the scope of the enquiry.

In the agricultural censuses of 1908 and 1925 the departments of agriculture in Great Britain and Ireland adopted the conception of net output from the industrial census, and the additional statistics which have been collected in the census years have been largely directed to the compilation of data which will enable the net output of the agricultural industry to be arrived at.

The ordinary annual agricultural returns are mainly deficient in that they do not enable estimates to be made regarding the production of live stock and live stock products. The ascertainment of this information is therefore of prime importance in the census of production year. As regards the physical volume of agricultural production, therefore, the two basic groups of data relate to:

1. The production, in terms of produce, of the farm crops, including fruit, vegetables and nursery crops.
2. The production, in terms of produce, of live stock and live stock products.

There is, however, obvious duplication between these two figures, since a considerable proportion of the crops grown on farms and some part of the live stock produce also, is used for

further agricultural production (*i.e.*, crops fed to stock, or used as seed, milk fed to calves, and so forth).

Estimates are accordingly made regarding the proportions of each product (1) used for further agricultural production and (2) sold off farms or consumed in farm households. Only the latter portion, free from all duplication, is taken into account in arriving at the gross output of the agricultural industry. This gross output is then given a money value.

In order to arrive at "net output" it is necessary to deduct from the gross output the value of any materials, not produced on farms, which are used in producing the output sold off farms. The main items under this heading are, of course, imported feeding stuffs, seeds, and artificial manures. Sales of feeding stuffs or seeds from one farmer to another within the area of the census enquiry are not taken into account, but purchases of feeding stuffs for live stock not on farms (for example, for the feeding of horses in towns) are credited to the agricultural industry and contribute towards the gross output figure.

An agricultural census, as understood, in Great Britain and Ireland, thus involves the ascertainment of:

1. The gross output of the industry free from duplication, in terms of quantity and value.
2. The net output, in terms of value only.

So far as gross output is concerned, I do not think it can be seriously challenged that this is essential for a true census of agriculture.

In the world census of the present year it is intended that estimates shall be obtained by each country regarding the volume of production of both crops and live stock, although it is true that questions regarding live stock production are relegated as an appendix in the "standard-form," as it may not be possible for all countries to obtain this information direct from farmers. Provision for the determination of the proportions of each item of output used for further agricultural production is not made in the standard-form but statistics of gross output, unless free from duplication, are so misleading and indeed, useless, that it is to be hoped that as many countries as possible will publish their figures for gross output after deduction of that quantity of produce used for further agricultural production.

Turning from gross output to net output we enter a field which is, perhaps, more controversial. Even in Great Britain, where net output has been adopted officially as one of the principal objects of an agricultural census, this conception has been seriously challenged. Granted that net output is a legitimate object in the census of industry it is argued that net output is not necessarily a valid object of an agricultural census.

It may, I think, be at once admitted that net output as arrived at by the British agricultural census is not strictly comparable with the net output arrived at by the industrial census. In the industrial census the net output arrived at really comprises only profits, interest on capital, and wages. Rent is largely confined to the rent of the factory in which the goods are produced. It is not rent in the economic sense as the contribution of nature towards production. This economic rent is really included in the cost of the raw materials brought to the factory and is thus included in external costs before the net output of the industry is arrived at. Only to a very limited extent is this true of agriculture, for whereas the cost of the materials purchased by the different trades included within the British industrial census of 1907 amounted to £1,028 million, and the net output of these firms came to £712 million, in the case of agriculture the cost of materials used amounted to only £45 million as compared with a net output of £108.6 million. This is, of course, because to a preponderating extent the materials for agricultural production are supplied by the industry itself and are made up of the items which have been deducted from the gross physical volume of production in order to obtain the gross output free from duplication. Net output in the case of agriculture thus includes rent in the economic sense. It is, in fact, the product of the three factors of production—land, labor, and capital.

Net output, therefore, is the basis from which all studies of distribution can most easily start. It represents the fund out of which all the factors contributing towards production are remunerated and, in the case of the agricultural industry, is on a sounder economic basis than in the case of industry, just because the "net output" arrived at by the British agricultural census does correspond with a recognized economic conception—the final product of industry resulting from the cooperation of all three factors.

I should like to quote from a recent publication of the League of Nations, issued in connection with the International Economic

Conference of 1927, and entitled "The Relation of Labor Cost to Total Costs of Production in Agriculture":

"Net output, or the reward from farming, is the most important conception which has to be stated in Farm Economics. A good definition is the Italian one, which states that net output is obtained 'by subtracting from the value of gross production all those values which have had to be used up in order to arrive at that gross production,' principally, of course, seeds, fertilizers, feed and other material of this kind, and also depreciation, inasmuch as depreciation is a used value. These materials had to be advanced by society before the processes of production could begin; they must therefore be subtracted from the final result before the remainder of gross production can be accounted as a value. When this has been done the 'net output' remains for society to spend or to accumulate, and the 'net output' is sometimes defined as the year's spending plus saving.

"But net output, besides being the reward from farming as received by society in general, may also be conceived of as the reward from farming as received by the farming industry. It is a narrower conception, but perhaps a more practical one, and the most commonly adopted. On this conception both taxes and rates and interest on outside loans, which are part of the reward of farming accruing to society in general, are excluded from net output; the community and non-agricultural banks have no share in net output or reward in this narrow sense."

Whether or not net output should include taxes and rates will depend upon conditions in different countries. I should emphasize, however, that under the British system both these items have to be defrayed out of net output. The importance of the distinction between net output as including the payment of rates and taxes, and net output after these items have been deducted really depends upon the nature of the taxation system in force. In Great Britain and Ireland rates are levied on agricultural land irrespective of the income derived from that land. Theoretically, of course, the valuation upon which the rates are levied, is supposed to be based upon the agricultural value of the land but the relation between valuation and income may obviously vary greatly. It is natural, therefore, to treat rates as a cost and they have to be deducted before the fund available for distribution between the factors of production is arrived at. Taxes on the other hand are levied on personal

income and—in agriculture at any rate—can in no sense be regarded as a cost and should not be deducted even if it were practicable to do so.

Having arrived at a figure representing the value of the net output of the agricultural industry, the question arises in what sense can this figure be regarded as the basis for subsequent economic studies regarding the position of the industry?

I am of the opinion that the figure for net output is probably the best measure of the prosperity or depression of the agricultural industry, treated in the widest sense. I do not wish to appear to minimize in any way the great value of farm management studies but I do wish to emphasize the fact that variations in the level of farmers' profits—or labor income or any other concept that we care to use in relation to the farm-occupier's income—do not necessarily give a true picture of the position of the industry as a whole, unless under very small scale conditions of agriculture where the farmer combines in his own person the functions of entrepreneur, laborer, and landowner. From a national point of view, from the point of view of the general agricultural economist, it is of the highest importance that data should be available showing the total net return obtained from the industry as a whole. I may take as an example the present situation in Great Britain where although the condition of arable farmers in the eastern counties is one of depression, agricultural laborers are probably enjoying higher real wages than at any time in recent history. This prosperity of the agricultural laborer has been brought about by the direct intervention of the State to influence the share of the total net output of the agricultural industry accruing to him. The machinery by which this result has been obtained was described to you by Mr. Dallas. I do not wish to enter into a discussion of this question beyond emphasizing the fact, that if the State is going to intervene in the determination of the share of the total net output of the agricultural industry which shall accrue to any one partner in the industry—whether the farm laborer or the farm landlord—then a wise decision upon the limits and extent of this governmental action can only be made upon the basis of a study of the total net return available for the industry as a whole. Obviously in a period when the net output of the industry is showing an increase, the effect of the State regulation of the share of labor in an upward direction will probably have less influence upon the

willingness of the farm-entrepreneur to extend his operations than in a period of depression when there is a fall in the net output.

Changes in the distribution of the net output can have, therefore, an extremely important place in determining whether the farm occupier—the entrepreneur of the farming industry—is operating under conditions of prosperity or depression.

Particulars are available regarding the value of the net output of the agricultural industry in Great Britain in two years—1908 and 1925. I should like to consider, in a very tentative fashion, the order of the changes in the distribution of this net output which occurred between these two census years.

In 1908, the value of the net output was about £108.6 million and in 1925 about £185.5 million—an increase of 70 per cent.

The increase in the rental value of agricultural land and building during this period can be determined fairly accurately on the basis of the returns under Schedule A of the income tax. In 1908, the annual value of farm land and buildings in Great Britain was £42.2 million and in 1925 it was increased to £47.9 million, or by 13.5 per cent. Deducting these sums from the net output the remainder was £66.4 million in 1908 and £137.6 million in 1925. After deducting rates and taxes which amounted to around £4 million in 1925, these sums were available for distribution in farm wages and farmers' profits and other earnings, including cost of maintenance of tenants' capital.

Now this increase from £66.4 million to £137.6 million represents an increase of 107 per cent. Since the rental value of lands increased by only 13.5 per cent and the value of the net output by 70 per cent it is obvious that between 1908 and 1925 there was a redistribution in the net output of agriculture in favor of the laborer and the farmer. As to which of these groups—the farmer or the farm laborer—benefited most from this redistribution it is more difficult to decide. Between 1914 and 1925, however, the English index number of agricultural wages increased by 72 per cent, but this does not take into account the greater amount of overtime which was paid for by farmers in the latter year. It is common to speak of wage charges having doubled since before the war, but against this it must be remembered that there has been a decline in the number of workers employed. The actual decrease in the number of hired workers cannot be stated but the total number of persons engaged in agriculture declined from 1,400,000 in

1908 to 1,280,000 in 1925 or by 8.6 per cent and the reduction in the number of hired laborers was probably even greater. On the whole, therefore, it appears improbable that between 1908 and 1925 the share of the farm worker increased by more than 107 per cent—the figure by which the total sum available for distribution between the farmer and farm-worker increased.

The increase in farmers' earnings and profits (subject to payment of rates and also an allowance for depreciation in tenants' capital) would therefore seem to have amounted to something over 100 per cent between 1908 and 1925.

In conclusion there is one other aspect of the British agricultural output figures to which I wish to refer because it has some bearing upon the subject of the importance of monetary fluctuations in relation to agricultural depression—a subject which has received considerable attention at this Conference.

The main reason why industry and agriculture are seriously affected by falling prices is because under such circumstances the entrepreneur—whether in industry or agriculture—is confronted with two sets of price levels and his expenses tend to be incurred at a higher price level than prevails when he comes to sell his finished goods. On account of the prolonged "time lag" in agricultural production the agricultural industry is specially affected by such differential price levels. In addition to the question of this time lag, however, there is also the question as to the proportion of the outgoings involved in agricultural and industrial production which are affected in this way. Now the purchases of raw materials to be worked up by the agricultural industry are very small compared with similar purchases of materials in industry. As already stated, at the British census of production for 1907 the net output of all firms included in the industrial census came to £712 million, while the value of the materials used was £1,028 million or 144 per cent of the value of the net output. In agriculture, the net output was £108.6 million and the cost of the materials used £45 million. There can, I think, be no question that expenditures on the purchase of raw materials and on goods to be used in further production is very much less in agriculture than in industry. This self-sufficing character of agriculture should mean that it is less susceptible to the effects of monetary fluctuations than other trades.

In British agriculture, however, the two primary items of expenditure with which the farmer is confronted are rent of land and wages of labor. In comparison, expenditure on purchases of materials required for use in production—which in the non-extractive industries is of great importance—take a second place. In general, rent and labor charges are precisely those which are least tractable to revision in accordance with changes in the general price level. The importance of price changes upon British agriculture, therefore, arises not merely through the extended "time lag" but also on account of the character of the principal items comprising the expenses of agricultural production. At the same time, as regards the period 1908 to 1925 it is necessary to remember that the rise in rents has been appreciably less than the rise in prices and that in this direction the farmer has gained through the change in price level. As regards wages these have of course risen greatly as indicated earlier, but the rise in wages is perhaps not altogether so out of proportion to the rise in the share of the net output accruing to the farmer as is sometimes assumed.

Outside of Great Britain the importance of rent is much less, while in Ireland, and probably over the greater part of Europe, even wages of labor do not enter into the expenses of the farm to any appreciable extent. The unit of agricultural production is still very largely the small holding, frequently owned by the occupier. On many holdings of this character a monetary economy hardly exists. The land is the property of the farmer and is the source of supply of food for his family and his live stock, and of seed for his next year's crops, while it is cultivated by his own labor and that of his family. His surplus produce is sold off the holding, however, and the price obtained is governed by price movements on the world market. But in fact the circumstances are reminiscent of barter, for the very market town in which the peasant proprietor's produce is sold is the mart for the purchase of the manufactured goods he requires. The exchange character of the transaction is hardly obscured, although money is the medium by which it is effected. At hardly any point, however, in the economy of the peasant proprietor does money serve as a store of value, and it is to its weakness in this respect that adverse effects upon the agricultural industry are to be found. It is, therefore, rather important to examine the relative susceptibility to changes

in the general price level of items such as rent, wages, purchases of raw materials and so on; for the true measurement of the influence upon agriculture of a changing price level is to be found in the sum of the effects upon the industry caused by that changing price level operating upon these and other items which enter into the expenses of the farm entrepreneur.