University of Cambridge
Department of Agriculture

Farm Economics Branch

Report No. 18

(Issued August, 1931)

An Economic Survey of Hertfordshire Agriculture

HEFFER & SONS Ltd., CAMBRIDGE

1931

TWO SHILLINGS AND SIXPENCE NET

University of Cambridge
Department of Agriculture

Farm Economics Branch
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ERRATUM.

para. 2, line 5, *for* "country," *read* "county."

Survey of Hertfordshire Agriculture

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"Books will not teach farming, but if they describe the practices of the best farmers they will make men think, and show where to learn it."

PHILIP PUSEY.

ACKNOWLEDGMENTS

IN May, 1929, the Principal of the Hertfordshire Institute of Agriculture suggested to the Advisory Economist for the eastern counties Province that an economic survey of the agriculture of the county would provide "an extraordinarily interesting variety of data, and would assist the Institute to make intimate contact with a very large number of farmers." The present publication is the outcome of that suggestion.

The survey was commenced at the end of September, 1930, and has thus taken just over nine months to complete. The first three months were occupied in collecting farm records, and in this the staff of the Hertfordshire Institute of Agriculture co-operated very fully by assuming responsibility for no less than one-third of the field work. Indeed, co-operation between the Hertfordshire Institute and the Cambridge University Farm Economics Branch has been maintained throughout the whole enquiry, and any credit which this *Report* may merit is due as much to the one as to the other of these two bodies.

The following took part in the collection of farm records:—Messrs. R. McG. Carslaw, H. W. Gardner, W. H. Kirkpatrick, J. W. Reid, G. Ll. Rogers, J. Hunter-Smith, and H. R. Williams. The arduous, and mainly tedious, work of analysing the data secured has been carried out by Mr. P. E. Graves, assisted by Mr. T. J. Hunt. Mr. J. W. Reid has contributed largely to Chapters I and III, and, together with Mr. Hunter-Smith and Mr. Gardner, has materially assisted in the editing of these pages.

To the three hundred Hertfordshire farmers who so generously provided the information on which this publication is based the most sincere thanks are accorded. It is hoped that the information here provided will recompense them, at least in some measure, for the inconvenience and trouble to which they were frequently put.

R. McG. CARSLAW,

9th July, 1931.

FARM ECONOMICS BRANCH,
DEPARTMENT OF AGRICULTURE,
CAMBRIDGE UNIVERSITY.

CHAPTER I

GENERAL DESCRIPTION OF THE AGRICULTURE OF THE COUNTY

HERTFORDSHIRE is situated on the south-western fringe of the great eastern arable district of England. The southern extremities, adjoining Middlesex, include some of the suburbs of London; the northern boundary adjoins the county of Cambridge; on the east the county is bounded by Essex, and on the west by Bedfordshire and Buckinghamshire. Hertfordshire is approximately 35 miles long and 20 miles wide, contains 148 parishes, and covers an area of about 404,500 acres, of which 2000 acres are under water. The soils of the county vary from light gravel to heavy clay. There are considerable areas of chalk and boulder clay in the north of the county, of glacial gravel and London clay in the south, and of chalk marl and "clay-with-flints" in the west. The rainfall of the county averages 27 in. per annum. The topography is undulating, particularly in the north and west, where ranges of chalk hills rise to several hundred feet. The principal rivers are the Lea and the Colne, which run south to join the Thames, and whose tributaries drain nine tenths of the county.

Hertfordshire has many historic associations. Its proximity to the Metropolis has always made it a favourite residential district, while, according to a nineteenth century writer, "the florid countenances of the living, and the churchyard records of the dead, are happy and incontrovertible proofs of the salubrity of the Hertfordshire air." The development of rapid and cheap transport, together with the gradual southerly movement of the centre of industrialism associated with recent years, has led, particularly since the War, to a great increase in the urban and suburban population of the county, and to the development of "garden cities" and other building sites. While this movement has absorbed large areas of agricultural land, it has brought in its train valuable marketing advantages to the Hertfordshire farmer.

Hertfordshire was one of the first counties to adopt modern methods of farming, and by the beginning of the eighteenth century was, except on the chalk lands in the neighbourhood of Royston, very largely enclosed. This early development was due primarily to the proximity of London which provided not only a convenient market for produce, but also an inexhaustible supply of manures. Writing in 1732, William Ellis, of Little Gaddesden,

stated* that "the soils of the county are most of them naturally poor of themselves, but of late greatly improved by the industry of its farmers, who, living within a days' journey of London, many of them have been encouraged to employ their teams at vacant times to carry meal, bran, chaff, corn, wood, and other vendibles thither, in order to load back again with soot, ashes, hoofs, horn-shavings, rags, etc., for dressing their land; by the help of these and good ploughings many have benefit of grain, grass, turnips, etc., yearly without the loss of one summer for the fallow season." In addition to road transport, the navigation of the rivers Lea and Colne, and later of the Grand Junction Canal, gave the Hertfordshire farmer, until the introduction of railways, something of a monopoly in supplying the wants of the Capital.

Ellis's book, *The Hertfordshire Husbandman*, describes very fully the practices followed by the best farmers of the county at the beginning of the eighteenth century. So far as the management of soil and crops is concerned there is little he could learn from the present generation of farmers, for the county was famous for its methods of tillage, the variety of its crops, and the enterprise of its agriculturists, before the improvements in Norfolk were even begun. At that time, and, indeed, until the latter half of the nineteenth century, wheat was the principal source of revenue of the farmers of Hertfordshire, "where they run upon this grain, as being a county best furnished of any others, with water-mills for grinding the same." Barley was also a crop "much sowed in Hertfordshire, and chiefly about Baldock, Hitchin, Royston, and Ware, by reason of the great conveniency of water-carriage from the latter to London, and also for the swell which the water causes in the measure." Buckwheat, rye, vetches, peas, and beans were commonly included in the rotation, while charlock, hairy-bind, cat's tail, docks, and twitch were as persistent and unwelcome intruders as they now are. The cultivation of clovers (said to have been introduced in the time of Oliver Cromwell), rye grass, trefoil, sainfoin, etc., had, when Ellis wrote, already made great strides in the county.

At that time livestock were of very secondary importance in Hertfordshire, and Ellis's writings clearly show that the management of animals had not reached that high standard associated with the crop husbandry of the county. Livestock were considered of value primarily as producers of manure. "Swine," we learn, "are generally of two sorts, the small wild Black China, or West India breed, and the great Leicestershire. Sheep are the most necessary and benefical of all the beasts upon a farm, and where they are not kept, a tenant's destiny may easily be read. Tame rabbits are great improvers of a farm by their dung, which is sold here for sixpence a bushel trod in. . . . Forty pairs of pigeons is reckoned to make about 20 single bushels of dung a year, and is here sold for tenpence the single bushel heaped." Cows were apparently kept as revenue

* *The Practical Farmer or the Hertfordshire Husbandman.*

producers, but the fresh milk trade was entirely undeveloped. Suckling calves, or the manufacture of butter and cheese, yielded an income of about £5 per cow per year.

A later picture of Hertfordshire agriculture is found in a Report* drawn up for the consideration of the Board of Agriculture and Internal Improvement in 1795. The predominance of cereal growing is again emphasised in the statement that "Hertfordshire is justly deemed the first and best corn-growing county in the kingdom." By this time the county had become famous for the practice of top dressing in the spring with soot, ashes, etc., and to the "almost magical powers of this practice the Hertfordshire farmers are principally indebted for their never-failing crops." The spread of this innovation was apparently not only increasing agricultural production, but was also relieving the urban dwellers of a considerable financial burden, for "but a few years ago the assessments to scavangers was a considerable burden on the inhabitants of London; the case is now directly the contrary. The parish of Marybone then paid about £500 per annum, the contracting scavenger now pays the parish £1050 per ditto."

At the end of the eighteenth century rents averaged 12*s.* per acre throughout the county, and wages of day labourers about 1*s.* 4*d.* "and small beer" for a 12 hour day. A good deal of the farm work was done at piece rates, such as hedging (at 2¾*d.* the pole), threshing, reaping, etc. Perhaps one of the most outstanding features of the agriculture at that time was the great attention given to chalking, quantities of from 60 to 100 load per acre being applied as frequently as once in 10 years. Chalking was done by specialists who travelled from farm to farm (generally in bands of three), and who were paid at piece rates. The method adopted was to sink a pit about four feet in diameter in the centre of the field to be chalked. If chalk was not struck within 20 feet of the surface, the pit was filled, and the process repeated in another place until rewarded with success. The sides of the pit were prevented from falling in by a sort of basket work woven of willow rods and brushwood. A cartwheel, an axle, a rope, and a bucket provided the means of raising the chalk, while two wheelbarrows, a spade, a shovel, and a pick axe formed the rest of the necessary stock-in-trade of the chalkers. The pitman, working at a depth of 20 or 30 feet, dug out the chalk horizontally, and filled the bucket, his two companions alternately winding up and wheeling the chalk onto the field. One pit chalked about six acres of land at 60 load to the acre. The cost to the farmer, including the sinking and ultimate filling in of the pit, was generally in the neighbourhood of 7*d.* per load, or about £1 15*s.* per acre for a dressing of 60 load. Writing in 1906, Sir Daniel Hall, stated that: "The amount of chalk thus spread upon the

* *A general view of the Agriculture of the County of Hertford, with observations on the means of its improvement.* D. Walker.

surface of the soil must have been considerable; the surface soil of the fields of the Rothamstead Estate now contains from three to five per cent. of carbonate of lime, which is equivalent to 30–50 tons per acre; and since none has been spread during the last 70 years at least, and solution in the rain water has been continuously going on, there must have been nearer 100 tons per acre at the beginning of the nineteenth century. . . . . It is not too much to say that the chalking has alone rendered arable farming possible on much of this land."*

As might be expected, Arthur Young has much to say on the agriculture of the county.† His description was written during the Napoleonic Wars, a fact which is reflected in his many references to rising costs of production. The average rent for the county he then estimated at 15*s.* per acre (although some of the good meadow land was rented at £2–£3), tithe at 3*s.* 5¼*d.*, while poor rates had risen three or four fold during the previous 30 years, and at the beginning of the nineteenth century averaged about 6*s.* to 7*s.* in the £. In some parishes (e.g. Sacombe and Little Munden) poor rates were as high as 17*s.* in the £. The most common size of farm at that time was from 150–400 acres, and the average annual expenditure about £5 per acre. The cost of four horse ploughing was in the neighbourhood of 11*s.* to 12*s.* per acre, excluding any allowance for depreciation of horses. Young has many faults to find with the "great Hertfordshire wheel-plough" then widely used in the county. It was evidently a very heavy and cumbersome implement, the share alone weighing 60–70 lb. "This plough will not move in its work one yard without the ploughman; a decisive proof of its miserable construction." The use of the drill was not yet common, for Young "passed through near 100 miles of the county, inquiring for drilled crops, but neither seeing nor hearing of any."

At the beginning of the nineteenth century much of the land was held by copyhold tenure, and such land sold at about 28 years purchase as compared with 34 years purchase for freehold property. Common rotations were:—

Strong and heavy soils.	Light soils.
Fallow	Turnips
Wheat	Barley
Fallow	Clover
Barley	Wheat
Clover	Oats
Oats	

Yields were estimated to average 23 bushels per acre for wheat, and 32 bushels per acre for barley and oats. Clover hay was a very profitable crop, and was carted in large quantities to London. At that time hedges formed more than a mere fence against livestock, for Hertfordshire was very badly situated with

* *Victoria County History*, Vol. II.
† *General view of the Agriculture of Hertfordshire*, 2nd edit., 1813.

regard to coal, and brushwood and hedge rows formed the principal source of fuel. These conditions caused many farmers to "fill the old hedges everywhere with oak, ash, sallow, and with all sorts of plants more generally calculated for fuel than fences, and which would form no kind of fence under any management but their own. Here they form a material object in the rural economy of the farm, supplying the house with wood sufficient for its consumption." Young comments at length on the Hertfordshire custom of "plashing" hedges, for which the county was famous.

In the middle of the nineteenth century, 50 years after Young's visit, James Caird travelled through the western portion of Hertfordshire and wrote a brief description of its agriculture.* A large area of the county between Hitchin and Hemel Hempstead was then rented at an average of 25*s*. per acre, tithe free, all rates being covered by 3*s*. per acre at the outside. The usual rotation was five course, comprising turnips or fallow, barley, clover, wheat, and oats. Caird estimated the average size of farms at 200 acres, and stated that "small farmers holding from 50 to 100 acres are not doing well." As an example of the common mode of husbandry in the district, he describes the organisation of a farm of rather more than 200 acres, on which the livestock comprised 6 cows and 100 ewes. The calves were fattened, and the dairy produce sold as butter. The lambs were either fattened or sold as stores at 16*s*. or 18*s*. each. About 20 pigs were fattened. Six horses worked the farm, three in line in a plough. Part of the straw was sold at about £1 per load, and soot purchased in place of it. The wheat crop averaged 22 bushels per acre, oats 24 bushels and barley 32 bushels. No cake and very little, if any, artificial manure was purchased. Labourers were paid 9*s*. a week.

11. The greater portion of Caird's description of Hertfordshire is devoted to the work of Lawes at "Rothamstead Park," now the most famous Agricultural Experimental Station in the world. The early work of Mr. (after Sir) John Lawes is perhaps most generally associated with the discovery of "superphosphate," but his later investigations, covering a period of more than half a century, in collaboration with Dr. (and later Sir) Joseph Gilbert, dealt with nearly every aspect of the science of agriculture, and revolutionised farming methods throughout the civilised world.

12. The latter half of the nineteenth century saw great changes in the economic position of Hertfordshire farming. With the development of rail and steamship transport the county lost its advantage as a grain producer, and more and more attention was given to the development of the liquid milk trade. The area under the plough commenced to decrease, and the pasture land to increase both relatively and absolutely. Poultry, potatoes, and hay became more prominent features, while the greater use of artificial fertilisers and foodstuffs

* *English Agriculture in* 1850–51.

helped to raise the general standard of production. The increasing cost of labour, partly offset by improved machinery, rendered chalking, sheep folding, and many other practices followed since the time of Ellis, uneconomic. The glass-house industry was started about 1880, while straw plaiting, which for 100 years had given work to the country folk round Luton, Dunstable and St. Albans, ceased to exist as a rural industry.

13. Hertfordshire is still predominantly an arable district, although there has been a decrease of 20 per cent. in the number of agricultural holdings, nearly 30 per cent. in the area under the plough, and of over 40 per cent. in the acreage devoted to wheat and barley between 1885 and 1929. Since 1913, the area under crops and grass has fallen by 23,750 acres, but how much of this is due to land going out of actual cultivation and how much to the urban development in the south of the county, it is not possible to ascertain. The growth of towns such as St. Albans, Watford and Barnet, and the springing up of new towns as at Letchworth and Welwyn Garden City must account for a very considerable acreage. The 1929 *Statistics* record for the county a total area of 302,125 acres under crops and grass, and 9800 acres under rough grazing. Of the area under crops and grass, 56 per cent. is arable land. There are 3,251 agricultural holdings of over one acre in extent, employing 10,526 regular workers (exclusive of the occupier, his wife and domestic servants). Of these holdings nearly half (1477) are below 20 acres in size, and over 60 per cent. are less than 50 acres. It should be noted, however, that in the light of information made available by the present enquiry, there is reason to believe that a large number of these smaller undertakings are not "agricultural holdings" in the generally accepted meaning of the term.

14. Statistics relating to the distribution of crops and grass, and to the numbers of livestock, holdings, and workers in 1885, 1907, 1924 and 1929 will be found in Table I in the Appendix, but here it may be mentioned that dairying is now the principal enterprise in the agriculture of the county, practically all the dairy produce being sold as whole milk in the local urban and suburban centres, or in London. Throughout the county the number of agricultural horses has decreased by about one-third since 1885, and the number of sheep by about two-thirds. Dairy cattle have increased by approximately 50 per cent., while poultry are nearly four times as numerous now as in 1885. There has been a decline in the area under practically all arable crops during the past 45 years, but nearly 5000 acres of potatoes, 2000 acres of vegetables (mainly brussel sprouts), 1700 acres of orchard, and 500 acres of small fruit were grown in 1929. Sugar beet has been of importance only in the east of the county; the nearest factory (Felsted) being situated in the adjacent county of Essex. The glass-house industry, associated particularly with the Lea valley, has developed rapidly during the last 40 years, and now covers close on 1000 acres within the

county boundaries. Tomatoes and cucumbers are here the principal crops grown, but grapes, roses, ferns, palms, and carnations are also produced. It has been estimated that this industry employs between 600–700 workers per 100 acres, and annually yields produce to the value of approximately £1900 per acre. Watercress cultivation has been developed in the valleys of the Colne, Gade, and Lea since 1850.

15. Between the very intensive glasshouse cultivation in the Lea valley and the large corn growing farms in the north-east of the county are many gradations and systems of farming. No one rotation is common to the county, and certain crops such as sugar beet, potatoes, and brussel sprouts are more or less confined to particular areas. Wheat is still the principal cereal crop, and, while it is grown on many varying soils and tilths, the best wheat lands are on the heavy soils in the neighbourhood of Bishop's Stortford. Oats are widely grown, but barley is largely confined to the region around Hitchin, Baldock and Royston. Rye, beans, and peas are grown to a lesser extent.

16. The principal fallow crops are potatoes, mangolds, sugar beet, turnips, swedes, cabbage, marrow stem kale, kohl rabi and rape. The area under potatoes is restricted to the comparatively free working loam which runs in a strip from Knebworth in the north to Rickmansworth in the south. Sugar beet is grown mainly in the east and north. Of green crops, lucerne and vetches are important, and there is a large acreage under rotation grasses. Other crops which find a place on Hertfordshire farms are mustard, linseed, brussel sprouts, brocolli, and peas for picking green.

17. As is to be expected owing to the proximity of London, a considerable amount of market gardening is practised, and a number of farmers grow market garden crops. Around Hitchin are several lavender fields. The principal fruit crops are black currants, gooseberries, strawberries, cherries, apples, pears and plums. Permanent grass is characteristic of the heavy London clay in the south, but is found all over the county except in the extreme north-east. Owing to the dry summers it is not uncommon for much of the grassland to suffer from drought.

18. Dairy cows are the principal livestock kept. Sheep on grassland are of growing importance, and pigs are kept throughout the county. In few counties is there such a variety of breeds of all livestock, and many herds are known throughout the world. Poultry-keeping, both as a side line and as a specialised business, is increasing. Cattle feeding, except in the north-east area, is not extensively practised.

19. Road and rail facilities with London are excellent, and there is good road connection from east to west, but rail facilities are poor for cross-country traffic. The river Lea is navigable to Ware, and the Grand Junction Canal offers an alternative method of transport to road and rail in the west of the county.

Weekly auction markets are held at seven main centres:—Hitchin, Bishop's Stortford, Hertford, Barnet, St. Albans, Watford and Tring. At each of these, sales of corn take place, in addition to live stock. There are also several smaller markets. Owing to their situation several markets serve adjoining counties, and Hitchin market attracts buyers and sellers from a wide area. A very large trade in livestock is carried on by direct bargaining between farmers and butchers, so that the numbers of livestock marketed through the auctions is not a reliable index of the trade in livestock.

There are but few co-operative organisations. At Hitchin, the *Herts. & Beds. Bacon Factory* is run by the farmers: in Harpenden, the *Harpenden Dairies* is an organisation of farmers selling milk and milk products, and, more recently, registered as an egg packing station; at Welwyn Garden City one of the earliest egg packing stations operates. There are no purchasing societies. Many grain, manure, seeds and feeding stuff merchants are located in the county, and many more operate in it. There is a considerable trade with Scotland in seed potatoes and sheep, and with Ireland and the West Country in cattle. One or other of the joint stock banks have branches in many villages.

Owing to the proximity of London, and the rapidly growing urban districts in Hertfordshire itself, there are many opportunities for retailing products like milk and potatoes, and there appears to be room for a greater exploitation of this method of sale.

CHAPTER II

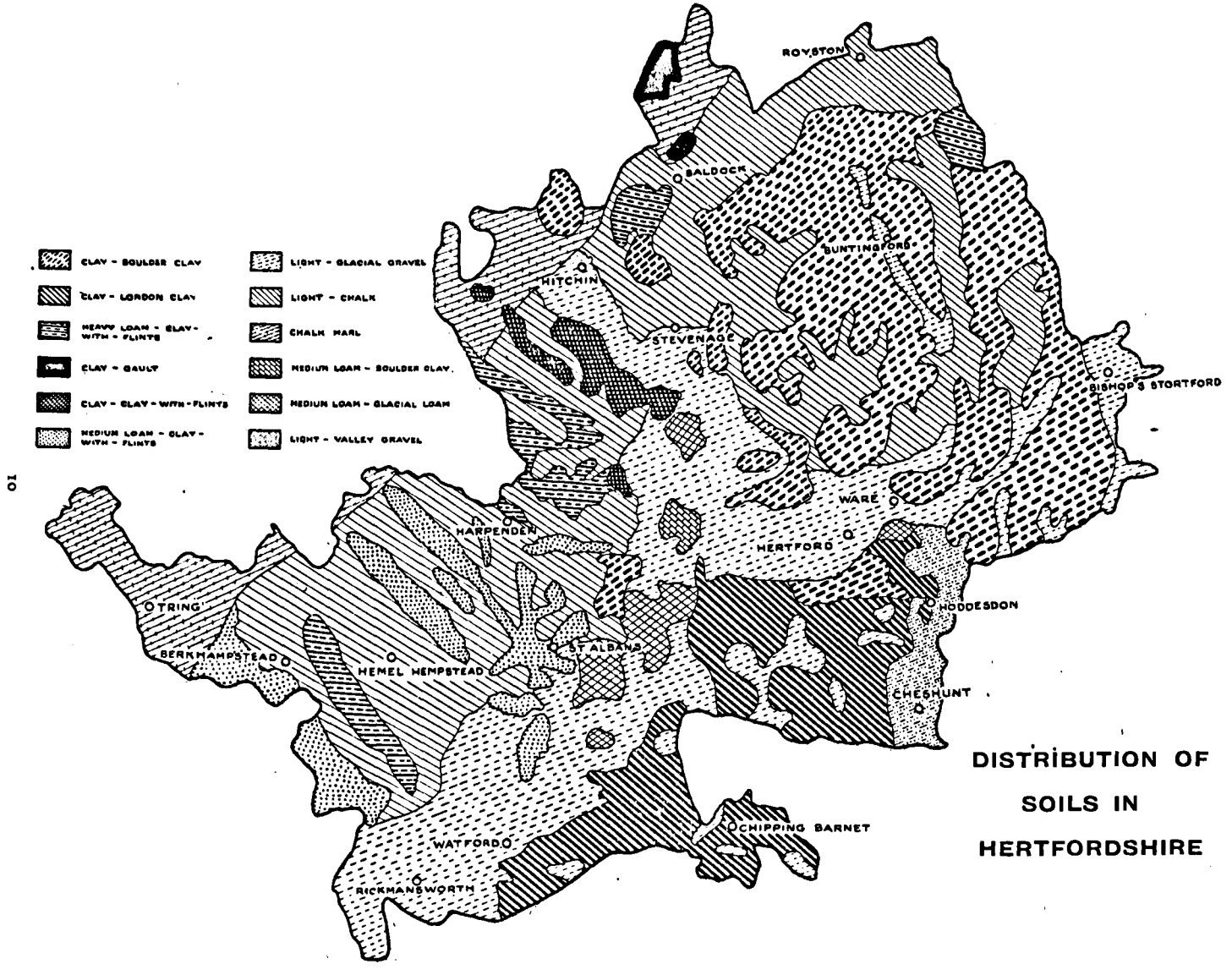
1. THE SAMPLE

THE records on which this study is based were collected in the autumn of 1930. Recording commenced in the last week of September and continued until the middle of December. During this period, data were obtained relating to 320 farms in the county.

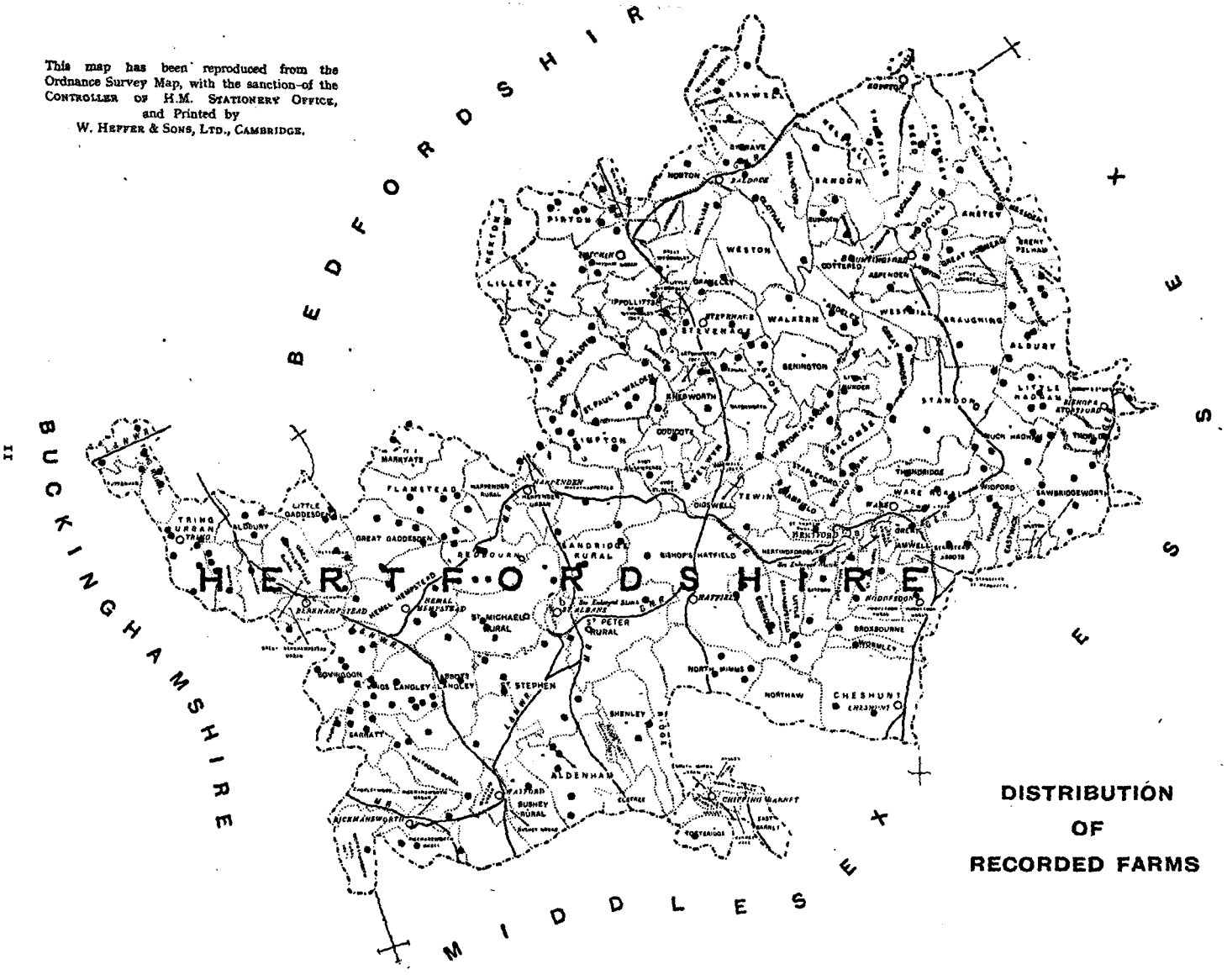
Every endeavour was made to secure a truly representative sample. For this reason selection was made in the first place from a complete list of all the holdings of more than one acre in extent in the county. There are approximately 3300 holdings enumerated in the Ministry of Agriculture's statistics, and these were grouped in their respective parishes, the names of the occupiers in each parish being arranged in alphabetical order. From this list every third name was selected, and a "short list" of approximately 1100 secured. All but 6 per cent. of this random selection were traced, and the sample was found to be comprised as follows:—

	% of total number of holdings.
Mixed farms (all sizes)	43·2
Private gardens and parks	14·3
Allotment (i.e. side line) type of holding	9·0
Specialised farms (nursery gardens, glass-houses, fruit, poultry, etc.)	7·7
Accommodation grass, and parcels of land sub-let	6·3
Contractors', brewers', butchers' yards and paddocks ..	3·8
Public houses, garages and cafés	3·7
Home and hobby farms	2·5
Holdings unoccupied or derelict (largely held as building sites)	1·9
Recreation grounds, golf courses, etc.	1·5
Not traced	6·1
Total number of holdings in short list	100·0

The outstanding feature of the above analysis is the large proportion of holdings in the county which are not genuine agricultural undertakings in the



DISTRIBUTION OF SOILS IN HERTFORDSHIRE



DISTRIBUTION OF RECORDED FARMS

commonly accepted meaning of the term. In this category must fall private gardens and parks (14·3 per cent.), contractors', brewers', and butchers' yards (3·8 per cent.), public houses, garages, and cafés (3·7 per cent.), holdings unoccupied or derelict (1·9 per cent.), and recreation grounds (1·5 per cent.); a total of just over one quarter of all the holdings enumerated in the official statistics. In this connection it must be observed, however, that owing to its proximity to London, Hertfordshire is, particularly in the south half of the county, largely suburban, and it is, therefore, unlikely that the criticism of the official statistics implied by this analysis will be equally valid in counties which are more genuinely rural.

In collecting the records for this investigation holdings devoted wholly, or mainly, to fruit, market gardening, horticulture or glass-house production were omitted. Similarly no records were taken from holdings of the non-genuinely agricultural type. The 320 records obtained thus represent about one-sixth of the mixed genuine agricultural holdings in the county. The records were collected by a personal visit to each occupier concerned. Of the 320 records collected, 17 had to be discarded for one reason or another and the data presented in the following pages refer therefore to 303 holdings.

The recorded farms are well distributed throughout the county (see diagram on page 11), 116 parishes out of a total of 148 being represented. The size-distribution of the recorded farms is less satisfactory:—

Size group (acres).	Total No. of holdings (1929).	No. of records.	Records as % of total.
1–5	764	8	1·0
5–20	713	15	2·1
20–50	485	31	6·4
50–100	311	43	13·8
100–150	275	44	14·1
150–300	416	97	23·3
over 300	287	65	22·6
Totals	3251	303	9·3

It is clear that the larger farms are much better represented in this enquiry than are the smaller, but in this connection it should be noted that the bulk of the non-genuine agricultural holdings, and of the specialised farms, fall into the two smallest size groups, and, if allowance is made for this, the size distribution of the recorded farms will not be so inadequate as at first sight appears. While the records obtained represent just over 9 per cent. of the total number of holdings over one acre in the county, they cover nearly 58,000 acres, or almost exactly 19 per cent. of the total area under crops and grass.

All the soil types found in the county are represented in the data collected. Classification of soils was effected by means of the soil maps made available by the soil survey of the Province which has recently been completed. A copy of the soil map of Hertfordshire is shown on page 10, while the soil distribution of the recorded farms is given in the following table:—

Soil type.	No. of records.
Light—chalk	87
Clay—boulder clay	65
Light—glacial gravel	47
Chalk marl	31
Medium loam—clay with flints	27
Clay—London clay	19
Heavy loam—clay with flints	15
Clay—clay with flints	5
Medium loam—glacial loam	3
Clay—gault	2
Light—valley gravel	2
Total	303

For comparative purposes these eleven soil types have been amalgamated into three major classes, viz: heavy, chalk, and light. The heavy class comprises the four clays plus the chalk marls. The chalk class comprises only one soil type. The light class comprises the glacial gravel, the medium loams, the heavy loams, and the valley gravel. When the sample is grouped by size and soil the following distribution is obtained:—

	Number of farms:—		
Size group (acres).	Heavy soil.	Chalk soil.	Light soil.
1–5	4	3	1
5–20	7	5	3
20–50	14	9	8
50–100	18	14	11
100–150	19	9	16
150–300	34	31	32
over 300	26	16	23
Totals	122	87	94

From the data collected in this investigation, supplemented, so far as the glass-house industry is concerned, by the 1925 Census of Production figures, it is possible to make a rough estimate of the value of the agricultural output of the county during 1930.

	Output £'000.
General mixed holdings..	2,022
Glass-house industry	1,615
Market and nursery gardens, fruit farms, etc.	140
Recreation grounds (grazing)	3
Produce consumed in occupiers' households	60
Total output	£3,840

These figures are, admittedly, no more than approximations, but they emphasise the importance of the glass-house industry, which, although occupying less than 1000 acres, is responsible for nearly one-half of the total output of the county. It is for this reason unfortunate that the present investigation contains no reference to this section of the rural economy of the county.

2. RELIABILITY OF OBSERVATIONS

From the description given in the previous section it will be evident that every precaution has been taken to avoid bias in selecting the sample. It is important, however, to consider whether bias may occur in the individual observations, and the extent to which the individual observations may be regarded as reliable.

The data for this investigation were collected by what is generally described as the "survey" technique. Where the farmer himself kept accounts or other records* these were referred to where available, but much of the data could only be obtained by relying on the farmer's memory and personal knowledge of his business organisation. It is difficult to secure evidence of the reliability of the survey figures based on the farmer's memory, for when such evidence is presented in the form of confirmative records made available *after* the survey figures have been secured, the obdurate critic maintains that the illustration is not a fair one, because the farmer who has taken the trouble

* 27% of the farmers providing data kept financial records, while many more had records of their labour costs, purchased foods, etc.

to keep records is more likely to remember the details of his business than is one who keeps no records. So far as certain more uncommon types of data are concerned this criticism is no doubt valid, but in the case of the ordinary transactions and general organisation of the farm, common observation would suggest that the less the occupier relies on written records the more retentive of details is his memory.

The data collected in this survey refer only to the ordinary transactions and general organisation of the farms concerned, i.e. to matters of which the majority of farmers have personal knowledge. While it is probable that in the case of individual records inaccuracies occur in many of the minor items, it seems certain that significant discrepancies are exceptional in details of major importance because these are largely amenable to cross checking. For example, every farmer knows the area of his farm within a reasonable degree of accuracy, and from this base the acreage under the various crops can be checked, and errors of estimation minimised, by the recorder at the time of his visit. Similarly with livestock, the numbers in hand at the beginning of the year plus purchases and births can be checked against numbers in hand at the end of the year, plus sales and deaths. Purchases of fertilisers and seed were obtained by considering each crop individually. Yields were obtained with such precision as the skill and experience of the farmer permitted; in many cases threshing yields were available as a check. Prices presented no great difficulty. Expenditure on foodstuffs was ascertained by the consideration of each individual type of foodstuff purchased. The labour bill was calculated by aggregating the wages and perquisites of each of the regular employees, and adding the estimated amount of expenditure on casual labour; as a wages book is probably the most common type of record kept on farms, a check on the farmer's estimates of this item of expenditure was frequently available. Miscellaneous expenses and receipts were obtained by enumerating a long list (over 50) of possible headings under which these transactions might have occurred. Thus petrol, paraffin, oil, coal, vet., blacksmith, etc., etc., were each considered individually, and with many of these items approximate cross checking was available (e.g. coal with number of days threshing, steam cultivation, and household consumption; petrol, oil, and paraffin with number of days tractor work, fixed engines, and motor car mileage; shoeing bills with number of horses, etc., etc.).

It can be seen that the questionnaire employed in collecting the data was designed in such a way that the recorder had many opportunities for checking the data for errors of estimation. In a number of cases confirmation was obtained of the accuracy of the major details collected in the enquiry, by wages books, foodstuff records, yields, etc., made available after the recorder's visit. The following example refers to a farm, the accounts of which were

not available for reference until some time after the survey figures were recorded:—

Expenses.	Per Accounts. £	Per Survey. £	Difference. £
Rent	320	320	0
Seeds	243	237	— 6
Fertilisers	287	232	—55
Foods	385	306	—79
Labour	819	838	+19
Livestock	196	193	— 3
Sundry crop expenses	103	147	+44
Miscellaneous	578	589	+11
Totals	2931	2862	—69

Receipts.	Per Accounts. £	Per Survey. £	Difference. £
Livestock products	1331	1323	— 8
Livestock	217	213	— 4
Miscellaneous	260	203	—57
Totals	1808	1739	—69

Records of crop receipts are not shown in the above table for the reason that the survey figures refer to the 1930 crops, whereas the account figures refer to the 1929 crops, and no comparison is therefore possible. By a coincidence the difference between the survey and account figures is identical in both the expenses and receipts, so that, so far as the profitableness of the undertaking is concerned, the error is self-cancelling. It is, of course, impossible to generalise from this individual example of survey accuracy, and it is given here merely because it is the only case occurring in the present investigation in which complete account records became available *after* the survey data had been collected.

In the above example, discrepancies between the survey and account figures are considerable in the case of certain of the individual items comprising the total expenses and receipts. These discrepancies may be due partly to complications associated with outstanding debtors and creditors (in the case of the survey figures all purchases and sales have been considered as cash transactions), and partly to errors of estimation in the survey figures. So far

as the former possibility is concerned the effect is justifiable, and the observations are unreliable only in so far as errors of estimation are the cause of the discrepancies. It is reasonable to assume, however, that genuine errors of estimation (apart from errors of bias) are just as likely to be over-estimates as to be under-estimates, and that where large numbers of observations are amalgamated for the purpose of averaging, the former will cancel the latter.

In considering the reliability of the observations one other matter should be given due weight. Where the objective of an investigation is to secure a picture of average, or normal, conditions, it is more desirable to obtain representativeness of sample than to obtain accuracy in the individual observations. For example, if it were desired to obtain a figure representing the average yield of wheat for the county, it would be more correct to secure the yields, estimated to the nearest quarter, on a large number of different fields and farms, rather than to weigh, to the nearest pound, the yield from one particular acre. The present investigation aims at giving an outline picture of general farming conditions in the county, and for this reason the number of observations and the representativeness of the sample are of greater importance than meticulous accuracy in the individual observations.

3. PRESENTATION OF RESULTS

In analysing the data collected in this investigation the principal grouping employed has been that of size measured in terms of acres. For convenience the size groups adopted correspond with those on which the official statistics are based, viz: 1–5 acres, 5–20 acres, 20–50 acres, 50–100 acres, 100–150 acres, 150–300 acres, and over 300 acres. Sub-grouping has been carried out both on the basis of soil type and on the basis of type of production. As the largest number of observations refer to farms of from 150–300 acres in size, this group is the one mainly used for sub-grouping.

In discussing the results it has been necessary to introduce certain technical terms. In order that the reader may interpret correctly the significance of the data presented in these pages the terms employed are defined as follows:—

(1) *Financial Year* covers a period of twelve months ending at a date varying with individual farms between the 25th September and the 15th December, 1930.

(2) *Gross Income* is the sum of the receipts for livestock, livestock products, and miscellaneous sales effected during the financial year; the receipts for the 1930 crops already sold plus receipts for anticipated crop sales at the prices ruling when the record was taken; and the increase in the livestock and fodder

crop valuations during the financial year. The gross income does not include the value of the private drawings in kind.

(3) *Gross Charges* comprise the expenditure on labour (including an allowance at current rates for unpaid family labour other than that of the occupier), foodstuffs, purchases of livestock, and miscellaneous expenses incurred during the financial year; the expenditure incurred on seeds and fertilisers for the 1930 crops; one full year's rent; and the decrease in livestock and fodder crop valuations during the financial year. The gross charges do not include any interest payments on loans, nor interest on the farmer's own capital. No credit has been given to the farm for the value of private drawings in kind.

(4) *Farm Income* is the difference between gross income and gross charges. It should be noted that this figure has been obtained by calculating the difference between the charges incurred during the financial year, and the income realised or anticipated *as a result* of these charges. The farm income is the amount available to defray interest on loans, and to remunerate the farmer for his own labour and capital investment.

(5) *Investment Income* is the farm income minus remuneration to the occupier for his own labour. This remuneration is calculated at the rate of £2 per week for manual work and £4 per week for managerial duties. Where an occupier employs part of his time on manual work and part on managerial duties, the allowance has been calculated *pro rata* to the estimated number of weeks spent on each. Investment income is, therefore, a measure of the return yielded by the capital invested in the farm (not including landlord's capital) on the assumption that *all* labour on the farm has been remunerated.

(6) *Labour Income* is the farm income minus 5 per cent. on the mean value of the farm capital. In this connection it should be noted that the farm income has been calculated on the basis of a debt-free undertaking; a condition which, in practice, is far from common. Labour income is, therefore, the return obtained by the occupier to remunerate him for his own labour after all charges, including interest on the capital invested, have been defrayed.

(7) *Profit Surplus* is the farm income minus an allowance for the occupier's own labour and for interest at 5 per cent. on the farm capital. It is thus the surplus left over after all legitimate charges have been met.

(8) *Drawings in kind.* In calculating the gross charges no credit has been given to the farm for private drawings in kind. These emoluments are, however, of considerable importance, and comprise such items as house rent, farm produce, fuel and other material consumed by the farmer's household. In considering any one of the four indices of profitableness (4, 5, 6, and 7 above)

it should be borne in mind that an addition must be made to represent drawings in kind.

(9) *Farm Capital* represents the capital invested in livestock, crops, implements and machinery. So far as livestock, implements and machinery are concerned the farmer's own estimate of their value has been accepted, and the mean of the opening and closing valuations adopted in the analyses. Corn, hay, potatoes, and other crops generally sold have been valued on the basis of the yield and estimated market price; while young seeds, bare fallows, folding and other root crops have been valued at standard rates based on earlier cost investigations. These crop valuations are referred to in later pages as "crops and tenant right."

(10) *Landlord's Capital.* This has been calculated by capitalising the rental value of each holding on the basis of 17 years' purchase for farms under 100 acres, 19 years' purchase for farms between 100 and 300 acres, and 21 years' purchase for farms over 300 acres.

(11) *Gross Output* represents gross income minus purchases of livestock and valuation decrease. Private drawings in kind should, theoretically, be included in the gross output.

(12) *Net (Social) Output* is the amount accruing to the three partners in the industry, viz: landlord, farmer and labourer. Net output is, therefore, the sum of the gross rent, the farm income, and wages (including family labour other than that of the occupier), and, as such, is a measure of considerable importance. Produce and other material consumed by the occupier's family should, theoretically, be included in the net output.

(13) *Animal Units* provide a somewhat unsatisfactory index of the livestock density. This measure expresses all types and ages of livestock in one composite index. One animal unit is equal to one horse, bullock, or cow; young stock and other types of livestock are expressed as fractions of one unit.*

(14) *Man Equivalent* is a convenient way of measuring the number of workers employed. One man working for one year equals one man equivalent. One man working for six months equals 0·5 man equivalent. Juvenile and female workers are expressed as a fraction of adult male workers.

(15) *Crop Index* provides a composite index of the yields of a number of

* The conversion factors used in the investigation are as follows:

Horse	= 1·0 A.U.	Ewe, ram	= 0·14 A.U.
Cow	= 1·0	Brood sows	= 0·2
Bull, bullock	= 1·0	Fat pigs	= 0·1
Heifer	= 0·5	100 adult poultry	= 1·0

crops weighted by the acreage covered by each. An index of 100 is parity, and corresponds with the decennial average for the county. Thus a crop index of 90 indicates an average yield, for the crops concerned, of 10 per cent. below the 10-year average for the county.

(16) *Rent.* All the farms have been considered as being occupied by tenants paying rent. Where a farm was occupied by the owner the rental value has been charged against the farm.

(17) *Credit transactions.* All purchases and sales effected during the financial year have been considered as cash transactions, i.e. outstanding debtors and creditors have been omitted from the opening and closing balance sheets.

(18) *Averages.* In general, the averages presented are weighted, but simple averages have been introduced where considered advisable.

CHAPTER III

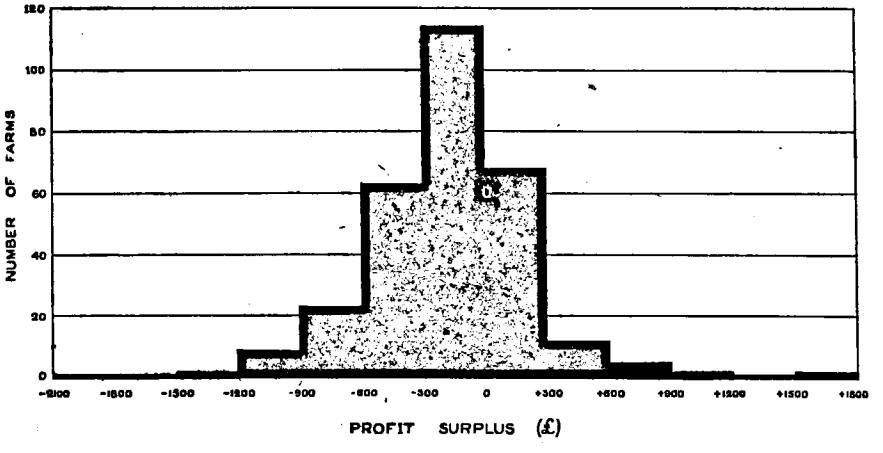
1. GENERAL FINANCIAL AND ECONOMIC DATA

(*a*) Over-all Averages

The results emerging from this investigation refer to the 1930 crop year, and must, therefore, be interpreted in the light of the weather conditions and prices affecting agricultural production in that season (see page 28.)

On the 303 farms for which records were completed the average profit surplus per holding was a *minus* figure of £180. This means that *on the average* there has been a deficit of £180 per holding after allowance has been made for the farmer's own labour (av. £133 per holding), after interest at 5 per cent. on the farm capital has been charged (av. £97 per holding), and after the farmer has obtained, free of charge, the use of a dwelling house and a certain amount of farm produce and other material (av. £70 per holding). To state this in another way, in order that the occupiers of agricultural holdings in Hertfordshire should have obtained interest on their capital and a modest remuneration for their own labour, it would have been necessary for the general price level of commodities to have been 11·8% higher, or the general cost level of requirements to have been 12·2 %

FREQUENCY DISTRIBUTION OF "PROFIT SURPLUS" ON 303 FARMS



lower than that actually ruling during the financial year. It is certain that this profit surplus figure does not exaggerate the seriousness of the position, for, owing to the general decline in crop prices after the survey was completed, the actual receipts for 1930 crops sold after Christmas must have fallen considerably short of those anticipated when the survey records were taken. The range in the profit surplus on individual holdings was from *minus* £2100 to *plus* £1700, and the distribution is illustrated in the preceding chart. This amazingly wide range is illustrative of the variations normally associated with agricultural production and practices, but the analyses given in further sections of this publication throw some light on certain fundamental factors influencing the profitableness of individual undertakings.

The capitalised value of land, buildings and improvements averaged just over £21 per acre. Rents averaged 21s. 8*d*. per acre, ranging from 10s. to £15. Arable land represented 56 per cent. of the total farmed area, with a variation of from 0 to 100 per cent. The farmed land was distributed in the following proportions:—

	Percentage of total farmed land:—	
	Survey records.	1930 statistics.
Permanent grass	41·7	45·2
Temporary seeds..	13·8	12·6
Cereals	30·9	29·9
Pulse crops	0·9	1·3
Fallow crops	6·2	5·0
Bare fallow	3·5	4·1
Other crops	0·3	1·9
Buildings, waste, etc.	2·7	—
Totals	100·0	100·0

The Michaelmas value of the farm capital (i.e. livestock, crops, tenant right, implements and machinery), approximated £10 per acre, but ranged, on individual holdings, from as low as £3½ to as high as £80. On the average the farm capital was distributed as follows:—

	Percentage of total Michaelmas Valuation.
Livestock	43
Crops and tenant right	37
Implements, machinery, and appliances ..	20
Total	100

Expressed in a single common denominator the number of livestock (including working horses) carried per 100 acres of farmed land averaged 19 animal units, ranging from ½ to 220 animal units. The distribution of this average figure between the different types of livestock was as follows:—

	Percentage of total animal units.
Dairy cattle	55
Feeding cattle	9
Sheep	11
Pigs	6
Poultry	5
Horses	14
Total	100

During the financial year to which these records refer there was a considerable all round increase in the numbers of livestock carried.

Gross income averaged £8 per acre, and comprised (to the nearest unit) the following items:—

	Percentage of gross income.	
Dairy produce	29	
Horned stock	17	
Pigs	9	
Sheep and wool	9	
Eggs	6	
Poultry	2	
		72
Wheat	7	
Hay	5	
Potatoes	4	
Sugar beet	4	
Barley	2	
Oats	1	
Other crops (including straw)	2	
		25
Other sources of income		3
Gross income		100

Gross charges averaged £7 15s. per acre, a figure which was distributed in the following proportions:—

	Percentage of gross charges.	
Labour	34	
Foodstuffs	17	
Rent	14	
Livestock	14	
Fertilisers	4	
Seeds	3	
Implements and machinery	3	
		89
Other items of expenditure		11
Gross charges		100

The gross output varied from £1½ to £154 per acre, with an average of £6. Expressed on the basis of "per manual worker" this output equals £240. The output per £100 farm capital averaged £68, and per £100 landlord's capital averaged £32. The output per £100 total capital invested (i.e. landlord's capital plus farm capital) amounted to only £22.

The net (or "social") output averaged £4 per acre, and was distributed between the three partners in the industry in the following proportions:—

	Percentage of total net output.
Labour (including family labour other than that of the occupier) ..	66
Gross rent	27
Farm income	7
Total net output	100

(*b*) Size Group Averages

The size grouping adopted corresponds with that used in the official statistics issued by the Ministry of Agriculture, and is based on superficial area. This basis of classification is somewhat unsatisfactory, for the volume of the output is of considerably greater economic significance than the unit of area farmed. Output is a composite measure of intensity of production and the productive area, and, as such, would appear to be the best method of expressing the size of the farm business. This suggestion is expanded in Chapter VII.

An analysis of the economic and financial data by size of farm (measured in terms of acres) is given in Table II in the Appendix. There is, of course, a wide variation between the averages (whether expressed on the basis of "per farm" or "per acre") of the different size groups. As these variations are important, no excuse seems necessary for devoting some space to discussing them.

Production on the smaller farms was much more intensive than that on the larger farms; the farm capital, the output per acre, and the turnover in the different size classes being as follows:—

Size group (acres).	Farm capital per acre.	Output per acre.	Turnover.
	£	£	%
1–5	55	60	109
5–20	22	25	114
20–50	14	12	86
50–100	12	9	75
100–150	10	7	70
150–300	10	7	70
Over 300	10	6	60

The greater intensity of production on the smaller farms was accomplished by a high density of employment and by concentration on livestock enterprises:—

Size group (acres).	Manual workers per 100 acres farmed land.	Animal units per 100 acres farmed land.	Income from livestock and their products as a % of gross income.
1–5	41·3	100	87
5–20	11·7	43	82
20–50	5·5	33	82
50–100	4·3	24	78
100–150	3·0	19	79
150–300	2·9	19	74
Over 300	2·5	17	65

The high density of employment on the smaller farms was associated, however, with a low output per worker, while the high output of livestock was made possible only by the purchase of relatively enormous quantities of foodstuffs. Further, the proportion of arable land to total farmed area varied inversely with the size of the holding:—

Size group (acres).	Gross output per manual worker. £	Arable land as a % of total farmed area.	Area under cereals as % of total farmed area.	Purchases of foods as % of gross charges.
1–5	144	14	0	60
5–20	212	38	14	48
20–50	229	42	19	35
50–100	205	56	32	25
100–150	231	40	28	18
150–300	237	55	32	17
Over 300	254	58	32	14

It is, perhaps, rather misleading to compare production on different sizes of holdings on the basis of production *per acre*. A more significant figure, from the point of view of profitableness, is production *per farm*, for the occupier cannot hope to secure an adequate income unless the total volume of his output is sufficient to leave him, on what must generally be a small profit margin, a net balance sufficient to recompense him for his labour and capital investment. For example, on the smallest size group the output per acre is as high as £60; but the average size of the farms in this group is 2·9 acres, and the total volume of the output is, therefore, only £173 per farm. From this gross output must be deducted, however, costs of production amounting to £164, leaving the occupier a farm income of only £9 to defray interest due on loans and to recompense him for his year's labour and for his capital investment. It is true that, *expressed on an acreage basis*, this farm income of £9 is much greater than that secured in any other size group, but to the individual producer it is the aggregate income which is of importance.

The incidence of the occupier's own labour, and of interest on the farm capital, varies largely between farms of different sizes, and due weight must be given to this fact when interpreting the profit indices of the various size groups. On the smaller farms remuneration for the occupier's own labour is of much greater importance than the return on the capital investment, but as the size of the farm increases interest on capital assumes ever greater significance:—

Size group (acres).	Ratio of remuneration for occupier's own labour to interest at 5% on the farm capital.
1–5	11 : 1
5–20	8 : 1
20–50	4 : 1
50–100	2¾ : 1
100–150	2¼ : 1
150–300	1¼ : 1
Over 300	¾ : 1

With the small farm, therefore, the return obtained by the occupiers for their labour (i.e. the "labour income") is the most important measure of profitableness, while for the large farms, particularly those falling into the largest size group, the return yielded by the capital investment (i.e. the "investment income") is the most important criterion of success.

The profit surplus (which averages a minus quantity in each size group) would suggest that the smaller farms have the advantage over the larger. But in this connection it must be remembered that the smaller farmers have less to lose than the larger farmers, for if the surplus figure is related to the size of the business, the larger farms are seen clearly to be in the better position. That small farms have less opportunity to realise large losses, and that large farms have more chance of making large profits is illustrated by the following figures which show the range in the profit surplus in each of the size groups comprising the present sample:—

	Range in profit surplus (£):—	
Size group (acres).	From minus.	To plus.
1–5	200	25
5–20	125	150
20–50	500	200
50–100	700	600
100–150	1500	700
150–300	1800	900
Over 300	2100	1700

The net (or "social") output has been described as "a standard of judgment for the whole agricultural community—for the amount of the net output determines the limit of possible incomes."* On the farms comprising the present sample the amount and distribution of the net output was as follows:

	Net output:—		Percentage distribution of net output:—		
Size group (acres).	Per farm (£).	Per acre (£).	Labour.	Gross rent.	Farm income.
1–5	56	19	48	36	16
5–20	129	12½	29	19	52
20–50	232	6¼	47	26	27
50–100	337	4¾	61	30	9
100–150	487	4	64	30	6
150–300	793	3¾	72	27	1
Over 300	1638	3¾	65	27	8

* A. W. Ashby, *Scot. Jour. Agric.*, October, 1923.

2. WEATHER AND PRICES IN 1930

The Weather.—1930 proved a wet year, the annual rainfall being considerably in excess of the normal. The actual rainfall recorded on the gauges at "Oaklands," St. Albans was 26·37 inches, and rain actually fell on 167 days. From the agricultural point of view, however, the period October, 1929, to September, 1930—the harvest year—is the most important, and the following table shows the rain distribution throughout that period.

Month.	Total rainfall inches.	Number of days rainfall.	Mean temperature °F.
October, 1929 ..	3·39	14	49·1
November ..	6·34	19	43·2
December ..	5·52	21	41·5
January, 1930 ..	2·55	17	41·6
February ..	0·99	8	37·1
March ..	1·36	10	41·5
April ..	2·17	15	46·5
May ..	2·30	17	51·7
June ..	0·52	5	59·3
July ..	2·37	15	59·7
August ..	2·97	13	61·1
September ..	3·46	17	57·3

The total rainfall for the harvest year was 33·94 inches; for the three preceding years it was 17·7 inches, 24·5 inches and 32 inches. The number of days on which rain fell was 171.

A history-in-brief of the weather during the year is given in the following table based on the Rothamsted records, and published in the *Monthly Weather Report of the Meteorological Office.*

Weather. Percentage Variations Above (+) or Below (−) Normal.

Month.	Rainfall.	Mean air temperature.	Hours of Sunshine.
October, 1929 ..	+ 33	+ 6	+19
November ..	+145	+ 9	+20
December ..	+105	+ 6	+80
January, 1930 ..	+ 50	+11	− 8
February ..	− 60	− 5·5	−15
March ..	− 31	0	+ 7
April ..	+ 34	+ 4·5	−28
May ..	+ 43	− 1	−16
June ..	− 57	+ 3	+23
July ..	− 3·5	− 3	− 4·5
August ..	+ 5	+ 1	+22
September ..	+ 67	+ 1·5	−17

The characteristics of each month can easily be read off from the table. Thus February was very dry (rain 60 per cent. below normal), dull (sunshine 15 per cent. below normal), and rather cold (average temperature 5·5 per cent. below normal). It is clear that the year as a whole was very wet but, owing to the absence of any long or very severe periods of cold, the average temperature was slightly above normal: hours of sunshine were very near to normal. In addition to February, March and June were also very dry months. The high sunshine figures for August were due largely to a fine period at the end of the month. The year was excellent for the growth of grass and other green crops. Harvest was rather late, and for those who missed the dry spell at the end of August it became a difficult operation as the September rainfall was 67 per cent. above normal.

Prices.—The following table, extracted from the notes on the agricultural index number which appear in the *Journal of the Ministry of Agriculture*, shows the monthly prices of agricultural produce expressed as a percentage increase over the average prices ruling during the base years 1911 to 1913:

Month.	1926.	1927.	1928.	1929.	1930.	1931.
January	58	49	45	45	48	30
February	53	45	43	44	44	26
March	49	43	45	43	39	23
April	52	43	51	46	37	—
May	50	42	54	44	34	—
June	48	41	53	40	31	—
July	48	42	45	41	34	—
August	49	42	44	52	35	—
September	55	43	44	52	42	—
October	48	40	39	42	29	—
November	48	37	41	44	29	—
December	46	38	40	43	26	—

These figures show the relative changes in average prices received by the farming community as a whole, and it should be remembered that the individual farmer is affected according to the variations in the price of the commodities he produces, and that his position may be considerably different from the average. In order to show the trend of prices, the index numbers since 1926 have been included in the table. It will be seen that prices of produce fell considerably during the period covered by the present investigation. The average percentage increase over the base years 1911–13 for the period September, 1929, to March, 1931, was 36. This period has been chosen as it represents the time during which the produce dealt with in this investigation

was sold. It should be noted, however, that owing to the fact that it includes two cereal harvests, the figure of 36 is probably rather higher than it would be were the crops grown in 1929, but sold in 1930, excluded.

For the *calendar* year 1930 the index number for certain types of agricultural produce were as follows:—

Wheat	..	5
Barley	..	0
Oats	..	(—) 13
Potatoes	..	(—) 4
Eggs	..	36
Milk	..	61

It is evident that while during 1930 crop prices had either fallen below, or had almost reached, pre-war levels, eggs and milk were still substantially above the level of 1911–13 prices.

Official price quotations for agricultural produce during the period covered by the investigation are set out in the following tables. Crop prices are shown from July, 1930, to March, 1931, and stock and animal product prices for the twelve months October, 1929, to September, 1930. For purposes of comparison the annual average price of the produce for the four preceding years is also shown, together with the average prices ruling during the period 1911–13.

The general tendency of crop prices during the period July, 1930, to March, 1931, has been one of depression, and by March, with the sole exception of potatoes, which are subject to seasonal fluctuation, prices were, in every case here quoted, below pre-war levels.

Crop Prices

	Wheat per cwt.	Barley per cwt.	Oats per cwt.	Potatoes (King Edw'rd) per ton.	Prime clover hay, per ton.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*
1911–13	7 7	7 11	7 1	78 10	89 0
1926	12 5	10 4	9 0	145 0	110 6
1927	11 6	11 9	9 1	141 6	116 6
1928	10 0	11 0	10 5	138 6	125 0
1929	9 10	9 11	8 10	97 6	134 0
July 1930	—	—	—	—	82 6
August	—	—	—	—	80 0
September	7 4½	7 8½	6 3	115 0	83 0
October	7 1½	5 7½	6 7¾	110 0	86 0
November	6 11½	5 9	6 8	110 0	90 0
December	6 4½	5 9	6 6	110 0	90 0
January, 1931	5 9	5 6	6 0	142 0	90 0
February	5 0	5 6	6 0	140 0	88 0
March	5 1	5 9	6 3½	142 6	87 6

In contrast to the prices for crops, live stock and livestock product prices have not suffered such severe falls, and in no case have they fallen to pre-war levels.

Live Stock and Livestock Product Prices

	Fat cattle Shorthorns 1st quality, per cwt. live wt.	Fat sheep lambs, 1st q. per lb. dead wt.	Fat pigs porkers, 1st q. per score dead wt.	Eggs National mark standard per 120.	Milk Nat. Agric. prices, Class 1, 10% var.
	s. d.	s. d.	s. d.	s. d.	s. d.
1911–13 ..	34 10	not avail.	10 7	11 6	8½
1926 ..	48 8	1 1¾	19 6	17 6	1 2⅞
1927 ..	43 8	1 4¼	16 5	16 8	1 2
1928 ..	47 9	1 5¼	14 8	16 10	1 2⅛
1929 ..	45 10	1 5¾	17 6	18 4	1 2¾
October, 1929 ..	49 9	1 2½	19 1	30 0	1 4
November ..	50 9	1 2½	20 0	29 4	1 5
December ..	53 3	1 3	20 11	28 10	1 5
January, 1930	53 9	1 6½	22 2	19 9	1 5
February ..	53 11	1 8½	22 9	19 7	1 5
March ..	54 7	1 8½	22 4	13 1	1 4
April ..	54 11	1 8½	20 4	12 9	1 0
May	54 4	1 6¾	18 11	12 3	1 0
June	53 5	1 5	16 10	13 1	1 0
July	52 2	1 3¾	16 9	16 11	1 0
August ..	51 11	1 3	17 2	17 11	1 0
September ..	50 7	1 2¾	17 1	18 10	1 4

Feeding stuff prices were falling during the period, and for the year 1930 averaged 4 per cent. below the 1911–13 level, or some 30 per cent. less than in 1929.

Feeding Stuffs, Prices per Ton

	Middlings coarse British.	Barley meal.	Maize meal.	Maize gluten feed.	Linseed cake English 12% oil.	Cotton cake English Egypt. 4½%	Decort. ground nut cake.
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
1911–13 ..	6 12	7 16	7 2	—	—	5 12	—
1926	7 11	9 17	9 1	—	—	6 14	—
1927	9 2	11 9	9 1	—	—	7 3	—
1928	9 4	11 6	11 1	—	—	8 12	—
1929	7 15	9 17	10 7	—	—	7 17	—
October, 1929 ..	7 15	9 7	9 17	10 3	14 19	7 16	12 6
November ..	7 5	9 0	9 6	9 17	14 10	7 8	12 0
December ..	6 17	8 13	8 15	9 14	14 0	7 4	12 1
January, 1930 .	6 13	8 6	8 5	9 8	13 15	6 18	11 10
February ..	5 18	7 11	7 13	8 18	13 1	6 10	10 6
March	5 11	6 19	7 6	8 12	12 0	6 3	9 9
April	6 1	7 3	8 5	8 2	12 1	6 1	9 7
May	6 11	6 13	8 0	7 14	11 14	5 14	9 6
June	4 19	6 7	7 11	7 4	10 18	5 4	7 13
July	5 1	6 7	7 18	7 4	10 7	5 0	7 13
August ..	6 3	6 15	8 13	7 7	11 0	5 9	8 3
September ..	6 2	6 11	7 12	7 0	11 3	5 5	8 2

Artificial manures maintained their position of approximately pre-war prices, and over the year averaged only 1 per cent. above the 1911–13 level.

Fertiliser Prices per Ton

	Nitrate of soda 15½% N.	Sulphate of ammonia 20·6% N.	Muriate of potash 50% K_2O.	Supers 16%.	Basic slag 14½%.
	£ s.	£ s.	£ s.	£ s.	£ s.
1911–13	10 13	13 9	—	—	1 14
1926	13 4	12 10	—	—	2 8
1927	12 15	11 7	—	—	2 10
1928	10 15	10 9	—	—	2 1
1929	9 18	10 4	—	—	2 1
October, 1929 ..	9 11	9 11	9 0	3 5	2 1
November ..	9 14	9 14	9 2	3 5	2 1
December.. ..	9 17	9 17	9 4	3 5	2 1
January, 1930 ..	10 0	10 0	9 7	3 6	2 1
February	10 2	10 2	9 7	3 6	2 1
March	10 2	10 2	9 7	3 6	2 1

Using the " weights " given on page 97 in the Appendix, it would appear that the prices of all agricultural commodities produced in Hertfordshire in the harvest year 1930 averaged 41 per cent. above the 1911—13 level, and that the comparable figure for requirements in production was 48 per cent. Thus, in spite of the cheapness of fertilisers and feeding stuffs, the cost of requirements was, on the whole, out of alignment with commodity prices.

CHAPTER IV

LIVESTOCK

FROM the data given in the previous chapter it is clear that livestock form the most important element in the economy of Hertfordshire agriculture. Capital invested in livestock comprises nearly half of the total Michaelmas valuation, while sales of livestock and their products amount to nearly three-quarters of the gross farm income. The livestock density averages 19 animal units per 100 acres, but there is a wide variation between individual farms. The following table illustrates the distribution of the livestock density in the various size groups:—

	Percentage of farms having a livestock density* of:—		
Size group (acres).	0–14 A.U.	14½–24 A.U.	Over 24 A.U.
1–5	—	—	100
5–20	13	20	67
20–50	13	10	77
50–100	16	37	47
100–150	34	39	27
150–300	33	42	25
Over 300	38	51	11
All together	28	37	35

It would appear that livestock density has a close connection with the profitableness of the individual farm, for when the labour incomes secured by the farmers concerned are sorted on the bases adopted in the above table a consistent sequence in favour of high density is shown:—

	Labour income (£) on farms having a livestock density of:—		
Size group (acres).	0–14 A.U.	14½–24 A.U.	Over 24 A.U.
1–5	—	—	+ 1
5–20	−24	−10	+92
20–50	+ 10	+38	+40
50–100	−162	−37	+57
100–150	−162	− 7	+96
150–300	−167	−81	−44
Over 300	−159	−23	+25
All together	−152	−41	+31

This sequence must not be interpreted to the effect that one type of stock is as profitable as another, but the evidence certainly suggests that those farmers

* "A.U" stands for Animal Units. Density of livestock is expressed in terms of animal units per 100 acres of crops and grass.

who carry a large head of livestock have (at current price levels) more chance of making reasonable returns than those who rely for their income mainly on crops. Certain outstanding exceptions do, of course, exist, such as, for example, where there is a ready market for straw and hay, and where production is carried out extensively.

The distribution of the income from livestock is shown in the following figures:—

Size group (acres).	Percentage of farms selling livestock and livestock products to the value of:— £1–500.	£501–1000.	£1001–1500.	Over £1500.
1–5	100	—	—	—
5–20	73	20	—	—
20–50	68	32	—	—
50–100	58	26	14	2
100–150	25	47	16	7
150–300	21	31	26	21
Over 300	6	21	14	57

Five farms (less than 2 per cent. of the sample) sold no livestock, and of these 1 was between 5–20 acres, 2 between 100–150 acres, 1 between 150–300 acres, and 1 over 300 acres.

Before discussing the individual livestock enterprises it seems desirable to draw attention to the fact that during the year to which these data refer there has been a considerable all-round increase in the numbers of livestock carried. The numbers at the opening and closing valuations are compared on the basis of animal units in the following table:—

Size group (acres).	Increase (+) or decrease (−) in animal units per farm:— Dairy cattle.	Feeding cattle.	Sheep.	Pigs.	Poultry.
1–5	—	+0·1	—	−0·1	+0·4
5–20	+0·2	—	—	−0·1	—
20–50	+0·5	—	—	+0·2	+0·4
50–100	+0·3	+0·3	−0·1	+0·2	+0·2
100–150	+1·7	−0·1	+0·3	+0·1	+0·3
150–300	+1·5	+0·5	+2·0	+0·2	+0·6
Over 300	+3·0	+0·5	+6·5	+0·5	+0·4

This tendency to increase livestock commitments has undoubtedly been largely caused by the low prices available for the 1930 crops, but the abundant grazing available during the season, and the high yields of hay secured, have been contributory factors. It is probable that this increase will not be fully reflected in the 1930 *Official Statistics*, for the decision to hold young stock, to increase dairy herds or to buy more stores, was only made by a large number

of farmers when the magnitude of the fall in crop prices was experienced after the 1930 harvest.

1. DAIRY ENTERPRISE

On the 303 farms comprising the present sample dairy cattle account for just over half the total livestock, while sales of dairy produce are equivalent to nearly one-third of the gross farm income, or approximately 40 per cent. of the gross income from all livestock. On the basis of capital commitments and cash sales it would, therefore, appear that dairying is the most important individual enterprise in the economy of Hertfordshire agriculture. Further, while it has been shown above that there is a relationship between the value of the livestock output and the profitableness of the farm, it is evident that those farmers who have secured a high livestock output have done so primarily by concentrating on dairy produce. For these reasons it seems desirable to scrutinise closely the data relating to the dairy enterprise.

The following table illustrates the distribution of sales of dairy produce in the different size groups:—

Size group (acres).	Percentage of farms selling dairy produce to the value of:—						
	£0.	£1–100.	£101–300.	£301–500.	£501–1000.	£1001–1500.	Over £1500.
1–5	87	—	13	—	—	—	—
5–20	67	20	13	—	—	—	—
20–50	32	10	19	26	13	—	—
50–100	37	14	19	12	16	2	—
100–150	23	16	7	20	30	2	2
150–300	27	12	6	10	23	17	5
Over 300	21	14	5	11	20	18	11

On farms below 20 acres in size the dairy enterprise is comparatively insignificant, but on the larger farms it would appear that the number of cows kept (so far as this reflects the value of the dairy produce output) is of considerable significance.

Size group (acres).	Farms with less than 5 cows.		Farms with 5–9 cows.		Farms with 10 or more cows.	
	% of total farms in size group.	Labour Income (£).	% of total farms in size group.	Labour Income (£).	% of total farms in size group.	Labour Income (£).
20–50	35	−,86	45	+ 98	20	+113
50–100	51	− 89	28	+ 39	21	+117
100–150	36	−162	14	−101	50	+ 82
150–300	37	−291	6	−313	57	+ 48
Over 300	23	+ 48	12	−331	65	− 42
All together	35	−151	17	−72	48	+ 33

It is true that the sequence suggested by the above table is somewhat irregular in the case of farms over 150 acres in size, but that this irregularity is probably due to the small intervals selected for the analysis is indicated by the following figures referring to the farms falling within the 150–300 acre size group:—

	Farms selling dairy produce to the value of:—			
	£0.	£1–500.	£501–1000.	Over £1000.
Number of farms	26	28	22	21
Acres arable per farm	130	118	92	124
Acres permanent grass per farm	58	89	109	98
Cows per farm	1·8	9·7	17·3	30·2
Sales of dairy produce per farm (£)	—	214	717	1453
Gross output per farm (£) ..	891	1153	1464	2389
Cost of labour per farm (£) ..	456	452	615	825
Output per £100 labour (£) ..	174	225	231	272
Output per £100 farm capital (£)	52	60	75	83
Output per 100 acres (£) ..	497	578	762	1127
Labour Income per farm (£) ..	−393	−102	−47	+209

An interesting feature of the above table is that it suggests that dairy cattle provide a source of income which is largely *additional* to the ordinary output of the farm. For example, farms selling no dairy produce achieved a gross output of £891; farms selling between £1–£500 worth of dairy produce achieved a gross output of £1153,, or approximately £891 plus dairy produce sales (£214); farms selling between £501–£1000 worth of dairy produce achieved a gross output of £1464, or approximately £891 plus dairy produce sales (£717); while farms selling over £1000 worth of dairy produce achieved an output of (£2389), or approximately £891 plus sales of dairy produce (£1453). Further, it would appear that, where markets and buildings are convenient, farmers who keep only one or two cows for supplying the farmhouse with milk could increase the number of cows up to 10 without materially increasing their costs of production. For example, the labour bill on farms selling no dairy produce (av. 1·8 cows per farm) is almost identical with that of farms keeping 10 cows and selling over £200 worth of dairy produce. This condition results in the latter group of farms having a greater labour efficiency with an output of £225 for every £100 worth of labour, as compared with £174 in the former group. Further, the farms in the second group have a greater turnover, a higher output per acre, and a considerably better labour income than those in the first group. Where more than 10 cows are kept, however, additional costs are incurred; a greater staff is necessary, and more foodstuffs have to be purchased. Thus, while the labour income is improved by further

concentration on the dairy enterprise, the improvement is not commensurate with the increased output.

For the purpose of studying the dairy cattle enterprise, those farms (134 in all) which kept 10 or more cows have been selected from the sample. The size distribution of these 134 herds is as follows:—

Size of herd (cows).	Percentage of total herds.
10–19	50
20–29	23
30–39	18
40–49	4½
50 and over	4½
Total	100

The milk yield per cow secured by those 134 farmers averaged 593 gallons, but ranged from as low as 300 to as high as 988 gallons. The yield per cow has been calculated by dividing the total production on the farm by the average number of cows kept. The distribution of the milk yields for these herds is shown in the following figures:—

Milk yield per cow (gallons).	Percentage of total herds.
300–399	4
400–499	20
500–599	34
600–699	23
700–799	12
800–899	5
900–999	2
Total	100

Twenty-nine per cent. of the herds were recorded, and the recorded herds averaged 646 gallons per cow as compared with 572 gallons on the unrecorded herds. Over the 134 herds there was one bull for every 23 cows, and, of the bulls, exactly one-half were described as pedigree stock. On farms using only pedigree bulls the yield per cow averaged 613 gallons, as compared with 586 gallons on farms where only non-pedigree bulls were used. Whether the recording and the pedigree bulls are the cause or the effect of the higher yields is not, however, apparent. Only 7½ per cent. of the farms with 10 cows or more were registered as producing a standard grade of milk.

Replacement of cows took place at the rate of one-fifth of the herd per annum; 20·7 per cent. of the average number of cows kept being drafted in during the year, and 19·9 per cent. being drafted out. The recorded herds replaced their milk stock at rather a quicker rate than the unrecorded herds, the average length of life in the recorded herds being only about four years. Included in the numbers "drafted out" are those lost by death, which approximated 2 per cent. of the total number of cows. Of the cows drafted in, 48 per cent. were bred on the farm and 52 per cent. were purchased; but on the recorded herds, more than half the cows drafted in were home-bred:—

Size group (acres).	Home-bred heifers as a % of total numbers drafted into milking herd.
20–50	19
50–100	22
100–150	27
150–300	51
Over 300	55
All together	48

It will be seen that the small farms depended much more than the large farms on purchased replacements.

The average capital value per cow was just over £24, while depreciation amounted to £1 6*s*. 9*d*. per cow per annum. This latter sum has been calculated by adding the value of cows drafted in to the opening valuation of the milking stock, and subtracting the sum of the sales of cows and closing valuation of the milking stock. The figure for depreciation may appear unduly conservative, but it must be borne in mind that the cows in these herds were being kept for an average of only five years and that depreciation would, therefore, not be severe.

The method of disposing of the milk is, of course, a very important factor affecting profitableness. For all the 134 herds combined, disposal of dairy produce was effected in the following proportions:—

	Percentage of total yield.
Sold wholesale	79·3
Sold retail	13·5
Consumed on the farm	7·2
Total	100·0

The average price received (wholesale and retail combined) was 16*d.* per gallon of milk sold,* but the range was from as low as 7*d.* to as high as 26*d.* More than 97 per cent. of the sales of dairy produce comprised whole milk, and manufacture was of only insignificant proportions. For all the farms above 20 acres in size, receipts for butter represented only 1·8 per cent., and receipts for cream only 0·9 per cent. of the total sales of dairy produce. No more than five farms sold over 1000 lb. butter, and on these the sales of dairy produce per cow averaged only £18·1, while the labour income was a minus figure of £196. Only one farm sold more than 2000 pints of cream. No cheese was sold. The average price received for butter was 1*s.* 7¾*d.* per lb., and for cream the average price realised was 2*s.* 8¾*d.* per pint. At these prices milk was worth (exclusive of cost of manufacture) 6·6*d.* per gallon as butter, and 21·8*d.* per gallon as cream, on the assumption that it requires 3 gallons of milk to make 1 lb. of butter and 12 gallons of milk to make 1 gallon of cream.

Farms having a retail market for their dairy produce were fortunate and, on the whole, obtained reasonable returns. The following figures refer to farms with more than 10 cows, and on which the sales of dairy produce amounted to 50 per cent. or more of the gross farm income:—

	Farms on which the following percentage of the total milk yield was retailed:		
	0%.	1–50%.	Over 50%.
Per cent. of yield sold retail	0	27·3	80·6
,, ,, ,, ,, wholesale	96·7	68·6	14·4
,, ,, ,, not sold	3·3	4·1	5·0
Average number of cows per farm ..	24·3	28·3	22·8
Capital value per cow (£)	24·1	24·4	24·4
Average milk yield per cow (gall.)	588	680	629
Average price per gallon sold (*d*).	14·4	17·9	22·9
Receipts for dairy produce per cow (£) ..	34·2	48·3	57·9
Receipts for dairy produce as a per cent. of gross income	63·3	63·4	68·2
Receipts for dairy produce as a per cent. of cattle and cattle produce sales ..	87·8	91·9	92·5
Labour income per farm (£)	−13	+394	+420

On the farms on which no dairy produce was retailed the average price received per gallon of milk sold was 14·4*d.* At the other end of the scale farms retailing 80 per cent. of the total milk yield obtained 22·9*d.* per gallon sold—a difference

* Butter and cream are included in this figure, having been converted on the basis of 3 gallons of whole milk to 1 lb. of butter and 12 gallons of whole milk to 1 gallon of cream.

of 8½*d.* per gallon, or £21 per cow on 600 gallons. The cost of retailing will vary largely with the nature of the "round," a scattered country clientèle being considerably more costly than a concentration of town customers. Probably 4*d.*–6*d.* is a reasonable estimate of the cost incurred in retailing a gallon of milk.

The principal data relating to the dairy enterprise on the 134 farms with 10 or more cows are given in Table III in the Appendix. When these data are grouped by size of farm it will be seen that the smaller farms keep a cheaper and lower yielding cow than the larger farms, and that milk recording is done mainly on the latter. The sales of dairy produce per cow average £37, this figure being dependent partly on the milk yield, partly on the price received per gallon sold, and partly on the proportion of total yield which is not sold. Approximately 7 per cent. of the milk produced does not leave the farm, but is consumed by the farmer's household, the employees, and the livestock. The receipts from dairy produce form a much larger proportion of the gross income on the smaller farms than on the larger farms. On farms over 300 acres in size a larger proportion of the milk is sold wholesale than is the case with the smaller farms. The effect of this on the price received per gallon is clearly evident. On all the farms together the value of the output (stock plus produce) from the dairy enterprise represents a capital turnover of 124 per cent.

2. HORNED STOCK

Over all the 303 farms comprising the sample the income from sales of horned stock approximates 17 per cent. of the gross farm income. Probably not more than two-fifths of the sales of horned cattle represent fat stock, for a large proportion is comprised of cast cows and calves—the by-products of the dairy enterprise—and of breeding stock and stores. The distribution of the sales of horned stock is shown in the following figures:—

Size group (acres).	Percentage of farms selling horned stock to the value of:						
	£0.	£1–100.	£101–300.	£301–500.	£501–1000.	£1001–1500.	Over £1500.
1–5	88	12	—	—	—	—	—
5–20	60	40	—	—	—	—	—
20–50	16	61	23	—	—	—	—
50–100	5	60	30	5	—	—	—
100–150	9	48	29	7	5	2	—
150–300	5	32	41	12	8	1	1
Over 300	5	17	40	12	15	3	8

It is somewhat difficult to isolate the feeding cattle enterprise for purposes of analysis, for a large number of farms which are concentrating primarily

on dairy produce keep a few feeding cattle during the grazing season, or fatten off some heifers which are, for one reason or another, not suitable for breeding purposes. On only one-quarter of the sample were fattening cattle kept in sufficient numbers to be classed as an important enterprise in the farm organisation. None of these farms was under 50 acres in size. The mean value of the fattening cattle in hand at the opening and closing valuations was £15·3 per head, and the cost of purchased stores averaged £13·0 per head. Six per cent. of the stores drafted in during the year were home-bred. Fat stock sold fetched an average of £23·1 per head. The number of stock sold during the year approximated 96 per cent. of the number in hand at the opening valuation. The value of the output represented 66 per cent. of the mean capital invested.

3. PIGS

Over the whole sample, sales of pigs averaged 9 per cent. of the gross farm income, but especially on the smaller size groups specialisation occurred on a few individual farms. Contrary to conditions in Denmark there appears to be no connection between the number of pigs and the number of dairy cattle kept.

Size group (acres).	Percentage of farms selling pigs to the value of:—						
	£0.	£1–100.	£101–300.	£301–500.	£501–1000.	£1001–1500.	Over £1500.
1–5	63	25	12	—	—	—	—
5–20	67	27	—	—	6	—	—
20–50	45	45	7	—	3	—	—
50–100	35	32	21	7	5	—	—
100–150	34	30	36	—	—	—	—
150–300	33	26	28	6	6	1	—
Over 300	25	18	34	12	8	3	—

Of the farms on which pigs were kept, approximately 75 per cent. had sows, while the remaining quarter were wholly dependent for their stores on purchased stock. Data relating to the pig enterprise on the farms keeping sows are given in the following table:—

Size group (acres).	No. of farms.	No. of sows per farm.	Percentage of farms keeping boars.	Pigs reared per sow per annum.
5–20	4	2·7	25	13½
20–50	14	1·9	14	9
50–100	23	2·7	35	13¾
100–150	23	2·0	26	13
150–300	60	3·1	28	12¾
Over 300	42	5·7	62	12¼
All together	166	3·4	36	12½

Only one-third of the farms with sows also kept a boar, and on these holdings there were on the average 5½ sows per boar. Farms with 10 or more sows (average 15 sows per herd) had a ratio of 9 sows to one boar. Data made available by the Cambridge Pig Recording Scheme show that on farms averaging over 20 sows per herd there is 1 boar to 14 sows. It would therefore appear that the small herds are at an economic disadvantage so far as boars are concerned. Two-thirds of the farms keeping sows had to hire a boar. Including the farms hiring boars there was an over-all average of 8½ sows per boar. The size distribution of the herds was as follows:—

	Farms:—	
Sows per herd.	No.	%
1–2	84	51
3–6	60	36
6–12	17	10
Over 12	5	3
Total	166	100

On the average there were only 12½ pigs reared per sow per annum. Records collected in the Cambridge Pig Recording Scheme show that in well-managed herds a reasonable average in pig production is 7½ pigs marketed *per litter*, or 15 pigs per sow, assuming two litters per annum; but in practice two litters per sow within twelve months is achieved by only about 40 per cent. of sows.

Replacement of sows took place at the rate of 33 per cent. per annum, i.e. sows had an effective breeding life of only about 3 years, or approximately 5 litters. It has been shown that the reproductive power of sows is not impaired up to the tenth litter, and that there is a tendency for farmers to replace their breeding stock much more frequently than is necessary.*

The value of the pig output on all farms combined represents a capital turnover of 204 per cent.

4. SHEEP

Sales of sheep and wool represent 9 per cent. of the gross farm income for all farms combined, but this source of revenue is of importance only on the larger farms, particularly those over 300 acres in size. Only one farm below 50 acres in size kept sheep.

* *Third Report, East Anglian Pig Recording Scheme.*

Size group (acres).	Percentage of farms selling sheep and wool to the value of:—						
	£0.	£1–100.	£101–300.	£301–500.	£501–1000.	£1001–1500.	Over £1500.
1–5	100	—	—	—	—	—	—
5–20	100	—	—	—	—	—	—
20–50	97	3	—	—	—	—	—
50–100	86	7	7	—	—	—	—
100–150	84	2	14	—	—	—	—
150–300	72	1	19	5	3	—	—
Over 300	43	3	11	14	25	4	—

In all, 88 farms (29 per cent. of the sample) kept sheep of one type or another; of these farms 68, or 77 per cent., had a breeding flock. The size distribution of the ewe flocks was as follows:—

Size of flock (ewes).	Farms:—	
	No.	%
Less than 50	20	29
50–99	27	40
100–149	11	16
150–199	7	10
200–249	1	2
250 or over	2	3
Total	68	100

Data relating to these breeding flocks is given in the following table:—

Size of farm (acres).	No. of farms.	No. per flock :—		Ewes per ram.	Lambs per ewe.
		Ewes.	Rams.		
50–100	4	24	0·8	32	1·10
100–150	6	31	0·9	34	1·34
150–300	26	68	1·3	51	1·22
Over 300	32	114	2·3	51	1·24
All together	68	84	1·7	49	1·23

The lamb crop ranged on individual farms from as low as 0·8 to as high as 1·6 lambs per ewe, with an average of just under 1¼. Replacement of breeding ewes took place at the rate of 25 per cent. per annum. The output expressed as a percentage of the mean capital invested in these flocks represents a 75 per cent. turnover. For all the flocks combined the receipts for wool represented just a little over 3 per cent. of the total income from sheep and wool sales.

5. POULTRY

It is common knowledge that the poultry enterprise has been increasing very rapidly during recent years, and it will come as no surprise to many

readers to learn that on the farms comprising the present sample sales of poultry and eggs amount to as much as 8 per cent. of the gross farm income, or almost half as much as the sales of horned stock, and more than the sales of wheat. Nearly nine-tenths of the farms kept poultry, the proportion being larger on the small farms and smaller on the large farms. Of the total income from poultry, eggs comprise 78 per cent. and birds 22 per cent. The distribution of the receipts for poultry is shown in the following table:—

Size group (acres).	Percentage of farms selling poultry to the value of:—						
	£0.	£1–100.	£101–300.	£301–500.	£501–1000.	£1001-1500.	Over £1500.
1–5	12	50	38	—	—	—	—
5–20	13	54	20	—	13	—	—
20–50	16	68	16	—	—	—	—
50–100	14	60	19	5	—	2	—
100–150	11	59	25	5	—	—	—
150–300	18	46	26	7	1	1	1
Over 300	21	41	28	5	2	3	—

On the farms on which poultry were kept the average size of the flock was 210 birds, of which pullets comprised 46 per cent., old hens 39 per cent., cocks (breeding and meat birds) 9 per cent., and "others" (ducks, geese, etc.) 6 per cent. For the different size groups the flocks varied as follows:—

Size of farm (acres).	No. of poultry per flock.	Average value per head.
1–5	190	5s. 5d.
5–20	150	4s. 3d.
20–50	130	4s. 6d.
50–100	160	5s. 3d.
100–150	175	4s. 9d.
150–300	265	4s. 11d.
Over 300	245	5s. 1d.

The egg yield averaged 89 eggs per hen, but ranged on individual farms from as low as 35 to as high as 184. The distribution of the egg yields is shown in the following table:—

Eggs per hen.	Percentage of flocks.
Less than 50	7
50–74	29
75–99	31
100–124	19
125–149	9
150 and over	5
Total	100

Eight per cent. of the eggs produced were consumed by the farmer's household, and the price received for the eggs sold averaged 1*s.* 8*d.* per dozen. The value of the poultry output represented 248 per cent. of the mean capital invested in the birds.

6. HORSES

The types of livestock to which reference has been made in the previous sections of this chapter are "productive" in the sense that the farmer looks for a direct profit from each of them. Horses, however, fall into a different category for they are maintained, with certain rare exceptions, solely to perform the work of cultivation and carting demanded by productive enterprises. Over the whole sample the ratio of arable acres to working horses was 24 : 1. The size of farm, the intensity of production, and the efficiency of organisation influenced this ratio, and were responsible for wide variations between individual farms. The following table illustrates the effect of the first of these three factors:—

Size group (acres).	Working horses per farm.	Average value per horse (£).	Arable acres per working horse.	Gross output per horse (£).
1–5	—	—	—	—
5–20	1·2	14·1	7·8	212
20–50	2·1	20·7	9·5	218
50–100	3·0	22·1	13·5	212
100–150	3·6	23·4	16·5	237
150–300	4·9	24·5	23·5	290
Over 300	7·8	26·3	31·4	346

It can be seen that, as in the case of manual labour (see p. 25), the larger farms can apply horse labour more efficiently than the smaller farms. In this respect account has to be taken of the fact that the larger farms are aided by the greater scope for mechanisation which they enjoy, as is illustrated by the following table relating to farms of over 150 acres in size:—

Number of days tractor work performed per farm.	Percentage of farms.	Arable acres per horse on these farms.
0	56	24
1–49	11	26
50–99	16	28
100 and over	17	34

For all the farms combined the working horses comprised almost equal proportions of mares and geldings, but only about 4 per cent. of the mares foaled during the year. The average value per working horse was £24 and the depreciation (calculated in the same way as that of the dairy cows, see p. 38) approximated £1 6*s*. per horse per annum. The number of work horses lost by death was equivalent to 3·3 per 100. During the year 6¾ per cent. of the working horses were drafted in and 10¼ per cent. were drafted out (including deaths), so that there was a net decrease of approximately 3½ per cent. in the working horse population. Whether this decrease reflects greater mechanisation or lesser intensity of production cannot be ascertained from the data available.

CHAPTER V

CROPS

SOME reference to the place of crops in the economy of Hertfordshire agriculture has already been made in Chapter III. It has been shown that on the average 56 per cent. of the farmed land is under the plough, and that of this area more than half (55 per cent.) is under cereals. But in spite of this large proportion of plough land, sales of crops average only one quarter of the gross farm income, the bulk of crops being marketed in the form of livestock and livestock products. Indeed, the crop produce from only 28 per cent. of the farmed area is marketed direct, the balance being consumed on the farm.

The distribution of crops in the different size groups is shown in Table IV in the Appendix. It will be noticed that the area cut for hay represents 28 per cent. of the total farmed land, and of this area the yield from 40 per cent. is sold. Wheat covers approximately 14 per cent. of the farmed land and nearly three-quarters of the produce is sold. Oats represent 12½ per cent. of the farmed area, but only 15 per cent. is sold. Barley accounts for only 4½ per cent. of the farmed land, but more than 50 per cent. of the crop is marketed. Potatoes and sugar beet are the two principal cash crops in the fallow shift, 90 per cent. of the former, and 100 per cent. of the latter, being marketed direct. Of the pulse crops nearly half the peas, and about 1/7th of the beans, are sold. The distribution of the income from crops is shown in the following table:—

Size group (acres).	Percentage of farms selling crops to the value of:—						
	£0.	£1–100.	£101–300.	£301–500.	£501–1000.	£1001–1500.	Over £1500.
1–5	37	63	—	—	—	—	—
5–20	60	33	—	7	—	—	—
20–50	42	32	23	3	—	—	—
50–100	14	37	39	5	5	—	—
100–150	14	20	48	14	4	—	—
150–300	7	11	36	27	15	3	1
Over 300	1	5	6	17	28	8	15

The proportion of arable land to the total farmed area varied from 0 to 100 per cent. Nearly 10 per cent. of the farms comprising the sample were

completely laid down to grass, and 2 per cent. of the farms had more than nine-tenths of their land under the plough. Of the farms having some arable

Size group (acres).	Precentage of farms on which the arable area amounted to the following proportion of the total farm land:—					
	0%.	1–20%.	21–40%.	41–60%.	61–80%.	81–100%.
1–5	50	25	13	12	—	—
5–20	46	7	7	7	20	13
20–50	23	13	13	10	28	13
50–100	9	4	14	14	42	17
100–150	7	13	18	21	30	11
150–300	3	4	14	36	28	15
Over 300	2	3	19	20	48	8

land 55 per cent. were following a definite rotation, and 45 per cent. had broken away from a fixed rotation. Definite rotations varied from three to seven courses, with the following distributions:—

No. of courses in rotation.	Percentage of farms having a definite rotation.
3	12
4	37
5	48
6	2
7	1
Total	100

The table given on page 49 shows the proportion of farms growing the various crops. Oats is the crop most commonly found, 83 per cent. of the farms growing at least a small area. Wheat was grown on 79 per cent., and meadow hay on 78 per cent. of the farms. Nearly three-quarters of the farms grew mangolds, and more than half the farms had potatoes, mixed seeds, and bare fallow. In the case of potatoes the acreage grown was generally small, and in a number of cases the crop was no more than sufficient to supply the farmer's household and the farm employees. Sainfoin and lucerne were grown on only 16 and 14 per cent. of the farms respectively.

The yield index for the four principal cash crops (wheat, barley, sugar beet and potatoes) averaged 2 per cent. below the decennial average for the county, while for the other crops (mainly fodder crops) the yield index was some 20 per cent. above the ten-year average. Hay yielded particularly well.

Crop—	Size group.	1–5 acres.	5–20 acres.	20–50 acres.	50–100 acres.	100-150 acres.	150-300 acres.	Over 300 acres.	All farms together.
		Percentage of farms on which this crop is grown:—							
Meadow hay	..	—	46·7	74·2	69·8	79·5	84·5	90·8	77·9
Mixed seeds	..	—	6·7	29·0	30·2	47·7	61·9	80·0	51·5
Clovers	..	—	13·3	25·8	41·9	20·5	41·2	52·3	36·6
Sainfoin	..	—	6·7	3·2	9·3	22·7	12·4	33·8	16·5
Lucerne	..	—	6·7	6·5	18·6	2·3	13·4	27·7	14·2
Wheat	..	—	20·0	48·4	81·4	86·4	91·8	95·4	79·5
Barley	..	—	6·7	19·3	51·2	45·5	58·8	67·7	49·5
Oats	..	—	20·0	54·8	81·4	90·9	96·9	98·5	83·5
Rye	..	—	—	3·2	—	4·5	1·0	1·5	1·6
Mixed corn	..	—	—	—	2·3	2·3	11·3	6·2	5·6
Field peas	..	—	6·7	6·5	14·0	2·3	3·1	1·5	4·6
Beans	..	—	—	3·2	14·0	6·8	17·5	23·1	13·9
Seed tares	..	—	—	—	—	6·8	6·2	3·1	3·6
Potatoes	..	—	13·3	38·7	60·5	52·3	66·0	70·8	57·1
Sugar beet	..	—	—	12·9	16·3	4·5	20·6	44·6	20·5
Mangolds	..	—	—	51·6	74·4	70·5	84·5	84·6	71·3
Swedes and turnips		—	—	22·6	34·9	38·6	52·6	43·1	38·9
Kale and other green crops	..	—	13·3	16·1	32·6	29·5	44·3	46·1	35·3
Bare fallow	..	—	—	29·0	48·8	59·1	60·8	64·6	51·8
Fruit and market garden crops	..	50·0	33·3	29·0	32·6	20·5	27·8	30·8	29·0

1. WHEAT

Wheat is the principal cash crop in Hertfordshire, the sales of the 1930 harvest averaging 7 per cent. of the gross farm income. More than three-quarters of the farms comprising the sample grew some wheat, the proportion being higher on the large farms and lower on the small farms (see above). No wheat was grown on farms under 5 acres in size. On the average 13·7 per cent. of the farmed land was devoted to wheat, but on the light soils the proportion was considerably less than that on the chalks and heavy lands.

The yield of the 1930 crop averaged 15·8 cwt. (3½ quarters) per acre, or some 4 per cent. below the 10-year average for the county. There was practically no variation in the average yields on the different soil types, but

between individual farms the range was from as low as 1 qr. to as high as 7 qrs. per acre.

Yield per acre (qrs.).	Percentage of farms growing wheat.
Less than 2	1
2–2·9	11
3–3·9	53
4–4·9	28
5–5·9	6
6 and over	1
Total	100

Of the 241 growers, only one experienced the complete failure of a field of wheat.

Nearly 73 per cent. of the crop was cashed, while 5 per cent. was used for seed and the remaining 22 per cent. fed to livestock. But the wheat consumed on the farm of its origin was supplemented by purchases of wheat from other farms, and if allowance is made for this exchange, and also for wheat consumed by "back yard" poultry, etc., it would appear that a maximum of 60 per cent. of the wheat grown in the county was available for milling. The price received for the wheat sold averaged 7*s.* 0½*d.* per cwt. (31*s.* 8*d.* per qr.).

Size group. (acres)	Percentage of farms selling wheat to the value of:—				
	£0.	£1–100.	£101–300.	£301–500.	Over £500.
1–5	100	—	—	—	—
5–20	93	7	—	—	—
20–50	68	32	—	—	—
50–100	40	46	14	—	—
100–150	36	46	18	—	—
150–300	20	38	35	7	—
Over 300	12	14	44	18	12

The average rate of seeding was 2·7 bushels per acre. Fifty-one per cent. of the wheat area was grown from purchased seed and 49 per cent. from home-grown seed. The average price paid for the seed purchased in the autumn of 1929 was 11*s.* 3*d.* per cwt. (50*s.* 8*d.* per qr.), but the larger farms bought more expensive seed than the smaller. On approximately half the sample

details of the variety of seed used were available, and the following figures, referring to those farms, illustrate a wide variation in farmers' preferences:—

Variety.	Percentage of farms using this variety.
Little Joss	30·9
Standard Red	27·7
Squarehead	19·1
Victor	6·4
Rivett	3·7
Renown	3·2
Yeoman	1·6
Wilhelmina, Browick, Swedish Iron, Success, Red Lammas, Croxton Champion, Marvell, Garton's Red, Millenium III, Empire	7·4
Total	100·0

Approximately 14 per cent. of the wheat area received a dressing of farmyard manure at an average rate of 13 loads per acre. Only 27 per cent. of the crop area received a top dressing of nitrogenous fertilizer, the rate of application being just over 1 cwt. per acre.

2. HAY

Hay is the second most important cash crop grown in Hertfordshire, and for the year to which these data refer represents no less than 5 per cent. of the gross farm income. The area cut for hay covers 27·5 per cent. of the total farmed land, and of this, meadows account for almost exactly half, mixed seeds for one-third, and clovers, sainfoin, and lucerne for the remainder. Forty per cent. of the hay is cashed (going largely to London), the balance being fed on the farm of origin.

The season of 1930 was very favourable to hay production, the yield of meadow hay averaging approximately 24 cwt. per acre, or 34 per cent. above the decennial average. First cuts of seeds hay yielded 27·7 cwt. for mixed

seeds, 28·5 cwt. for sainfoin, and 27·7 cwt. for clover. The distribution of the hay yields (meadows and first cut seeds combined) was as follows:—

Yield per acre (cwt.).	Percentage of farms growing hay.
Less than 20	10
20–29·9	45
30–39·9	28
40–49·9	14
50 and over	3
Total	100

In the case of meadow hay the heavy soils yielded nearly ¾-cwt. more than the light soils, and over 2 cwt. more than the chalks. In the case of seeds hay the heavy soils again had the advantage, but chalk soils yielded more heavily than the light soils with clovers and sainfoin.

Second cuts were taken from 12 per cent. of the area under mixed seeds, 53 per cent. of the area under sainfoin, and 38 per cent. of the area under clover, but no less than 25 per cent. of the second cuts could not be harvested on account of inclement weather. Of the successfully harvested second cuts, 12 per cent. (mainly clover) was threshed for seed. Where the second cuts were harvested for hay the yields averaged 16 cwt. for mixed seeds and clovers and 13 cwt. for sainfoin. The total hay yield, where two cuts were successfully harvested, averaged 44 cwt. for mixed seeds and clovers, and 41 cwt. for sainfoin.

The prices received for hay sold reflect the high yields for the year. The very best hay seldom fetched more than £3 per ton, and much was unsaleable. The average prices obtained per ton of hay sold were as follows:—Meadow hay, 47*s.* 3*d.*; clover, 55*s.* 3*d.*; mixed seeds, 55*s.* 5*d.*; sainfoin, 58*s.* 1*d.* The distribution of sales of hay in the different size groups is given below:—

Size group (acres).	Percentage of farms selling hay to the value of:—				
	£0.	£1–100.	£101–300.	£301–500.	Over £500.
1–5	88	12	—	—	—
5–20	73	27	—	—	—
20–50	81	19	—	—	—
50–100	60	37	3	—	—
100–150	39	39	22	—	—
150–300	34	33	31	2	—
Over 300	23	12	51	6	8

The area undersown with new seeds for the 1931 crop amounted to 60 per cent. of the temporary grass area harvested during 1930, i.e. assuming the temporary grass area to remain constant, the seeds are left down, on the average, for just under two years. Seven per cent. of the area drilled in 1930 was sown with seed grown on the farm.

3. POTATOES

Sales of potatoes average 4 per cent. of the gross farm income, although the area covered by this crop represents only 1 per cent. of the total farmed land. More than half the farms comprising the sample grew at least a small area of potatoes, but that the crop was little more than a side line on most farms is illustrated by the following figures:—

Area grown (acres).	Percentage of farms growing potatoes.
Less than 1	29
1–2	26
2–4	16
4–8	15
8–16	9
Over 16	5
Total	100

Nearly one-third of the potato growers had less than 1 acre of the crop, and only 14 per cent. grew more than 8 acres.

The yield averaged 6·5 tons per acre, or 17 per cent. above the decennial average, but the light soils yielded half a ton more than the chalk and heavy lands. Out of 173 growers only one experienced a complete failure. The yields obtained by individual growers were distributed as follows:—

Yield per acre (tons).	Percentage of farms growing potatoes.
Less than 3	1
3–3·9	3
4–4·9	11
5–5·9	15
6–6·9	29
7–7·9	13
8–8·9	16
9 and over	12
Total	100

Ninety per cent. of the crop was cashed, the balance being used for seed, consumed by the farmer's own household, given to the employees, or fed to livestock. The average price received per ton sold was £4 15*s.* 8*d.*, and the distribution of the sales is illustrated below:—

Size group (acres).	Percentage of farms selling potatoes to the value of:— £0.	£1–100.	£101–300.	£301–500.	Over £500.
1–5	100	—	—	—	—
5–20	86	7	7	—	—
20–50	71	23	6	—	—
50–100	51	42	7	—	—
100–150	66	25	9	—	—
150–300	50	38	8	3	1
Over 300	37	31	17	9	6

Seed was planted at an average rate of 13·1 cwt. per acre, and the varieties grown are detailed in the following table:—

Variety.	Percentage of growers using this variety.
King Edward	66·7
Great Scott	9·3
Arran Chief	7·0
Majestic	6·2
Red King	4·6
Eclipse	6·2
Sharpe's Express	
Field Marshal	
Duke of York	
Arran Comrade	
Arran Victory	
Total	100·0

It is apparent that quite an insignificant area of early potatoes are produced. Fifty-six per cent. of the crop was grown from purchased seed for which the average price paid was £4 13*s.* 4*d.* per ton.

More than three-quarters of the acreage under potatoes was dunged, the application ranging round 20 loads per acre, but on farms growing one acre or more, no less than half the crop received no fertilisers, and only one quarter was dressed with more than £2 worth of fertiliser per acre. On the average, the following amounts of fertilisers were applied per acre: ¼ cwt. nitrogenous fertiliser, ½ cwt. phosphatic fertiliser, ¼ cwt. potassic fertiliser, and 1⅓ cwt. of proprietary mixtures.

4. SUGAR BEET

One-fifth of the farms comprising the sample grew sugar beet, but the distribution in the different size groups was uneven, for nearly half the farms over 300 acres in size had at least a small area of this crop, and none was produced on farms of less than 20 acres. Over all farms together sugar beet comprised 1·2 per cent. of the total farmed area, while sales of beet were equivalent to 4 per cent. of the gross farm income.

The yield averaged 8·5 tons, as compared with 8·7 tons for the county in 1929, and there was the usual wide variation between individual farms:—

Yield per acre (tons).	Percentage of farms growing beet.
Less than 6	2
6–6·9	11
7– 7·9	11
8– 8·9	27
9– 9·9	20
10–10·9	23
11–11·9	3
12 and over	3
Total	100

The light soils yielded nearly ½-ton more than the heavy, and nearly ¾-ton more than the chalk soils. Practically the whole crop was consigned to Felstead factory in the adjacent county of Essex. The average price received (after deducting transport costs which, owing to distance, were considerable) approximated 47*s.* per ton, and the sales of beet were distributed between the different size groups as follows:—

Size group (acres).	Percentage of farms selling beet to the value of:—				
	£0.	£1–100.	£101–300.	£301–500.	Over £500.
1–5	100	—	—	—	—
5–20	100	—	—	—	—
20–50	87	10	3	—	—
50–100	84	12	4	—	—
100–150	95	—	5	—	—
150–300	79	13	7	—	1
Over 300	55	2	31	6	6

The rate of seeding averaged 14·6 lb. per acre, and the cost of the seed 6¾*d.* per lb. More than half (55 per cent.) of the beet area was dunged, the

application ranging round 18 loads per acre, while, apart from compound mixtures, almost exactly the same proportion received a dressing of nitrogenous fertiliser at the rate of about 1¾ cwt. per acre.

5. BARLEY

The area under barley in Hertfordshire is insignificant compared with that of Norfolk, the largest barley-growing area in the eastern counties Province. Of the farms comprising the present sample, one-half grew barley (see page 49), and the crop comprised just under 4½ per cent. of the total farmed area. Only one farm under 20 acres in size grew barley, but nearly three-quarters of the farms over 300 acres cultivated this crop. On the chalk soils the area under barley was relatively high at 5½ per cent. of the total farmed area.

The yield averaged 15·3 cwt. (3·8 qrs.), or 3 per cent. above the ten-year average for the county, but the chalk soils yielded nearly 3 cwt. more than the light soils. As in practically all measures of agricultural production, there was a wide range in the yields on individual farms.

Yield per acre (qrs.).	Percentage of farms growing barley.
Less than 2	4
2–2·9	10
3–3·9	37
4–4·9	30
5–5·9	17
6 and over	2
Total	100

Of the 150 barley growers only two experienced a crop failure, and in both cases only small areas were involved.

Three-fifths of the crop was cashed, but the sales amounted to only 2 per cent. of the gross farm income, and were thus less than one-third those

Size group (acres).	Percentage of farms selling barley to the value of:—				
	£0.	£1–100.	£101–300.	£301–500.	Over £500.
1–5	100	—	—	—	—
5–20	100	—	—	—	—
20–50	90	10	—	—	—
50–100	77	21	2	—	—
100–150	78	20	2	—	—
150–300	67	23	10	—	—
Over 300	51	17	23	6	3

of wheat. The remaining two-fifths of the crop did not leave the farm on which it was grown, but was used for seed and fed to livestock in the ratio of 1 to 7 respectively. In addition to the barley consumed on the farms on which it was produced, considerable quantities were purchased for seed and feeding. If allowance is made for this exchange, and also for the fact that a proportion of the purchased barley was of foreign origin, it would appear that not more than 25 per cent. of the barley grown in Hertfordshire was available for brewing. The price received for the barley sold averaged 8*s.* 5*d.* per cwt. (33*s.* 8*d.* per qr.).

The average rate of seeding was 3·1 bushels per acre. Forty-three per cent. of the barley crop was grown from purchased seed, for which the price paid averaged 9*s.* 8½*d.* per cwt. (38*s.* 10*d.* per qr.). Details as to the variety of seed used were available on approximately half the farms growing barley, and these show the following distribution:—

Variety.	Percentage of farms using this variety.
Plumage Archer	42·9
Spratt Archer	22·9
Chevalier	17·1
Archer	10·0
Burton's Malting	7·1
Garton's 1917	
„ 1920	
Standwell	
Total	100·0

Only 4 per cent. of the area under barley was dunged, and, apart from compound mixtures, 17 per cent. received a dressing of nitrogenous fertiliser at an average rate of just over 1 cwt. per acre.

6. OATS

Oats was found in the rotation more commonly than any other crop, 83 per cent. of the farms comprising the sample growing at least a small area (see page 49). This crop accounts for 12½ per cent. of the total farmed area, but only 14½ per cent. of the yield was cashed, while 5½ per cent. was used for seed, and 80 per cent. fed to livestock on the farm of origin. The sales of oats amounted to only 1 per cent. of the gross farm income, the average price received being 6*s.* per cwt. (18*s.* per qr.).

Size group (acres).	Percentage of farms selling oats to the value of:— £0.	£1–100.	£101–300.	£301–500.	Over £500.
1–5	100	—	—	—	—
5–20	86	14	—	—	—
20–50	84	16	—	—	—
50–100	84	12	4	—	—
100–150	84	14	2	—	—
150–300	73	23	4	—	—
Over 300	66	20	11	3	—

The yield averaged 15·6 cwt. per acre (5·2 qr.), or 5 per cent. above the ten-year average for the county, but the heavy soils yielded two bushels more than the light and chalk soils. The yields on individual farms ranged from 1½ qr. to 8 qrs., with the following distribution:—

Yield per acre (qrs.)	Percentage of farms growing oats.
Less than 2	½
2–2·9	1
3–3·9	7
4–4·9	18
5–5·9	40½
6 and over	33
Total	100

The rate of seeding averaged 3·8 bushels per acre and purchased seed was used for 43 per cent. of the area grown. The average price paid for the purchased seed was 11*s.* 1*d.* per cwt. (33*s.* 2*d.* per qr.). Grey Winter was the variety most commonly grown.

Dung was applied to 1½ per cent. of the crop area, and only 34 per cent. received a top dressing of nitrogenous fertiliser.

7. MISCELLANEOUS CROPS

The crop enterprises to which reference has been made in the previous six sections account for over 90 per cent. of the income derived from sales of crops, and, with the exception of oats, may be called the principal cash crops of the county. Collectively, these six crops compose almost exactly 60 per cent. of the total farmed area, the balance of the farmed land being accounted for by permanent pasture (28 per cent.), miscellaneous crops (9 per cent.), and buildings, spinneys, and waste (3 per cent.). Ten different

crop enterprises are listed in Table IV as comprising the miscellaneous crops, and of these bare fallow covers the largest area, at 3·5 per cent. of the total farmed land. The remaining nine miscellaneous crops are mangolds (1·6 per cent.), kale and green crops (1·6 per cent.), turnips and swedes (0·8 per cent.), beans (0·7 per cent.), mixed corn (0·3 per cent.), fruit and market garden crops (0·3 per cent.), seed tares (0·1 per cent.), field peas (0·1 per cent.), and rye (less than 0·1 per cent.).

(*a*) *Bare Fallow.* A catch crop (mainly mustard) was ploughed under on 10 per cent. of the bare fallow, while nearly 20 per cent. received a dressing of dung. The largest proportion of bare fallow was on the chalk soils (5·0 per cent.). The light soils came next with 3·6 per cent., while the heavy soils had only 3·1 per cent. of the farmed land under bare fallow.

(*b*) *Mangolds.* Nearly three-quarters of the farms comprising the sample had at least a small area under mangolds, but no farms under 20 acres in size grew this crop. The yield averaged 21·6 tons per acre (20 per cent. above the decennial average), and all but 2½ per cent. of the crop was fed to live-stock on the farm of origin. The rate of seeding averaged 7·8 lb. per acre and the cost of the seed 2*s.* 6*d.* per lb. Dung was applied to 86 per cent., and nitrogenous fertilisers to 37 per cent. of the crop, applications being made at the rate of 19 loads per acre for the former and 1½ cwt. for the latter.

(*c*) *Kale and other green crops.* Just over one-third of the farms (mainly those on the light and chalk soils) grew kale or some other green crop of a similar nature. The bulk of this was folded by sheep or cut green for dairy cattle, but 17 per cent. was cashed and this proportion might legitimately be included under the heading of market garden crops.

(*d*) *Turnips and Swedes.* These crops were grown mainly on the chalk and light soils for folding. The yield was estimated to average 11 tons per acre (6 per cent. below the decennial average), and only 1·8 per cent. of the crop was cashed.

(*e*) *Beans.* Beans were grown primarily on the heavy soils on which the crop represented 1·2 per cent. of the farmed area as compared with 0·4 and 0·2 per cent. on the light and chalk soils respectively. The yield averaged no less than 20·8 cwt. per acre, or almost 40 per cent. above the decennial average. Fifteen per cent. of the crop was sold, and the price realised averaged 7*s.* 7*d.* per cwt. (34*s.* 1*d.* per qr.). The average rate of seeding was 2·7 bushels per acre, and 35 per cent. of the crop was grown from purchased seed, the cost of which had averaged 9*s.* 4½*d.* per cwt. (42*s.* 2*d.* per qr.). More than half the crop was dunged, the most common dressing ranging round 15 loads per acre.

(*f*) *Mixed Corn.* Only 5½ per cent. of the farms comprising the sample grew mixed corn which was wholly used as food for livestock on the farm of origin.

(*g*) *Fruit and Market Garden Crops.* Nearly one-third of the farms had at least a small area under fruit or market garden crops. More than three-quarters of this produce was sold, the balance being consumed by the farmer's household.

(*h*) *Seed Tares.* On only a few of the larger farms tares were grown for seed, the yield approximating 23½ bushels per acre. The rate of seeding averaged 2·7 bushels per acre, and of the area under the crop 60 per cent. was grown from purchased seed. The cost of purchased seed averaged 15*s.* 9*d.* per bushel, but the price received for the yield was so low (average 5*s.* per bushel) that much was used for fodder instead of being cashed.

(*i*) *Field Peas.* Field peas were grown on only a small number of farms (4½ per cent. of the sample). The yield averaged 14·6 cwt. per acre (12 per cent. above the decennial average), and nearly half the crop was cashed.

(*j*) *Rye.* Only 5 farms grew this crop for harvesting, and the area covered represents an insignificant fraction of the total farmed land. A small proportion of the yield was sold.

8. GRASS FARMS

As stated on page 47, nearly 10 per cent. of the farms comprising the sample were completely laid down to grass, the proportion being considerably larger in the case of the small farms, and smaller in the case of the large farms. In comparing the organisation and achievements on the grass and arable farms, both geographical and geological situation must be taken into account, for it is not by coincidence that more than nine-tenths of the grass farms over 20 acres in size are situated in the south or south-west of the county, and that more than half are placed on a clay soil.

From the data available it would appear that the grass farms have been no more profitable than the arable farms. Such economies as were effected in labour, fertilisers, seeds and upkeep costs were counterbalanced by the large purchases of foodstuffs which were necessary. Only one farm over 300 acres in size (approximately 350 acres) was wholly devoid of arable land. Situated on London clay, this farm carried a large herd of cows, and achieved a gross output of just over £6 per acre, of which dairy produce comprised 85 per cent. and horned stock 12 per cent. The farm capital approximated £10 per acre, of which dairy cows accounted for one-half, implements and machinery one-fifth, hay one-fifth, and young cattle, horses and a few poultry, the remainder. The wages of the permanent employees were high, averaging over £2 per

week. The milk yield was less than 500 gallons per cow; 96 per cent. of the production being sold as whole milk at wholesale prices, and 4 per cent. being consumed on the farm. All the dung produced was applied to the grass land, and about 170 acres of grass were mown for hay. The labour income was *minus* £100.

Three farms between 150–300 acres were completely laid down to grass, and here again a minus labour income was achieved. The number of workers employed averaged 2·5 per 100 acres of farmed land, and the farm capital approximated £10 per acre, of which livestock accounted for three-quarters. Dairy produce constituted the largest individual item of the gross income, but sheep and pigs collectively were equally important. Purchases of foods amounted to 40 per cent. of the gross charges.

The remaining grass farms are distributed throughout the different size groups, and, when grouped by size, cover too small a number of observations to carry much significance. The above brief description of a few grass farms over 150 acres in size has been given merely to show that grass farming in the county does not necessarily imply less capital and labour, a smaller output, or a larger profit than does arable farming.

9. DISPOSAL OF CROPS

It has been shown that the crop produce from only one-quarter of the farmed land is cashed direct, the remaining three-quarters of the farm being devoted to the production of fodder for livestock, or seed for the coming year's crops. Table IV in the Appendix illustrates that these proportions are remarkably constant in all the size groups except that referring to farms over 300 acres in size, for which the crop area cashed is represented by the comparatively high figure of one-third of the total farmed land.

The table given on page 63 shows how the crop areas for the whole sample were disposed, the average yields, and the approximate value of the crops per acre. In computing the proportion fed to livestock it has been assumed that the amount of home-grown seed used for the 1931 crops was the same as that used for the 1930 crops. In calculating the approximate value per acre of the different crops the basis adopted has been market price for cash crops, and a conservative cost estimate for other crops. The value of the three cereals (wheat, barley, and oats) has been augmented above the value of the grain to the extent of £1 per acre to represent straw. Some idea of the losses incurred on the cash crops can be obtained by comparing their value per acre with the following approximate cost figures:—*

* See *Farm Economics Branch Reports*, Nos. 12 and 16.

	Cash cost per acre.
Wheat	£8 10 0
Barley	8 0 0
Oats	7 10 0
Beans	12 0 0
Potatoes	34 0 0
Sugar beet	21 0 0
Seeds hay	4 10 0

The total *value* of the crop produce (including pasture) averages some £4 10*s.* per acre of farmed land, and of this total approximately 45 per cent. was cashed, 2½ per cent. used for seed, and 52½ per cent. fed to livestock. Over the whole sample livestock have thus consumed home-produced foods to the value of approximately 46*s.* per acre of farmed land, and purchased foods (see page 67) to the value of 27*s.* per acre of farmed land, i.e. home-produced fodder (including grazing) is equivalent to about two-thirds of the total foods fed to livestock.

Crop.	Percentage of farmed area.	Percentage of 1930 crop area:—			Av. yield per acre.	Approx. value per acre (£).
		Sold off farm.	Fed on farm.	Seed on farm.		
Permanent pasture ..	27·7	—	100	—	—	1·8
Meadows	13·7	24	76	—	23·8 c	2·8
Mixed seeds	8·2	54	46	—	29·3 c	4·1
Clovers	3·2	59	40	1	31·9 c	4·4
Sainfoin	1·7	60	40	—	31·9 c	4·7
Lucerne	0·7	60	40	—	50·0 c	5·6
Wheat	13·7	73	22	5	15·8 c	6·5
Barley	4·4	59	35	6	15·3 c	7·4
Oats	12·5	15	80	5	15·6 c	5·7
Mixed corn	0·3	—	95	5	—	4·5
Field peas	0·1	43	55	2	14·6 c	5·5
Beans	0·7	15	80	5	20·8 c	7·8
Seed tares	0·1	58	36	6	23·5 b	6·0
Potatoes	1·0	90	6	4	6·5 t	31·0
Sugar beet	1·2	100	—	—	8·5 t	20·0
Mangolds.	1·6	2	98	—	21·6 t	15·0
Swedes and turnips ..	0·8	2	98	—	11·0 t	8·0
Kale and green crops..	1·6	17	83	—	—	8·0
Bare fallow	3·5	—	—	—	—	—
Fruit & mkt. gar. crops	0·3	78	22	—	—	20·0
Rough grazings ..	0·6	—	100	—	—	0·5
Woods and waste ..	1·3	—	—	—	—	—
Buildings	1·1	—	—	—	—	—
Total	100·0	28	70	2	—	—

CHAPTER VI

COSTS

THE distribution of the items comprising the total farm costs has already been described in Chapter III (page 24). Labour, at 34 per cent. of the gross charges, is the largest individual item; purchased foodstuffs represent 17 per cent., and are second in importance; rent and purchases of livestock are each equal to 14 per cent. of the total; fertilisers comprise only 4 per cent. of the gross charges; seeds and implements each represent 3 per cent., while miscellaneous expenses account for the remainder. With the exception of foods and fertilizers, all these charges are more or less fixed, and will be incurred whether production is high, medium or low.

1. LABOUR

The average labour bill per farm in the various size groups is shown in Table II in the Appendix. Of the total charge, regular labour accounts for approximately 90 per cent., and casual labour for 10 per cent.

The regular labour comprises paid employees and family labour (e.g. wife, brother, etc.) other than that of the occupier. Over the whole sample the regular paid employees account for 83 per cent. of the total labour bill, and family labour (not including the occupier) for 7 per cent. Of the total earnings of the regular paid employees 86 per cent. represents weekly cash wages and 14 per cent. represents overtime payments, harvest bonus, insurance and perquisites, i.e. weekly cash wages are 15 per cent. less than the total earnings of the regular paid workers. There is, of course, a marked variation between the different size groups, and the following table gives the relative data:—

	Percentage of total labour bill:—					
	Regular paid employees.			Family labour.*		
Size group. (acres).	Weekly cash.	Extras and perquisites.	Casual workers.	Wife.	Others.	Total labour bill.
1– 5	0	0	29	36	35	100
5– 20	39	27	19	8	7	100
20– 50	56	8	18	11	7	100
50–100	61	10	16	6	7	100
100–150	67	10	13	4	6	100
150–300	71	12	9	1	7	100
Over 300	78	11	8	0	3	100

* Not including that of the occupier.

Of the regular paid employees 61 per cent. were high-pay workers with an average weekly cash wage of 39*s.*; 27 per cent. were ordinary labourers with a weekly cash wage of 31*s.*; while 12 per cent. were low-pay workers with an average cash wage of 20*s.* per week:—

	Regular paid employees:—					
	High pay.		Ordinary.		Low pay.	
Size group (acres).	Percentage total paid employees.	Average cash wages per week. (*s.*)	Percentage total paid employees.	Average. cash wages per week. (*s.*)	Percentage total paid employees.	Average cash wages per week. (*s.*)
1– 5	0	—	0	—	0	—
5– 20	20	32	0	—	80	12
20– 50	61	38	13	28	26	17
50–100	67	37	16	26	17	16
100–150	67	40	18	31	15	19
150–300	59	39	29	31	12	19
Over 300	61	39	30	31	9	21
All together	61	39	27	31	12	20

Insurance, overtime, bonuses, perquisites, board, and lodging averaged £14 per regular paid employee, this total being distributed in the following proportions:—

		Items as a % of total extras and perquisites:—							
Size group (acres).	Total extras and perquisites per regular paid employee. (£)	Over-time.	Harvest bonus.	Insurance.	Cottages.	Potatoes.	Coal.	Milk.	Board and lodging.
1– 5	0	—	—	—	—	—	—	—	—
5– 20	30	—	1	7	9	3	1	5	74
20– 50	12	13	10	31	3	2	—	16	25
50–100	14	14	11	32	4	—	1	4	34
100–150	14	20	16	26	16	1	—	11	10
150–300	14½	19	18	25	21	1	—	6	10
Over 300	13	12	24	34	24	1	—	5	—
All together.	14	19	16	29	20	1	—	6	9

Overtime and harvest bonuses (both paid in cash) collectively account for over one-third of the additions to the weekly cash wages. Insurance (mainly National Health Insurance) is the largest individual item in the extras. The figure here given represents the total cost of the insurance, as the weekly cash wages have been computed *ex* the employee's contribution. Tied cottages (average rent about 3*s.* per week) are more common on the large than on the

small farms, but board and lodging in the farmer's own house is provided more often on the small than on the large farms.

Labour provided by the farmer's wife and family has been valued at what it would cost to hire. The figures given on page 64 illustrate that this family labour is of most importance on the small farms, particularly those below 5 acres in size, on which it comprises nearly three-quarters of the total labour bill. The value of the wife's labour (mainly employed on poultry and dairy) represents one-quarter of the total charge for family labour, or 1½ per cent. of the total labour bill. On farms below 50 acres in size the value of the wife's labour represents 60 per cent. of the total charges for family labour, or 12 per cent. of the total labour bill.

One-quarter of the casual labour was hired for threshing, the remainder being mainly employed for root thinning, hay making and harvesting. The average number of "man weeks" casual employment given during the year by farms of different size was approximately as follows:—

Size group. (acres).	Casual employment ("man weeks") per farm per annum.
1– 5	4
5– 20	4
20– 50	11
50–100	18
100–150	21
150–300	27
Over 300	57

One-half of the farms were in need of casual labour in June and August, and one-third in July, September, and October. In May and November, 12 per cent. and 18 per cent. of the farms respectively were in need of casual labour, but for the remaining five months of the year the demand was negligible.

In calculating the "Profit Surplus" (see page 18) a charge has been made for the occupier's own labour. The allowance has been computed at the rate of £2 per week for manual work and £4 per week for managerial activities. Thus a farmer who works half his time along with his employees and the other half of his time in organising his business would be charged at £156 per annum. On the small farms the occupiers are almost wholly engaged on manual work, but, as the size increases, managerial functions occupy an ever greater share of the farmer's time. Over the whole sample, remuneration to the occupiers for their labour averages 56 per cent. for manual work and

44 per cent. for managerial work. The distribution in the different size groups is shown in the following figures:—

Size group. (acres).	Total allowance for occupiers' own labour. (£ per farm).	Percentage of total allowance for:—	
		Manual work.	Managerial work.
1– 5	85	100	0
5– 20	79	97	3
20– 50	100	95	5
50–100	121	72	28
100–150	139	54	46
150–300	142	48	52
Over 300	160	34	66

In studying the incidence of wages on farm costs, the amount paid must be considered *in relation to* the output. A highly efficient worker may be cheap at 50*s*. per week while an incompetent worker may be dear at 5*s*. Similarly, a labour bill of £3 per acre, or £1000 per annum, is high or low only in relation to the value of the gross farm output. But the efficiency of the individual worker is not the only factor influencing the relationship between wages and output, for the efficiency with which the labour is organised and the directions in which it is applied are of equal or greater importance. Perhaps the best way of measuring the incidence of the labour costs is to express the value of the gross output on the basis of one unit of labour, including an allowance for the manual work of the occupier and his family. A unit of £100 worth of labour is a convenient one, and, measured in these terms, the value of the gross output for all the farms comprising the sample averages £226, i.e. £100 worth of manual labour was required to produce £226 worth of output. There is, of course, a wide variation in this measure between individual farms, the range in output per £100 labour being from as low as £50 to as high as £500.

There is a very close connection between output per £100 labour and profitableness. This aspect will be discussed fully in Chapter VII, and for the present it only remains to state that livestock enterprises appear beneficially to influence the relationship between output and wages. Farms keeping less than 14 animal units per 100 acres averaged a gross output of only £191 for each £100 labour; farms keeping from 14–24 animal units per 100 acres achieved an output of £227; while the comparable figure for farms having more than 24 animal units was no less than £255.

2. FOODSTUFFS

Foodstuffs form the second largest item in the cost budget, and over the whole sample expenditure under this heading averages 17 per cent. of the gross charges, or 27*s*. per acre of farmed land. The expenditure on foodstuffs

per farm in each size group is shown in Table II in the Appendix, but in connection with these figures it must be remembered that they refer to *purchased* foods, which represent only about one-third of the value of all foods consumed on the farm (see page 62).

The distribution of the expenditure on foodstuffs on farms of different sizes is shown in the following table:—

Size groups. (acres).	Percentage of farms purchasing foods to the value of:—						
	£0.	£1–25.	£26–50.	£51–100.	£101–200.	£201–400.	Over £400.
1– 5	—	—	25	38	12	25	—
5– 20	—	27	13	20	27	13	—
20– 50	—	3	—	45	32	13	7
50–100	—	9	14	19	25	21	12
100–150	2	4	5	18	41	21	9
150–300	—	4	6	15	24	29	22
Over 300	2	—	3	8	20	35	32

The items comprising the total outlay on purchased foodstuffs are given in the table on page 69, and, in addition to providing approximate "weights" for calculating a local price index, illustrate the remarkable range in choice open to the farmer. It will be noticed that over all the farms middlings is by far the largest individual item, comprising just over one-quarter of the total expenditure on foodstuffs. Next in importance comes dairy nuts at nearly 14 per cent. of the total. On the smaller farms purchases of foodstuffs are less varied than on the larger. The approximate quantities purchased per farm are given in the following table:—

Size group. (acres).	Average tons bought per farm:—							Other purchased foods. (£)
	Cakes.	Middlings and bran.	Meals.	Corn and pulse.	Hay and straw.	Proprietary mixtures.	Brewer's grains and protos.	
1– 5	—	1½	1	7¼	1	—	3	—
5– 20	¼	3½	2	3	1½	—	—	2½
20– 50	2½	6½	4¾	4	4¾	½	2¼	1¼
50–100	1¾	9	2¾	1½	2¾	1	½	1½
100–150	4	7½	1¾	2	4	1	¼	¼
150–300	5¼	9½	2½	2	3	1¾	1¾	1¼
Over 300	13	12¼	4¾	2½	2¼	2	5½	1

From the data given here and in the previous Chapter a rough idea may be obtained of the value of the livestock output per £100 worth of foods consumed. It has been shown on page 62 that just over half the total value of the crop produce (including pasture) has been fed to livestock on the farm of origin. Over the whole sample a total livestock output of £339,000 has been obtained as a result of feeding £122,000 worth of home-produced foods, and

£77,000 worth of purchased foods. If allowance is made for the foods consumed by horses, the value of the livestock output, based on these figures, approximates £190 per £100 worth of foods. It must be remembered, of course, that home-produced foods have been valued largely on the market prices of the 1930 crops, which, generally, were less than the cost of production. The

Size group.	Percentage of total expenditure on purchased foods.								Average price paid per ton. (£)
	1–5 acres.	5–20 acres.	20–50 acres.	50–100 acres.	100–150 acres.	150–300 acres.	Over 300 acres.	All farms.	
Type of food:—									
Agistment	—	1·5	0·7	0·3	0·2	0·3	0·1	0·26	—
Barley and barley meal	—	12·5	19·0	10·1	5·8	6·8	6·0	7·83	8·55
Beans	—	—	—	—	0·6	0·8	1·0	0·69	9·87
Biscuit meal ..	—	—	—	—	—	0·2	—	0·05	—
Bran	—	3·3	2·1	5·1	5·5	5·3	6·3	5·24	6·73
Chicken corn ..	38·8	28·5	15·9	4·3	6·2	3·7	1·3	5·32	10·10
Cocoanut cake ..	—	—	—	1·3	0·9	0·7	—	0·48	9·60
Cotton cake ..	—	—	2·9	2·0	3·6	6·5	8·0	5·67	7·50
Dairy nuts	—	2·1	7·4	7·4	12·2	11·7	21·4	13·70	9·83
Fish meal	—	3·5	—	1·3	1·0	1·2	1·0	1·04	20·22
Grains (brewers) ..	23·1	—	5·0	0·8	—	2·5	1·3	2·11	4·42
Ground nut cake ..	—	—	—	—	1·3	1·4	1·0	0·97	9·23
Hay	—	3·7	5·8	2·6	2·1	2·0	3·6	2·91	5·50
Linseed cake ..	—	0·5	2·7	1·1	7·5	5·7	6·3	5·15	11·70
Locust beans ..	—	—	—	—	—	—	0·8	0·25	7·00
Maize and maize meal	6·4	5·7	3·1	5·4	3·7	2·9	2·8	3·35	8·00
Middlings	9·2	26·8	22·7	40·3	28·9	28·0	19·0	25·75	7·10
Milk	—	—	—	0·1	—	—	—	0·01	—
Molasses	—	—	0·2	—	—	0·1	0·2	0·12	6·90
Molassine meal ..	—	—	—	—	—	—	0·5	0·17	9·00
Oats	6·8	4·2	3·4	5·2	4·7	3·6	3·2	3·84	7·39
Palm kernel cake ..	—	—	—	0·1	—	0·1	—	0·05	7·67
Peas	—	—	—	—	—	—	0·1	0·01	—
Proprietary mixtures	—	1·1	2·9	7·6	9·0	10·0	7·1	7·78	11·65
Protos	—	—	0·5	0·5	0·4	1·4	6·7	2·75	5·06
Rice meal	—	—	—	—	—	—	0·3	0·10	7·00
Roots	—	1·3	—	0·8	—	0·2	—	0·19	—
Soya bean meal ..	—	—	—	—	—	0·8	1·9	0·87	10·71
Straw and chaff ..	2·5	2·8	4·0	3·7	5·7	3·0	0·1	2·53	2·45
Wheat	13·2	2·5	1·7	—	0·7	1·1	—	0·81	9·04
Total expenditure ..	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·00	—

low price of purchased foods and the low value of home-produced foods has given a marked advantage to livestock production during the past year, and at least partly explain the correlation between livestock enterprises and farm profits which was referred to on page 33.

3. LIVESTOCK

Purchases of livestock for feeding or replacements aggregate nearly 23*s.* per acre of farmed land. More than half this expenditure is incurred in the purchase of horned stock, and one quarter on the purchase of sheep. On the small farms the purchase of pigs and poultry is of relatively greater importance than on the larger farms, while the purchase of sheep is material only on farms of over 150 acres in size.

Size group. (acres).	Total purchases of livestock per farm. (£).	Percentage of total livestock purchases represented by:—					
		Cattle.	Sheep.	Pigs.	Poultry.	Horses.	Others.
1– 5	8	—	—	88·0	12·0	—	—
5– 20	9	11·3	—	36·0	18·8	11·3	22·6
20– 50	53	63·2	2·8	32·0	1·4	0·6	—
50–100	105	57·1	6·2	31·8	0·9	4·0	—
100–150	153	78·3	7·4	8·3	1·3	4·7	—
150–300	209	55·0	21·2	15·8	3·5	4·5	—
Over 300	487	51·7	35·6	9·6	0·3	2·8	—

4. RENT

Of the total area covered by this investigation, 26 per cent. was owned by the occupiers and 74 per cent. was rented. On farms over 100 acres in size 27 per cent. of the farmed land was owned, while on farms of less than 100 acres the comparable figure was 19 per cent.

The rental value of all the farms averages nearly 22*s.* per acre of farmed land, and, over the whole sample, comprises 14 per cent. of the gross charges. The rent charge per acre on the small farms is, of course, much higher than that

Size group. (acres).	Average rent per acre. £ s. d.	Percentage of gross charges.
1– 5	6 3 6	11·5
5– 20	2 11 10	12·9
20–50	1 14 7	13·5
50–100	1 7 7	14·1
100–150	1 5 3	14·7
150–300	1 1 1	13·3
Over 300	1 0 7	14·4

on the large farms. This is due mainly to the fact that on the small farms capital invested in buildings, and other improvements, is, relative to the total value of the property, greater than that on the large farms, while the cost of administration is also higher on the small farms.

Rent is, of course, a composite measure of soil fertility, improvements, and marketing facilities. Over the whole sample the distance from farm to market averaged 4½ miles, and from farm to rail station 2½ miles. These distances, however, ranged up to 12 miles and 8 miles, respectively.

5. MANURES

In the previous chapter passing reference was made to the amounts of dung and nitrogenous fertilisers applied to the various crops. It may be desirable, however, to provide a more detailed account of the types, amounts, and values of the manures and fertilisers used in the production of the 1930 crops.

Dung was made on the farms at an average rate of 3·4 loads per acre of arable land, or 7½ loads per animal unit. In addition to the home-produced dung, purchases of (mainly) town manure were effected, particularly in the south of the county, and by the larger farms, to the extent of approximately 0·3 loads per acre of arable land. A small amount of dung was sold, principally by the smaller farms. Over the whole sample, dung was available at the rate of just over 2 loads per acre of farmed land. The largest applications of dung were made on farms of between 20 and 150 acres, while farms on the chalk soils produced less dung per acre of arable land than those on the light and heavy soils. The practice of folding sheep, which is most common on the chalks, doubtless compensates to some extent for the shortage of farmyard manure.

Size group. (acres).	Loads of dung:— Made per farm.	Purchased per farm.	Available per 100 ac. arable.
1– 5	8	—	89
5– 20	35	—	223
20– 50	102	—	546
50–100	153	4	416
100–150	205	6	570
150–300	289	24	329
Over 300	479	59	253

Approximately two-thirds of the dung applied was put on fallow crops, the remainder being almost wholly absorbed by wheat, grass, and beans.

The amount spent per farm on the purchase of manures is shown in Table II in the Appendix. Over the whole sample this expenditure averages only 5*s.* 6*d.* per acre of crops and grass, of which purchased dung represents a comparatively small proportion. The largest farms bought relatively greater

Size group.	Percentage of available dung applied to:— 20–50 acres.	50–100 acres.	100–150 acres.	150–300 acres.	Over 300 acres.	All sizes.
Crop—						
Wheat	12	19	19	17	17	17
Barley	4	2	1	3	1	2
Oats	3	—	5	2	1	2
Beans and peas ..	2	9	2	6	4	5
Potatoes	11	11	9	11	15	13
Sugar beet	10	4	2	5	13	8
Mangolds	20	15	16	20	18	18
Swedes and green crops	12	10	8	21	16	16
Bare fallow	26	23	27	7	5	11
Seeds and permanent grass	—	7	11	8	10	8
Total dung applied..	100	100	100	100	100	100

amounts of manure than did the smaller farms, while more than one-quarter of all the farms comprising the sample bought no fertiliser at all. Nitrogenous

Size group. (acres).	Expenditure on fertilisers. Per 100 acres arable. £	Per acre farmed land. s. d.	% of farms buying fertilisers to the value of:— £0.	£1–8.	£8–16.	£16–32.	£32–64.	£64–128.	Over £128.
1– 5	0	—	100	—	—	—	—	—	—
5– 20	13	1 11	80	13	7	—	—	—	—
20– 50	35	4 4	64	10	16	—	10	—	—
50–100	28	3 10	26	21	21	18	12	2	—
100–150	83	4 2	20	16	7	30	14	11	2
150–300	51	5 7	12	4	9	17	26	21	11
Over 300	47	5 10	12	2	5	6	11	24	40

fertilisers were bought at the rate of 27 cwt. per 100 acres of arable, and there was little variation in this figure between the heavy, light and chalk soils. Phosphatic fertilisers were purchased at the rate of 65 cwt. per 100 acres of arable, but here the heavy soil farms used 14 per cent. more than the light, and 25 per cent. more than the chalk soil farms. Potassic fertilisers were

bought at the rate of 10 cwt. per 100 acres of arable, but the light soil farms used 10 per cent. more than the chalk, and 100 per cent. more than the heavy soil farms. Various proprietary mixtures were purchased, applications of these averaging no less than 35 cwt. per 100 acres of arable. Small quantities of lime and soot were also bought, the equivalent of 16 cwt. of the former and ½ cwt. of the latter being available per 100 acres of arable.

Size group. (acres).	Purchases of fertilisers per 100 acres of arable land:— Nitrogenous cwt.	Phosphatic. cwt.	Potassic. cwt.	Proprietary. cwt.	Lime. Tons.	Soot. Cwt.
1– 5	—	—	—	—	—	—
5– 20	20·5	34·2	17·1	—	3·4	—
20– 50	18·9	22·1	7·2	32·0	1·1	4·8
50–100	18·8	15·7	6·6	19·9	0·2	1·3
100–150	21·2	57·6	10·8	25·0	1·2	1·6
150–300	28·2	83·1	9·2	33·7	1·3	0·5
Over 300	27·7	60·3	11·4	35·0	0·5	0·1

The various items comprising the total outlay on fertilisers are given in the following table, which provides a rough basis for calculating a local price index:—

Size group.	Percentage of total expenditure on fertilisers. 5–20 acres.	20–50 acres.	50–100 acres.	100–150 acres.	150–300 acres.	Over 300 acres.	All farms.	Average price paid per ton. (£)
Fertiliser:								
Sulphate ammonia	41·0	20·4	21·7	16·5	17·9	20·8	19·5	10·49
Nitrate of lime	—	—	1·2	0·9	0·9	3·9	2·3	10·22
Nitrate of soda	—	1·8	6·8	7·2	5·0	3·4	4·4	9·98
Cyanamide	—	—	1·7	—	0·4	0·6	0·5	9·42
Bone charcoal	—	—	—	—	—	0·9	0·4	4·61
Superphosphate	24·6	0·8	6·7	8·2	14·0	14·0	13·0	3·46
Mineral phosphate	—	—	0·9	6·1	4·2	0·9	2·6	3·16
Basic slag	—	3·7	6·6	6·7	8·0	3·4	5·5	2·76
Mur. of potash	—	—	2·1	1·1	0·3	2·3	1·4	9·33
Potash salts	—	—	1·1	2·8	0·8	2·7	1·9	4·98
Kainit	11·4	2·3	2·1	1·4	2·1	2·5	2·3	3·27
Proprietary mixtures ..	—	28·9	26·0	21·1	27·1	28·3	27·1	7·67
Soot	—	36·9	14·6	17·3	8·9	0·4	6·2	3·22
Lime	23·0	2·1	2·1	4·2	3·2	1·2	2·3	1·40
Dung	—	3·1	6·4	6·5	7·2	14·7	10·6	0·23
Total expenditure ..	100·0	100·0	100·0	100·0	100·0	100·0	100·0	—

6. SEED

Rates of seeding and the proportions of purchased and home-grown seed used have already been referred to in the various crop sections. It may, however, be convenient briefly to recapitulate this information. The total expenditure on purchased seed per farm in each size group is given in Table II in the Appendix. Expressed per acre of crops and grass this expenditure is equal to approximately 5*s*., a figure which is fairly constant in the different size groups, and which is almost equivalent to the outlay on fertilisers. The items comprising the over-all average cost of seed per farm are detailed in the following figures:—

	Average rate of seeding per acre.	% total crop area grown from purchased seed.	Cost per unit of purchased seed.	Cost as a % of total expenditure on purchased seed.
			s. *d.*	
Wheat	2·7 bu.	51	50 8 (qr.)	24·5
Barley	3·1 ,,	43	38 10 ,,	5·9
Oats	3·8 ,,	43	32 2 ,,	17·1
Beans	2·7 ,,	35	42 2 ,,	0·7
Peas	3·2 ,,	90	46 1 ,,	0·4
Tares	2·7 ,,	60	15 9 (bu.)	0·4
Potatoes	13·1 cwt.	56	93 4 (ton)	7·0
Mangolds	7·8 lb.	100	2 6 (lb.)	6·3
Sugar beet	14·6 lb.	100	0 6¾ (lb.).	2·0
Grass, clovers, etc. ..	—	93	—	27·1
Other crops	—	—	—	8·6
Total expenditure on purchased seed				100·0

It will be seen that the purchase of grass seeds and seed wheat together comprise more than half the total expenditure on purchased seeds.

7. MISCELLANEOUS COSTS

The costs referred to in the previous six sections of this chapter cover 86 per cent. of the gross charges. The remaining costs aggregate approximately £1 per acre of farmed land and comprise a large number of petty disbursements, of which the most important are oil (petrol, paraffin, and lubricating), coal,

machinery and implements, hire of steam tackle, rates, harness, motor expenses, haulage and rail carriage, binder twine, fire and stock insurance, blacksmith, small tools, and vet. These items are set out in Table V in the Appendix, and it should be noted that, as in the case of rent, all the farms have been considered on the basis of tenancy, i.e. landlord's expenses are excluded.

(*a*) *Tractors.* Nearly one-third of the farms comprising the sample had a tractor, but nine-tenths of these farms were 150 acres or more in size. The most common types of tractor were the Fordson and the International.

Make.	Percentage of total tractors.
Fordson	37·9
International	37·9
Titan	7·8
Wallace	4·8
Overtime	2·9
Austin, Case, Sanderson, Crawley, Rushton, Cleveland	8·7
Total	100·0

A few of the larger farms had more than one tractor apiece, but nearly 15 per cent. of the tractors kept were not utilised during the year. The tractors which were utilised averaged 72 days' work each per annum, but on farms over 300 acres in size the tractors averaged 83 days' work, as compared with 63 days on farms of less than 300 acres. One farm of between 20-50 acres had a tractor, but it was worked for only 20 days in the year. Of the farms over 150 acres in size which had tractors, approximately a third got less than 50 days' work, a third got from 50–100 days' work, and a third got more than 100 days' work for each tractor utilised. Fuel consumption averaged 1·2 gallons per hour, and 90 per cent. of the owners expressed satisfaction with their machines.

The effect of the use of tractors on the requirements for horse labour has already been referred to on page 45. It has been shown that on farms on which more than 100 days' tractor work are done in the year one horse is required for 34 arable acres, as compared with one horse to 24 arable acres on farms on which no tractor work is done. That the requirements for manual

workers are influenced in a similar way is suggested by the following figures referring to farms over 150 acres in size:—

No. of days' tractor work performed per farm.	Arable acres per man equivalent.
0	19
1–49	19
50–99	22
100 and over	24

(*b*) *Motor Vans.* Ten per cent. of the farms had a motor van, and of these farms, four-fifths were over 150 acres in size. One-half of the vans were Ford, and one-fifth Morris. In several cases the vans had been converted from old cars. In no case was the capacity of the van more than 30 cwt. Distance run per annum averaged 6500 miles per van (average fuel consumption = 18½ miles per gallon), and nine-tenths of the owners expressed themselves satisfied with their machines.

(*c*) *Motor Cars.* Motor cars were owned by 41 per cent., and motor cycles by 3 per cent. of the farmers comprising the sample. Three-quarters of the occupiers of more than 300 acres had a car. Distance run per annum averaged 5700 miles, of which three-quarters was on business.

(*d*) *Other Machinery.* Twenty-five per cent. of the farms had a fixed engine, but nearly three-quarters of these farms were over 150 acres in size. Ten per cent. had a threshing machine, and here all the farms were over 100 acres in size. Two per cent. had a weighbridge, while only two farms used a milking machine, one farm had a steam engine, and one had a combine harvester.

(*e*) *Telephones.* Less than one-quarter of the farms had a telephone:—

Size group. (acres).	Percentage of farms having telephones.
less than 50	0
50–100	9
100–150	18
150–300	30
Over 300	51

(*f*) *Electricity.* Only 5 per cent. of the farms were supplied with electricity for power or light.

8. PRIVATE DRAWINGS IN KIND

It has already been explained (page 18) that in calculating the gross farm charges no credit has been given for the rental value of the dwelling house, and for produce and material used by the farmer's own household. These

items have in effect been treated as costs against the farm, a method of procedure which is not easily defended. Collectively, the private drawings in kind aggregate a considerable sum, ranging from £30 per annum on farms under 20 acres in size to over £90 on farms of more than 300 acres. The private drawings in kind are itemised in the table below:—

Size group.	1–5 acres.	5–20 acres.	20–50 acres.	50–100 acres.	100–150 acres.	150–300 acres.	Over 300 acres.
	£	£	£	£	£	£	£
House rent	10·9	11·3	14·2	20·6	22·8	24·8	28·4
Milk	2·1	4·0	9·2	13·6	13·5	15·5	15·5
Butter	1·5	0·4	1·8	3·1	3·8	3·5	3·4
Eggs	5·1	4·8	5·5	7·1	7·2	8·9	8·0
Poultry	2·7	1·5	1·7	2·8	3·7	2·8	3·9
Fruit and vegetables	3·3	3·9	4·1	6·5	5·7	7·7	8·5
Coal	4·0	1·6	2·8	4·5	4·5	4·4	7·1
Paraffin, etc.	0·6	0·4	0·5	0·9	0·6	0·4	0·6
Proportion of cost of motor car..	—	—	0·8	4·2	3·2	8·5	13·5
Labour	—	2·3	0·2	0·5	0·6	0·7	3·9
Totals	30·2	30·2	40·8	63·8	65·6	77·2	92·8

Produce used in the farmhouse comprises milk, butter, eggs, poultry, fruit and vegetables. On the assumption that these commodities would have been sold had they not been thus consumed they have been valued at market price, which is a retail price only in those cases where retailing is practised. This assumption is not, of course, valid in all cases, for the household not infrequently absorbs surplus or low-grade produce which has no market value. Coal and paraffin, bought in bulk for the farm, are, in the majority of cases, used as required for household purposes, while a small amount of farm labour is sometimes employed on the farmer's garden or in doing odd work in or around the dwelling house. The largest individual item is house rent, and here it is difficult to arrive at a money value which is not arbitrary. A proportion of the ordinary rates (see Table V) should also, no doubt, be included in the private drawings, but in this investigation these have been wholly charged against the farm.

The gross output figures given in other sections of this volume do not include private drawings in kind, although these have been taken into consideration in calculating milk yield per cow and egg yield per hen.

CHAPTER VII

CONCLUSIONS

THE year 1930 was unremunerative for the majority of Hertfordshire farmers. The price level of almost all commodities continued to decline during the period, and the agricultural index number was 22 points lower at the end of the year than it had been twelve months earlier. The prices of livestock and livestock products kept firmer than those of crops, which dropped away disastrously towards the end of the year. With the exception of labour and rents, costs of production declined to some extent, particularly foodstuff costs which, over the year, averaged some 30 per cent. less than in 1929. Labour, which comprises one-third of the gross farm charges, maintained its position at approximately double the pre-war level of wages.

The previous chapters of this *Report* have been confined almost wholly to a descriptive outline of the economic organisation of the agriculture of the county. The relative importance of the various products and costs has been shown, and the profitableness, or rather the unprofitableness, of the industry described. The profit surplus on the 303 farms comprising the sample averaged *minus* £180, but while approximately half the farmers fared worse than this, nearly one-third secured reasonable rates of interest on their capital and remuneration for their own labour, and a few experienced a highly profitable year (see diagram on page 21).

A popular explanation of the variation in profitableness between individual farms would be to attribute successful results either to luck or to some indefinable trait in the personality of the occupier. But luck can exert an influence only when embodied in a combination of circumstances, while personality is synonymous with technical or executive ability. In other words a successful business man may owe his position either to a fortunate combination of certain circumstances outside his control, or to his own ability as an organiser of those forces which are within his control. In the majority of cases both these influences share the responsibility of the result.

There is no doubt that luck, or rather bad luck, has exerted more than its fair share of influence on the fortunes of Hertfordshire farmers during 1930. Nation- and world-wide economic forces have continued to increase the disequilibrium between prices and costs, and the economic lag, always of special importance to the agricultural industry, has penalised farmers with a large unearned decrement. Capital has depreciated, and the relative weight of fixed charges has increased with each rise in the purchasing power of money. Farmers have also been handicapped, technically and psychologically, for the conditions to which methods of production had been adjusted through a generation of experience have been vanishing before their eyes; confidence has

been lost, while new methods of production are still in the experimental stage. The economic storm seems to be blowing from all points of the compass.

All forms of human activity are governed by a greater or lesser amount of uncertainty, but agricultural production is particularly at the mercy of factors outside the control of the producer. Prices are dependent not only upon the relationship between (largely) world production and consumption, but also upon the purchasing power of money. It is true that, assuming a "free" market, costs will eventually adjust themselves to an economic level, but the invariable lag in this adjustment proves a severe handicap to farmers in times of falling prices, while a "free" market for labour, the farmer's largest item of expense, does not exist in England. The inelasticity of wages is, therefore, causing, and is likely to cause still further, marked changes in farming technique and organisation. In addition to prices and costs, the individual producer is at the mercy of climatic and biological conditions. Thus, even though the difficulties associated with prices and costs could be surmounted, agricultural production would still contain a large element of risk.

Climatic and biological influences are relatively constant, so that a certain annual insurance premium will, over a series of years, compensate for crop failure or livestock losses. But economic forces are continually changing, a series of years of rising price or cost levels being succeeded by a period of falling levels. Thus it comes about that the fortunate or intelligent anticipation of these economic changes, and the readiness to adjust methods of production to new conditions, must always form the principal element in successful (i.e. profitable) farming.

1. EFFICIENCY IN THE USE OF LABOUR

The principal adjustment necessary at the present time refers to labour. It is clear that if wages cannot be reduced to the level of output, then output must be increased to the level of wages. The influence of the productivity of labour on profitableness is illustrated in the following figures referring to the 303 farms comprising the present sample:—

Size group. (acres).	Average labour income (£) per farm where the gross ouput per £100 labour* is:—		
	Under £195.	£195–255.	Over £255.
Less than 20	— 19	+ 85	+117
20–50	—122	+100	+123
50–100	—177	— 24	+257
100–150	—241	— 44	+286
150–300	—456	— 89	+342
Over 300	—719	—105	+327
All together	—329	— 52	+280

* Includes family labour; see p. 67.

The sequence in favour of a high output is unbroken even within size groups, and the difference in profitableness between the highest and lowest efficiency groups is very wide. Approximately one-third of the farms achieved a gross output of less than £195 per £100 worth of labour, and on these farms the labour income averaged *minus* £329 per farm; one-third of the sample achieved an output of between £195 and £255 per £100 labour, and on this group the labour income averaged *minus* £52; one-third of the farms achieved an output of more than £255 per £100 labour, and here the labour income averaged *plus* £280. From these figures it is clear that there is a close relationship between output per unit of labour and profitableness, and that it is therefore to the farmer's advantage to organise his undertaking with this in view.

Extensive methods of production tend to give a high output per unit of labour, but conditions in Hertfordshire (and in the eastern counties generally) are such that land is too scarce, and farms and fields are too small, for prairie farming, while cereals, which of all arable enterprises are the most suited to mechanised production, are the least sheltered, and relatively the least important, products. Farms of the Baylis type* are always likely to be exceptional rather than typical of English arable conditions, while Hertfordshire farmers, because of their proximity of London, and because of climatic and geological conditions, are unlikely to adopt a whole-hearted grass farming policy.

Certainly there is considerable scope for increasing labour efficiency by the modernisation of power and equipment. Developments in labour-saving machinery and appliances have been so rapid in recent years, and the economic outlook has been so depressing, that it is little wonder if equipment has in many cases become obsolete. Tractors could, no doubt, be employed economically much more widely than at present. But capital is scarce, and reliable information on the economics of tractors is practically non-existent. Electricity, too, available to only 5 per cent. of the farmers in a county which is nowhere further than 40 miles from the Metropolis, would appear to hold scope for development, particularly in regard to grinding, pulping, chaffing, threshing, and milking machinery.

While the modernisation of appliances will give increased labour efficiency, there is another way, of at least equal importance, by which improvement in this direction may be achieved. Certain enterprises yield a higher output per unit of labour than do others, and the introduction of such enterprises, or their intensification if they are already present, will, therefore, increase the labour efficiency of the farm. Speaking generally, livestock give a higher output per unit of labour than do crops (see table below), but it is clear that changing

* See *Progress in English Farming Systems;* No. III, Oxford Institute of Agricultural Economics.

price levels will cause a constant variation in the relative position of different enterprises. It would, therefore, appear advisable to increase the livestock output as much as possible until such time as the relative levels of crop and livestock prices are materially altered.

Size group. (acres).	Output (£) per £100 labour on farms having a livestock density* of:— Less than 14 A.U.	14–24 A.U.	Over 24 A.U.
Less than 20	112	88	237
20–50	183	246	238
50–100	104	199	261
100–150	178	222	276
150–300	197	224	255
Over 300	226	256	305
All together	191	227	255

Of the livestock enterprises dairy cattle seem to have been, during 1930, particularly closely connected with labour efficiency, for the figures given below show a marked tendency for the output per £100 labour to increase in proportion to the magnitude (measured in terms of money values) of the dairy enterprise:—

Size group. (acres).	Output (£) per £100 labour on farms on which the sales of dairy produce represent the following percentage of the gross income:— 0%.	1–50%.	Over 50%.
Less than 20	201	152	365
20–50	194	242	254
50–100	154	238	260
100–150	165	230	251
150–300	184	231	250
Over 300	238	251	267
All together	189	237	257

This tendency is undoubtedly associated with the correlation between number of cows kept and the profitableness of the farm to which reference was made on page 35.

It is not suggested that it is possible, or even desirable, in the eastern counties generally to divorce livestock production from crop production, for it must always be borne in mind that the swing of the pendulum may, in time, reverse the present economic position of crops and stock, while geological and climatic conditions are unfavourable to grass farming over a large area in the Province. Further, the farm, particularly the arable farm, is a highly complex organisation, and the interdependence of the various enterprises is

* Livestock density is expressed in animal units (A.U.) per 100 acres of farmed land. Compare this table with that given on page 33.

too obvious to those conversant with practical conditions to require stressing here. The achievement of an even distribution of his labour forces (men, horses, and machines) throughout the year should be the farmer's first consideration, and to obtain this a combination of crops and livestock will be necessary. But considerable latitude, not only in the choice of enterprises and in the proportions in which the various enterprises are combined, but also in the form in which produce can be marketed, is available. Crops do not necessarily have to be marketed as crops, and a good balanced ration can be made up from the field produce of the farm alone.

At the present time fertilisers are relatively cheap, and it is, therefore, economic to make more liberal use of them than if they were more expensive. It costs just as much to cultivate for a 30-bushel crop as for a 40-bushel crop, and if such an increase can be secured economically by the judicious application of fertilisers, the output per unit of labour (and per unit of all fixed charges) will be augmented. The following figures, referring to the present sample, illustrate that high yields are associated with good land, relatively large purchases of fertilisers, and the intensive production of livestock:—

	Farms on which the yield index* for all crops was:—		
	100 or less.	101–120.	Over 120.
Rental value per acre	21/7	22/4	30/2
Purchases of fertilisers per 100 acres arable (£)	30	48	86
Livestock density (A.U. per 100 acres) ..	17	21	27
Output per £100 labour (£)	182	232	272
Labour income (£)	−179	+47	+99

These figures show that the farms with the highest crop yields bought nearly three times as much fertiliser as did those with the lowest crop yields.

The data made available in Chapters V and VI show that in 1930 approximately one-quarter of the farms bought no fertilisers, while, on the average, expenditure on fertilisers represented only 5s. per acre, or some 4 per cent. of the gross farm charges. Top dressings of nitrogenous fertilisers were applied to only one-quarter of the wheat area and one-third of the oat area. It is commonly argued by farmers that there is no objective in working for large crop yields in the face of low price levels, but so long as foodstuffs have to be purchased the production of high yields (whether of pasture or arable crops) has the advantage of permitting a reduction in the outlay on fodder. It will

* The decennial average yields for the county are expressed as an index of 100; see definition on page 19.

be remembered that under his present organisation, expenditure on foodstuffs is the Hertfordshire farmer's second largest outgoing, and if an increase of 50 per cent. in the fertilisers bill will make it possible to reduce the foodstuff bill by 20 per cent. an economy will have been effected. The degree of intensity of production which is most economic will, of course, vary with each change in the relative price level of commodities and requirements.

2. INFLUENCE OF TURNOVER

It would appear, from what has been said, that the directions in which labour is applied and the efficiency with which it is organised are of primary importance. The securing of a high money output per unit of labour is one of the main essentials for profitable farming. The next most important element is connected with the rate at which the farmer turns over his capital, and here it may be advisable to explain what is meant by "capital turnover." If the farm valuation of livestock, deadstock, crops and tenant right is £1000, and the gross output during the year is £500, then there has been a 50 per cent. turnover; if the output had been £1000 the turnover would have been 100 per cent. A high turnover is advantageous because it reduces capital costs and fixed current costs per *unit* of output. When an arable farmer says that dairying is useful because it brings in some money every week he is merely describing in non-technical language the fact that, compared with crops, dairy cattle give a high turnover.

Compared with other industries, agriculture is handicapped by the slow turnover which its dependence on nature permits. In Hertfordshire the average turnover (excluding landlord's capital, for which see page 32) was 68 per cent., i.e. for every £100 worth of farm capital the value of the output secured was only £68. But certain farmers secured a higher turnover, while others did not do so well, and the following table illustrates the effect of these variations on profitableness:—

Size group (acres).	Average labour income (£) per farm where the gross output per £100 farm capital was:—		
	Under £55.	£55–75.	Over £75.
Less than 20	+ 10	−16	+ 53
20–50	− 87	−57	+ 79
50–100	−189	−17	+154
100–150	−302	−48	+279
150–300	−474	−93	+241
Over 300	−581	+ 6	+529
All together	−385	−36	+204

It is clear that profitableness is associated with a high turnover. Approximately one-third of the farms achieved a turnover of less than 55 per cent., and on these the labour income averaged *minus* £385; one-third of the farms secured a turnover of between 55 per cent. and 75 per cent., and here the labour income was *minus* £36; the remaining one-third of the sample had a turnover of more than 75 per cent., and the occupiers of these farms obtained a return of *plus* £204 for their own labour. It would, therefore, appear to be to the farmer's advantage to concentrate as much as possible on those enterprises which give a relatively high turnover.

Speaking generally, livestock give a higher turnover than do crops, and this would seem to provide a further inducement at the present time to concentrate as far as possible on the former. Certain livestock enterprises are, however, less advantageously situated in this respect than are others. The raising of store cattle, for example, is a type of production with a very low turnover, and this fact no doubt partly explains why calves are more generally disposed of as veal rather than kept on as stores. Fattening bullocks and breeding flocks of sheep also allow of only a comparatively low turnover. On the other hand, pigs, poultry and dairy cattle permit of a high turnover, and for this reason alone possess definite economic advantages.

3. EFFICIENCY IN LIVESTOCK PRODUCTION

As livestock enter so largely into the economy of Hertfordshire farming it is not unexpected to find that the economic efficiency with which they are produced exerts a most important influence on the profitableness of the farm as a whole. In the production of livestock and livestock products, foodstuffs comprise approximately three-quarters of the total costs, and for this reason a good measure of efficiency in production is obtained by expressing the value of the livestock output on the basis of one unit (say £100) of food costs. Admittedly this measure fails to differentiate between efficiency secured in production, and advantages secured through special marketing facilities, e.g. a farmer may obtain a high output per unit of food cost by keeping the cost of his foods relatively low or by obtaining a relatively high price for his produce. But as the effect on profits of either of these alternatives is identical, and in default of a better method of expression, the value of the livestock output per £100 worth of foods consumed may be accepted as providing at least a rough index of economic efficiency in livestock production.

Over all the farms for which data are included in this *Report* each £100 worth of foods (purchased plus home-grown, including pasture) consumed by livestock yielded, on the average, £194 worth of produce. The basis on which

home-grown fodder has been valued is explained on pages 61 and 69; and although criticisms may justly be levelled at the method of computation employed, readers are reminded that it is *comparative* rather than *absolute* data which are of importance and interest in farm management problems. The average livestock efficiency figure of £194 is, of course, merely the point of division between one-half of the farms, which secured a lower output per £100 foods, and the other half which secured a higher output. The following table illustrates the influence of economic efficiency in livestock production on the profitableness of the farm:—

Size group. (acres).	Average labour income (£) per farm where the livestock output per £100 foods was:—		
	Under £160.	£160–230.	Over £230.
Less than 20	− 16	+21	+138
20–50	−131	+ 6	+149
50–100	−142	+73	+ 83
100–150	−281	+ 3	+262
150–300	−365	−101	+263
Over 300	−392	+ 51	+313
All together	−280	− 12	+212

Approximately one-third of the farms secured less than £160 worth of livestock output per £100 worth of foods, and on these the average labour income was *minus* £280; one-third achieved a livestock output of between £160–230, and here the labour income was *minus* £12; the remaining one-third obtained more than £230 livestock output per £100 worth of foods consumed, and on these farms the occupiers obtained a return of *plus* £212 for their own labour.

4. INTENSITY OF PRODUCTION

In Chapter III attention has been drawn to the fact that the actual size of a business is in itself an economic factor which must be taken into consideration in discussing profitableness. It is the custom to express the size of a farm in terms of acres, but that this measure is unsatisfactory is readily apparent. Take, for example, a local illustration provided by one farm of 10 acres in the south of the county devoted entirely to the production of water cress, and another farm of 800 acres on the light chalk lands to the north of the county producing principally grain and sheep. Both these farms yielded in 1930 approximately the same *value* of produce, and although a politician might call the water cress farm a Small Holding, it is, in effect, as large a business unit as the sheep and grain farm. This illustration emphasises the fact that in measuring the size of a farm business it is necessary to take into account not only the area covered, but also the degree of intensity of production.

The best individual measure for expressing the size of a farm business is the annual value of the gross output.

As the profit margin per unit of produce must generally be small in agriculture it is obvious that large profits can only be made where a large output is achieved. For example, a profit margin of one penny per gallon gives a negligible aggregate profit on 100 gallons, but a sizeable return on 10,000 gallons. Similarly, if a farm has a gross output of only £500, the opportunity for the occupier to secure a reasonable income is small; indeed a 20 per cent. profit margin would be necessary to yield him £100. At the same time it must be borne in mind that while a small farm cannot be expected to yield a large profit, it holds less opportunity for realising a heavy loss than does a large farm. These facts are illustrated in the figures given on page 27.

For quite another reason the farmer should appreciate that it is to his advantage to secure the maximum *economic* output from his undertaking. In arable farming, approximately three-quarters of the total costs of production are more or less fixed; indeed, apart from fertilisers and foodstuffs, the arable farmer has little opportunity to reduce his total outgoings. But the total costs of a business are of minor importance, it is the *relationship* between costs and output which is of primary significance. Thus, if total costs are more or less fixed, the farmer can improve his position only by making every endeavour to increase his output, and by this means reduce his fixed costs per unit of produce. Livestock provide the readiest means of increasing the size of the farm business, but side lines of every sort offer opportunities which should be given serious consideration. The cultivation of small areas of, say, horticultural produce, or the introduction of fancy livestock, may be suggested as possible methods of swelling output without adding to gross charges.

5. CHANGING ECONOMIC CONDITIONS

The previous pages in the present chapter have emphasised the importance of the efficient application of labour, a high turnover, and a large output. Under each of these headings livestock appear to provide special economic advantages, and it is no doubt on this account that during the last 50 years there has been a decided tendency for Hertfordshire farmers to rely more and more on livestock enterprises as a source of income. It is true that since 1885 horses have decreased in number by about one-third, and sheep by about two-thirds, but dairy cattle have increased by 50 per cent. (and this figure makes no allowance for improved milk yields), while poultry are nearly four times as numerous now as they were in 1885. Even during the year 1930 there was a marked increase in the numbers of livestock. Historically this movement is of interest, for it is little more than a century since Hertfordshire was described

as "the first and best corn growing county in the kingdom," and livestock were kept only for the manure which they produced. In effect there has been a complete reversal of policy in the comparatively short space of 100 years. Changing price levels (both those of requirements and commodities) are responsible for this movement, and so long as price levels continue to fluctuate there will be need for producers continually to scrutinise their management and to be prepared to adjust, and then to re-adjust, their organisation.

In considering the advisability of modifying his organisation to meet current economic conditions, the individual farmer will naturally take into account the effect of the proposed change on his farm business *as a single unit.* The highest possible profit on his farm as a whole, and not the highest net return on individual enterprises, will be his objective. It may be assumed that Hertfordshire farmers are as technically efficient as their neighbours, and that while improvement in production processes is possible and desirable, modification of economic organisation holds greater opportunities for surmounting financial depression. The avenue of thought which every farmer should be continually exploring takes this direction:—"Here am I with certain heavy capital investments, and compromised with a certain practically immutable annual expenditure; how can I apply my capital, and organise the activities of my employees, in order to secure the maximum economic output from my fixed costs?"

Starting from this point the farmer will do well to review his present organisation, and, with the help of a simple financial statement, summarise the financial results of that organisation. With his financial statement in front of him, he may obtain at least a general idea of how his efficiency compares with that of his neighbours by referring to the data given in this publication. (See Efficiency Chart in Appendix.) The next step is to consider what modifications are desirable in view of obvious weaknesses in the present organisation, and probable price changes in the future. For example, should more barley be grown at the expense of the wheat area; should cows be reduced in number and more pigs and poultry kept; should the temporary grass be allowed to lie for three years instead of one or two, and more sheep and store cattle introduced; is there an opening for a few acres of potatoes; should more oats be grown and less concentrated foods purchased; are there any side-lines that can be exploited; can surplus milk be more advantageously marketed as cream or as butter, or should it be sold as whole milk for what it will fetch, or would it be more economic to feed it to pigs and young stock; are pig prices likely to rise or fall during the coming year?

These, and a hundred other similar questions will require to be considered when preparing a working plan for future operations, and to assist in clarifying

the issue it is helpful to draw up an annual "budget" estimate. An outline of such a budget is illustrated in the Appendix, but here it may be advisable briefly to recapitulate the objective of budgeting, and the principles involved. The objective is, of course, to take advantage of past errors in judgment and future movements of prices. Admittedly it is impossible accurately to foretell price fluctuations, but a conscious attempt to plan in advance is more likely to yield satisfactory results than is entire dependence on chance. In setting down the expenditure items in the budget it is advisable to differentiate between the more or less fixed costs, and those which are primarily dependent on the organisation selected. So far as fixed costs are concerned the past year's records will provide the necessary basis of calculation. In arranging for the most desirable combination of enterprises consideration will have to be given not only to relative price levels and local natural and economic conditions, but also to the labour requirements of the different enterprises, and to the seasonal variation of these requirements. The achievement of an even distribution of the labour requirements (men, horses, and machines) throughout the year is of great importance. In addition to the selection and combination of enterprises, scope for re-adjustment is sometimes to be found in alternative forms of marketing produce. For example, in the dairy enterprise, apart from the alternatives of wholesale and retail trading, surplus milk might be marketed as cream, as butter, or it might be fed to pigs and young stock as part, or whole, of the protein ration. From the figures given on page 39 it would appear that cream-making is worth serious consideration. Pork, bacon, and stores provide alternatives for the pig enterprise, while veal, baby beef, stores, or dairy heifers are alternative outlets for calves.

6. FACTORS INFLUENCING PROFITABLENESS

In conclusion, it may be said that statistical analysis of the data collected in this investigation shows that approximately nine-tenths of the influences affecting farm profits in Hertfordshire during 1930 were covered by five factors which are here given in order of importance:—

(1) Efficiency of labour measured in terms of the gross output per £100 worth of labour.

(2) The rate of capital turnover.

(3) Efficiency of livestock production measured in terms of the gross livestock output per £100 worth of foods.

(4) The size of the farm measured in terms of the gross output.

(5) The value of the dairy produce sales.

In the following table a comparison is made of the labour income secured by the occupiers of those farms which were below "normal" in all five factors with that obtained on farms which were above "normal" in one or more of the factors:—

Size group. (acres).	Labour income (£) per farm on holdings below normal in all five factors.	Labour income (£) per farm on holdings above normal in factor:—				
		1.	1 and 2.	1, 2 and 3.	1, 2, 3 and 4.	1, 2, 3, 4 and 5.
Less than 20	− 42	+110	+110	+143	—	—
20–50	−208	+124	+124	+220	—	—
50–100	−230	+160	+173	+336	+619	+619
100–150	−223	+189	+328	+328	+488	+488
150–300	−430	+219	+304	+343	+403	+464
Over 300	−572	+261	+453	+527	+527	+657
All together	−321	+203	+269	+336	+463	+499

One-fifth of the farms were below normal in all five factors, and on these the income secured by the occupiers for their labour and management averaged *minus* £321. Half the farms were above normal in Factor 1, and on this group the labour income was *plus* £203. One-third of the farms were above normal in Factors 1 and 2, and here the labour income was *plus* £269. A quarter of the farms were above normal in Factors 1, 2 and 3, and the occupiers of these holdings obtained *plus* £336 for their labour and management. Only one-eighth of the sample were above normal in four factors, and one-ninth in all five factors, and on these two groups the labour income averaged *plus* £463 and *plus* £499 respectively. These analyses illustrate, of course, only that there is a *marked tendency* for a certain effect to be produced by a certain cause and, as with all biological data, do not allow of dogmatism in individual cases.

Lastly, it may be of interest to compare briefly the economic organisation of the 14 most profitable and the 14 least profitable farms selected in equal proportions from each of the seven size groups. Although there is a difference of £1400 in the labour income per farm in these two groups there is little

difference in the size of farm, proportion of arable, capitalisation, distribution of crops, density of employment, and numbers of livestock carried between the best and the worst. But a comparison of income and expenditure demonstrates a startling variation:—

	14 best farms.	14 worst farms.
Gross charges per farm:—	£	£
Permanent labour	414	543
Casual labour	44	27
Fertilisers	51	46
Foods	266	484
Seeds	29	56
Livestock	96	258
Rent	202	157
Miscellaneous	215	261
Total charges	£1317	£1832
Gross income per farm:—		
Dairy produce	861	270
Horned stock	73	294
Sheep and wool	94	96
Pigs	85	222
Poultry and eggs	270	56
Crops	650	189
Miscellaneous	78	88
Total income	£2111	£1215

The most profitable farms bought less foods and less livestock, and yet sold more crops and more livestock than the unprofitable farms. In addition to carrying nearly double the number of dairy cows the most profitable farms attained a milk yield per cow of 50 per cent. above that on the most unprofitable, while the former sold all but 2 per cent. of the total milk yield and the latter had 9 per cent. unsold. The profitable farms received 1½*d*. more per gallon of milk sold than did the unprofitable farms. Poultry, which were of insignificant proportions on the unprofitable farms, formed quite an important element in the economy of the profitable farms. Crop yields were some

10 per cent. higher on the best farms, and this, no doubt, assisted to reduce outlay on purchased foods. Further, the profitable farms grew more "high value crops" (e.g. beet, potatoes, etc.) than did the unprofitable farms, and this helped to increase the output of crop produce. In spite of a considerably smaller gross expenditure the profitable farms yielded produce to nearly double the value of that yielded by the unprofitable farms. These differences in organisation resulted in the best farms achieving an output of £356 per £100 labour, and a capital turnover of 115 per cent., as compared with £148 and 67 per cent. respectively on the worst farms.

Table I

AGRICULTURAL STATISTICS FOR HERTFORDSHIRE

Year.	1885	1907	1924	1929
CROPS AND GRASS (ACRES).				
Total area except water		402,861	402,861	402,736
Total area under crops and grass	341,381	328,243	315,391	302,125
Arable land		203,472	193,679	168,381
Permanent grass for hay	106,812	124,771	41,206	44,543
,, ,, not for hay			80,506	89,201
Rough grazings			5,961	9,800
Wheat	54,112	50,661	47,181	39,148
Barley	43,747	21,381	22,218	17,159
Oats	27,979	39,316	37,072	32,979
Mixed corn			1,570	1,171
Rye	178	268	433	175
Beans	7,642	6,885	4,303	1,723
Peas	3,404	1,213	874	456
Potatoes	5,481	4,751	4,669	4,661
Turnips and swedes	22,374	10,770	5,444	3,726
Mangolds	5,587	6,973	6,428	4,246
Sugar beet			31	1,452
Cabbage, kohlrabi and rape for fodder	1,657	3,412	2,517	2,596
Vetches or tares	8,596*	2,496	1,886	1,243
Lucerne		3,796	3,497	2,242
Small fruit		483	482	480
Orchards	1,334		1,749	1,656
Clover and rot. grass for hay	39,793	39,822	32,881	29,208
,, ,, not for hay			3,846	5,719
Other crops		1,168	3,311	3,951
Bare fallow	13,924	10,077	13,477	14,552
LIVE STOCK (NUMBER).				
Horses for agricultural purposes	10,858	11,355	8,596	7,186
All horses	13,975	14,785	13,337	10,100
Cows in milk		12,898	15,309	15,234
,, calf	13,708	4,182	2,755	2,635
Heifers in calf			3,682	3,695
Bulls			721	756
Other cattle—2 years and over	7,898	7,227	6,597	6,337
,, 1 and under 2	16,125	8,381	8,364	8,061
,, under 1		7,281	7,997	6,644
Total cattle	37,731	39,969	45,425	43,362
Ewes		38,923	22,308	28,249
Rams and ram lambs	102,918		415	756
Others—1 and over		17,264	9,209	9,057
,, under 1	66,589	34,350	22,447	29,110
Total sheep	169,507	90,537	54,379	67,172
Sows		3,896	6,090	3,568
Boars			540	309
Other pigs		23,046	34,040	21,414
Total pigs	32,464	26,942	40,670	25,291
Fowls	139,180		322,278	470,751
Ducks	21,768		23,121	21,027
Geese	4,808		3,425	2,360
Turkeys	4,844		8,740	7,472
HOLDINGS (NUMBER).				
1– 5 acres	1,275	1,047	867	764
5– 20 ,,	899	1,276	861	713
20– 50 ,,	454		463	485
50–100 ,,	366		339	311
100–150 ,,	729	1,074	265	275
150–300 ,,			423	416
Over 300 ,,	335	316	312	287
Total above 1 acre		3,713	3,530	3,251
WORKERS (NUMBER).				
Reg. Males over 21			8,537	8,476
" ,, under 21			2,043	1,639
" Women and girls			341	411
Cas. Males over 21			1,148	1,076
" ,, under 21			348	130
" Women and girls			351	323
Total			12,768	12,055

* Includes other green crops.

Table II

ECONOMIC AND FINANCIAL DATA (SIZE GROUPS)

All figures expressed "per farm."

Size group (acres)	No. of farms	Average size (acres)	Arable area (acres)	Animal units	Manual* workers	Landlord's capital	Farm capital	Gross income	Gross charges	Gross output	Farm income	Remuneration for occupier's labour	Investment income	Interest @ 5% on farm assets	Labour income	Profit surplus	Private drawings in kind
						£	£	£	£	£	£	£	£	£	£	£	£
1–5	8	2·9	0·5	2·9	1·2	336	158	181	172	173	(+) 9	85	(−) 76	8	(+) 1	(−) 84	30
5–20	15	10·3	3·9	4·4	1·2	428	226	263	196	254	(+) 67	79	(−) 12	10	(+) 57	(−) 22	30
20–50	31	36·6	15·3	12·2	2·0	1034	509	511	449	458	(+) 62	100	(−) 38	26	(+) 36	(−) 64	41
50–100	43	72·2	40·5	17·2	3·1	1686	871	740	710	635	(+) 30	121	(−) 91	44	(−) 14	(−) 135	64
100–150	44	123·8	59·8	23·7	3·7	2730	1215	1006	977	853	(+) 29	139	(−) 110	61	(−) 32	(−) 171	66
150–300	97	207·7	114·9	38·8	6·0	4108	2121	1630	1624	1421	(+) 6	142	(−) 136	106	(−) 100	(−) 242	77
Over 300	65	425·3	245·8	70·6	10·6	9105	4148	3183	3046	2696	(+) 137	160	(−) 23	207	(−) 70	(−) 230	93

* Includes all family labour.

Size group (acres)	Capital value (£) of:—			Acres in:—								Animal units in:—					
	Livestock	Crops	Implts. and appliances	Perm. grass	Temp. grass	Cereals	Pulse crops	Fallow crops	Bare fallow	Other crops	Bldgs., roads, etc.	Dairy cattle	Feeding cattle	Sheep	Pigs	Poultry	Horses
1–5	78	18	62	2·1	0·2	—	—	0·1	—	0·2	0·3	0·5	0·1	—	0·2	1·8	0·3
5–20	93	47	86	6·1	1·5	1·5	0·3	0·5	—	0·1	0·3	1·5	—	—	0·7	1·4	0·8
20–50	266	140	103	20·4	3·8	6·8	0·3	3·0	1·1	0·3	0·9	8·3	0·3	—	0·8	1·0	1·8
50–100	382	317	172	30·7	7·6	23·1	1·4	5·4	2·5	0·5	1·0	8·5	1·8	0·5	1·7	1·3	3·4
100–150	558	425	232	60·6	13·3	34·2	0·6	6·0	5·5	0·2	3·4	15·0	1·3	0·8	1·0	1·4	4·2
150–300	927	758	436	87·2	27·3	65·7	1·9	12·2	7·5	0·3	5·6	22·3	3·2	3·8	2·2	1·9	5·4
Over 300	1727	1671	750	167·4	65·0	134·0	3·4	28·0	14·0	1·4	12·1	35·9	8·1	12·0	3·4	2·1	9·1

Size group (acres)	Gross Income (£) from:—									Gross charges (£) for:—							
	Dairy produce	Cattle	Sheep	Wool	Pigs	Poultry	Eggs	Crops	Miscellaneous	Regular labour	Casual labour	Fertilizers	Foods	Seeds	Livestock	Rent	Miscellaneous†
1–5	14	5	—	—	20	31	88	17	6	26	1	—	104	—	8	20	13
5–20	33	17	—	—	38	17	111	34	13	26	11	1	95	2	9	25	27
20–50	223	67	3	—	65	20	43	76	14	88	21	8	156	8	53	61	54
50–100	220	109	16	—	130	30	69	151	15	173	34	14	176	22	105	100	86
100–150	391	196	28	1	183	32	64	181	30	277	37	26	177	29	153	144	134
150–300	539	259	108	3	152	40	107	361	61	523	48	59	274	56	209	216	239
Over 300	723	553	403	14	248	40	96	1027	79	971	92	126	425	90	487	438	417

† See p. 96.

Table III

DAIRY ENTERPRISE DATA (relating to 134 farms having 10 cows or more)

(a) Grouped by size of farm.

Size group (acres)	No. of farms	Av. no. of cows per farm	Capital value per cow (£)	Milk yield per cow (gall.)	Percentage of total yield:—			Av. price received per gall. sold (d.)	Sales of dairy produce per cow (£)	Receipts for dairy produce as a % of:—		% of herds milk recorded officially	% of herds producing registered grade milk	Total no. of bulls for all herds in group†	Labour income per farm (£)	Corrected labour income* (£)
					sold wholesale	sold retail	not sold			Cattle plus dairy produce sales	Gross farm income					
20– 50	6	12·5	21·0	538	79·0	15·8	5·2	16·3	34·2	83·8	62·5	0	0	1P+ 2C	+113	+105
50–100	9	15·6	22·2	565	68·4	24·6	7·0	18·0	39·2	88·4	56·1	11	11	3P+ 7C	+117	+ 49
100–150	22	17·1	24·e	613	78·8	16·6	4·6	16·3	39·6	82·8	52·7	14	9	7P+12C	+ 82	+ 70
150–300	55	22·0	24·6	619	75·8	17·3	6·9	16·4	40·3	80·4	46·6	27	5½	38P+23C	+ 48	+ 26
Over 300	42	33·2	24·3	561	86·8	3·9	9·3	14·8	32·3	76·6	34·6	49	10	21P+27C	− 42	+ 45
Altogether	134	23·9	24·1	593	79·3	13·5	7·2	16·0	37·4	80·4	45·5	29	7½	70P+71C	+ 33	+ 33

(b) Grouped by size of herd.

Size of herd (cows)	No. of farms	Av. no. of cows per farm	Capital value per cow (£)	Milk yield per cow (gall.)	Percentage of total yield:—			Av. price received per gall. sold (d.)	Sales of dairy produce per cow (£)	Receipts for dairy produce as a % of:—		% of herds milk recorded officially	% of herds producing registered grade milk	Total no. of bulls for all herds in group†	Labour income per farm (£)	Corrected labour income* (£)
					sold wholesale	sold retail	not sold			Cattle plus dairy produce sales	Gross farm income					
10–19	67	14·4	23·1	584	72·7	17·9	9·4	16·3	36·7	79·5	43·7	12	4½	20P+33C	+ 37	+ 27
20–29	31	23·9	25·3	631	89·1	5·9	5·0	15·8	39·7	78·4	46·1	58	13	25P+14C	−143	−131
30–39	24	33·1	25·1	580	87·2	8·9	3·9	15·2	36·3	84·2	44·9	37	8	17P+15C	+159	+222
40 and over	12	57·9	24·0	571	80·8	15·3	3·9	16·6	38·5	83·0	55·6	36	8	8P+ 9C	+217	+137

(c) Grouped by ratio of sales of dairy produce to gross farm income.

Sales of dairy produce as % of gross farm income	No. of farms	Av. no. of cows per farm	Capital value per cow (£)	Milk yield per cow (gall.)	Percentage of total yield:—			Av. price received per gall. sold (d.)	Sales of dairy produce per cow (£)	Receipts for dairy produce as a % of:—		% of herds milk recorded officially	% of herds producing registered grade milk	Total no. of bulls for all herds in group†	Labour income per farm (£)	Corrected labour income* (£)
					sold wholesale	sold retail	not sold			Cattle plus dairy produce sales	Gross farm income					
less than 20	9	15·4	22·9	487	69·2	10·4	20·4	13·7	21·6	59·6	14·9	22	0	4P+ 2C	−325	−269
20–39	50	22·9	24·8	573	89·1	4·0	6·9	15·1	33·7	76·8	30·9	44	12	30P+26C	+ 60	+106
40–59	42	23·3	23·6	641	75·7	19·8	4·5	16·7	42·5	82·6	49·0	21	5	20P+24C	+131	+ 90
60–79	28	24·0	23·7	572	77·2	18·6	4·2	16·5	37·9	90·4	67·0	14	3½	15P+12C	+ 62	+ 34
80 and over	5	35·8	24·6	654	60·8	37·0	2·2	19·2	52·6	89·7	83·8	40	20	1P+ 7C	+380	+ 66

* Corrected for price of milk at a flat rate of 16·0d. per gallon sold.

† P = pedigree, C = commercial.

Table IV

DISTRIBUTION AND SALES OF CROPS

Size Group	1–5 Acres		5–20 Acres		20–50 Acres		50–100 Acres		100–150 acres		150–300 acres		Over 300 acres		All farms together	
Crop:—	Area grown as % of farm area	Amount sold as % of crop area	Area grown as % of farm area	Amount sold as % of crop area	Area grown as % of farm area	Amount sold as % of crop area	Area grown as % of farm area	Amount sold as % of crop area	Area grown as % of farm area	Amount sold as % of crop area	Area grown as % of farm area	Amount sold as % of crop area	Area grown as % of farm area	Amount sold as % of crop area	Area grown as % of farm area	Amount sold as % of crop area
Permanent pasture	72·4	—	34·6	—	31·7	—	26·0	—	29·1	—	27·1	—	27·8	—	27·7	—
Meadows	—	—	24·6	15·8	23·0	7·5	16·3	12·7	19·2	27·1	14·5	22·2	11·3	28·1	13·7	24·1
Mixed seeds	—	—	5·0	100·0	6·6	22·8	4·5	30·8	6·2	57·5	8·5	48·5	8·9	59·4	8·2	53·9
Clovers	—	—	7·0	72·7	3·0	14·7	4·0	49·6	1·9	83·2	3·3	61·3	3·2	58·1	3·2	59·4
Sainfoin	6·9	100·0	0·6	—	0·7	100·0	1·0	96·8	2·6	59·8	1·0	36·4	2·2	64·7	1·7	59·8
Lucerne	—	—	2·0	100·0	0·1	—	1·0	6·7	—	—	0·4	16·8	1·0	76·7	0·7	60·1
Wheat	—	—	8·4	15·4	7·5	75·0	14·5	63·1	12·0	54·5	13·8	69·9	14·2	79·1	13·7	72·7
Barley	—	—	2·0	—	2·2	43·2	5·7	47·3	3·2	51·8	4·0	55·7	4·8	64·7	4·4	59·4
Oats	—	—	4·2	38·5	8·8	30·2	11·8	9·7	12·0	12·5	13·2	11·1	12·3	17·7	12·5	14·6
Rye	—	—	—	—	0·1	—	—	—	0·3	7·1	—	—	—	—	—	7·0
Mixed corn	—	—	—	—	—	—	0·1	—	0·1	—	0·6	—	0·2	—	0·3	—
Field peas	—	—	2·9	100·0	0·6	—	0·7	31·8	0·1	100·0	0·1	56·0	—	—	0·1	43·4
Beans	—	—	—	—	0·2	—	1·2	16·9	0·2	66·0	0·6	20·2	0·7	9·2	0·7	15·4
Seed tares	—	—	—	—	—	—	—	—	0·2	66·7	0·2	45·5	0·1	85·7	0·1	58·0
Potatoes	—	—	2·9	100·0	1·8	86·4	1·8	87·7	0·8	84·7	0·9	85·7	1·2	94·9	1·0	90·5
Sugar beet	—	—	—	—	1·7	100·0	0·8	100·0	0·5	100·0	0·6	100·0	1·7	100·0	1·2	100·0
Mangolds	—	—	—	—	2·3	1·9	2·0	—	1·6	1·1	1·8	2·5	1·4	3·3	1·6	2·5
Swedes and turnips	—	—	—	—	0·7	6·7	1·0	3·1	0·8	2·1	1·0	0·5	0·6	3·0	0·8	1·8
Kale and other green crops	3·4	100·0	1·9	—	1·7	70·0	1·9	49·2	1·1	36·5	1·6	16·3	1·7	9·1	1·6	17·5
Bare fallow	—	—	—	—	3·0	—	3·5	—	4·5	—	3·6	—	3·3	—	3·5	—
Fruit and market garden crops	6·9	85·7	1·0	100·0	0·9	97·6	0·7	59·0	0·2	93·8	0·1	44·4	0·3	90·9	0·3	77·7
Rough grazings*	—	—	—	—	2·1	—	0·2	—	1·5	—	0·7	—	0·5	—	0·6	—
Woods and waste	—	—	—	—	—	—	—	—	0·6	—	1·3	—	1·6	—	1·3	—
Buildings, yards, and roads	10·4	—	2·9	—	1·3	—	1·3	—	1·3	—	1·1	—	1·0	—	1·1	—
TOTALS	100·0	25·5	100·0	26·7	100·0	19·2	100·0	23·8	100·0	23·7	100·0	25·2	100·0	32·4	100·0	28·3

* For purpose of analyses rough grazing has been allocated in equal proportions to pasture and to waste.

Table V

MISCELLANEOUS EXPENSES IN £ PER FARM

Size group (acres)	Binder twine	Buildings and sheds		Clinkers and road metal	Coal	Dairy utensils	Draining	Electric power and light	Fencing	Fire and stock insurance	Harness (new and repairs)
		New	Repairs								
1–5	—	3·75	·89	—	4·00	—	—	—	·19	1·00	·09
5–20	·07	9·70	2·37	·07	2·10	·13	—	·40	·43	1·40	·50
20–50	·77	1·90	4·80	·08	3·90	·97	—	·13	1·30	1·97	1·63
50–100	3·26	5·16	5·31	·25	7·54	·74	·08	·17	1·24	3·60	2·44
100–150	4·02	2·93	6·22	·80	10·41	2·22	·34	·34	1·48	5·55	3·66
150–300	7·65	11·70	10·75	1·14	13·70	2·22	1·18	·58	4·28	8·36	5·48
Over 300	15·45	2·35	10·08	·78	26·82	2·43	1·08	·74	3·86	14·37	9·16

MISCELLANEOUS EXPENSES—*continued.*

Size group (acres)	Horse shoeing	Machinery and implements.		Milk hauling	Motor insurance, tyres and repairs	Petrol, oil and paraffin	Rail carriage and sack hire	Rates		Registration and recording	Small tools, plough shares, etc.
		New	Repairs					Ordinary	Water		
1–5	·09	·34	·37	—	—	1·97	·19	2·12	·72	—	·03
5–20	1·40	1·52	·67	—	3·93	1·63	·35	2·75	·73	·07	1·20
20–50	4·44	3·11	3·84	1·31	5·51	5·43	·81	5·62	1·05	—	1·12
50–100	6·94	9·02	6·57	·42	5·19	8·04	2·60	6·13	1·82	·65	2·97
100–150	8·66	14·32	8·58	1·90	11·73	10·79	3·65	9·11	3·96	1·41	4·18
150–300	11·52	33·28	24·14	3·22	22·00	30·95	9·17	12·03	4·42	2·00	7·32
Over 300	19·07	31·79	38·52	13·42	31·34	60·35	19·42	19·64	3·70	3·88	11·20

MISCELLANEOUS EXPENSES—*continued.*

Size group (acres)	Sprays and dips	Hire of steam tackle		Telephone and stationery	Tractor hire	Vet. and medicine	Sundries	Gross expenditure	Deduct for capital costs	Net expenditure	
		Threshing	Cultivations								
1–5	·03	—	—	·22	—	·09	—	16·09	3·47	12·62	
5–20	—	1·23	—	·63	2·71	·70	—	36·69	9·57	27·12	
20–50	—	2·76	—	·88	1·20	2·15	—	56·68	2·45	54·23	
50–100	·18	10·29	·86	1·85	·42	2·45	—	96·19	10·43	85·76	
100–150	·08	13·07	5·13	4·64	1·08	5·12	·68	146·06	11·92	134·14	
150–300	·46	20·25	8·47	7·00	1·56	6·94	2·19	273·96	34·80	239·16	
Over 300	1·48	34·22	24·29	13·78	1·52	10·10	7·63	432·47	15·93	416·54	

WEIGHTS FOR HERTFORDSHIRE PRICE AND COST INDEX

THE price and cost indices published in the annual statistics issued by the Ministry of Agriculture cover the most important agricultural commodities and requirements and refer to conditions throughout the country as a whole. In arriving at a composite index number for all commodities "weights" are introduced in the official figures to represent the relative importance of each commodity, but obviously a composite index weighted for the country as a whole cannot be taken as a fair representation of conditions in any particular locality. Crops, for example, are of much greater significance in the eastern counties than in any other district of the country, while dairy produce is of more importance in Hertfordshire than in Norfolk.

Weights for calculating a local price and cost index for Hertfordshire are given below. These have been computed by assuming that the percentage composition, established in the present investigation, of the gross income and gross charges during 1930 for each size group is representative. The various size group averages have then been weighted by the total number of holdings in each size group in the country making allowance for the fact, however, that a large proportion of the holdings under 20 acres are not agricultural undertakings in the commonly accepted meaning of the term (*vide* p. 9). Thus it has been assumed that two-thirds of the holdings under 5 acres, and one-eighth of the holdings between 5 and 20 acres are not genuine productive units. It should be noted that glass house produce, fruit, and market garden crops have not been included in this calculation, and that the weights apply therefore only to agricultural production in 1930.

Commodities.	Weights for:—	Requirements.	Weights for:—
Dairy Produce	28·9	Labour	32·0
Horned stock	15·7	Foodstuffs	20·7
Pigs	10·1	Rent	13·9
Eggs	8·8	Livestock	13·8
Sheep	6·8	Fertilisers	3·1
Poultry	2·9	Seeds	2·9
Wool	0·2	Implements and Machinery	2·5
Wheat	6·0	Miscellaneous	11·1
Hay	4·6		
Sugar beet	3·8	Total	100·0
Potatoes	3·6		
Barley	2·0		
Oats	1·0		
Other crops	2·6		
Miscellaneous	3·0		
Total	100·0		

EFFICIENCY CHART

(1) Gross farm output	(2) Output per £100 labour	(3) Capital Turn-over	(4) Livestock output per £100 foods	(5) Crop yield index	(6) Milk yield per cow
£	£	%	£	%	Galls.
8840	412	135	351	178	990
7560	398	130	339	172	960
6280	384	125	327	166	930
5640	370	120	315	160	900
5000	356	115	303	154	870
4360	342	110	291	148	840
3720	328	105	279	142	810
3080	314	100	267	136	780
2760	300	95	255	131	750
2440	286	90	243	124	720
2120	272	85	231	118	690
1800	258	80	219	112	660
1480	244	75	207	106	630
1320	230	70	195	100	600
1160	216	65	183	94	570
1000	202	60	171	88	540
840	188	55	159	82	510
680	174	50	147	76	480
520	160	45	135	70	450
440	146	40	123	64	420
360	132	35	111	58	390
280	118	30	98	52	360
200	104	25	86	46	330

NOTES ON HOW TO USE EFFICIENCY CHART

The factors enumerated on this chart are those which are likely to exert most effect on the farm profit. The highest and lowest figure in each column represents the extremes within which the majority of Hertfordshire farms will be placed. The figures are lowest at the bottom of the chart and highest at the top.

Mark the point in each column which corresponds to the results you obtained on your farm last year. The lower down the scale you are in any particular column, the more likely will attention to that particular factor increase your profits during the coming years. A chain is as strong as its weakest link. Don't try to increase your efficiency in directions in which you are already reasonably efficient. Concentrate your attention on strengthening the weakest link in your organisation. The higher up the scale you are in any particular factor the less is the need for you to try to improve efficiency under that heading.

The six factors noted on the chart refer only to the very broadest considerations in management. Any suggestion of weakness in one of these factors should be followed up by a detailed investigation of the enterprise or enterprises concerned. For example, if the livestock output per £100 foods is low, every endeavour should be made to trace the cause of the trouble. It may be due to the production of the wrong type of livestock or livestock produce, to inefficient rationing, or to purely temporary circumstances such as an outbreak of disease. The important thing is, however, to diagnose the trouble and then try to correct it.

Of course you will need to refer to your accounts to find out exactly where your mark should be in the different columns. The explanations given in the following paragraphs will show you how to make the necessary calculations.

1. GROSS OUTPUT. There are a number of ways of measuring the size of a farm business, no one of which is in itself entirely satisfactory. But probably the best individual measure is the value of the gross output per annum. The gross farm output equals the total farm sales minus purchases of livestock, plus or minus any increase or decrease in the valuation of the farm live and dead stock, crops, etc., between the beginning and end of the year. Thus, if your total sales for the year were £1500, if your purchases of livestock cost £200, and if the valuation of your live and dead stock, crops, etc., was £3000 at the beginning of the year and £3100 at the end of the year, then the farm output for the year would be £1500−£200+£100=£1400. A large output helps to reduce fixed costs per unit of produce, while the larger the output the greater will be the total profit on a given margin per unit.

2. FARM OUTPUT PER £100 WORTH OF LABOUR. Compared with the cost of other farm requisites, labour is now the most expensive of the farmer's purchases. For this reason it is vital to achieve maximum efficiency in the organisation of the labour staff of the farm. The amount of wages paid to each man per week is of secondary importance; the value of the output obtained for every £100 worth of labour is of primary importance. In order to measure your efficiency under this heading calculate your total labour bill for the year by adding to the actual wage payments (including N.H. Insurance, perquisites, casuals, etc.) an allowance at current rates for the value of all unpaid family labour. Divide this total into the farm output figure already obtained, and multiply by 100.

3. CAPITAL TURNOVER represents the rate at which you turn over your capital. If you have £3000 capital in your farm, and your gross output for the year is £1500, then you have made a 50 per cent. turnover. To calculate turnover divide total output by value of total capital, and multiply the answer by 100. A quick rate of turnover is advantageous because it reduces capital costs and fixed current costs per unit of produce.

4. LIVESTOCK OUTPUT PER £100 FOODS. The most important item in livestock production is the cost of foods, which comprises about three-quarters of the total costs. The relationship between cost of foods and the livestock output is, therefore, likely to

provide the best index to the efficiency of management of your livestock. The livestock output is found by subtracting the value of all livestock purchases from the total value of all livestock and livestock product sales, and adding or subtracting the difference between the opening and closing valuations of the livestock. Thus, if the total livestock and livestock product sales amount to £900, the value of livestock purchases to £150, and the livestock valuation at the beginning of the year is £1100 and at the end of the year £1050, then the "output" would be £900−(£150+£50)=£700. An estimate must now be made of the value of the foods consumed. This can be done by adding to the cost of all purchased foodstuffs an estimate of the value of all home-grown foodstuffs (e.g. hay, roots, oats, pasture, etc.). An approximation of the value of home-grown foods consumed may be made by deducting from the opening Michaelmas valuation of crops, the receipts for sales of crops effected during the year, and adding the rental value of the pastures. From the total value of home and purchased foods thus determined, make a deduction, at the rate of £20 per horse per annum, for foods fed to working horses, and divide the remainder into the total value of the livestock output and multiply the answer by 100. In the above example, if the value of all the foods consumed amounted to £475, and three working horses are kept, the livestock efficiency factor would be—

$$\frac{700}{415} \times 100 = £169.$$

5. CROP YIELD INDEX. Write down one below the other the principal crops grown on your farm. Opposite each crop write the acreage and the total yield obtained. Then put the average yields per acre for your county. The following is an example:—

Crop.	Acreage grown.	Total yield obtained.	Av. yield per acre for county.	Acreage necessary to produce total crop obtained at av. county yields.
Wheat ..	40	900 cwt.	17½ cwt.	51
Barley ..	30	420 cwt.	15 cwt.	28
Oats, etc. ..	20	360 cwt.	15 cwt.	24
Totals ..	90			103

Divide, for each crop, the county average yield per acre into the total yield actually obtained, and the answer will show the number of acres which would have been required to grow the farm production if only average yields had been harvested. When you have done this for all your principal crops, add up the two columns of acreages. In the above example the total actual production from 90 acres was as large as the county average production from 103 acres. On the whole, then, the crop yields on this particular farm were above average. The amount by which they were above average can be expressed as a per cent. by dividing 90 into 103 and multiplying by 100, i.e.

$$\frac{103}{90} \times 100 = 114.$$

By this means you can express in one figure the yields of all your crops in relation to the county averages.

6. MILK YIELD PER COW. Divide the total quantity of milk produced during the year by the average number of cows kept.

BUDGETING

Pages 102 and 103 provide general headings for preparing a budget estimate. Space has been left for the working out of alternative methods of organisation, so that comparisons may be made and the plan which seems likely to be most profitable selected. The principles and objectives of budgeting are outlined on pages 87 and 88. The more or less fixed costs of the business can be estimated from past experience, while moveable costs will, of course, vary according to the working plan chosen for the coming year. Estimates of production should be based on the "average" yields achieved in past years, but both skill and luck will influence the accuracy of price forecasts. If capital costs (*e.g.* new machinery) are included in the expenditure side of the estimate, or if the realisation of capital (*e.g.* reduction in flocks or herds) has helped to swell the estimated receipts, it will be necessary to make due allowance for such valuation changes.

Budget

ESTIMATED EXPENDITURE FOR NEXT YEAR.

	Total per annum.	
	Plan 1.	Plan 2.
	£	£
1. RENT		
2. MANUAL LABOUR		
(a) REGULAR WORKERS.		
..... high pay workers @ ..... per wk.		
..... ordinary labourers @ ..... per wk.		
..... women & low pay workers @ ..... per wk.		
Family labour.		
Self ..... hours per day @		
Wife ..... hours per day @		
Others ..... hours per day @		
(b) CASUAL WORKERS.		
Root hoeing.		
Haymaking.		
Cereal harvest.		
Root harvest.		
Threshing.		
.....		
(c) PERQUISITES AND EXTRAS.		
Bonuses (Harvest and Stockmen).		
Overtime.		
Health and liability insurance.		
Board in farm house.		
.....		
3. LIVESTOCK PURCHASES		
(a) Cows, heifers and bulls.		
(b) Store or young cattle.		
(c) Pigs.		
(d) Sheep.		
(e) Horses.		
(f) Poultry.		
(g) Service fees.		
4. PURCHASED SEEDS		
(a) Grass seeds.		
(b) Wheat.		
(c) Barley.		
(d)		
5. IMPLEMENTS AND MACHINERY		
(a) New implements, machinery, and appliances.		
(b) Repairs to implements, machinery, and appliances.		
(c) Small tools, dairy utensils, plough shares, etc.		
(d) Hire of steam tackle and other machinery.		
(e)		
6. MISCELLANEOUS EXPENSES		
(a) Petrol, paraffin and oil.		
(b) Coal.		
(c) Motor and van insurance, tyres and repairs.		
(d) Horse shoeing.		
(e) Binder twine.		
(f) Carriage and sack hire.		
(g) Vet. and medicines.		
(h) Interest and bank charges.		
(i)		
7. PURCHASED FOODSTUFFS		
(a) Cakes.		
(b) Meals.		
(c) Grain.		
(d)		
8. PURCHASED FERTILISERS		
(a) Nitrogenous		
(b) Phosphatic.		
(c) Potassic.		
(d) Dung.		
TOTAL ESTIMATED EXPENDITURE	£	£

Estimate

ESTIMATED RECEIPTS FOR NEXT YEAR.

	Total per annum.	
	Plan 1.	Plan 2.
	£	£
1. LIVESTOCK SALES		
(*a*) DAIRY PRODUCE.		
Total estimated yield of milk (1).....galls. (2).....galls.	×	×
Sales :—		
..... gallons whole milk @		
..... gallons whole milk @		
..... pints cream @		
..... lb. butter @		
(*b*) HORNED STOCK.		
..... cows @		
..... calves @		
..... stores @		
..... fat cattle @		
.....		
(*c*) PIGS.		
..... fat pigs @		
..... stores @		
..... sows @		
(*d*) SHEEP.		
..... fat lambs @		
..... ewes @		
..... lb. wool @		
.....		
(*e*) POULTRY.		
..... score eggs @		
..... birds @		
..... chicks and hatchings.		
(*f*) HORSES.		
.....		
2. CROP SALES		
(*a*) ..... qrs. wheat @		
(*b*) ..... qrs. barley @		
(*c*) ..... qrs. oats @		
(*d*) ..... tons seeds hay @		
(*e*) ..... tons meadow hay @		
(*f*) ..... tons potatoes @		
(*g*) ..... tons straw @		
(*h*)		
(*i*)		
(*j*)		
3. MISCELLANEOUS RECEIPTS		
(*a*) Labour and machines hired out		
(*b*) Grazing and foldings let out.		
(*c*) Shooting rents.		
(*d*) Dung.		
(*e*)		
(*f*)		
TOTAL ESTIMATED RECEIPTS	£	£
Add estimated increase in valuation.		
Subtract estimated decrease in valuation.		
NET ESTIMATED RECEIPTS	£	£

VALUATIONS.	At beginning of year.	At end of year.	
		Plan 1.	Plan 2.
	£	£	£
Livestock			
Crops and tenant right			
Implements and machinery			
Total Valuation	£	£	£

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