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Farm business analysis

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Farmers' Report No. 119

Economic Aspects of Yorkshire Farming

A Résumé of 117 Leeds University Farmers' Reports

University of Leeds
Economics Section
Department of Agriculture

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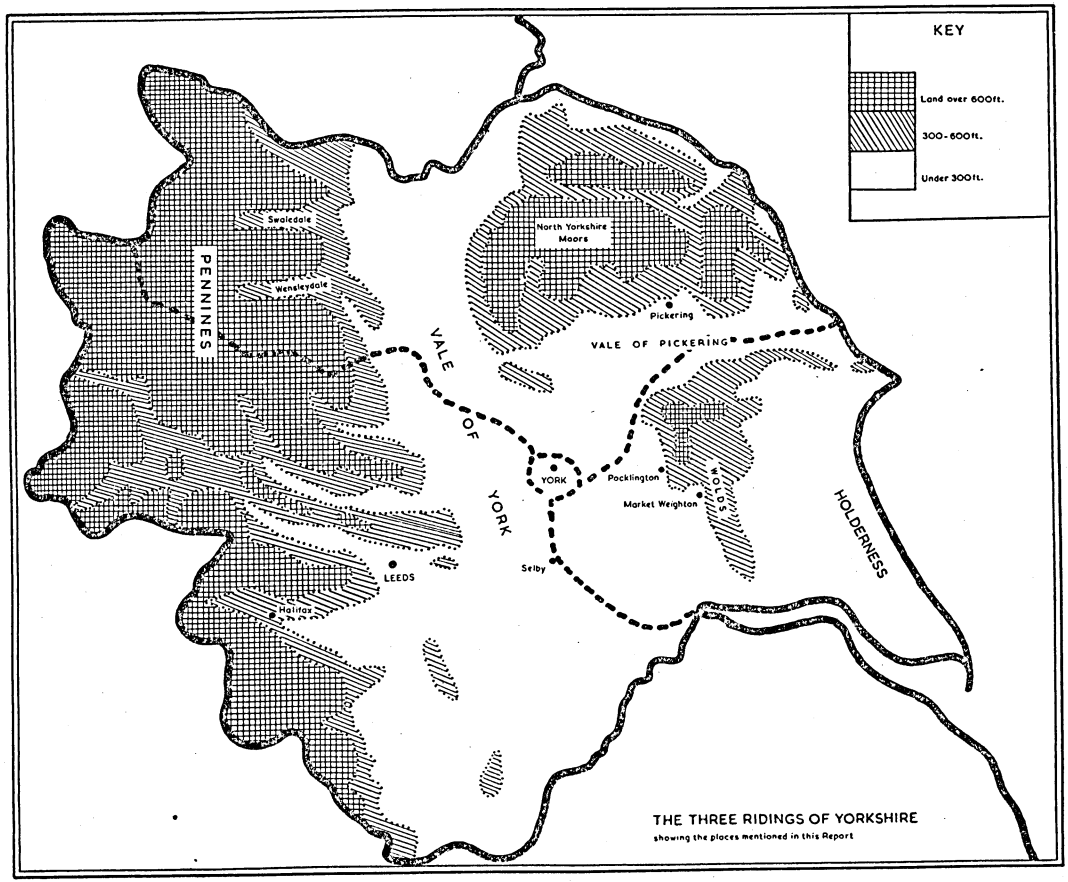
Five Shillings

Economic Aspects of Yorkshire Farming

A Résumé of 117 Leeds University Farmers' Reports



THE THREE RIDINGS OF YORKSHIRE

showing the places mentioned in this Report

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The opportunity is taken here to make a general acknowledgment to those who gave their time and energies in helping the writer.

M. C. Mathieson.

PREFACE

During the last eighteen years a succession of reports has been issued by the Economics Section of the Department of Agriculture at Leeds University. They form a series of " Farmers' Reports " and already number one hundred and seventeen. All of them deal with some branch of the agriculture of Yorkshire and most are based on information obtained in the first place from farmers themselves. Some are independent investigations and deal with such matters as the costs of combine harvesters and pick-up balers, or the size of estates in Yorkshire. Most of them, however, are written up from the information collected in the first place to provide information on a national basis on the economic position of agriculture.

One important part of this work is the investigation known as the Farm Management Survey, which is designed to enable a check to be made on the Government's " Departmental " calculation of the global agricultural income. Between 250 and 300 farm " primary returns " are sent from Yorkshire and this University also has the responsibility of using the data for advisory and research purposes. This responsibility has been discharged in Leeds by issuing a series of statements and reports each year to every farmer who co-operates with the University in this investigation. First he receives a statement of his profit or loss, with a note showing the reasons, if more than one years' accounts are available, why he has done better (or worse) than last year. This statement is followed later in the year by tables which compare the results of the individual with the average of a group of farms following a system similar to his own, and showing him also how the returns of his own type of farming group compare this year with a year ago. Finally, when all the grouping has been completed, a report is issued which compares with each other the results of the ten or a dozen groups into which the accounts usually fall.

Another aspect of the work " required " by the Ministry of Agriculture is the costing of selected farm enterprises. The Ministry's custom has been to invite each University centre to cost, at any one time, three or four enterprises for a year or two, then changing these for others which generally had been costed hitherto in some other part of the country. In this way, information on the costs of production of all the main farm enterprises has been collected from all those parts of the country where their production is important. At the same time as this was done the Universities have been able to study each enterprise in its economic environment. As well as supplying official needs, the material has been used for local purposes by writing short reports for circulation amongst farmers

giving the costs and general economic information of each enterprise studied. The best known of the enterprise cost studies is the investigation into the economics of milk production. From 1934 to 1952 each provincial centre obtained costs on milk production from some 50 to 70 herds, and no less than 52 of the reports in this series relate to this investigation. Although the full costing of milk production is in abeyance just now, it will be resumed during 1955.

The purpose of the present publication is to give a resumé of the material which has appeared from Leeds as Farmers' Reports in the hope that it will make a useful reference work for anyone who wishes to know what subjects have been studied over nearly two decades and what information about them is available. The task of preparing it has been done by Miss **M. C. Mathieson** and her prime object has been to abstract from the reports on each subject such information as will give in a nutshell the results of each investigation, while referring the reader to the fuller report or reports from which the abstract has been taken.

Sometimes, she has worked up material from the original reports which therefore appears here for the first time. The annual reports on the Economic Organisation of Yorkshire Farming Types have been particularly suitable for this treatment, and Miss Mathieson shows the changes that have developed in Yorkshire farming during the War and into the post-war period in all farming types for which data are available.

It is not always realised, however, what are the limitations to types of farming groups which are drawn up from accounts collected in this way. Is it possible to use them to say which of two systems is the more profitable ? If the profits per 100 acres on the Mixed Farms Without Milk are greater than on the Mixed Farms With Milk does this indicate that dairying is less profitable than other enterprises which are associated with mixed farming in Yorkshire ? The answer depends, of course, on how far the two groups are, each of them, representative of the types of farming after which they are named. It is obvious that the sample of farms does not cover more than a very small proportion of the total number of mixed farms with milk in Yorkshire. This in itself would not be of critical importance if it were possible to select the farms on a basis which would ensure that the sample was representative of the universe. In fact, no opportunities have occurred at present for classifying farms in order to find out what is the normal acreage, cropping rotation, herd size, and so on of the farms which answer to these group titles. And even if they had there is no guarantee that the occupiers of these representative farms rather than others could be persuaded to co-operate in the accounting scheme. It has, in fact, to be admitted that another sample of some 30-40 mixed farms with milk *might* show average results that were distinctly different from those shown on these pages. The weakness of this method of grouping, therefore, has two sources. In the first place, a mixed farm

with milk may be one of many variations of a general type—it may have a considerable proportion of its land under cash crops, or it may be practically self-supporting in its food requirements for a variety of livestock ; it may rear its own followers or the herd may be a flying one ; it may have a flock of sheep as a supplementary enterprise, or there may be no sheep at all on it ; other supplementary enterprises may be pigs or poultry, neither of which make any real direct demands on the farm acreage but may cause a useful addition to the farm output. Holdings varying considerably in size and system may, therefore, qualify for inclusion in the Mixed With Milk Group. The second source of weakness is the standard of management of the farms comprising each group. This will necessarily vary and there is no guarantee that the proportion of well managed to indifferently managed farms in any sample is the same as it would be if all the farms in the system were included ; to put it another way, another sample from the same system might have quite a different proportion of good to badly managed farms. If the proportion of well managed farms in the Mixed Without Milk Group was much higher in the sample than in the universe, while in the Mixed With Milk Group it was lower than in the universe the difference in the profits of the two groups might merely reflect the too high proportion of efficiently managed farms in one sample and the too low proportion in the other.

This danger can be guarded against to some extent by noting the average yields and other achievements of the groups before drawing conclusions from their results. The average output per cow, the yield per acre of wheat or of potatoes, may be significantly greater on one group than on the other. This difference, it is true, may be a feature of the system of farming ; the possibility that it is must not be dismissed. In practice it is much more likely to represent differences in managerial ability of the individual farmers who compose the groups. A knowledge of the capacity of the land and the stock upon it, such as is gained by anyone who makes a study of the farming of a region his profession will generally make it possible to assess the position.

In spite of what has already been said, the value of comparing the organisation of two systems of farming (or of the same system in two different districts) should not be minimised. Moreover the groups provide a very useful comparison of the profits from a system of farming in one year with those of the previous year. But the greatest value of the group averages is in the comparisons they make possible between the individual farm and the average. This is true whether the average refers to the complete output and expenses of a group, or whether it applies to one branch of a farm only (e.g. the cost of growing potatoes). But always it must be remembered that there is no especial virtue in being average and that it is the achievements of the farmers whose results are above average which are generally most worth following.

This leads to the criticism that is sometimes made that the average of all farms in a group should be replaced for comparative purposes by the average of the best (i.e. the top fifty per cent. or thirty-three per cent., or even twenty-five per cent.). There is considerable force in this argument, but usually the number of farms in a group is so small that one hesitates to draw conclusions from only a part of it. Until the size of the sample for each group can be considerably increased, the group average will generally give more valuable information for comparative purposes than any fraction of it, and with a full realisation of its limitations this has nevertheless been used as the basis for the reports which are surveyed in the following pages.

Few of the reports referred to in the following pages appear under the name of their writers and an explanation of the reasons for the anonymity which surrounds their authorship may seem to be due. Practically all these investigations depend on team work. One member of staff may collect the original information, two or three clerks may have a hand in tabulating it, often under supervision from another member, and the writing up may be the work of someone else. There are occasions when the direction of the study and its ultimate responsibility fall on the shoulders of yet another member. Under these circumstances it would be invidious to award the publicity which attaches to a report to one member only of a team where all have taken a considerable share. Nor must it be forgotten that none of these reports would see the light of day without the help of the farmers of Yorkshire on whose team spirit all these investigations depend so vitally. But although authorship as such is not acknowledged there is generally a note to say by whom the material has been collected in the first place, and by whom written up. In those reports where this is not specifically stated it can be assumed that the writing and views expressed are the responsibility of the undersigned.

W. HARWOOD LONG.

1. TYPES OF FARMING IN YORKSHIRE

Since the early 1920's a number of Yorkshire farmers have taken part in a farm accounting scheme organised by the University of Leeds. In recent years this scheme has been incorporated into the Farm Management Survey of England and Wales, which is designed ' to provide a body of physical and financial data for local and national policy and research purposes.' The Yorkshire material is published in a series of some 15 annual reports which cover the period 1934-1951.

The farm accounts collected are very similar in form to the type nowadays submitted for income tax purposes [1], in addition considerable physical information is included about the individual farms. The accounts are classified according to the type of farming followed.

The definition of type of farming used here is based on the pattern of the economic organisation of the farms rather than on their geographical location in types of farming areas. There is of course a relationship between the two. Farms with similar patterns of economic organisation tend to be situated in the same type of farming area, but a type of farming area may well contain a variety of types of farming in the sense used here.

The annual reports are very similar in form from year to year. They contain a series of tables with the minimum of text. Group averages for types of farming systems are given usually on a 100 acres basis, for cropping, stocking, gross output, expenses and profit. Gross output and expenses are broken down in some detail among their constituent items. Among other tables included are those giving details of crop yields, farm valuations and information about certain measures notably profit per £100 spent on labour and on total expenses.

A discussion on the uses and limitations of the material contained in the reports is given in the introduction to Report 113 and elsewhere. It should be only necessary to repeat that the group results should be interpreted as referring to a certain group of bona fide farmers following a common system rather than regarded as representative of a type of farming.

Despite their limitations the group results published in the reports, have proved of considerable value in farm management advisory work. Most of the main types of farming systems found in Yorkshire are covered and valuable information is given about

[1] The main differences are firstly that an allowance is made for unpaid family labour and secondly that no initial allowance for new machinery is made corresponding to that given by the Inland Revenue from 1945-1952.

the economic structure of the various types. Group results, also, have been used as standards or yardsticks in the diagnosis of farm management problems. Where, for example, an individual farm has a lower output than that shown by the group average, examination of the relevant material will often indicate possible sources of weakness in managerial policy. Crop yields may be low, the proportion of the farm acreage under crops yielding a high monetary output may be less than that of the group average. The use of such an approach in tackling farm management problems has been explained in much greater detail elsewhere, notably by A. G. Jeffrey.[1]

This section, however, is concerned with only one aspect of the reports, an account of the economic organisation of different types of farming over the period since 1938. The discussion throughout is based on group average figures. The changing composition of the sample is a point which should be mentioned. As would be expected during the period some farmers dropped out of the accountancy scheme and others came in, but a significant proportion of those who came in at the beginning stayed the full course.

Eleven groups are discussed in this section, a current description of the individual groups is given in every report. To give a short description of each group which would be relevant for every year under review is a difficult matter.[2] The few brief notes below on the groups are very generalised and are meant to serve only as an introduction. It is hoped that the more detailed discussion which follows will give a much fuller idea of the distinguishing features of the individual systems.

The first four groups are concerned with relatively large farms which have the main part of their acreage under arable cultivation.

These are:—

Cash Roots

The farms in this group are found fairly generally throughout the Vale of York, a district of light and medium soils. The farming system is based on cash roots—potatoes, sugar beet and sometimes carrots. These crops are the main source of farm income although they occupy a smaller part of the farm acreage than do corn crops. The main function of livestock is to maintain soil fertility.

Heavy Land Arable—Non-Intensive Livestock

These farms are mainly found in Holderness, a district where the soils are relatively heavy. Corn, especially wheat, is the main source of farm income.

(1) A. G. JEFFREY. The use of Farm Accounts in Farm Management. Journal of Proceedings of the Agricultural Economics Society. Vol. VIII, No. 1, June 1948.

(2) See Footnote to Table B, page 28 in the appendix to this section, for details of the changes n the names of these groups.

Mixed Without Milk

These farms are in the Vale of York; the system of farming followed is halfway between one based on cash roots and one on corn. Livestock contribute a larger proportion of farm income than on the rest of these four groups. Cattle are the main source of livestock income.

Wold

These farms are mainly on the chalk Wolds. Corn especially barley is the main source of income. Sheep are important and many are still folded on roots.

The next four types of farming represent modifications of some of the groups described above. The main difference lies in farm sizes. The following groups consist of smaller farms.

Heavy Land Arable—Intensive Livestock

These farms are mainly in Holderness. While corn is an important source of income, the output from pigs and poultry is their mainstay.

Mixed With Milk

Before 1947/48 this group consisted almost entirely of Vale of York farms. From that year onwards, Wold and Holderness milk farms have also been included. As would be expected, dairying is the chief enterprise, but even so it only represents about one third of the total farm output. Crop sales are also important. Corn, and on the Vale of York farms cash roots, contribute a large share of the income of these farms.

Small Cash Roots—Milk

These are small Vale of York farms averaging about 50 acres in size. Potatoes and sugar beet occupy a fair proportion of the farm acreage and dairy cows are the main class of stock kept.

Small Cash Roots—Non-Milk

These farms are very similar to those in the other Small Cash Roots Group, except, of course, that they have no dairy herd.

The remaining three groups are concerned with the farming of the West of the County, with its emphasis on grass and stock as opposed to the predominantly arable farming of the East.

Intensive Milk

The farms are situated in the Pennine country of the Industrial West Riding. They are small in size and mainly under grass. The land is heavily stocked with dairy cows, and milk is by far the most important source of income.

Swaledale Milk

Most of the farms in this group are in Swaledale and its tributary, Arkengarthdale, but the farming here has much in common with that of the other Yorkshire dales. This is traditionally a sheep and cattle rearing district. Almost the entire farm areas are under grass, and rough grazings are important. The farms in this group are concerned with sheep and cattle rearing but they also go in for milk production.

Swaledale—Sheep

These farms are very similar to those in the other Swaledale group, except that they do not produce milk. Sheep are the main source of farm income, followed by cattle—mostly young dairy stock.

The first four groups to be discussed are **the Cash Roots, the Heavy Land Arable—Non-Intensive Livestock, the Mixed Without Milk and the Wold Group.**

TABLE I

AVERAGE FARM SIZE. FOUR ARABLE GROUPS, 1951-52

	Cash Roots	Heavy Land Arable Non-Intensive Livestock	Mixed Without Milk	Wold
Average size—acres	272	363	212	373

Table I gives average farm sizes in 1951-52. Between years there is relatively little change in the average sizes, while within a group the majority of farms are fairly close to the average in size. Heavy Land Arable and Wold farms tend to be larger than those of the other two groups, a point which is not altogether surprising in view of the more extensive nature of their farming systems.

All four groups are primarily concerned with arable farming. Even before the outbreak of the 1939-45 War, both the size of the arable acreage and the proportion of income from crop sales were high. Table II gives details of these for a representative pre-war, war and post-war year; the war year 1943-44 saw the peak percentages of gross output from direct crop sales.

TABLE II

FOUR ARABLE GROUPS. ARABLE ACREAGES AND THE PROPORTION OF FARM GROSS INCOME FROM CROP SALES

	Cash Roots		Heavy Land Arable Non-Intensive Livestock		Mixed Without Milk		Wold	
	% of Total		% of Total		% of Total		% of Total	
	Acreage arable	Gross output from crop sales	Acreage arable	Gross output from crop sales	Acreage arable	Gross output from crop sales	Acreage arable	Gross output from crop sales
1938-39	68	56	60	43	50	36	79	49
1943-44	82	82	76	72	70	69	85	79
1950-51	84	64	75	50	70	49	87	57

The national emphasis on arable cultivation during the war is reflected in the increases in arable acreages and in the proportion of gross output coming from crop sales. But with the greater emphasis on livestock production since the end of the war, the proportion of gross output from crop sales has fallen. The sizes of the arable acreages, however, have not noticeably changed.

The distinctive cropping and stocking patterns of each group are illustrated in Table III. Table A page 26 in the appendix to this section gives fuller details of cropping. Table III underlines the importance of the potato and sugar beet crops to the Cash Roots Group ; the intermediate character of the Mixed Without Milk Group is shown as is also the greater dependence of the two other groups on corn. The proportion of total farm acreage devoted to corn on Cash Roots farms is not far less than that on the other groups, but corn contributes a far smaller proportion of gross farm output. This is a reflection of the more intensive nature of Cash Root farming rather than of any differences in yield or in the proportions of home grown corn fed to livestock. Of the individual corn crops, barley is the most important on the Wolds, wheat on the Heavy Land Arable farms, while on the other two groups the emphasis is about equal on wheat and barley. Oats are grown mainly for feed in all four groups, while peas for threshing are important on Heavy Land Arable farms in Holderness.

Table A gives details of cropping. The contrast between the diversified Cash Roots system and the more simple pattern of Wold farming is shown. Over the whole period the arable acreage has expanded at the expense of the permanent grass. Of interest is the recent increase in the temporary grass acreages, a trend which is apparent in all four groups.

TABLE III
FOUR ARABLE GROUPS

(1) CROPPING

	Cash Roots		Heavy Land Arable Non-Intensive Livestock		Mixed without Milk		Wold	
	percentage of		percentage of		percentage of		percentage of	
	Total Farm Acreage	Gross Farm Output from	Total Farm Acreage	Gross Farm Output from	Total Farm Acreage	Gross Farm Output from	Total Farm Acreage	Gross Farm Output from
Corn:								
1938-39 ..	31	16	38	38	31	23	45	45
1943-44 ..	43	29	50	63	47	46	50	71
1950-51 ..	38	17	50	41	37	23	48	48
Potatoes:								
1938-39 ..	11	21	(a)	(a)	3	7	(a)	(a)
1943-44 ..	13	32	2	5	4	13	(a)	(a)
1950-51 ..	12	26	(a)	(a)	6	17	2	6
Sugar Beet:								
1938-39 ..	5	8	(a)	(a)	(a)	(a)	(a)	(a)
1943-44 ..	7	11	(a)	(a)	1	3	(a)	(a)
1950-51 ..	8	13	(a)	(a)	3	4	(a)	(a)

(2) STOCKING

	Cash Roots		Heavy Land Arable Non-Intensive Livestock		Mixed without Milk		Wold	
	No.'s per 100 Acres	Percentage of Gross Farm Output from	No.'s per 100 Acres	Percentage of Gross Farm Output from	No.'s per 100 Acres	Percentage of Gross Farm Output from	No.'s per 100 Acres	Percentage of Gross Farm Output from
Pigs: (b)								
1938-39 ..	32	17	16	14	28	12	14	18
1943-44 ..	9	4	9	6	4	2	3	2
1950-51 ..	17	12	10	15	13	14	5	6
Cattle (c) ..								
1938-39 ..	15	11	15	15	21	24	11	12
1942-43 (d) ..	17	9	13	10	18	12	10	7
1950-51 ..	21	14	18	17	27	22	13	12
Sheep:								
1938-39 ..	24	4	37	10	47	12	110	18
1943-44 ..	19	3	34	9	26	7	27	8
1950-51 ..	30	5	31	10	26	6	60	16

NOTES: (a) Negligible.
(b) Numbers per 100 acres do not include unweaned pigs.
(c) Numbers per 100 acres do not include dairy cows. Output does not include dairy products.
(d) Year 1943-44 figures not available.

TABLE IV

THE BREAKDOWN OF EXPENSES. FOUR ARABLE GROUPS

Percentages

	Total	Labour	Foods	Rent	Manures	Sundry Expenses	Actual Expenditure per 100 acres £s
Cash Roots							
1938-39	100	32	29	11	8	20	1,071
1943-44	100	43	5	8	12	32	1,705
1950-51	100	37	16	5	11	31	3,268
Heavy Land Non-Intensive Livestock Arable							
1938-39	100	31	31	14	3	21	675
1943-44	100	42	4	10	7	37	942
1950-51	100	37	12	8	7	36	1,438
Mixed Without Milk							
1938-39	100	30	30	15	7	18	750
1943-44	100	40	4	10	10	36	1,121
1950-51	100	35	16	6	10	33	2,133
Wold							
1938-39	100	35	26	14	5	20	584
1943-44	100	40	5	9	9	37	836
1950-51	100	38	9	7	8	38	1,518

Before the war the main livestock enterprises were associated with pigs, cattle and sheep. Shortage of concentrates and the strict rationing of home grown corn necessitated a drastic reduction in pig numbers during the war. Since the end of the war pig keeping has been revived to a marked extent on the farms of all these groups except the Wolds.

The numbers of cattle and sheep did not suffer such a drastic reduction, except on the Wolds, where the introduction of the Tank Training Scheme in the latter years of the war resulted in a great fall in sheep numbers. It will be seen from Table III that both cattle and sheep numbers have increased since the end of the war, the revival of cattle being the most marked. It is encouraging that the post-war increase in stock numbers has not been associated with a return to the pre-war grassland acreages, since this suggests an increase in the productivity of grassland. There is little change in the acreage of feeding roots between the two periods, while the high percentage of total farm expenditure contributed by purchases of feed pre-war has not been re-attained.

Details of the breakdown of gross expenses are given in Table IV. Again a similar broad trend can be discerned in all four groups. The declining importance of rent is apparent. The variation in the relative importance of purchased feeds illustrates the changes which have taken place in the livestock enterprises. Another feature is the modest increase in the proportion of total expenditure devoted to purchases of fertilisers.

Comparing the breakdown of expenses in 1943-44 with that of 1950-51 it will be seen that there is little difference in the proportion of total costs covered by the sundry expenses item. Further analysis of this item shows that the proportion of the total which can be attributed to mechanisation—i.e., repairs, depreciation, and fuel and power—was very much the same in 1950-51 as it was in 1943-44 ranging from 65 per cent. to 75 per cent. according to group. This point is of some interest in view of the mechanisation of the farms concerned which had been steadily taking place between the two dates.(1)

Details of gross output, expenses and profits are given in Table B, page 28 in the appendix to this section. It will be noticed how erratic the course of profit is. The level of profits in 1938-39—a good year by pre-war standards—appears to be very low. From 1941-42 to 1943-44 profits stood at a high total level; costs had not risen at so fast a rate as produce prices. The poor harvest of 1944-45 coincided with a large rise in costs, profits received a set back and the profit levels of the early 1940's were not reached until the end of the decade—a point of some significance in view of the steady fall in the purchasing power of money throughout this period.

In each of the twelve years covered, Cash Root farms have per acre the highest level of gross output, expenses and profits. The order of the other groups shows some variation from year to year, but over the whole period the Mixed Without Milk Group comes second as regards the level of output, expenses and profits, the Heavy Land Arable Group third and the Wold last. In other words each group comes in the same order as regards the intensity of production, the input of resources and the level of profits.

Comparisons of output, expenses and profits have been made so far on an acreage basis. Other bases of comparisons are used in the reports; two of the most important are profit per £100 total expenses and profit per £100 spent on labour.

Table C, page 30 gives profit figures on a 100 acres, £100 labour and £100 expenses bases. Table V below is designed to summarise some points of the larger Table C. The shorter table compares the average returns of three groups in terms of the fourth—the Cash Roots Group.

(1) See Section on Farm Machinery and Farming System. Pages 102-104.

TABLE V

FOUR ARABLE GROUPS. INDICES OF PROFIT PER 100 ACRES, PER £100 SPENT ON EXPENSES AND PER £100 SPENT ON LABOUR

Indices based on 12-year average

	Cash Roots	Heavy Land Arable Non-Intensive Livestock	Mixed Without Milk	Wold
Profit per 100 acres.. ..	100	54	71	53
Profit per £100 expenses ..	100	104	106	103
Profit per £100 labour ..	100	107	111	109

The Cash Roots farms average the highest rate of profit per 100 acres, the Mixed Without Milk farms the highest rate of profit per £100 expenses and per £100 labour. But profit per £100 expenditure and per £100 labour did not vary so much from system to system as did profit per 100 acres. The great gain in profits per acre secured by following a Cash Roots system only involved a slight disadvantage as regards profits per £100 total expenses and per £100 labour.

The more extensive systems—the Heavy Land and Wold types—might be expected to have a higher level of profit per £100 labour but their profit figures are exceeded by those of the more intensive Mixed Without Milk Group which had the added advantage of a higher rate of profit per acre.

The two systems to be described next—**Mixed Milk and Heavy Land Arable—Intensive Livestock Groups**—represent modifications of two predominantly arable systems—Mixed Without Milk and Heavy Land Arable—Non-Intensive Livestock. The modifications lie in stocking practices and in farm size rather than in cropping.

TABLE VI

AVERAGE SIZE OF FARM. FOUR FARM GROUPS.(1) 1951-52

	Heavy Land Arable Non Intensive Livestock	Heavy Land Arable Intensive Livestock	Mixed Without Milk	Mixed Milk
Average Size—acres	363	240	212	158

(1) The average size of the Heavy Land Arable—Intensive Livestock farms is high in 1951-52 in comparison with 1950-51 and 1949-50 when the average size was 188 acres and 195 acres respectively.

The farms concerned are smaller and are engaged in more intensive forms of livestock production—in one system milk, in the other pigs and poultry.

The Heavy Land Arable—Intensive Livestock Group, like the other Heavy Land Group consists almost entirely of Holderness farms. The comparison of the two is rather limited by the fact that prior to 1949-50 no results are available for the intensive livestock farms.

Details of cropping are given in Table A. The importance of corn in the cropping of both Heavy Land systems is shown. The intensive livestock farms have the more complex cropping rotation; a modest acreage of cash roots mostly potatoes is grown, and they avoid the fallow break of the other system. The intensive livestock farms had better crop yields and also a slight advantage as regards gross crop output per 100 acres due mainly to higher corn and potato outputs. This higher corn output is rather surprising in view of the greater retention of home grown corn for feed on these farms, but presumably their greater corn acreages per 100 acres and their higher yields provide enough for both feed and for a high level of off-farm sales.

The livestock farms, of course, were far more heavily stocked than those of the other group. Pig and poultry numbers per 100 acres were high and the density of stocking with cattle and sheep was not noticeably less than on the other farms. In fact the livestock farms had a slightly higher cattle output, but pigs and poultry were the main contributors to the high stock output of these farms, which was nearly three times as great per 100 acres as that of the other group.

With the greater intensity of production on the livestock farms it is not surprising that their gross output and profit per acre are considerably higher than those of the other group.

In the two systems the breakdown of gross expenses was fairly similar; purchased feed bills however, comprised a higher proportion of total expenses on the livestock farms. The actual rate of total expenditure per acre was considerably higher on the latter farms, proportionally it was higher than the extra output obtained, consequently while the livestock farms had an advantage as regards profit per acre, they were at a disadvantage as regards profit per per £100 total expenses. Profit per £100 labour was also lower on these farms.

With the two Heavy Land Groups the expected tendency occurs; the smaller farms intensify their farming and secure the greater profit per acre. But an 11-year comparison of the results of the Mixed Without and Mixed With Milk Groups shows the converse. The smaller farms have the lower level of profit per acre.

TABLE VII

HEAVY LAND ARABLE FARMS. INTENSIVE AND NON-INTENSIVE LIVESTOCK. INDICES OF PROFIT PER 100 ACRES, PER £100 SPENT ON EXPENSES AND PER £100 SPENT ON LABOUR

Indices based on 3-year average

	Heavy Land Arable	
	Non-Intensive Livestock	Intensive Livestock
Profit per 100 acres	100	140
Profit per £100 expenses ..	100	71
Profit per £100 labour ..	100	88

From Table B of the appendix it can be seen that the milk farms had a slight advantage as regards gross output per acre but a relatively greater disadvantage in the matter of expenses, consequently they made a lower profit per acre as well as a lower profit per £100 spent on total expenses. Their profit per £100 labour was also lower than that of the non-milk farms.

TABLE VIII

MIXED WITH AND WITHOUT MILK FARMS. INDICES OF PROFIT PER 100 ACRES, PER £100 SPENT ON EXPENSES AND PER £100 SPENT ON LABOUR

Indices based on 11-year average

	Mixed without Milk	Mixed Milk
Profit per 100 acres	100	89
Profit per £100 expenses ..	100	80
Profit per £100 labour ..	100	80

Table A shows the cropping patterns of the two groups. The proportion of land devoted to grass and feeding roots is very similar. Since the end of the war, the milk farms have maintained a high corn acreage and have shown a decrease in their cash roots acreages, while the other group shows the opposite trend. This divergence is probably due to the fact that before 1947-48 both groups consisted mainly of Vale of York farms, whereas in 1947-48 the milk group was widened to include farms on the Wolds and in Holderness. Such a change would be expected to lead to an increasing emphasis on corn and a diminishing one on cash roots.

In every year studied the farms without milk had a higher gross crop output per 100 acres due mainly in the earlier years to a higher level of corn sales and in the later years to greater sales of potatoes and sugar beet.

The milk farms have the advantage in gross livestock production per acre, but the level of output is not particularly high; compared with that of the Heavy Land Arable—Intensive Livestock Group, it is relatively low. The farms without milk have more of each class of stock per 100 acres with the exception of course of dairy cows. The milk farms have approximately 1 cow to every 10 acres of crops and grass, not heavy stocking as judged by some standards, but milk is only one of several enterprises.

Despite the less intensive cropping system and the relatively extensive form of milk production, expenses per acre were higher on the milk than on the farms without milk. The actual breakdown of total expenses was very similar, so in practice the milk farms were spending per acre a slightly larger amount on each item of expenditure.

Small farms averaging approximately 50 acres in size comprise the next two groups to be discussed. The names of the groups, **the Small Cash Roots—Milk and Small Cash Roots—Non-Milk,** give an indication of the type of farming concerned. Both systems have a strong arable basis with a fair proportion of the farm acreage under cash root crops. The difference between the two types lies of course in livestock production, one group has a dairying side, the other has not.

Details of the cropping of these farms are given in Table A; if the figures are compared with those of the Cash Roots Group it will be seen that the proportion of land devoted to cash root crops is very similar in all three systems. A striking feature is the far lower proportion of temporary grass on the smaller farms. All three groups have approximately the same acreage of grassland per 100 acres, but while the Cash Roots farms tend to go in for recuperative leys, the smaller farms keep a larger proportion of their grass as permanent pasture.

Gross crop output per acre is higher on the Cash Roots farms. The main reason for this seems to lie in the lower crop yields of the smaller farms, especially as regards potatoes, a crop which plays an important part in the economy of all three systems.(1) In connection with lower yields, it is interesting to note that besides the

(1) Potato and sugar beet yields per acre on a five year average were :—

Potatoes—Cash Roots 8¼ tons. Small Cash Roots—Milk, 7 tons. Small Cash Roots—Non-Milk, 6¾ tons.

Sugar Beet—Cash Roots 11 tons. Small Cash Roots—Milk, and Small Cash Roots —Non Milk, 10 tons.

For a discussion on the connection between yields and profits from these crops, the reader is referred to the Potato and Sugar Beet Sections and especially to Tables XLVII, and LI.

greater attention given to recuperative leys, the larger farms spend more per acre on fertilisers. Another factor which contributes to the higher gross crop output figure of the Cash Roots Group is the greater importance of other sale crops, notably carrots and green peas, on these farms.

The density of stocking on the Small Cash Roots—Non-Milk Group is not high. Cattle are the most important class of stock kept, followed by poultry. Cattle numbers per 100 acres are slightly higher than those of the Cash Roots Group. Fewer sheep are kept on the smaller farms, but what perhaps is the most interesting feature is that the larger farms have considerably more pigs per 100 acres. Cash Roots farms have a higher gross stock output per 100 acres mainly due to the greater output from pigs and sheep.

On the Small Cash Roots—Milk farms the pattern of stocking is very different. Dairy cows are by far the most important class of stock kept, other classes of stock play only a minor part in the economy of these farms. Of the three groups the Milk Group has the highest gross stock output per 100 acres, but it is worth mentioning that the gross stock output per acre on these farms falls considerably short of that attained by the Heavy Land Arable—Intensive Livestock Group.

The Small Cash Root Milk farms had a considerably higher rate of expenditure per acre than the non-milk ones. Labour was the main item of expenses on both groups. On small farms family labour is usually of great importance and the practice adopted is to charge this type of labour at the prevailing wage rates. On the Small Cash Roots farms family labour accounted for approximately half the labour bill.

TABLE IX

CASH ROOTS, SMALL CASH ROOTS MILK AND NON-MILK FARMS. INDICES OF PROFIT PER 100 ACRES, PER £100 EXPENSES AND PER £100 LABOUR.

Indices based on 5-year average

	Cash Roots	Small Cash Roots Milk	Small Cash Roots Non-Milk
Profit per 100 acres ..	100	56	27
Profit per £100 expenses ..	100	53	27
Profit per £100 labour ..	100	52	25

Table IX gives a comparison between the three groups as regards profits per 100 acres, per £100 expenses and per £100 labour, the smaller farms and especially the non-milk farms compare very badly with the larger farms. Profit per acre on the Small Cash Roots—Non-Milk Group is only about a quarter of that of the Cash Root Group; a considerable disadvantage in view of the differences in farm sizes and the greater need of the small farmer to secure the higher rate of profit per acre. The evidence suggests that the management of the smaller farms lags behind that of the larger. Consequently some of the differences in the results obtained by these groups may be due rather to the relative efficiencies of the farmers concerned, than to differences in farming systems.

Most of the West Riding industrial conurbation is situated in Pennine country and here bordering the towns and factories are small dairy farms operating under unfavourable natural conditions. Soil is poor and smoke pollution a problem; slopes are steep and much of the land is at high altitudes. Of such farms is the **Intensive Milk Group** composed.(1)

Intensive Milk Group farms are small, the average size being about 40 acres. The greater part of the farm acreage is under permanent grass and the few arable crops grown are for feed.

The investigations show that the land was heavily stocked with dairy cattle, one beast to every $2\frac{1}{2}$ to 3 acres. Over 80 per cent. of farm output came from the sales of dairy produce. As regards farm expenses, feed bills were the most important item and these and labour costs amounted to approximately 75 per cent. of total farm expenditure. Most of the labour, however, was supplied by the occupier and his family and this has been charged for at the prevailing wage rates.

Compared with the results of the other groups over a ten-year period, the Intensive Milk Group had, per 100 acres, the highest gross output and highest level of farm expenses. The ratio of expenditure to output was very high, consequently the group had the lowest rate of profit per £100 expenses. (See Tables B and C.) Profit per £100 labour was also low. Profit per acre in 1942-43 compared favourably with other groups, but after that year there was a steady deterioration in the profit per acre and by 1951-52 Intensive Milk farms had the lowest rate of any group.

Throughout this period expenses on these farms increased at a faster rate than did output. In the earlier years the wartime rationing of concentrates led to a reduction in cow numbers and the evidence suggests that the milk yields of the remaining cows fell. The easing of the feed position in the late 1940's resulted in an increase in cow numbers and in gross output. But unfortunately for these farms the prices of purchased concentrates doubled between 1947-48 and 1951-52 while wage rates have gone up considerably.

(1) See also the next section "Farming in an Industrial Area."

It is this increase in the prices of their main factors of production which is probably the main cause of the further deterioration in the position of these farms since 1947-48, a period which has seen a more favourable trend in profits on the other groups (see Tables B and C).

Hill farming is the concern of the last two groups to be discussed —**The Swaledale Milk and the Swaledale Sheep Groups.** The majority of the farms included in these groups are in Swaledale but the farming in Swaledale has much in common with that of the other Yorkshire dales.

A Dales farm will probably be made up of three classes of land, enclosed fields in the valley bottom, enclosed grazings on the hill and finally a share of the common grazing on the open hill. Consequently it is almost impossible to compare farms on an acreage basis and instead the reports give the results in terms of £100 spent on rent. It is for this reason that the Swaledale figures are excluded from Tables A, B and C.

TABLE X

SWALEDALE MILK AND SWALEDALE SHEEP GROUPS

Profits, Gross Outputs and Expenses £s.

	Swaledale Milk					Swaledale Sheep				
	Per £100 Rent			Profit per £100 spent on		Per £100 Rent			Profit per £100 spent on	
	Gross Output	Expenses	Profit	Expenses	Labour	Gross Output	Expenses	Profit	Expenses	Labour
1942-43	725	618	107	17	41	887	667	220	33	76
1943-44	906	644	262	41	97	1,034	654	380	58	128
1944-45	912	649	263	41	86	1,016	679	337	50	103
1945-46	961	743	218	29	64	..	..	..	..	..
1946-47	890	854	36	4	9	876	1,074	–198	–18	–42
1947-48	1,143	1,052	91	9	18	1,148	1,093	55	5	11
1948-49	1,414	1,154	260	22	49	1,417	1,142	275	23	50
1949-50	1,492	1,344	148	11	28	1,490	1,258	232	18	43
1950-51	1,562	1,446	116	8	21	1,632	1,353	279	20	46
1951-52	1,661	1,461	200	14	38	1,653	1,469	184	13	31

Table X gives the results for the two Swaledale Groups. Sheep farms tend to have the advantage as regards profits per £100 rent, labour and expenses. These results, however, should be accepted with considerable caution since the sample of sheep farms is very small.

Compared with the milk farms, these sheep farms had a very similar level of gross output but a lower level of expenditure. The milk farms are operating under disadvantageous conditions compared with dairy farms in other parts of the county. Natural

conditions are unfavourable and Dales farmers are forced to rely to a great extent on purchased foods which have been both scarce and expensive. It is little wonder that the form of milk production carried on is extensive in nature.

The sheep farms were more heavily stocked ; besides the production of sheep and wool, the rearing of young dairy stock for sale was an important enterprise. Another rather speculative side line on these particular farms was the sale of homebred rams.

The sheep farms, however, are probably in the weaker position since Government subsidies for hill sheep and cattle formed a considerable proportion of their income. In 1950-51 the amounts received from subsidies and ram sales came to more than the total farm profit, so the basic forms of production, sheep, wool and dairy stock did not return their costs.

" Although the farming groups which appear in this study do not exhaust all the farming systems in Yorkshire, they do give a fairly complete cross section. It is not too much to claim, therefore, that a comparison of the results of the groups gives a useful indication of the differences that are met within most of the main systems of farming."(1) Group averages based on the results of bona fide farmers following a common system have therefore a certain value, despite the fact that such figures cannot be taken as the valid averages relating to different types of farming.

To conclude with a quotation from the most recent report, " Which group should be regarded as having obtained the more satisfactory results depends on the point of view. A farmer who had ample land but was limited in capital would need to attach importance to the margin he could earn on every £100 expenditure. But where it is difficult to add to the acreage of a farm because of shortage of land, as is common under conditions in this country, the best way of increasing one's farming income is to farm more and more intensively so long as every extra £100 spent gives more than £100 in return."(2)

(1) Report 66, page 24.

(2) Report 113, Pages 28 and 31.

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The Economic Organisation of Some Types of Farming in Yorkshire, 1947-48.

continued on page 32

TABLE A CROPPING PER 100 ACRES

	Cash Roots			Heavy Land Arable Non-Intensive Livestock			Mixed Without Milk			Wold		
	1938-39	1943-44	1950-51	1938-39	1943-44	1950-51	1938-39	1943-44	1950-51	1938-39	1943-44	1950-51
Wheat ..	16½	16¾	12½	22	26	20½	9¼	14¾	14½	16½	17	14
Barley ..	5½	11¼	10½	3	8	10	15½	17	9½	17	21¾	22½
Other Corn ..	9¼	14¾	14¾	12½	16¼	19¾	5¾	15	13¼	11	11¼	11½
Total Corn ..	31¼	42¾	37¾	37½	50¼	50¼	30½	46¾	37¼	44½	50	48
Potatoes ..	10½	13	12¼	—	1½	¼	2½	4¼	5¾	—	—	1¾
Sugar Beet ..	4¾	6½	7¾	½	½	—	¼	1¼	2½	½	¼	½
Carrots ..	1½	1¾	2½	—	—	—	—	—	—	—	—	—
Total Cash Roots	16¾	21¼	22½	½	2	¼	2¾	5½	8¼	½	¼	2¼
Feed Roots ..	4¾	4½	4	3¾	5¼	3¾	6¾	5½	4¾	14	6½	12¼
Other Crops ..	5	2	3	1¼	2	½	¼	1¼	2¼	2	7	2
Fallow	¾	—	½	6½	4¼	6	1½	¾	—	½	2¾	¾
Temporary Grass	9¾	11¼	15¾	10½	11¾	14	8	10¼	17¼	17½	18	21¾
Total Arable ..	68¼	81¾	83½	60	75½	74¾	49¾	70	69¾	79	84½	87
Permanent Grass	31¾	18¼	16½	40	24½	25¼	50¼	30	30¼	21	15½	13
Total Acreage ..	100	100	100	100	100	100	100	100	100	100	100	100

FARMING GROUPS

ACRES

Heavy Land Arable Intensive Livestock			Mixed With Milk			Small Cash Roots Non-Milk			Small Cash Roots Milk			Intensive Milk		
1938-39	1943-44	1950-51	1938-39	1943-44	1950-51	1938-39	1943-44	1950-51	1938-39	1943-44	1950-51	1938-39	1943-44	1950-51
—	—	22½	—	16¾	15½	—	—	11½	—	—	10	—	3¼	1¾
—	—	13½	—	7½	10	—	—	9¼	—	—	8¾	—	—	¼
—	—	23	—	16½	17¼	—	—	19	—	—	16¼	—	12¼	6¾
—	—	59	—	40¾	42¾	—	—	39¾	—	—	35	—	15½	8¾
—	—	3	—	5	3¼	—	—	11	—	—	9¾	—	2	¼
—	—	¾	—	1¼	½	—	—	9	—	—	7½	—	—	—
—	—	—	—	—	—	—	—	¼	—	—	1¼	—	—	—
—	—	3¾	—	6¼	3¾	—	—	20¼	—	—	18½	—	2	¼
—	—	3¼	—	4	4¾	—	—	6¼	—	—	8½	—	5¾	2¼
—	—	1¼	—	1¾	1¼	—	—	1¾	—	—	3	—	2¼	¾
—	—	—	—	1	1¼	—	—	—	—	—	¾	—	—	½
—	—	13¼	—	11¼	14¾	—	—	7½	—	—	8½	—	6	11¼
—	—	80½	—	65	68½	—	—	75½	—	—	74¼	—	31½	23¾
—	—	19½	—	35	31½	—	—	24½	—	—	25¾	—	68½	76¼
—	—	100	—	100	100	—	—	100	—	—	100	—	100	100

TABLE B GROSS OUTPUT, TOTAL EXPENSES AND PROFITS

	Cash Roots			Heavy Land Arable Non-Intensive Livestock			Mixed Without Milk			Wold		
	Output	Expenses	Profit	Output	Expenses	Profit	Output	Expenses	Profit	Output	Expenses	Profit
1938-39 ..	1,245	1,071	174	756	675	81	774	750	24	637	584	53
1941-42 ..	1,975	1,238	737	1,251	796	455	1,439	905	534	1,127	669	458
1942-43 ..	2,358	1,593	765	1,276	888	388	1,574	959	615	1,344	833	511
1943-44 ..	2,428	1,705	723	1,523	942	581	1,657	1,121	536	1,384	836	548
1944-45 ..	2,140	1,847	293	1,218	995	223	1,437	1,161	276	1,022	939	83
1945-46 ..	2,692	2,079	613	1,415	1,144	271	1,692	1,343	349	1,335	1,089	246
1946-47 ..	2,777	2,226	551	1,496	1,221	275	1,741	1,406	335	1,358	1,109	249
1947-48 ..	2,998	2,469	529	1,424	1,332	92	1,878	1,583	295	1,536	1,275	261
1948-49 ..	3,416	2,662	754	1,553	1,171	382	2,298	1,697	601	1,501	1,317	184
1949-50 ..	4,000	3,004	996	1,981	1,394	587	2,614	2,045	569	1,877	1,458	419
1950-51 ..	3,976	3,268	708	1,881	1,438	443	2,777	2,133	644	1,946	1,518	428
1951-52 ..	4,787	3,679	1,108	2,249	1,746	503	3,449	2,578	871	2,613	1,877	736

NOTES

1. Up to and including 1947-48 there are slight differences in the output and expenditure figures given here and those given in the reports. The profit figures are all identical. After 1947-48 a change was made in the procedure followed for charging the negative output of homegrown foods. In the Table above the figures for 1947-48 and earlier years have been adjusted in accordance with the new method.

2. Changes in the names of three groups have been made. The present Cash Roots Group started as the Arable Plain of York Group, in 1941-42 the name changed to Plain of York, in 1942-43 to Vale of York and finally in 1946-47 to Cash Roots. The Heavy Land

FARMING GROUPS

PER 100 ACRES £s.

Heavy Land Arable Intensive Livestock			Mixed With Milk			Small Cash Roots Non-Milk			Small Cash Roots Milk			Intensive Milk		
Output	Expenses	Profit	Output	Expenses	Profit	Output	Expenses	Profit	Output	Expenses	Profit	Output	Expenses	Profit
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	1,513	1,033	480	—	—	—	—	—	—	—	—	—
—	—	—	1,820	1,240	580	—	—	—	—	—	—	3,325	2,656	669
—	—	—	1,866	1,364	502	—	—	—	—	—	—	3,153	2,650	503
—	—	—	1,833	1,467	366	—	—	—	—	—	—	3,251	2,805	446
—	—	—	1,908	1,532	376	—	—	—	—	—	—	3,125	2,784	341
—	—	—	1,998	1,609	389	—	—	—	—	—	—	2,696	2,541	155
—	—	—	2,020	1,828	192	2,341	2,163	178	3,028	2,711	317	3,490	3,216	274
—	—	—	2,426	1,874	552	2,705	2,535	170	3,543	2,884	659	3,807	3,700	107
3,302	2,520	782	2,718	2,165	553	2,871	2,567	304	3,779	3,310	469	4,262	4,058	204
3,756	3,077	679	2,808	2,343	465	2,944	3,032	–88	3,715	3,395	320	5,254	4,982	272
4,275	3,580	695	3,001	2,461	540	3,844	3,298	546	4,583	4,035	548	5,869	5,709	160

Arable—Non-Intensive Livestock Group was known simply as the Heavy Land Arable Group until the introduction of the Heavy Land Arable—Intensive Llivestock Group in 1949-50. Prior to 1948-49 the Mixed Without Milk Group was termed the Light Land Mixed Group.

3. The Intensive Milk Group. Although the name of this Group has not changed the type of farming system covered by the name has. For this reason results earlier than 1942-43 are not included. In 1946-47 and 1949-50 the Group was split into two, wholesale and retail sellers. The figures given above refer only to wholesalers for the two years concerned.

TABLE C PROFITS PER 100 ACRES, PER £100 EXPENSES AND

	Cash Roots			Heavy Land Arable Non-Intensive Livestock			Mixed Without Milk			Wold		
	Per 100 acres	Per £100 Labour	Per £100 Expenses	Per 100 acres	Per £100 Labour	Per £100 Expenses	Per 100 acres	Per £100 Labour	Per £100 Expenses	Per 100 acres	Per £100 Labour	Per £100 Expenses
1938-39 ..	174	50	16	81	39	12	24	11	3	53	26	9
1941-42 ..	737	149	60	455	141	57	534	162	59	458	176	68
1942-43 ..	765	116	48	388	107	44	615	160	64	511	156	58
1943-44 ..	723	98	42	581	149	61	536	120	47	548	163	65
1944-45 ..	293	39	16	223	55	22	276	59	24	83	23	9
1945-46 ..	613	68	29	271	60	23	349	64	26	246	57	22
1946-47 ..	551	54	24	275	53	23	335	52	24	249	50	22
1947-48 ..	529	48	21	92	16	7	295	43	18	261	50	20
1948-49 ..	754	65	28	382	75	32	601	84	35	184	34	14
1949-50 ..	996	84	33	587	113	42	569	73	27	419	73	28
1950-51 ..	708	58	21	443	82	30	644	85	30	428	73	28
1951-52 ..	1,108	87	30	503	88	29	871	106	34	736	116	39

FARMING GROUPS

PER £100 LABOUR £s.

Heavy Land Arable Intensive Livestock			Mixed With Milk			Small Cash Roots Non-Milk			Small Cash Roots Milk			Intensive Milk		
Per 100 acres	Per £100 Labour	Per £100 Expenses	Per 100 acres	Per £100 Labour	Per £100 Expenses	Per 100 acres	Per £100 Labour	Per £100 Expenses	Per 100 acres	Per £100 Labour	Per £100 Expenses	Per 100 acres	Per £100 Labour	Per £100 Expenses
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	480	129	46	—	—	—	—	—	—	—	—	—
—	—	—	580	119	47	—	—	—	—	—	—	669	79	25
—	—	—	502	93	37	—	—	—	—	—	—	503	58	19
—	—	—	366	62	25	—	—	—	—	—	—	446	45	16
—	—	—	376	60	24	—	—	—	—	—	—	341	31	12
—	—	—	389	57	24	—	—	—	—	—	—	155	15	6
—	—	—	192	24	10	178	17	8	317	27	12	274	20	8
—	—	—	552	67	29	170	13	6	659	54	22	107	6	3
782	96	31	553	67	25	304	25	11	469	35	14	204	14	5
679	75	22	465	55	19	–88	–6	–2	320	24	9	272	18	5
695	78	19	540	66	22	546	38	17	548	38	13	160	10	3

Farmers' Report No. 90

Types of Farming in Yorkshire. A Study based on 172 Farm Accounts in 1948-49.

Farmers' Report No. 97

Types of Farming in Yorkshire. A Study based on 215 Farm Accounts in 1949-50.

Farmers' Report No. 108

Types of Farming in Yorkshire. A Study based on 202 Farm Accounts in 1950-51.

Farmers' Report No. 113

Types of Farming in Yorkshire. A Study based on 197 Farm Accounts in 1951-52.

2. FARMING IN AN INDUSTRIAL AREA

The small farms which are such a feature of the West Riding industrial area, represent a survival from the past. In the 17th and 18th Centuries the district was famous for a form of the old domestic system which combined the home manufacture of wool with small scale farming. The coming of the Industrial Revolution meant the transference of manufacture from the home to the factory. What effects such changes had on the economy of these farms are rather obscure but by the present century the district became noted for a distinct type of farming, in which the abundant supplies of cheap purchased concentrates were processed into the milk and eggs demanded by the local urban population.

The outbreak of the 1939-45 war led to a drastic curtailment of the supply of purchased concentrates thus giving rise to a situation which would greatly affect the farming of the area. It was in order to throw more light on the consequences of this situation that a survey was made of some farms in the Halifax district in 1944.

Most of the farmers of the Halifax area labour under the disadvantage of altitude. The district is very hilly and the level ground of the valley bottoms tends to be built up, leaving the valley sides and hill tops for agriculture. Of the 41 farms surveyed in 1944, 34 were sited over the 700 foot contour and 8 over the 1,000 foot contour.

Pre-war these 41 farms were almost entirely in grass and specialised in milk and egg production depending largely on purchased concentrates.

Broadly speaking the information gained by the survey falls under two headings, a general impression of the changes since the outbreak of war and a more detailed picture of the situation in 1944.

The shortage of concentrates forced farmers to reduce their stock numbers and to consider the possibilities of growing more feed at home. Grass was broken up and arable crops sown, notably oats, roots and kale. The results were rather unsatisfactory and many farmers became sceptical of the advantages to be gained from arable cultivation. A more successful attempt to ease the feed situation resulted from re-seeding operations carried out by the West Riding War Agricultural Committee. Where re-seeding had been done the carrying capacity of grassland was improved.

All these efforts, however, did not prevent a considerable fall in the stock numbers and consequently a reduction in the size of farm businesses. Generally speaking the poultry rather than the dairy enterprise was cut down.

TABLE XI

1944 SURVEY OF 41 FARMS IN THE HALIFAX DISTRICT

AVERAGE CROPPING OF 41 FARMS	acres
Oats	3
Swedes	1
Other Crops	2
Temporary Grass for hay	1
Temporary Grass for pasture	1
Total Arable	8
Permanent Grass for hay	8
Permanent Grass for pasture	11
Rough Grazing	3
Total	30

AVERAGE STOCKING OF 41 FARMS	Nos.
Cows	12·5
In-calf Heifers	0·5
Bulls	0·5
Store Cattle	1·0
Calves	1·0
Sheep	0·5
Pigs	1·0
Horses	1·0
Poultry	29·0

The conclusion reached by the surveyors was that farmers in the district were considerably worse off financially since the outbreak of the 1939-45 war.

Considerable detail about the actual conditions in 1944 on the farms surveyed is given in Report 51. Table XI gives information relating to cropping and stocking practices.

The average total stock valuation on these 41 farms amounted to £500 of which 75 per cent. represented the value of the dairy herd. From data relating to purchases and sales of stock it would seem " that almost 50 per cent. of the (dairy) herd is sold and replaced each year."(1) Since there was a considerable difference between incoming and outgoing values, herd depreciation must have been a large item in farm expenses. The main reason for the high rate of herd turnover seems to have been the farmers' inability to carry dry cows. Feed was short and also where only a few cows were kept it was essential that milk production should be kept up in order to maintain farm income. This was especially true on the smaller farms surveyed.

(1) Report 51, Page 6. The average price paid for incoming cows was £41. The average price received for outgoing dry cows £30 and for barren and other cull cows £17.

The main source of labour consisted of the farmer and his family. When a milk round was added to the farm business a hired man was generally employed. Horses were almost the sole source of motive power available—the upkeep of a horse must have placed some strain on the slender resources of feedingstuffs. Of farm implements, a cart and a grass reaper were found on nearly every farm, only half the farms ran to a plough, while only one farmer had a milking machine.

Reference

Farmers' Report No. 51

Farming in an Industrial Area.

3. MILK

Over half the reports are concerned with milk costs. A detailed milk costing scheme was in operation from 1934-52 and the usual practice was to publish the results three times a year in a winter, summer and annual report. The winter and summer reports are interim ones published for the benefit of the co-operating farmers; their figures cannot be used to assess the comparative costs of seasonal milk production. Another feature of the scheme was, prior to 1948, the complete concentration on the cost aspect ; no figures earlier than 1948 are available for profits.

The discussion here is confined to the annual reports dealing with the main group of farms costed—the " normal herds " group of the earlier reports. The term " normal herds " covered wholesale milk producers operating on a moderate scale in most districts of Yorkshire, in 1946 T.T. and attested herds were included in this group for the first time.

The first part of this section is devoted to a review of the annual costs of milk production of this group over a 17-year period. The second part contains a discussion on returns and profits based on the information given in the later reports.

In any discussion on costs it should of course be remembered that while low costs are in many cases a decisive factor governing the level of profitability, they are not the sole criterion of efficiency in milk production.

Milk costing started at Leeds in 1934 but the first complete October to September year covered is 1935-36. Table XII gives net costs per cow and per gallon for all the complete October—September years covered by the investigations.

Net costs are arrived at by subtracting credits for the value of calves born and for manurial residues, from the gross costs totals. Over the whole period covered net costs per cow and per gallon averaged 97 per cent. of the corresponding gross costs.

The level of net costs per cow depends, of course, on the annual cost of keeping a milk cow. Net costs per gallon are influenced by the level of this cost but also depend on the annual milk yield. It will be noted that in Table XII the two cost indices do not move together. During the war years cost per gallon rose at a faster rate than cost per cow; after the war the positions were reversed. Changes in annual milk yields are responsible for this. (See Table XIII.) During the war yields fell to 83 per cent. of the pre-war average. Since the war the trend is upwards but even in the latest year costed, yield only stands at 107 per cent. of the pre-war figure.

TABLE XII

NET COSTS PER COW AND PER GALLON

Actual Costs and Indices(1)

Year Oct.-Sept.	Per Cow		Per Gallon	
	Net Cost	Index	Net Cost pence	Index
	£ s. d.			
1935-36	28 18 0		10·2	
1936-37	28 5 0	100	10·2	100
1937-38	30 13 0		10·6	
1938-39	28 8 0		10·0	
1939-40	33 0 0	114	12·5	122
1940-41	39 2 0	135	15·7	153
1941-42	40 6 0	139	16·8	164
1942-43	42 8 0	146	18·0	176
1943-44	42 1 0	145	17·8	174
1944-45	44 4 0	152	17·8	174
1945-46	47 14 0	164	19·1	186
1946-47	52 9 0	181	20·3	198
1947-48	56 16 0	196	20·3	198
1948-49	57 8 0	198	19·5	190
1949-50	64 0 0	220	20·7	202
1950-51	70 8 0	242	22·7	221
1951-52	73 10 0	253	24·3	237

(1) From 1935-36 to 1945-46 (both years inclusive) the costs given above are those for "normal herds." After 1945-46 the figures are the averages for each annual investigation. For details of changes in methods of charging home grown foodstuffs, see footnote to Table XV.

TABLE XIII

ANNUAL MILK YIELD PER COW

Actual and Index

Year Oct.-Sept.	Yield Per Cow	
	Actual-gallons	Index
Average Prewar	682	100
1939-40	632	93
1940-41	599	88
1941-42	576	85
1942-43	564	83
1943-44	566	83
1944-45	594	87
1945-46	599	88
1946-47	621	91
1947-48	672	99
1948-49	706	104
1949-50	740	109
1950-51	741	109
1951-52	727	107

One reason for the relatively low level of milk yields is that the percentage of dry cows has risen since the pre-war period. The highest percentages are found in those years with the lowest milk yields. It is interesting to note that while the pre-war yield per cow has been passed, the percentage of dry cows remains higher than before the war.

The seasonality of milk production greatly influences the level of costs. It is a well known fact that it costs more to produce milk in winter than in summer. Consequently any switch from summer to winter production, other things being equal, can be expected to raise the annual costs. While comparatively speaking there has been little change in the seasonality of milk production in the Leeds sample, there has been a slight movement towards greater winter milk production since the war. Under pre-war conditions 46 per cent. of the annual production occurred in the winter months and 54 per cent. in the summer. The average for the three latest years is 50 per cent. in both seasons.

Another point with some bearing on costs is that before 1946-47 no T.T. or attested herds were included in the sample. Such herds may have higher costs. Earlier Leeds investigations show that their average costs per cow were 15 per cent. above those of the " normal group " The amalgamation of these two groups in 1946-47 probably resulted in a rise in the level of costs per cow by comparison with the old " normal group."

The next step is to consider the separate items that go to make up the costs of milk production. While the actual cost of each item differs according to whether a per cow or a per gallon basis is used, the percentage breakdown does not, and this is the conception which is primarily used here. Table XIV gives the average and the range of the percentage breakdown of costs for the 17 years concerned. Table XV contains full details of actual costs on a per cow basis.

TABLE XIV

COSTS PER COW AND PER GALLON OVER A 17 YEAR PERIOD

Average and Range of Percentage Breakdown of Costs.

Percentages

	Total	Feed	Labour	Herd Depreciation	All other Costs
Average ..	100	55	22	8	15
Range(1) ..	—	50–60	18–26	3–14	13–18

(1) Range of average costs of each investigation

Table XIV shows the great importance of feed costs, which, broadly speaking, account for just over half the total costs, labour is next in size accounting for just under one quarter. The residue, approximately one quarter of the total, covers all the other costs incurred in milk production.

Foodstuffs fed to cows fall into three broad classes, concentrates including proprietary cakes and meals and home grown corn, bulky foodstuffs such as hay and roots, and grass. While farms are generally self-sufficient as regards fodder and grass, a fair proportion of concentrates is usually purchased.

TABLE XV
GROSS COSTS PER COW

Year Oct.-Sept.	FEED COSTS										Labour Costs			Herd Depreciation			All Other Costs			Total Costs		
	Purchased Feed			Home(1) Grown Feed			Grazing			Total Feed												
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1935-36	10	1	0	4	5	0	2	4	0	16	10	0	7	1	0	3	1	0	4	6	0	30	18	0
1936-37	9	16	0	5	6	0	1	18	0	17	0	0	6	8	0	2	9	0	4	10	0	30	7	0
1937-38	10	18	0	6	10	0	1	18	0	19	6	0	6	7	0	2	14	0	4	14	0	33	1	0
1938-39	9	8	0	5	2	0	2	0	0	16	10	0	6	6	0	2	16	0	4	16	0	30	8	0
1939-40	9	9	0	9	1	0	2	1	0	20	11	0	6	14	0	3	4	0	4	18	0	35	7	0
1940-41	10	7	0	12	9	0	2	4	0	25	0	0	7	5	0	3	16	0	5	4	0	41	5	0
1941-42	7	6	0	13	0	0	2	4	0	22	10	0	8	6	0	5	17	0	5	16	0	42	9	0
1942-43	5	6	0	15	19	0	2	6	0	23	11	0	9	0	0	5	4	0	6	15	0	44	10	0
1943-44	5	15	0	14	15	0	2	3	0	22	13	0	9	5	0	5	16	0	6	17	0	44	11	0
1944-45	7	3	0	14	12	0	2	9	0	24	4	0	9	19	0	5	0	0	7	12	0	46	15	0
1945-46	7	15	0	17	0	0	2	16	0	27	11	0	10	10	0	4	11	0	7	18	0	50	10	0
1946-47	11	0	0	15	8	0	2	9	0	28	17	0	14	1	0	3	3	0	9	11	0	55	12	0
1947-48	12	0	0	14	18	0	3	2	0	30	0	0	15	16	0	3	14	0	10	8	0	59	18	0
1948-49	12	9	0	16	0	0	3	12	0	32	1	0	15	12	0	2	18	0	10	5	0	60	16	0
1949-50	21	9	0	14	3	0	4	1	0	39	13	0	15	5	0	2	4	0	10	8	0	67	10	0
1950-51	24	0	0	15	3	0	4	6	0	43	9	0	15	18	0	2	9	0	12	5	0	74	1	0
1951-52	22	2	0	18	14	0	5	18	0	46	14	0	16	0	0	2	18	0	12	0	0	77	12	0

(1) CHANGES IN METHODS OF CHARGING HOME GROWN FEED.

Up to October 1941 home grown feed was charged at market prices. From October 1941 to October 1946 home grown feed was charged at 'feeding values.' From October 1946 to September 1947 average production costs for the country as a whole were used. After October 1947 home grown feed was charged at the production costs on the farms concerned.

During the 17-year period many changes took place in feeding practices. Before the war the general tendency was to rely to a large extent on feeding purchased concentrates. Wartime exigencies necessitated a reduction in concentrate purchases and their partial substitution by home grown corn and by the increased use of bulky foods. The total amount of concentrates fed fell somewhat drastically as also did milk yields while the percentage of dry cows rose. Since the war there has been up to 1950-51 a gradual increase in the amount of concentrates fed, an increase due entirely to the

greater use of purchased concentrates. The quantities of home grown corn used remain at roughly their wartime levels. However, the attractions of purchased concentrates have been rather diminished by recent price changes—their cost has more than doubled since 1947-48, a distinction enjoyed by no other foodstuff used in milk production—and in 1951-52 purchases of concentrates fell.

Much of what has been said in the last paragraph is illustrated by Table XVI. The figures given here are four year averages of a pre-war, wartime and post-war period. They show the changing degree of reliance placed on purchased and home grown food. Physical information is also included which relates to the level of concentrates fed, milk yields and the percentages of dry cows.

TABLE XVI

A COMPARISON OF FEEDING PRACTICES AND MILK YIELDS(1)

(*a*) Purchased and Home Grown food. Average Percentage Composition, by Value, of Total Feed Costs

Representative Periods(2)	Total Feed Costs	Purchased Foods	Home Grown Foods other than Grazing	Grazing
Pre-war	100	58	31	11
Wartime ..	100	27	63	10
Post-war	100	49	40	11

(1) Owing to the changes in the methods used for charging home grown feedingstuffs, the percentages given in Table XVI are not strictly comparable for inter-period comparisons. They are, however, sufficiently comparable for the purposes they are used for in this account—i.e. the illustration of changes in feeding practices.

(*b*) Level of Concentrates fed, Milk Yield and Percentages of Dry Cows

Representatives Periods(2)	Milk Yield Per Cow gallons	Concentrates Fed per Cow cwts.	Concentrates Fed per Gallon lbs.	Percentage of Dry Cows
Pre-war	682	26·5	4·3	18
Wartime ..	575	15·5	3·0	23
Post-war	729	21·7	3·4	20

(2) Representative periods. Pre-war Average of 1935-36—1938-39 inclusive
Wartime Average of 1941-42—1944-45 inclusive
Post-war Average of 1948-49—1951-52 inclusive

One very encouraging feature is that milk yields were higher in the post-war than in the pre-war period despite a higher percentage of dry cows and a lower level of concentrate feeding. The fact that better results have coincided with the use of less concentrates is a promising augury for the future especially if concentrate prices continue at their present high level.

Since the war the feeding of silage has been an important development and its growing use has proved perhaps one of the most important factors in enabling farmers to obtain higher milk yields without greatly increasing the concentrate ration. In 1944-45 only 5 per cent. of the herds costed used silage; by 1951-52 46 per cent. did.

One interesting point emerging from Table XVI is that grazing costs have remained a fairly stable percentage of total feeding costs, both have increased throughout the period at a similar rate in actual cost. The increase in the actual cost of grazing is not caused by any rise in rents which have remained nearly stationary, but is due mainly to increased expenditure especially on fertilizers and reseeding. Such expenditure represents an investment which should lead to better and cheaper grass. Before the war, rent was the main component of grazing costs accounting for about two thirds of the total, but by 1951-52 rent comprised only one quarter of the cost.

Labour costs also show an encouraging trend through the 17-year period. Their actual increase has not been nearly so marked as the increase in wage rates. The period saw a marked reduction in the man hours required for milk production. Table XVII gives details of labour requirements. Comparing 1934-35 with 1951-52 man hours per cow have fallen by 33 per cent. and per gallon by 42 per cent.

TABLE XVII

MANUAL LABOUR REQUIREMENTS PER COW AND PER GALLON MAN HOURS

Year Oct.-Sept.	Annually per cow	Per 100 gallons milk produced
1934-35	197*	31
1946-47	168	27
1947-48	160	24
1948-49	146	21
1949-50	141	19
1950-51	143	19
1951-52	131	18

* Raised from 11 month year.

" Milk yields, the relative importance of summer and winter milk production, the size of herd, layout and equipment of buildings, and whether milking is done by hand or by machine are all factors which influence the cost of labour."(1)

(1) Farmers' Report 61, Page 11.

During the period yields have risen slightly and the percentage of milk produced in winter has slightly increased, two factors which would tend to increase labour requirements. While it is difficult to say whether the size range of the herds costed has changed much, the average size has not. Little is known about improvements in the layout of buildings. The change which has attracted most attention is the switch from hand to machine milking. Table XVIII shows this trend.

TABLE XVIII

PROPORTION OF HERDS, HAND AND MACHINE MILKED.

percentages

	Total	Hand Milked	Machine Milked
1934-35	100	74	26
1946-47	100	33	67
1951-52	100	14	86

Most of the herds costed are now machine milked; their labour requirements per cow and per gallon are lower than those for hand milked herds. In 1951-52 herds costed using milking machines, had an average labour requirement of 125 man hours a cow per year and 17½ man hours per 100 gallons. The corresponding figures for hand milked herds were 197 man hours per cow and 23 man hours per 100 gallons. There can be little doubt that the introduction of milking machines is the main factor responsible for the fall in labour requirements shown in Table XVII.

Compared with feed and labour costs, herd replacement costs are exceptional, having in a period of inflation hardly increased at all. Consequently they have become a steadily diminishing percentage of total costs. Their level is partly artificial in the sense that the method of calculation used has a great influence on the result. Throughout the whole period the basis of the calculation has been in essence the same. The practice adopted, broadly speaking, is to keep the value of cows which stay in the herd at a fairly constant figure and only take as replacement costs the differences in value between the cows brought in and those leaving the milking herd. The almost stationary level of replacement costs means that the actual difference in prices between incoming and outgoing cows has remained at the pre-war level. What has happened is that the price fetched by outgoing cows has risen at a greater rate than that paid for incoming cows.

Little information has been published concerning the rate of turnover of dairy cows. Report 46 indicates a high rate for 1942-43. " About one cow in four was a first calf heifer. Only one in every five had had more than four calves."[1] A survey of the evidence relating to the disposal of cows suggests that most were either sold as milkers to other dairy farmers or were sold fat. Disease accounted for some but the risk of a cow dying was not high.

The importance in herd turnover of the sale of healthy cows offers an explanation of the lack of increase in herd replacement costs. The majority of incoming cows are now home bred and enter the herd at their estimated market price. After a few lactations they will have probably appreciated in value and if sold in milk or fat may fetch a higher price than that commanded by an incoming heifer.

A special report issued in 1937 deals exclusively with the miscellaneous expenses of milk production.[2] These fall into two groups, arbitrary estimates and actual costs. The two most important miscellaneous cost items in 1937, share of general farm expenses and charges for dairy buildings, come under the heading of arbitrary estimates. Expenses falling under the other heading included general dairy expenses—costs of fuel, light, power, washing materials, etc.—bull upkeep, service fees, repairs, veterinary fees and medicines. Little detail about these expenses is given in any of the other reports. Their total cost, however, has increased in line with food and labour costs, a point of some interest in view of the growing use of milking machines, a practice that involves a considerable addition to the miscellaneous cost item.[3]

The period 1934 to 1952 is marked by an encouraging trend in the costs of milk production. At the end of the period yield per cow was up, while labour requirements fell as also did the rate of concentrates fed per gallon. An improvement was secured in herd replacement costs. In addition the increased quantity of milk produced per cow included a greater proportion of winter milk and was of better quality, since costs taken after 1946 were from T.T. and attested herds as well as from ordinary producers.

One of the main objects of a producer is to obtain satisfactory profits. With farming it is the profit on the farm as a whole which is the final test—a point to remember in considering the profitability of an enterprise such as milk production. It may well be that in order to increase total farm profit some of the profit on an individual enterprise has to be foregone. In most situations, however, the maximisation of farm profit and of that of an individual enterprise

(1) Farmers' Report No. 46, Page 9.

(2) Farmers' Report No. 13.

(3) In 1946-47 it was estimated that a milking machine cost £35 a year to run. This sum covered fuel, repairs and depreciation but not the cost of the labour required to operate the machine. In 1951-52 the annual cost had risen to £42 a machine and accounted for 15 per cent. of the total miscellaneous expenses of machine milked herds.

are not opposed to one another. " The profit on the dairy herd, therefore, needs to be considered in relation to alternative uses of resources on the individual farm. Where milk is an important sale product, however, and the profit on milk is below average, it is highly likely that the best use is not being made of the available resources."(1)

Figures for the returns and profits of milk production are available from 1947-48 and are set out in Table XIX on a per cow and per gallon basis. Total profit comprises profit per gallon multiplied by the number of gallons produced. With fixed prices for milk, profit per gallon mainly depends on costs. The amount of milk produced is determined by the yield per cow and the number of cows kept. Profit expressed on a per cow basis takes yield into account and is therefore a better measure of profitability than profit per gallon. On the other hand because more account is taken of yields, costs per gallon are a better measure of costs than those per cow.

TABLE XIX

MILK. PROFITS, NET COSTS AND RETURNS. AVERAGE, PER COW AND PER GALLON

Year Oct.-Sept.	Yield per cow gallons	PER COW			PER GALLON		
		Returns	Net Cost	Profit	Returns	Net Cost	Profit
		£ s. d.	£ s. d.	£ s. d.	pence	pence	pence
1947-48	672	86 1 0	56 16 0	29 5 0	30¾	20¼	10½
1948-49	706	92 7 0	57 8 0	34 19 0	31¼	19½	11¾
1949-50	740	102 12 0	64 0 0	38 12 0	33¼	20¾	12½
1950-51	741	106 19 0	70 8 0	36 11 0	34½	22¾	11¾
1951-52	727	109 18 0	73 10 0	36 8 0	36¼	24¼	12

The influence of milk yields and costs per gallon is clearly shown in Table XIX. Costs per gallon have not risen as steeply as costs per cow owing to increasing milk yields, which have also resulted in profit per cow increasing at a greater rate than profit per gallon. The maximum profit per cow was secured in 1949-50 when a high milk yield went with a high profit per gallon.

Little is known of the effects on costs and profits of very high yields; only a few herds with an average yield of over 1,000 gallons per cow have been costed. The evidence of the costed herds " gives a

(1) Farmers' Report 106, Page 11.

clear indication that at least up to a yield of 900 gallons per cow, it is the higher yields which pay best under normal conditions. Both profit per cow and profit per gallon show increases with each increase in yield . . . it appears that the better class of cow,capable of giving a good yield of milk, is much more profitable than the more general run of cows."(1)

TABLE XX

MILK. YIELDS AND PROFITS

Range of Annual Milk Yields per Cow—gallons	1950-51			1951-52		
	Average Yield	Profit per gallon	Profit per Cow	Average Yield	Profit per gallon	Profit per cow
	gallons	pence	£ s. d.	gallons	pence	£ s. d.
0–600	536	6¾	15 4 0	501	9½	20 18 0
600–700 ..	662	10	27 8 0	655	9¾	26 8 0
700–800 ..	765	11	35 0 0	760	11½	36 6 0
800–900 ..	838	14¾	51 6 0	857	14¾	52 12 0

The evidence of much of what is said in the previous paragraph, is contained in Table XX. Increased yields tend to go with increased profits per gallon and increased profits per cow. Since the price received per gallon of milk in any one year does not vary much, the variation of profit per gallon is due mainly to differences in costs. It would seem that on these farms which are representative of typical producers in most parts of the three Ridings, high yields and low unit cost work together not against one another.

Another measure of the profitability of the dairy enterprise is the profit earned per acre by the land devoted to milk production. This is calculated by dividing the total profit from the dairy herd by the acreage used for grazing and for the production of home grown foodstuffs for the dairy cows. Profit per acre enjoys two advantages over the other measures—profit per cow and per gallon. The management of the dairy herds is directly related to that of the land used for milk production, and a basis is afforded for comparisons with the estimated returns from possible alternative uses of the land There is, however, one disadvantage, the difficulties in calculating profit per acre are such that the figures " cannot be regarded as quite so accurate as those calculated per cow and per gallon."(2)

(1) Farmers' Report No. 106, Page 11.

(2) Farmers' Report No. 106, Page 17.

TABLE XXI

MILK. PROFIT PER COW AND PROFIT PER ACRE 1950-51

Profit per Acre	Acres per Cow (a)	AVERAGE PROFIT		AVERAGE YIELD	
		Per Cow	Per Acre	Per Cow	Per Acre
		£ s. d.	£ s. d.	gallons	
Up to £6 ..	3·5	4 12 0	1 6 0	586	166
£6-£14 ..	2·5	24 16 0	10 4 0	701	289
£14-£22 ..	2·2	38 14 0	17 12 0	728	333
Over £22 ..	1·9	50 4 0	26 17 0	806	428

1951-52

Profit per Acre	Acres Per Cow (a)	AVERAGE PROFIT		AVERAGE YIELD	
		Per Cow	Per Acre	Per Cow	Per Acre
		£ s. d.	£ s. d.	gallons	
Up to £6 ..	2·9	6 10 0	1 16 0	602	213
£6-£14	2·5	21 12 0	8 15 0	667	283
£14-£22 ..	2·3	40 16 0	18 0 0	722	324
Over £22 ..	2·1	56 15 0	27 16 0	871	421

(a) Home grown feed only.

Table XXI shows that a high rate of profit per acre went with a high rate of profit per cow, a high milk yield per cow and a low acreage requirement per cow. "It can be stated as a general conclusion that under present conditions the highest profits are found on the farms that are stocked intensively and obtain good crop yields, while low yields of milk and low yields of crops are characteristic of the less profitable herds."(1)

On some farms costed natural conditions are unfavourable and feeding resources limited. It is difficult to say whether under such circumstances high yields are obtainable at an economic cost. Recent reports contain a special study of some grassland farms which have the disadvantages of high altitude and poor facilities for the home production of feedingstuffs. The grazing season also is shorter on these farms, a factor adding to cost. Milk yields are lower than on the rest of the farms costed, and this coupled with a higher cost per gallon gives a lower rate of profit per cow.

(1) Farmers' Report No. 111, Pages 21-22.

Table XXII contains information relating to some grassland producers, these are mainly farmers in the Dales area. Compared with the average results given in the earlier tables, this group makes a poor showing. It is difficult to say whether or not these producers could improve their profits by getting higher yields. Little information is available on the effects of extra yield on costs under Dales conditions. But one point is stressed in the reports, silage feeding would seem to be good policy since it appears to have a beneficial effect on both yields and costs.

TABLE XXII

GRASSLAND DAIRY FARMS. COSTS, PROFITS AND YIELDS

Year	Net Cost per gallon	Profit per gallon	Yield per per cow	Profit per cow
	pence		gallons	£ s. d.
1949-50	22½	10½	694	30 3 0
1950-51	25¾	8¾	650	23 10 0
1951-52	26½	10	637	26 10 0

It must be remembered that these grassland producers are using land for milk production which has few alternative uses. The mixed farmer with a dairy enterprise has to consider the profit from cash cropping he foregoes from the land devoted to raising feed for his cows. It may well be that despite unfavourable costs the grassland farm's milk enterprise may be more economic from the standpoint of total farm profitability than a milk enterprise of an arable farm. The economics of any one enterprise can only be considered in relation to the economy of the farm as a whole.

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Farmers' Report No. 6
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Farmers' Report No. 8
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Winter Milk Production Costs in Yorkshire 1947-48.

Farmers' Report No. 81
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Farmers' Report No. 88
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Farmers' Report No. 92
Milk Production Costs in Yorkshire. Winter 1949-50.

Farmers' Report No. 98
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Farmers' Report No. 100
Milk Production Costs in Yorkshire. Winter 1950-51.

Farmers' Report No. 106
Milk Production in Yorkshire 1950-51.

Farmers' Report No. 109
Milk Production in Yorkshire. Winter 1951-52.

Farmers' Report No. 111
Milk Production in Yorkshire 1951-52.

4. COSTS OF ATTESTATION IN DAIRY HERDS.

Attested herds, accredited and tuberculin tested milk are all terms familiar to milk producers. In the drive for safer milk the statutory regulations governing these designations are modified from time to time. The present policy is to encourage producers to become both attested herd owners and tuberculin tested milk producers. (1)

An attested farm is one on which all the cattle are certified as free from tuberculosis. A tuberculin tested milk producer in addition to satisfying certain requirements as regards the health of his animals, has to produce milk in suitable hygienic conditions. The granting of a T.T. licence may be conditional on alterations to existing cowhouses and dairies. For the current regulations the reader is referred to the Statutory Instruments mentioned in Footnote (1) below.

This study is based on the experiences of ten Yorkshire farmers who during the period they were going attested, co-operated in the Milk Costs Investigation. The average time taken to become attested was from 2-3 years. A farmer can get an attestation certificate either by culling out reactors to a series of tuberculosis tests or by the sale of all existing cattle on the farm and their replacement with attested stock. The ten farmers concerned in this study chose the culling method.

Two of the main cost items of attestation can be the losses incurred in the sale of reactors and the expenditure on attested stock which are bought to keep up herd numbers. These items of costs are classified in the report under two headings, herd replacement costs and the cost of the new capital investment in cows. In this study, herd replacement costs represent the actual costs of maintaining the herd at the same strength with cows of the same quality; new capital investment is required if the size of the herd is increased or cows of a superior quality are purchased.

On the ten farms annual herd replacement costs were not adversely affected by changing from an ordinary to an attested basis. This was mainly because most of the farmers " were able to choose their time for selling reactors in order to minimise their losses and in two cases there was actually a profit."(2) However " capital investment is required which can range up to at least £25 per cow in the herd at the start. The size of the capital investment is determined primarily by the number of cows to be replaced, the price they can be sold for, and the cost of the replacements."(3)

(1) After 30th September 1957 the designation " Tuberculin Tested " may only be used in respect of milk from attested herds. No application to use the designation will be granted after 30th September 1954 unless the herd is an attested one.

After 30th September 1954 the designation " Accredited " will be abolished, no new application to use that designation has been granted since 30th September 1952.

The relevant Statutory Instruments are :—

1949. No. 1590. Food and Drugs, England. The Milk (Special Designation) (Raw Milk) Regulations, 1949.

1950. No. 1126. Animals' Diseases. The Tuberculosis (Attested Herds) Scheme, 1950.

(2) Report 115, Page 2.

(3) Farmers' Report 115, Page 3.

With other classes of farm cattle, losses due to attestation are not normally heavy. The reactors can usually be sold for beef stores while the stock which pass the test have an enhanced value.

" The greatest single loss that is likely to occur during attestation is the loss of income due to decreased cow numbers and consequent decreased production."[1] Arising from this, costs per gallon of the milk produced by the remaining cows may well increase since overhead costs have to be spread over a smaller herd. In the short run many of the costs can be overheads since they may be inescapable. So " in most cases not only has total milk production fallen during the transition period, but profit per gallon has also fallen so that total profit has been drastically reduced."[2] On the ten farms, estimated losses of profit ranged up to £13 per cow (in the original herd) a year during an attestation period of 3 years. The investigation shows however, that after attestation profits were greater than before.

Loss of profit incurred by attestation can be alleviated to some extent if the labour, feedingstuffs and land rendered temporarily surplus to milk production can be switched to some alternative profitable enterprise. This point is made very strongly in the report.

In other words care should be taken to see that the level of inescapable costs or overheads is not too high. This involves finding profitable alternative uses for the factors of production which are temporarily redundant in the milk enterprise. Any profits these factors earn in other enterprises should logically be offset against the fall in profits in milk production. Unfortunately, owing to lack of data and the presence of complicating issues, it was impossible to allow any credits for the effects of alternative productive uses of these surplus factors.

Other costs incurred by the co-operating farms included veterinary bills, and the costs of extra fencing. A stock-proof farm boundary fence is a condition of the issue of an attestation certificate. Building alterations were undertaken on those farms which obtained their T.T. licences. On two of the farms concerned the cost of the alterations was met by the landlords who then raised the annual rents by £21 and £36 respectively.

From the available data it is impossible to give any firm average figures for the costs of going attested because there are too many complicating factors about which full information is not available. In any case there is a considerable fortuitous element as regards the proportion of reactors and the length of time taken to go attested by the culling method. All that can be done is to discuss the types of costs involved and to describe the experiences of ten farmers in the period 1947-1952.

(1) Farmers' Report 115, Page 4.

(2) Farmers' Report 115, Page 4.

Reference

Farmers' Report No. 115

Costs of Attestation in Dairy Herds.

5. THE REARING AND FINISHING OF BEEF CATTLE.

The cattle reports contain the results of nine yearly investigations on yard finished cattle covering altogether 4,000 beasts, six yearly investigations on grass finished cattle covering 3,000 beasts and five yearly investigations on calf and store rearing covering 2,000 beasts. The majority of the farms co-operating in the schemes are in the Vale of York.

The investigations show that of the three practices, yard finishing was the most unprofitable, followed by grass fattening while store rearing showed a modest profit. While financial returns are an important factor in any one farm enterprise, there are two other points to bear in mind; the way in which the enterprise fits in with the management of the farm as a whole, and the returns the resources used in the enterprise could give elsewhere. These returns which are foregone in order to produce any commodity are termed " opportunity costs " by economists.

Calf Rearing

Three methods of calf rearing were studied—single suckling, multiple suckling and bucket rearing. Single suckling, as its name suggests, is a system in which a cow rears only her own calf. The other two systems are more intensive. With multiple suckling a cow rears from about 2-6 calves during a lactation, while with bucket rearing the calves are separated from the cows and brought up by hand.

In the costed herds, the cows used for single suckling and the bulls to which they were mated, were usually of a pure beef breed. The system of management followed was to winter the cows in yards, calve them down in the spring and run them with their calves until the autumn. The calves would be from seven to eight months old at weaning.

Table XXIII (Page 54) sums up the results of the single suckling investigations. The term " annual cost per cow " represents the total cost of the breeding herd divided by the number of cows. The cost per calf is higher than the cost per cow since on average each cow reared less than one calf. Each calf, consequently, bore a share of the costs of the failures caused by barren cows and by calves dying before weaning.

TABLE XXIII
SINGLE SUCKLING COSTS PER CALF
Birth to Weaning

	1947	1948	1949	1950	1951
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Annual cost per Cow	18 5 0	15 4 0	17 4 0	19 6 0	18 10 0
Calves reared per 100 Cows ..	80	96	97	95	90
Total Cost per Calf	21 10 0	16 8 0	17 16 0	20 6 0	20 16 0

Of the annual cost per cow over the five years, food comprised approximately 75 per cent. of total costs, labour 15 per cent. and all other costs 10 per cent.

With multiple suckling the number of calves reared per lactation was from 2-6. When a small number of calves were reared they usually ran with the cow for about six months but with larger numbers the practice was to put them on in batches, each calf suckling for about three months. Multiple suckling costs therefore include the costs of food and labour devoted to the individual calf besides the annual cost of the nurse cow's upkeep.

TABLE XXIV
MULTIPLE SUCKLING COSTS PER CALF
Birth to Six Months Old

	1947	1948	1949	1950
No. of calves reared per 100 cows	210	280	290	260
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Annual cost of nurse cow ..	21 12 0	21 11 0	22 13 0	24 4 0
Suckling cost per calf ..	9 5 0	7 8 0	8 8 0	9 2 0
Share of cost of purchased calves	1 12 0	2 1 0	2 8 0	3 2 0
Food fed directly to calf ..	2 14 0	2 2 0	1 6 0	2 5 0
Other costs directly charged to calf (1)	0 6 0	0 8 0	0 6 0	0 4 0
Total Cost per Calf ..	13 17 0	11 19 0	12 8 0	14 13 0

(1) Mainly labour.

TABLE XXV

BUCKET REARING COSTS PER CALF

Birth to Six Months Old. October-September years

	1946-47	1948-49	1949-50
	£ s. d.	£ s. d.	£ s. d.
Feed Costs	9 7 0	8 19 0	9 7 0
Purchase Price of Calf	3 8 0	2 14 0	3 0 0
Labour Costs	2 7 0	2 14 0	2 13 0
Other Costs	0 5 0	0 1. 0	0 15 0*
Total Cost per Calf	15 7 0	14 8 0	15 15 0

* Includes 13 shillings for overheads.

Bucket rearing was the most intensive system studied. The calves were reared by hand on cow's milk eked out with various types of milk substitutes; the average quantity of new milk fed per calf was forty gallons. Bucket rearing costs are given in Table XXV.

Over the period the investigations were carried out, single suckling proved to be the most expensive method, bucket rearing averaged 77 per cent. of single suckling costs and multiple suckling 70 per cent.

There are certain interesting features as regards costs. First there is the possibility of out-wintering cows used for single suckling—a feasible practice with cows of a hardy breed and one which could lead to a considerable saving in costs. Secondly, the number of calves reared per cow is of great significance in determining costs per calf. While an increase in the number of calves reared per cow does not lead to a directly proportional fall in costs, since the nurse cow and the calves require more food and attention, a low rate of calves reared per cow usually goes with a higher than average cost per calf. A third point concerns the amount of manual labour each system requires. Single suckling had a labour requirement of 22 hours per calf, bucket rearing 20 hours(1) and multiple suckling 17 hours.

It is not possible to say much about returns. Most of the calves were not sold at weaning but were run on for a considerable time afterwards. The evidence suggests, however, that single suckled calves gave the greatest gross returns for age and bucket reared the least.

(1) The labour involved in bucket rearing is used in the first six months of the calf's life. While with single and multiple suckling the labour is all charged to the first six months of a calf's life, some of it is expanded over a calendar year since an allowance for the labour involved in tending the nurse cow is included.

One final point in the comparison of the three systems is the amount of land involved. It is estimated that in these investigations, single suckling required 1·9 acres per calf, multiple suckling 1·0 acre and bucket rearing 0·4 acres. It is obvious that when an enterprise demands an extensive use of land, the more profitable alternative uses of that land should be taken into consideration when any decisions are made.

Store Rearing. Six to Thirty Months Old.

This section covers the subsequent career on the same farms of all the calves costed in the calf rearing investigations. Since calves were being sold off the farm at irregular intervals during the store period the number of calves costed in the earlier stages was far greater than those covered in the later stages. Sufficient information, however, is available about the costs of the whole period and these are set out in Table XXVI.

Comparing the costs of the two stages in the same years—so allowing for changes in prices—it will be seen that a beast cost more to keep in its second year as a store than in its first. The reverse would be expected since while in-wintering is probably essential for the younger animal, the older should be sufficiently mature to stand out-wintering. But almost all the beasts covered by the investigations were in-wintered in both years, probably because of the importance placed on manure production.

Taking the costs incurred in the first thirty months of the lives of the calves born in 1947 and 1948, single suckled calves cost approximately £43, bucket reared £38 and multiple suckled £37. Corresponding prices paid for thirty-month old stores in the autumn of 1949 and 1950 were about £47 for first quality beasts and £40 second quality.(1) Single suckled calves on the whole commanded first quality prices, bucket reared tended to make second quality prices, while multiple suckled fell between the two. A comparison of these costs and prices suggests that the profit margin of the rearer was probably very modest.

Yard Finishing

The previous sections dealt with store raising. This and the next section are concerned with the transition from the store to the fat beast—the finishing period. During this period the object of the finisher is to increase the percentage of edible meat in the carcass. The increase takes place only after the animal has provided for its maintenance and growth requirements. In feeding livestock, the

(1) In addition, however, all the calves costed qualified for a subsidy of £4 a head for steers and £3 a head for heifers. Store prices quoted are based on York market averages.

TABLE XXVI

COSTS OF REARING STORES PER HEAD

(*a*) Six to Eighteen Months Old

	YEAR OF BIRTH		
	1947	1948	1949
	£ s. d.	£ s. d.	£ s. d.
Food	8 4 0	8 5 0	8 18 0
Labour	1 19 0	1 14 0	2 3 0
Other costs	0 3 0	0 4 0	0 16 0
Total Costs	10 6 0	10 3 0	11 17 0

(*b*) Eighteen to Thirty Months Old

	YEAR OF BIRTH	
	1947	1948
	£ s. d.	£ s. d.
Food	10 2 0	11 19 0
Labour	2 2 0	2 5 0
Other Costs ..	0 7 0	0 18 0
Total Costs	12 11 0	15 2 0

greater the daily intake of food in terms of nutritive value the more concentrated the diet must be. Consequently the fattening of immature animals requires a diet with a larger proportion of concentrates to roughage than that needed by a more mature beast. Only mature animals can be finished on a diet with a high proportion of roughages and only a mature animal can be finished on grass.

Before the outbreak of war in 1939 the yard finishers co-operating in the investigations were using an immature animal. The store was brought in at a liveweight of about 8 cwts. and sold fat four months later at a liveweight of about 10 cwts., having been fattened intensively on a ration based on a daily intake of about 9 lbs. of concentrates. The wartime rationing of concentrates forced the finishers to modify their system and the pre-war system has not yet been readopted. The modified system, introduced during the war, involves the use of an older store which is sold fat after a five month finishing period at about 11-12 cwts. liveweight. The initial store weight of the older beast is only a little less than the fat weight of the younger type of beast used before the war. The daily intake of concentrates has been cut by half and larger quantities of fodder and roots fed instead.

Yard fattening is not a profitable enterprise. In seven out of the nine years covered by the investigations, a net loss per head was made. In the other two years a profit was made only because the control price for fat cattle was increased during the actual fattening period.

The most important item of costs is the price paid for the store animal. There is a significant connection between store prices and profitability. The main cause of the unprofitability of yard fattening is the high price paid for the store beast in relation to the fat price finally received. It would seem that if the store price paid was over 70 per cent. of the expected fat price, the margin between the two would not be sufficient to pay the actual cost of fattening.

A study of the relative movements of store and fat prices shows that each increase in the fat price was soon followed by a corresponding increase in the store price. Taken over its whole life, an animal tended to show a small profit but this usually went to the rearer, the finisher tended to work at a loss and to pass on most of any increase in fat prices to the rearer in the form of higher store prices.

One point of some interest is the remarkably even percentage breakdown in total costs from year to year, despite the change in system. This evenness is due to the fact that the fattening of an older store led to a similar relative increase in store and feeding costs. The increase in the first is more obvious than that in the second. The feeding of an older animal on a ration based on roughages lengthened the fattening period and any saving in costs secured by using relatively cheaper food than concentrates was more than offset by the extra length of the feeding period.

TABLE XXVII
YARD FINISHED CATTLE
(*a*) Costs and Returns Per Head

Period: Winter	Returns(1)	Costs	Profit	Loss
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1937-38	23 11 0	24 17 0	—	1 6 0
1938-39	22 9 0	23 0 0	—	0 11 0
1939-40	28 13 0	27 1 0	1 12 0	—
1942-43	40 2 0	44 3 0	—	4 1 0
1943-44	41 17 0	49 12 0	—	7 15 0
1944-45	43 9 0	47 6 0	—	3 17 0
1945-46	45 18 0	48 11 0	—	2 13 0
1949-50	68 7 0	73 13 0	—	5 6 0
1950-51	72 15 0	70 12 0	2 3 0	—

(1) Price of fat beast. No allowance for Manurial Residues.

(*b*) Percentage Breakdown of Total Costs

	Store Costs	Feed Costs	Labour Costs	All Other Costs	Total
	per cent	per cent	per cent	per cent	per cent
Average ..	67	28	4	1	100
Range(2) ..	64–69	26–32	3–4	1–3	—

(2) Range of average cost of each investigation.

On the average food accounted for 28 per cent. of total costs and 85 per cent. of the cost of the actual fattening process, labour for 4 per cent. of total costs and 12 per cent. of the actual fattening process, and all other costs 1 per cent. and 3 per cent. respectively. These averages are representative of each of the nine investigations. Two minor points worth mentioning are that the average time spent tending a beast a day was ten minutes, and that the chances of a beast dying seemed to be remote.

Yard finishers succeeded in getting their beasts fattened. 96 per cent. of the beasts costed were sold fat and over 80 per cent. of them made the top three grades, half the animals sold actually made the top two grades. As one would expect the grass finishers did not achieve such good grading results.

Perhaps the main reason why yard finishers are prepared to work at a loss is the value they place on muck. The great majority of the cattle costed were on Vale of York farms where cash roots are important crops and muck is held by many to be essential to these crops. The yarded fattening bullock is the best converter of straw into muck. Table XXVIII gives the estimated cost of muck a ton. This is calculated by assuming each beast made one cwt. of farm yard manure a day and the total quantity produced is charged

to the loss made on fattening the beast. Consequently when a beast is fattened at a profit the manure is free. No charge is made for straw or for carting the manure on to the land.

TABLE XXVIII
COSTS OF MANURE PER TON
Shillings

1937-38	1938-39	1939-40	1942-43	1943-44	1944-45	1945-46	1949-50	1950-51
4	2	0	12	17	10	7	14	0

It is unlikely that the value of the manure in increasing crop yields is less than any of the costs shown in this table. The real question, however, is whether it is more profitable to use the resources involved in fattening for some other enterprise and maintain fertility by another method. This is a point which will be discussed at the conclusion of the cattle section.

Grass Finishing

The alternative to yard finishing is to fatten cattle off grass during the summer. To do this it is necessary to have a mature beast. The grass finishers covered by the investigations either bought their stores in the previous autumn or in the early spring. The extra effort which wintering involved is thought to be justified by the saving in the store price and by the muck produced by in-wintered bullocks.

The results of the investigations show that the saving in store prices was absorbed by the extra cost of feeding and tending the beast if it was in-wintered, consequently the only advantage gained was the muck produced. If the beasts were out-wintered a considerable saving in costs resulted but no muck was produced. The finishers' interest in manure is reflected perhaps by the fact that the majority of beasts were in-wintered.

Grass fattening can hardly be called a profitable enterprise. The relatively large profit made in 1951 is due to a rise in the fat price per cwt. which took place after the store was bought. Compared with yard fattening (Table XXVII) grass finishing gave a lower cost, a lower gross return and a slightly more favourable net return. The lower costs are due mainly to savings in feed and labour, the lower returns to poorer grading. A higher percentage of beasts failed to get fat and those which did had poorer grading results than the cattle finished in yards.

The direct cause of the unprofitability of the enterprise is the high price of the store beast in relation to both the price made by the fat beast and the cost of finishing. After store prices, feed costs form the major item of expense. Grazing accounted for 20 per cent.

TABLE XXIX

GRASS FINISHED CATTLE—COSTS AND RETURNS PER HEAD

(*a*) Stores bought in autumn prior to summer fattening

Summer Sold Fat	Returns(1)	Costs	Profit	Loss
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1944	42 14 0	44 8 0	—	1 14 0
1945	42 12 0	41 14 0	0 18 0	—
1946	50 18 0	54 5 0	—	3 7 0
1949	59 3 0	60 14 0	—	1 11 0
1950	59 0 0	59 8 0	—	0 8 0
1951	69 0 0	62 3 0	6 17 0	—

(*b*) Stores bought in spring prior to summer fattening

Summer Sold Fat	Returns(1)	Costs	Profit	Loss
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1950 .. .	57 9 0	59 14 0	—	2 5 0
1951	65 7 0	60 10 0	4 17 0	—

(1)Price of fat beast. No allowance for Manurial Residues

(*c*) Average percentage breakdown of costs

	Costs percentages				
	Total	Store	Feed	Labour	Others
Autumn bought Stores ..	100	71	23	4	2
Spring bought Stores ..	100	87	11	1	1

of the feeding costs of autumn purchased stores and 60 per cent. of that of the spring bought beasts. The rest of the food costs are accounted for by supplementary feed, mainly roughages. Autumn bought stores were hand fed for about half the time that they were on the farm, and the spring bought stores for a month or two early in the season. The average time an autumn bought store was on the farm was 290 days and a spring bought store 175 days.

The Place of Beef Cattle on Arable Farms

These studies give a discouraging account of the money profits which were made on beef cattle. Still more disheartening is the examination of opportunity costs. The low rate of return coupled with the comparatively slow rate of turnover raises the question whether the resources used in beef production could have been more profitably employed elsewhere. Taking the beef enterprise in isolation the answer is probably always in the affirmative but taken as a part of the farm business as a whole the answer is more difficult to give.

Beef cattle make heavy demands on capital and land—capital to finance the purchases of stores, land to provide keep on the farm. In most situations capital and land are capable of earning higher returns in enterprises other than cattle. An estimate of the land required for rearing and finishing is given in Table XXX. This assumes that all food is home grown.

TABLE XXX

ESTIMATED ACREAGE OF LAND REQUIRED PER BEAST

At different stages of its life(1)

	Acreage
Birth to Six months—	
Single suckled	1·9
Multiple suckled	1·0
Bucket reared	0·4
6–18 months	1·3
18–30 months	1·3
Finishing period in yards	0·7
Wintering as a store	0·3
Grass finishing period	1·0

(1) Assuming all food home grown.

The greatest demands on land were made by summer grazing. Every beast over six months old required about one acre of pasture. In-wintering on the other hand did not involve the use of so much land. 0·3 acres produced enough food for an in-wintered store and 0·7 acres for a yard fattened beast. When the cattle enterprise makes a large demand on land it is necessary to examine the possible alternative uses of that land—most arable crops would show a higher profit per acre than that given by the cattle.

Of the three systems of calf rearing, single suckling made the greatest demands on land and capital, bucket rearing the least. Therefore when land and capital are capable of being used more profitably in other directions there is a definite case against single suckling. Of the two systems of finishing, despite the poorer

financial returns yarding has certain advantages; it does not require so much land, manure is produced and compared with the system of grass finishing where stores are bought the previous autumn, capital is not locked up for such a long time.

In-wintering cattle added greatly to the financial costs yet probably the main reason cattle were kept at all was in order to produce muck from in-wintered cattle, whether they were nurse cows, store or fattening beasts. Most farming systems have abandoned the yarded beef beast as a source of manure. The costs are too high and fertility can be maintained by other methods, especially so far as corn growing is concerned. The Vale of York farmers, however, are concerned with potatoes and sugar beet and for such crops muck is more or less essential for the maintenance of fertility over a period of time. These farmers also could well afford the financial losses involved and judging by their actions thought the losses were justified.

Another method of using cattle in the maintenance of fertility is to run them on leys in the summer. It is worth mentioning here that only a very small proportion of the cattle costed were kept on temporary grass, the great majority being run on permanent pasture.

The investigations show that food accounted for about 80 per cent. of the total cost of keeping a beast from birth to its arrival at the slaughter house as a mature bullock. Consequently the adoption of a more judicious feeding policy would lead to lower financial costs and free resources for more profitable use elsewhere.

Starch and protein are the main nutritive requirements of cattle, starch being by far the most important as regards the amount of intake. The discussion here is confined to starch requirements. It is customary to compare the relative values of different types of foodstuffs in terms of starch equivalents. The use of a common denominator enables various types of foodstuffs to be compared in terms of cost per unit of starch equivalent. The use of a food with a low unit starch equivalent cost means lower feeding costs provided the rearing and fattening periods are not too prolonged by using too bulky a ration.

In the choice of home grown feedingstuffs the amount of starch equivalent produced per acre by the various crops has considerable bearing on the question of opportunity costs. The less the acreage required to keep a beast the greater the opportunities for freeing land for more profitable use.

Table XXXI gives details of costs per unit of starch equivalent and production of starch equivalent per acre of various home grown foodstuffs. The figures are the 1949 averages of the Yorkshire Milk Costs Investigation. While the actual figures do not relate to other situations, they do give some idea of the comparative costs and yields in terms of starch equivalents.

TABLE XXXI

HOME GROWN FEEDINGSTUFFS

COST PER UNIT OF STARCH EQUIVALENT AND YIELDS OF STARCH EQUIVALENT PER ACRE. 1949(1)

(*a*) Cost per Unit of Starch Equivalent

Crop	Cost of production per ton of crop	Starch equivalent per 100 lbs. of crop	Cost per 100 lbs. Starch equivalent
	£ s. d.		£ s. d.
Grass Silage	1 6 3	12·6	0 9 3
Oat Straw	2 4 9	20·0	0 10 0
Seeds Hay	3 14 3	30·0	0 11 0
Meadow Hay ..	4 16 6	32·0	0 13 6
Kale	1 12 6	9·0	0 16 3
Oats	11 3 6	59·5	0 16 9
Arable Silage ..	2 9 3	12·8	0 17 3
Mangolds	1 8 3	6·2	1 0 3
Swedes	2 9 3	7·3	1 10 0

(*b*) Production of Starch Equivalent per Acre

Crop	Crop yield per acre	Yield per acre lbs. of starch equivalent
Kale	18 tons	3,630
Mangolds	21¾ ,,	3,020
Grass Silage (2)	9¼ ,,	2,610
Arable Silage..	5¾ ,,	1,680
Swedes	9¾ ,,	1,595
Seeds Hay (2)	2¼ ,,	1,525
Oats	21½ cwts.	1,435
Meadow Hay (2)	28 ,,	1,010
Oat Straw	20 ,,	450

(1) This is a revised version of Table VI, Page 7, Report 93.

(2) The yields of grass silage, seeds and meadow hay are calculated on equivalent acreages, i.e. adjustments have been made for other productive uses of the land concerned in the same season. The following example is given to illustrate the method used:—

A 10 acre field is first cut for hay, the aftermath is cut for grass silage and then the field is used for autumn grazing. It is estimated that the hay crop accounts for half the total grass produced, the silage for 30 per cent. and the fog 20 per cent. The equivalent acreages will then be hay 5 acres, silage 3 acres and grazing 2 acres. Cost per unit of starch equivalent is unaffected by adopting an equivalent acreage basis.

Of all the foods listed in the Table, grass silage and kale are perhaps the most attractive since they combine the advantages of low unit cost with a comparatively high yield of starch equivalent per acre.

The choice of home grown feedingstuffs may be limited by the basic crop rotation adopted. But whatever the crop grown, higher than average yields per acre, usually mean lower financial costs per ton of crop and lower opportunity costs. Therefore, it would seem good policy to concentrate on pushing yields per acre up to as high a level as possible.

References

Farmers' Report No. 19
The Cost of Producing Winter Beef.

Farmers' Report No. 25
The Cost of Yard Feeding Cattle, 1938-39.

Farmers' Report No. 30
Costs of Winter Fed Cattle, 1939-40.

Farmers' Report No. 44
Costs of Winter Feed Cattle, 1942-43

Farmers' Report No. 52
Costs of Winter Fed Cattle, 1943-44.

Farmers' Report No. 59
Some Costs of Winter Fed Cattle, 1944-45.

Farmers' Report No. 67
Some Costs of Winter Fed Cattle, 1945-46.

Farmers' Report No. 87
Costs and Returns from Wintering Store Cattle and Finishing on Grass. Seven Yorkshire Farms, 1948-49.

Farmers' Report No. 89
The Costs of Rearing Store Cattle on a Number of Yorkshire Farms, 1947-49.

Farmers' Report No. 93
Costs and Returns from Fattening Cattle in Yards on 19 Yorkshire Farms, 1949-50.

Farmers' Report No. 99
Costs and Returns from Rearing Store Cattle on a Number of Yorkshire Farms, 1947-50.

Farmers' Report No. 101
Costs and Returns from Fattening Cattle in Yards on 13 Yorkshire Farms, 1950-51.

Farmers' Report No. 104
Costs and Returns from Fattening Cattle on Grass on 13 Yorkshire Farms, 1951.

Farmers' Report No. 107
Rearing Cattle for Beef by Single Suckling.

6. PIGS

Investigations were made into the costs and returns from pig keeping in 1951-52 and 1952-53. Most of the co-operating pig keepers were engaged in both breeding and fattening. The majority bred their own stores and then finished them for bacon. On some holdings, however, quite a few home-bred stores were sold, while on others extra stores were bought in for fattening. Because of these complications it was found to be impossible to calculate the financial results on a per pig basis; instead they are given in terms of £100 gross output.

The sizes of the pig enterprises varied greatly. The average number of breeding sows per holding ranged from 0 to 77 and the average number of bacon pigs sold annually varied from 39 to 586.

Pigs are housed in both specialised and adapted buildings. So far as the herds that were costed are representative, it appears that the smallholder has the specialised buildings—such as Danish type finishing houses—while the general farmer tends to keep pigs in parts of the existing farm buildings especially fold yards.

Table XXXII gives details of the costs and profits per £100 gross output. "The gross output is calculated by deducting the cost of pigs purchased from the total return for pigs sold during the year and adjusting it for changes between the opening and closing valuations."(1)

TABLE XXXII

PIGS. COSTS AND PROFITS PER £100 GROSS OUTPUT

1951-52 and 1952-53 Investigations

	Costs and Profits per £100 Gross Output		Percentage of Total Cost	
	1951-52	1952-53	1951-52	1952-53
	£ s. d.	£ s. d.		
Purchased Feed	65 16 0	57 11 0		
Home Grown Feed ..	7 14 0	13 2 6		
Total Feed	73 10 0	70 13 6	88	87
Labour	7 16 6	7 12 6	9	9
All Other Costs	2 16 6	2 17 6	3	4
Total Costs	84 3 0	81 3 6	100	100
Profit	15 17 0	18 16 6		
	100 0 0	100 0 0		

(1) Report 112, Page 2.

Food is the most important item of cost. Food fed on both the general farms and on the smallholdings costed consisted mainly of compound pig meals. Several herds were fed only with this class of food. On the general farms purchased meals were usually supplemented with home grown corn. The use of bulky foods such as potatoes, fodder beet and swill was fairly uncommon. One pig keeper, however, a wholesale potato merchant, ran his pig unit mainly on surplus potatoes.

Home grown foods have been charged at market values and the food costs include charges for preparing food, such as steaming potatoes and swill.

Labour costs comprise only a small proportion of total expenditure. The item for all other costs includes allowances for the rent of buildings, depreciation on equipment and other sundry items. **No allowance is made for overhead costs.**

Because of the lack of the necessary data, it is impossible to give any figure for the cost of rearing a weaner and for finishing a store pig for bacon. One can, however, say something about certain factors which greatly influence the results obtained both from breeding stores and from bacon production.

Efficiency in feeding is perhaps the most vital factor. The quantity and cost per unit of meal equivalent fed per breeding sow are important points to consider in breeding pigs. On the fattening side the cost per unit of meal equivalent and the quantity fed per pound of liveweight increase, are factors which may largely determine the success of the enterprise.(1)

The cost of producing a store pig is greatly affected by the number of pigs reared per sow per year. The whole cost of maintaining the breeding stock is borne by the weaners produced. The annual number of weaners reared per sow depends on the number of litters a sow has a year, the size of these litters at birth and the percentage of piglets that die during the suckling period.

Table XXXIII gives the estimated " birth and mortality " rates pertaining to the two investigations.

It will be seen from Table XXXIII that more pigs were weaned per sow in the 1952-53 investigation than in the 1951-52 and this is one reason why the profit per £100 gross output in 1952-53 was greater than in 1951-52.

(1) Owing to insufficient data it is impossible to give the average figures for food fed per head per year to breeding sows and for lbs. of food fed per lb. liveweight increase of fattening pigs. It is also impossible to give the cost per unit of meal equivalent for the full range of foods fed. Investigations are proceeding (March 1954) which it is hoped will throw some light on these questions.

TABLE XXXIII

SOME FACTORS INFLUENCING THE RETURNS FROM PIGS

1951-52 and 1952-53 Investigations

	1951-52	1952-53
Litters per sow per year	1·5	1·8
Pigs born per litter	8·8	9·1
Pigs weaned per litter	7·1	7·9
Pigs weaned per sow per year ..	10·6	14·2
Percentage of pigs lost from birth to weaning	19·5	13·5
Percentage of pigs lost after weaning ..	3·6	5·4

TABLE XXXIV

GRADING OF BACON PIGS

1952-53 Investigation

Percentages of Total Numbers falling into Various Grades

Grades	Percentages
A	74
AT	6
B	7
BT	1
C	1
L	—
Ungraded ..	11
Total	100

The incidence of disease is also important. The mortality figures do not cover all the losses due to disease, since no allowance is made for pigs which through exposure to infection, are slaughtered and sold as casualties.(1)

Table XXXIV gives details of the grading of the majority of the bacon pigs covered by the 1952-53 investigation. While 74 per cent. of the baconers obtained the highest grade, 11 per cent. failed to grade at all.

The results of the two investigations suggest that pigs can make a useful contribution to total farm profit. A great advantage of a pig unit on a general farm is that no great dislocation of the farming system is involved. If most of their feed is purchased, pigs make no great demands on land. Labour requirements are low. Housing can usually be provided in existing farm buildings. An added attraction, of course, is that the turnover on pigs is relatively quick and with a small initial outlay a successful pig unit can be gradually built up.

In considering the financial results of these investigations one important point should be remembered. At the time Government policy was to expand home bacon production through using the incentive of high prices. It is generally agreed that the price cost ratio for bacon was consequently very favourable to producers. Therefore it cannot be assumed that the rates of profit shown in Table XXXII will be repeated in the future.

(1) In the 1951-52 investigation a considerable number of pigs were slaughtered on one farm as a result of a suspected outbreak of swine fever.

References

Farmers' Report No. 112

Costs and Returns from Keeping Pigs on 12 Yorkshire Farms, 1951-52.

Farmers' Report No. 116

Costs and Returns from Keeping Pigs on 14 Yorkshire Farms, 1952-53.

7. SHEEP

Two investigations have been made into the costs and returns from the winter fattening of sheep on arable crops. In 1942-43 costs were obtained from various parts of Yorkshire and the results are published under two headings, Wold and non-Wold farms. The 1945-46 investigation was concerned only with the Wolds, a district where arable sheep are more important than in any other part of Yorkshire.

The investigations were concerned with the fattening process. The sheep were costed from the time they were first folded on crops in the autumn until they went off fat in the late winter and early spring. A sequence of crops was used for folding, usually kale, turnips and swedes. On the non-Wold farms sugar beet tops generally replaced turnips.

One of the most important requirements in costing folded sheep is reliable figures for the costs of growing the crops eaten off by the sheep. In costing these crops, however, several difficulties arise especially in connection with calculating the manurial residues and treading values left by the folded sheep. Table XXXV gives the net costs per acre incurred in growing kale, turnips and swedes in the two investigations. These net costs are arrived at after crediting the crops with the manurial residues and treading values from the folded sheep. There is a slight difference in the method used for costing in the two years, so comparisons between the two should be made with caution.

In addition to folded roots, most of the sheep costed received supplementary feed in the form of concentrates and hay. In 1942-43 it was noted that Wold farmers fed more concentrates and less hay than did non-Wold ones, the probable reason for this being the shortage of hay in the district.

TABLE XXXV

NET COSTS PER ACRE FOR GROWING ARABLE CROPS EATEN OFF BY SHEEP(1)

	1942-43	1942-43	1945-46
	Wold Farms	Non-Wold Farms	Wold Farms
	£ s. d.	£ s. d.	£ s. d.
Kale	3 14 0	5 2 0	4 6 0
Turnips	4 11 0	5 4 0	4 19 0
Swedes	5 2 0	7 12 0	4 6 0

(1) Gross costs not available. Credits allowed, include manurial residues from sheeps' droppings, treading values and cleaning values of a root crop.

TABLE XXXVI

COSTS AND RETURNS PER "AVERAGE SHEEP" FATTENED

	1942-43		1945-46
	Wold	Non-Wold	Wold
	£ s. d.	£ s. d.	£ s. d.
Value of sheep at beginning of Fattening Period..	3 11 6	3 6 9	3 17 6
Value of sheep at end of Fattening Period	5 2 9	4 13 6	5 0 0
Fatteners' Margin	1 11 3	1 6 9	1 2 6
Fattening Costs:			
Feeding Costs(1) —			
Folded Crops	0 13 3	0 10 6	0 12 0
Supplementary Foods ..	0 9 6	0 8 9	0 7 0
Total Feeding Costs	1 2 9	0 19 3	0 19 0
Labour	0 9 3	0 6 0	0 6 3
All Other Costs (2)	0 4 3	0 4 0	0 1 0
Total Fattening Costs ..	1 16 3	1 9 3	1 6 3
Loss per Sheep	0 5 0	0 2 6	0 3 9
Length of Fattening Period ..	196 days	156 days	(3)

(1) Net Costs, manurial residues allowed for. For costs of folded crops see note under Table XXXV.

(2) No overhead charges made in 1945-46. In 1942-43 Overheads amounted to 2s. 6d. per sheep.

(3) Not available.

Table XXXVI gives costs per "average sheep" fattened. Most of the sheep concerned were wethers, a few, however, were cull ewes. All of these of course were being fattened for slaughter. In 1945-46 an unspecified number of gimmers were costed with the fattening flock.

The proportion of the different classes of sheep together with the mortality rates and the proportion of sheep which fail to fatten, all influence the value of the "average sheep" at the end of the fattening period. In 1945-46 about one-third of the sheep were left unsold at the end of the period, while 4 per cent. of the original total had died. The sheep left unsold included the gimmers retained for breeding. It is interesting to note that while the "average sheep" was valued at £5 at the end of the fattening period, the average price a head realised by sheep sold for slaughter was £5 9s.

In considering the profitability of the arable sheep enterprise in connection with the figures given in Table XXXVI, it is important to bear in mind the method of costing used. For example, all the feeding costs given are net. If gross costs had been used the results would have been far more unfavourable. Again various deductions have been made from the costs of growing the folded crops. If these credits had been ignored the loss per sheep would have been greater. But whether one method of costing gives a more favourable or less favourable result is not the vital point. The farmers co-operating in the investigations did not keep their sheep primarily in order to make money out of them, but kept them to maintain the fertility of the soil. Whether these farmers were justified in doing so on economic grounds is another matter. But it must be remembered that the Wolds have a tradition of arable sheep and in the past at least the " golden hoof " was held in high regard.

References

Farmers' Report No. 43

Cost of Feeding Sheep on Arable Land, 1942-43.

Farmers' Report No. 65

Some Costs of Folding Sheep on the Yorkshire Wolds, 1945-46.

8. WHEAT

In the wheat investigations considerable attention is given to the collection of data relating to cultural practices as well as to obtaining financial information. Material has been collected on a district basis. In 1945 and 1947 wheat costs from Holderness were studied, in 1945 a few costs were also collected from farms on the fairly heavy soils of the Vale of York. The Pickering and Vale of York areas were concentrated on in 1950 and 1951.

In the Types of Farming Section the place of wheat in the economy of some Vale of York and Holderness farms has been discussed. The wheat costs investigation confirms the impressions given by the farm account data. In Holderness wheat is the most important crop in the rotation and is usually taken after a ley, bare fallow or pea crop. Potatoes and sugar beet are of great importance in the Vale of York and wheat is grown merely as a subsidiary crop to lengthen the rotation.

Manuring practices and their connection with the crop grown previously to wheat are examined in some detail in the 1950 and 1951 reports. Broadly speaking wheat received little or no tillage after a recuperative crop ; such tillage as was applied consisted usually of a light dressing of a nitrogenous fertiliser.[1] If, however, wheat was taken after an extractive crop generous dressings of tillage were given. Following a white straw crop the land was often mucked on the Pickering farms costed. On the Vale of York farms little muck was given to the wheat land. On such farms it is usual to reserve the muck for cash root crops. The place of wheat in the rotation differed between the two groups. On the Pickering farms costed, wheat usually followed another white straw crop, while on the Vale of York farms, potatoes were the most common crop preceeding wheat.

These differences are reflected in the costs. Cultivation costs tended to be lower on the Vale of York farms since after a potato crop the land usually does not require ploughing.

Allowing for residual values there was little difference in the manuring costs between the two groups. The Pickering farms had the higher direct manuring costs, but their land was left richest in manurial residues. In the Vale of York, the opposite tendency was present, the costs of direct manuring were low but the wheat crop was a net consumer of manurial residues.

The studies were confined to autumn sown corn. Seeding rates averaged 1½ cwts. an acre. No very strong preference was shown for either purchased or home grown seed. A wide selection of varieties was grown. In 1945 Als and Scandia were the most popular varieties on the Holderness farms costed. On the Pickering farms the two most common varieties grown in 1950 were Squarehead's

[1]) Tillage is a Yorkshire term for artificial manures.

Master and Als and in 1951 Essex Pearl and Als.[1] On the Vale of York farms Jubilégem and Scandia were the favourites in 1950 and Scandia and Nord 59 in 1951. One point of interest is that while Scandia was popular with Vale of York producers it was hardly grown at all on the Pickering farms, and Als a firm favourite on the latter farms, was seldom grown on the Vale of York farms.

The results of the four investigations into the costs and returns of wheat production are given in Table XXXVII. These figures are composite averages, consisting of results for different districts and also for wheat harvested by combine as well as by binder. This lack of uniformity does not perhaps detract much from the value of these figures for inter-year comparisons. The proportion of the crops combined is roughly the same each year, 15 per cent. to 20 per cent. and costs and returns in the different districts do not seem to be very dissimilar. In only one report was it considered worth while to show the district results separately. In that year Vale of York farms had a slightly higher rate of profit.

Table XXXVII suggests that the position of wheat growers has improved during this period, wheat prices appear to have risen at a faster rate than have production costs.

TABLE XXXVII

COSTS AND RETURNS FROM WHEAT PRODUCTION[2]

Harvest	Yield Per Acre cwts.	Per Acre				Per Cwt.		
		Returns	Net Costs	Profit	Returns	Net Costs	Profit
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	s. d.	s. d.
1945 ..	20	18 11 0	11 10 0	7 1 0	0 18 6	11 6	7 0
1947 ..	17¼	19 0 0	11 8 0	7 12 0	1 2 0	13 3	8 9
1950 ..	20¼	28 12 0	14 3 0	14 9 0	1 8 3	14 0	14 3
1951 ..	19¾	28 18 0	15 5 0	13 13 0	1 8 9	15 6	13 3

(1) The high acreage of Essex Pearl in the 1951 Costs was partly due to a considerable acreage grown on one particular farm.

(2) Returns include returns from *head* corn and in 1945 and 1947 acreage payments under the Wheat Subsidy Scheme. No value is given to the *straw*. The cost of production of *tail* corn is assumed to be the same as that for head corn and the value of the tail corn taken as its cost of production is subtracted from the costs per acre. The yield of tail corn averaged 1 cwt. per acre.

The alternative methods of harvesting by combine and binder are discussed in some detail in the 1950 and 1951 reports. Under the conditions prevailing in the sample, combining resulted in a slightly lower cost. Details of the costs of the two methods are given in Table XXXVIII.

Comparisons of the costs of combining with those of the more traditional harvesting methods are difficult to make. The harvesting operations with combined crops are far from uniform, grain can be sold straight from the combine, or artificially dried by special plant and stored on the farm. Straw can, for example, be left loose in the field or baled and collected. The more elaborate the harvesting

TABLE XXXVIII
WHEAT PRODUCTION.
GROWING AND HARVESTING COSTS
Per Acre

	1950	1951
	£ s. d.	£ s. d.
Growing Costs up to Harvest (1)—		
Cultivations	3 4 0	2 19 0
Manures and Seeds	4 15 0	5 10 0
Rent and Rates	1 7 0	1 10 0
Overheads	0 16 0	0 14 0
TOTAL Gross Costs	10 2 0	10 13 0
Less Net Manurial Residues	0 8 0	0 3 0
TOTAL Net Costs	9 14 0	10 10 0
Harvesting by Binder—		
Harvesting	3 0 0	3 6 0
Threshing	2 12 0	2 18 0
TOTAL	5 12 0	6 4 0
Harvesting by Combine—		
TOTAL (2)	2 11 0	3 17 0
Total Costs, Growing and Harvesting (3)—		
By Binder	15 6 0	16 14 0
By Combine	12 5 0	14 7 0

(1) Includes cost of growing and harvesting tail corn.

(2) A standard charge is made for the cost of operating the combine itself. This charge is based on the Leeds Combine investigation figures. (See Combine Section Pages 105-113). The 1950 combine harvesting costs given above do not include any charges for baling and collecting straw, the 1951 costs do.

(3) Composite totals. A common growing cost up to harvest is added to the harvesting totals for binders and combines respectively.

TABLE XXXIX

WHEAT. LABOUR REQUIREMENTS[1]

Per Acre

Cultivations to nearest hour

	1945	1947	1950	1951
Man Hours	13	11	12	10
Tractor Hours ..	3	4	7	5
Horse Hours ..	9	6	1	2

Harvesting by binder and threshing

	1945	1947	1950	1951
Man Hours	25	—	23	23
Tractor Hours ..	1	—	3	3
Horse Hours ..	5	—	—	1

Harvesting by combine[2]

	1945	1947	1950	1951
Man Hours	4	—	4	8
Tractor Hours ..	1	—	1	4
Horse Hours ..	—	—	—	1

Total growing and harvesting[3]

	1945	1947	1950	1951
By Binder—				
Man Hours	38	—	35	33
Tractor Hours	4	—	10	8
Horse Hours	14	—	1	3
By Combine—				
Man Hours	17	—	16	18
Tractor Hours	4	—	8	9
Horse Hours	9	—	1	3

(1) 1945 Holderness farms and Heavy Land farms in Vale of York.
1947 Holderness farms. In 1950 and 1951 Vale of York farms and farms in the Pickering District.

(2) In 1950 the straw was left loose on the field after combining; in 1951 most of the straw was baled and stacked.

(3) Composite totals. A common figure for labour requirements for pre-harvest operations is added to the labour requirements for harvesting by binder and combine respectively.

operations are, the higher are the total costs, but the end products are usually of better quality and are more comparable with those of the conventional method of harvesting. The use of a binder and threshing machine usually involves the storage and drying of the grain in the stack, and after threshing the straw is available in a form easy to handle and in a convenient place.

The alternative methods of straw disposal with combining are mainly responsible for the differences in costs and in labour requirements in 1950 and 1951—see Tables XXXVIII and XXXIX. In the 1950 investigation most of the straw was left loose on the field; in 1951 straw was generally baled and stacked. No farmers co-operating in the investigation dried their own corn. Instead, all corn was sold straight off the combine at a price per cwt. that averaged 2s. less than that received for corn harvested by binder.

The use of a combine results in a considerable saving in manual labour. Table XXXIX shows a reduction of 15 to 19 man hours in the labour required to harvest and thresh out an acre of wheat. Not all this labour, however, is saved at the peak time of harvest. Part covers the labour used in threshing, an operation usually carried out at a slack time of the year. The whole subject of combines and corn harvesting is dealt with more fully in the Combine Section, Pages 105-113.

Another point brought out by Table XXXIX is the tendency to replace horses with tractors. On the farms costed in 1945, 14 hours of horse work were involved in growing and harvesting an acre of wheat—cut by binder. In 1951 the corresponding figure was 3 hours. Tractor work requirements have increased but not, of course, to the level of the former horse totals. It is interesting to note that no great saving in time was secured by using tractors instead of horses for leading the harvest.

The cultivation costs shown in Table XXXVIII are broken down in greater detail in Table XL. Unfortunately similar details for combining are not available and information relating to corn cut by binder is available for one year only.

Manures and seed form the largest item of costs incurred up to harvest time. In Table XXXVIII the credit allowed for manurial residues results from the heavy rate of direct manuring carried out for the wheat crop. Other important cost items are the charges for manual labour and tractor work.

Among the other points raised by the reports is the relative cost of using straw trussers or balers at threshing time. Threshing and baling cost slightly more than did threshing and tying—an additional 5s. an acre in 1950 and 3s. in 1951. The extra costs incurred comprised mainly the higher hire charges for the necessary tackle and the cost of baling wire.

TABLE XL.

WHEAT. PERCENTAGE BREAKDOWN OF COSTS

Growing Costs up to harvest. Percentages

	Total	Manures & Seeds	Man Labour	Tractor Work	Rent & Rates	Other Costs
1950 ..	100	47	14	14	14	11
1951 ..	100	52	13	10	14	11

Growing, Harvesting and Threshing (cut by binder). Percentages

	Total	Manures & Seeds	Man Labour	Tractor Work	Rent & Rates	Other Costs
1950 ..	100	30	28	12	9	21

References

Farmers' Report No. 63

Some Costs of Growing Wheat in Yorkshire, 1945.

Farmers' Report No. 79

Costs of Growing Wheat on Some Holderness Farms, 1947.

Farmers' Report No. 96

Costs of Growing Winter Wheat in two Districts of Yorkshire, 1949-50.
Part I—Costs up to and including harvesting.

Farmers' Report No. 102

Costs of Growing Winter Wheat in two Districts of Yorkshire, 1949-50.
Part II—Threshing Costs.

Farmers' Report No. 105

Costs of Growing Winter Wheat in two Districts of Yorkshire, 1950-51.
Part I—Costs up to and including harvesting.

Farmers' Report No. 110

Costs of Growing Wheat in two Districts of Yorkshire, 1950-51.
Part II—Threshing Costs.

9. BARLEY

Two reports have been issued on the costs and returns from growing barley. The earlier report deals with the 1944 crop, the other with the 1946 crop. Data were collected mainly in the Vale of York from farmers who were seasoned barley growers as opposed to those who grew barley merely as a wartime expedient.

About two-thirds of the crops costed were taken after roots while most of the remainder followed a white straw crop, usually wheat. The root crops were mainly sugar beet, turnips and swedes. In some cases the barley crop derived some benefit from sheep which either had been folded on the swedes and turnips or had cleaned up the sugar beet tops.

TABLE XLI

PROFITS, NET COSTS AND RETURNS(1)

1944 and 1946 Barley Investigations

	Yield per Acre	Per Acre			Per Cwt.		
		Returns	Net Costs	Profit	Returns	Net Costs	Profit
	cwts.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	s. d.	s. d.
1944..	21·6	25 0 0	13 11 0	11 9 0	1 3 0	12 6	10 6
1946..	21·5	23 16 0	13 2 0	10 14 0	1 2 3	12 3	10 0

(1) Returns.—No value put on straw. Returns include value of both head and tail corn. Yield per acre of tail corn averaged 1·2 cwts. in 1944 and 1·9 cwts. in 1946.

The average seeding rate was 12 stones an acre and in addition about half the acreage costed was undersown with a ley.(1) Most of the co-operating farmers grew malting varieties of barley. Plumage-Archer was the most popular variety grown, other malting varieties sown included Spratt-Archer, Golden-Archer and Plumage 63. A few growers went in for the higher yielding but lower quality barleys and varieties of these types sown included Abed Maja and Abed Kenia.

The weather at harvest time was bad in both 1944 and 1946; many of the crops costed were laid and when finally cut the corn spent a long time in the stook. All these difficulties and delays increased harvesting costs. None of the costs in this section refer to combined barley.

Average net costs, returns and profits for the two investigations are given in Table XLI. It will be seen from this table that the return per cwt. was lower in 1946 than in 1944. The vagaries of the malting barley trade are the main factors responsible. Malting prices for

(1) The costs of establishing the seeds are excluded from the barley costs given in this section.

TABLE XLII

BARLEY. BREAKDOWN OF NET COSTS(1)

(*a*) **Per Acre**

	1944	1946
	£ s. d.	£ s. d.
Growing Costs to Harvest—		
Cultivations	1 10 0	1 15 0
Net Manures and Seeds	6 1 0	4 13 0
Rent	1 5 0	1 9 0
Overheads	0 13 0	0 13 0
Other Costs	0 3 0	0 4 0
TOTAL to Harvest	9 12 0	8 14 0
Harvesting and Threshing—		
Harvesting	2 2 0	2 7 0
Threshing	1 17 0	2 1 0
TOTAL Harvesting and Threshing ..	3 19 0	4 8 0
TOTAL NET COSTS	13 11 0	13 2 0

(*b*)

	Net Cost Per Acre		Percentages	
	1944	1946	1944	1946
	£ s. d.	£ s. d.		
Manual Labour	3 10 0	4 6 0	26	33
Horse Work	0 8 0	0 6 0	3	2
Tractor Work	0 13 0	0 16 0	5	6
Net Manures and Seeds ..	6 1 0	4 13 0	44	36
Rent	1 5 0	1 9 0	9	11
Overheads	0 13 0	0 13 0	5	5
All Other Costs	1 1 0	0 19 0	8	7
TOTAL NET COSTS ..	13 11 0	13 2 0	100	100

(1) Costs given as net costs since only net costs figures are available for the 1946 investigation.

the 1944 crop were high in relation to the price paid by the Ministry for millable barley while much of the 1946 crop costed made only the millable price, despite the fact that some samples were of high malting quality.

One point of interest in connection with the 1946 crop was that on the farms costed, growers of the poorer quality higher yielding barleys made greater profits than those who grew malting varieties, since their yields were higher while their grain made a

similar price per cwt. " It is noteworthy that five of the six farms growing the lower grade barleys (Abed Kenia and Abed Maja) yielded a full 10 cwts. per acre more than the highest yielding of the 24 growers of the Archer varieties."[1]

Table XLII gives a breakdown of total net costs. It will be seen that labour, net manures and seeds are the main items of expenditure. Most of the seed used was either home grown or bought locally from other farmers. Little of the more expensive pedigree seed was used. Unfortunately details of the division of net manuring costs and manurial residues are not available for the 1946 investigation. The 1944 figures show that most of the net costs of manures were for the unexhausted value of manures applied to a previous crop. Little direct manuring was carried out for the barley crop which was a fairly heavy consumer of manurial residues.

Details of the average labour requirements are given in Table XLIII. It should be remembered that harvesting conditions were unfavourable in both years and this entailed heavier demands on labour. None of the crops concerned were combined.

TABLE XLIII

LABOUR REQUIREMENTS

Per Acre

1944 and 1946 Barley Investigations.[2]

Hours

	1944	1946
Man	41	45
Tractor	5	6
Horse	10	6

(1) Farmers' Report 71, Page 5.

(2) 1944 figures are actual averages, 1946 estimates based on costs.

References

Farmers' Report No. 56

Barley Costs and Returns on 29 Yorkshire Farms, 1944.

Farmers' Report No. 71

Barley Costs and Returns, 1946.

10. OATS

In 1946 and 1947 oat costs were collected from two districts with very different predominant farming systems; the Wolds and the Southern part of the Yorkshire industrial area. An idea of the contrast between the two is given by the average size of the farms co-operating in the investigations. The Wold farms averaged 300-350 acres and the others less than 100 acres in size. Despite the differences in farming systems the costs of growing oats were found to be very similar. Consequently it has not been considered worth while to give the district results separately.

On the Wold farms oats usually followed roots which had been folded with sheep, while on the farms of the other group the crop was generally taken after kale or mangolds. Star, Victory and Onward were the most popular varieties grown and seeding rates averaged 13-14 stones an acre. The tables in this section are not in the usual form. No figures, for example, are given for returns and profits. In the detailed cost structure no charge is made for overhead costs. In the two reports concerned these departures from the normal practice have been made because all the crops costed were retained on the farm for feeding to stock.(1)

Table XLIV gives the detailed breakdown of the cost structures. It will be seen that the largest individual item is that for net manures and seeds. A considerable proportion of this cost resulted from the crop being a net consumer of manurial residues, a situation which arises mainly from the place of the crop in the rotation. Roots folded by sheep leave behind a high level of manurial residues and kale and mangolds are crops which are usually mucked.

(1) " Nothing was allowed for overheads. The reason was that oats are grown mainly for consumption on the farm and it is a frequent practice to divide the cost of overheads only amongst those branches of the farm which are sold off." Farmers' Report No. 80, Page 7.

TABLE XLIV

OATS. BREAKDOWN OF COSTS[1]

	Per Acre	
	1946	1947
	£ s. d.	£ s. d.
Growing Costs to Harvest—		
Cultivations	2 2 0	1 16 0
Manures and Seeds	3 0 0	2 4 0
Rent	1 2 0	1 1 0
Other Costs	0 5 0	0 6 0
TOTAL to Harvest	6 9 0	5 7 0
Harvesting and Threshing—		
Harvesting	2 10 0	1 14 0
Threshing	1 9 0	1 10 0
TOTAL	3 19 0	3 4 0
TOTAL Gross Costs	10 8 0	8 11 0
Debit Manurial Residues	1 14 0	2 17 0
TOTAL Net Costs	12 2 0	11 8 0
Average Yield per Acre—Grain	20·1 cwt.	17·1 cwt.

(1) No charge made for overheads, see Footnote, Page 83.

1947 (2)	Per Acre	
	£ s. d.	Percentages
Manual Labour	3 0 0	26
Horse Work	0 5 0	2
Tractor Work	0 15 0	7
Net Manures and Seeds ..	5 1 0	44
Rent and Rates	1 1 0	9
All Other Costs	1 6 0	12
TOTAL	11 8 0	100

(2) 1947 figures only available.

Details of manual labour requirements are given in Table XLV together with figures for horse and tractor work. Manual labour requirements were considerably higher in 1946; unfavourable weather at harvest time was the main factor responsible. Many crops were laid and some had to be cut by hand. The crop was in stock for some time and in many cases the stooks had to be remade.

TABLE XLV

OATS. ESTIMATED LABOUR REQUIREMENTS

Per Acre

Hours

	1946	1947
Man	41	32
Horse	10	5
Tractor	6	6

References

Farmers' Report No. 72
Some Costs of Growing Spring Oats in Yorkshire, 1946.

Farmers' Report No. 80
Costs of Growing Spring Oats in two Districts of Yorkshire, 1947.

11. POTATOES

Investigations have been carried out in 1951 and 1952 into the costs and returns from growing potatoes on some Vale of York farms. All the fields costed consisted of main crop potatoes. The great majority of the co-operating farmers clamped their crops after lifting and then sold the potatoes off in late winter, spring or early summer.

Potatoes usually followed a white straw crop or ploughed out clover. Most growers mucked for potatoes and dressings averaged 12 tons per acre. Whether the land had been mucked or not, made little difference to the amount of tillage applied; dressings were heavy, averaging 11 cwt. per acre.

The amount of seed set averaged between 21 and 22 cwts. an acre. About half the seed was new Scottish or Irish, while the remainder was either Yorkshire Wolds or else home grown. The use of Yorkshire Wolds seed is an interesting feature. "This source of supply has only been developed in the last few years but is already competing with some success against the more traditional seed growing areas."(1) Majestic was by far the most popular variety grown. Other varieties included Arran Peak, Redskin, Dr. McIntosh and Stormont Dawn.

TABLE XLVI

POTATOES. YIELDS, NET COSTS, RETURNS AND PROFITS

	1951 Investigation		1952 Investigation	
	Per Acre	Per Ton	Per Acre	Per Ton
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Returns	102 4 6	11 3 6	113 10 0	10 13 6
Net Costs	58 2 0	6 7 0	65 4 6	6 3 0
Profit	44 2 6	4 16 6	48 5 6	4 10 6
(a) Yield per Acre ..	9·15 tons		10·6 tons	

(a) Including ware, seed and chat potatoes.

Table XLVI summarises the results of the two investigations. It will be seen that potatoes leave a very useful profit. The greater returns per acre in 1952 are due entirely to increased yields. Returns per ton actually fell since a larger proportion of the crop went for stockfeed.

(1) Farmers' Report 117, Page 5.

Table XLVI, of course, refers to costs and returns at the average yields. If, however, the individual results are grouped into classes according to yields, as in Table XLVII, wide differences are shown in the sizes of net costs per ton between the classes. There is a marked tendency for net costs per ton to fall with increases in yields. Net costs per acre appear to be relatively independent of yields on the farms studied. "As far as this sample is concerned those who achieved yields of 12 or more tons per acre incurred, on average, no greater costs (except for harvesting and sorting) than those whose yields were much more moderate."(1)

TABLE XLVII

POTATOES. NET COSTS PER TON AT DIFFERENT YIELDS

Per Acre

1951 Investigation			1952 Investigation		
Yield per acre	Number of Costs	Net Costs per ton	Yield per Acre	Number of Costs	Net Costs per ton
		£ s. d.			£ s. d.
Under 6 tons ..	2	14 0 0			
6·0-7·99 tons ..	10	7 6 0	Under 8 tons ..	6	9 7 0
8·0-9·99 tons ..	12	6 1 0	8·0-9·99 tons ..	9	6 17 6
10·0-11·99 tons..	10	5 6 6	10·0-11·99 tons ..	13	6 1 6
12 tons and over	6	4 17 0	12·0-12·99 tons ..	6	5 3 6
			13 tons and over	5	4 9 6
	40	(a) 6 7 0		39	(a) 6 3 0

(1) Farmers' Report 114, Pages 7-8.

(a) Weighted Averages.

The breakdown of costs is shown in Table XLVIII on two bases, firstly according to cultural operations, secondly according to the costs of the individual factors of production.

TABLE XLVIII

POTATOES. BREAKDOWN OF COSTS

(*a*) **Per Acre**

	1951	1952
	£ s. d.	£ s. d.
Costs to Harvest—		
Cultivations	10 5 6	11 6 0
Gross Manures	15 12 0	20 13 0
Seed	15 6 6	16 1 6
Rent	1 14 6	1 13 6
Overheads	4 16 6	5 3 0
TOTAL Gross Costs to Harvest	47 15 0	54 17 0
Harvesting Costs—		
Lifting	1 19 0	2 10 6
Picking up(1)	8 9 0	6 3 0
Pieing(1)	1 6 0	3 16 0
TOTAL Harvesting Costs	11 14 0	12 9 6
Riddling and Bagging	5 10 0	6 11 0
TOTAL GROSS COSTS	64 19 0	73 17 6
Credit for Manurial Residues	6 17 0	8 13 0
TOTAL NET COSTS	58 2 0	65 4 6

(1) 1951. Costs of carting off included under both Picking up and Pieing.
1952. Costs of carting off all included under Pieing.

(*b*)

	1951		1952	
	Per Acre	Percentages	Per Acre	Percentages
	£ s. d.		£ s. d.	
Manual Labour	19 6 6	33	20 11 6	32
Horse Work	0 17 6	2	0 17 6	1
Tractor Work	4 10 6	8	5 17 0	9
Seed and Net Manures	24 1 6	41	28 2 0	44
Rent	1 14 6	3	1 13 6	2
Other Costs	7 11 6	13	8 3 0	12
TOTAL NET COSTS	58 2 0	100	65 4 6	100

A credit item is shown for manurial residues; the heavy rate of manuring carried out for the potato crop results in the land being left richer in manurial residues.

Expenditure on labour, seeds and net manures accounts for nearly three-quarters of total net costs. From Table XLVIII (*a*) it will be seen that a fairly large proportion of total expenses is incurred before the crop is harvested. The outlay on manures and seed comes early in the crop's life, and this outlay is greater than that required for any other common field crop. It is especially heavy when the expenses of Scottish or Irish seed are added to the relatively high rate of expenditure on fertilisers usually incurred by potato growers.[1] A lot of money can be locked up in the early stages of the life of a crop which may not be sold off until the early summer of the following year.

The expenditure on manual labour is more evenly spread over the crop's life. Table XLIX gives estimates of the manual labour requirements at different stages, together with estimates of total average requirements for horse and tractor work.

TABLE XLIX

POTATOES. ESTIMATED LABOUR REQUIREMENTS Per Acre[2]

(*a*) Total Labour Requirements.

Hours

	1951	1952
Manual Labour ..	148	154
Horse Work	14	14
Tractor Work	22	26

(*b*) Estimated Distribution of Manual Labour.

Hours

Operations	1951
Pre-Harvest ..	40
Harvesting	74
Riddling and Bagging	34
TOTAL	148

(1) The average cost of seed per acre is based on the costs of both purchased and home grown seed. Where only purchased Scottish or Irish seed is used the cost would be greater.

(2) These estimates are based on costs divided by the relevant standard hourly charges. Quite a lot of female and child labour was employed at harvest time. The total cost of this type of labour has been divided by the standard hourly rate for an adult male, so expressing it in terms of adult male workers.

Muck spreading, setting and cleaning the crop are the most labour demanding of the pre-harvest operations. The peak of labour demand, however, came at harvest time. The final process when the crop is taken out of the clamp, riddled and bagged up, requires a considerable amount of labour time, consequently a fair proportion of total labour costs is not incurred until just before the crop is sold.

The use of mechanical planters and harvesters affords considerable potentialities of saving labour. Planters and harvesters were used on some of the farms co-operating in the investigations. In 1952 about half the acreage costed was set with potato planters and about a third mechanically harvested.(1)

Report 117 gives some information about the costs of operating mechanical harvesters. These refer to the machines owned by the individual farmers and not to contractors' machines which lifted a fair proportion of the acreage. Only four machines were costed—three elevator-diggers and one complete harvester—so that the figures obtained are probably not representative of the performances of these types of machines. This is especially true for the complete harvester which had several breakdowns.

In this sample, there was little difference in costs per ton and per acre between crops harvested by elevator-diggers and crops lifted in the usual way with a spinner. The saving in labour costs was only approximately 15 shillings an acre and this was mainly offset by the higher depreciation and repair charges. The complete harvester, however, had a far lower labour cost per acre but a far higher depreciation charge. This suggests that it would not be economic to use such an expensive machine for a small acreage.(2)

(1) Figures from the mechanically planted and harvested acreages enter into all the averages given in this section.

(2) See Sections on Combines and Sugar Beet Harvesters for a discussion on depreciation. The annual depreciation charge taken for the elevator-diggers was £19 9s. 4d. and for the complete harvesters £60 15s. 6d. It is not possible to give any figures for the manual labour requirements of the different methods.

References

Farmers' Report No. 114

Some Costs of Growing Potatoes in Yorkshire in 1951.

Farmers' Report No. 117

Some Costs of Growing Potatoes in Yorkshire in 1952.

12. SUGAR BEET

The costs and returns of growing sugar beet have been the subject of five investigations. All the farms concerned were in the Vale of York, mostly within a thirty-mile radius of either the Poppleton or Selby factories of The British Sugar Corporation. The great majority of these farms were on lightish soils although a few costs were obtained from fields on the heavier warps of the Goole district. Results from the lighter and heavier soil groups are given separately in the 1948 and 1949 reports.

On the farms studied, sugar beet was generally taken after a white straw crop—usually wheat. Manuring practices were also relatively similar from farm to farm. After a white straw crop the land received a dressing of muck, about 12 tons an acre, although a few farmers applied shoddy or sewage sludge instead—dressings of these averaged 2 tons an acre. On a few farms beet was taken after another root crop, generally potatoes, and the practice here was not to muck directly for beet since the land had been mucked for the previous crop. Whether the land was mucked or not therefore depended on the type of crop previously grown and the manurial treatment it had received. But, on almost all the fields costed, organic manure had been applied either in the year that beet was taken or in the previous year.

Whether or not land was directly mucked for beet made little difference to the amount of tillage applied. Dressings averaged about half a ton to the acre of compound fertiliser. Some farmers applied salt in addition at the rate of about 3 cwt. an acre. As might be expected from this description of cultural practices, manuring costs were high.

On the heavy and light soils, seeding rates averaged 15 lbs. and 12 lbs. an acre respectively. Rows were usually 22 inches, 24 inches or 26 inches apart.

The financial results of the five investigations are summarised in Table L(a). Perhaps the most striking point is the considerable variation in the level of profits per acre from year to year. The main cause of this variation lies in returns per acre rather than in costs.

If the results for 1948 and 1949 are taken, it will be seen that profit per acre in 1948 was £9 9s and in 1949 £35 13s., about four times as great. The difference in net costs per acre was less than £2. Yields, however, averaged 9.6 tons per acre in 1948 and 14.5 tons in 1949. These differences cannot be ascribed to changes in the sample of farms since it was basically the same in the two years.

In 1948 out of some 82 crops costed only 15 had a yield of 11 tons or more of beet to the acre, while in the next year out of a total of 74 crops only 14 had a yield of less than 11 tons (see Table LI).

To attempt an explanation of why yields should vary so much from year to year is to tread on controversial ground. Climatic conditions, the incidence of pests and diseases must all influence yield. The writer of the 1946 report summarises the results of the two earlier reports and ascribes most of the differences in yield to weather conditions; lack of sunshine in the growing season being in his opinion an important factor. In 1948 the summer in Yorkshire was rather cold and wet, in 1949 it was exceptionally sunny and dry. In this latter year beet yields in Yorkshire were greatly above average.[1]

TABLE L

SUGAR BEET

(*a*) Returns, Net Costs and Profits per Acre and per Ton[2]

	Per Acre			Per Ton		
	Returns	Net Costs	Profit	Returns	Net Costs	Profit
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1944	37 3 0	31 6 0	5 17 0	4 3 6	3 10 6	0 13 0
1945	51 11 0	31 16 0	19 15 0	4 10 6	2 16 6	1 14 0
1946	48 16 0	33 3 0	15 13 0	4 12 0	3 2 6	1 9 6
1948	50 17 0	41 8 0	9 9 0	5 6 6	4 7 3	0 19 3
1949	78 13 0	43 0 0	35 13 0	5 8 6	2 19 3	2 9 3

(*b*) Yields per Acre Clean Beet. Sugar Content and Percentage of Tare. Averages of Five Investigations.

	1944	1945	1946	1948	1949
Average Yield (Tons) ..	8·9	11·5	10·6	9·6	14·5
Per Cent. Sugar Content ..	15·7	16·2	15·1	15·7	15·8
Per Cent. Tare	20·8	12·4	16·1	16·4	15·2

(1) See Journal of the Yorkshire Agricultural Society, 1950, Page 50.

(2) Returns. Sales of clean beet.

Net Cost. Gross costs minus net manurial residues, credits for cleaning value of the beet and for the feeding value of the tops.

1948 & 1949 Figures. Weighted averages of Light & Heavy Land Groups.

Table L(b) gives the sugar content and tare percentages relating to each investigation. The levels of these are influenced by the weather. Sugar contents are depressed by lack of sunshine and wet harvest conditions increase tare percentages. The return from the crops is, of course, affected by variations in sugar content. In 1949 for every 1 per cent. variation above or below 15.5 per cent. five shillings a ton was added or substracted. A high tare percentage does not affect the price paid for the crop but lifting and hauling unnecessary quantities of soil adhering to the roots adds to the cost of harvesting. Of the five years in which costs were collected, it is interesting to note that the two years with the highest yields had also above average percentages of sugar content and below average tare figures.[1] The variation in sugar content is not, however, very marked from year to year.

To return to the financial results shown in Table L*a*; during the period of the investigations returns per ton and costs per acre increased gradually from one year to another mainly as a result of the general inflationary tendency of the time. Costs per ton, however, have a most erratic course. In 1949 they were lower than in 1944. The reason for this lies in differences in yields.

TABLE LI

SUGAR BEET

Net Costs per Ton at Different Yields per Acre of Clean Beet.[2]

1948 Investigation			1949 Investigation		
Yield Per Acre Clean Beet	No. of Costs	Net Cost Per Ton	Yield Per Acre Clean Beet	No. of Costs	Net Cost Per Ton
		£ s. d.			£ s. d.
Under 7 tons ..	14	8 0 0	Under 10 tons ..	5	4 0 1
7·0-7·99 tons ..	10	5 6 9	10·0-10·99 tons ..	9	3 17 6
8·0-8·99 tons ..	10	4 9 2	11·0-11·99 tons ..	13	3 14 10
9·0-9·99 tons ..	12	4 8 4	12·0-12·99 tons ..	9	3 7 6
10·0-10·99 tons..	21	4 3 6	13·0-13·99 tons ..	6	3 4 3
11·0-11·99 tons..	7	4 1 0	14·0-14·99 tons ..	7	2 19 0
12 tons and over..	8	3 8 6	15·0-15·99 tons ..	9	2 16 0
			16·0-16·99 tons ..	7	2 14 7
			17 tons and over ..	9	2 6 3
	82			74	

(1) It is interesting to note that the costs per acre of harvesting the 1944 crop were slightly higher than those for the 1945 crop, despite the fact that yields in the latter year averaged 2½ tons an acre more. According to the writer of the 1945 report, unfavourable weather at harvest time and high tare percentages were contributory factors.

(2) These are reproductions of Table VII, Page 11, Report 83, and of Table IX, Page 13, Report 91. All costs are simple averages as opposed to the weighted averages of the other tables in this section.

TABLE LII

SUGAR BEET

Costs per Acre

	1944	1945	1946	1948(*b*)	1949(*b*)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Costs to Harvest—					
Cultivations	9 16 0	10 5 0	10 15 0	13 6 0	13 5 0
		(*a*)	(*a*)		
Manures	9 15 0	7 0 0	6 7 0	11 15 0	12 14 0
Seeds	0 16 0	0 15 0	0 15 0	0 17 0	0 19 0
Rent and Rates ..	1 5 0	1 7 0	1 9 0	1 13 0	1 16 0
Overheads	2 7 0	2 12 0	2 10 0	4 15 0	4 12 0
TOTAL Gross Costs to Harvest	23 19 0	—	—	32 6 0	33 6 0
Harvesting Costs—					
Ploughing out, Lifting and Topping ..	6 0 0	6 0 0	6 16 0	7 4 0	7 0 0
Carting and Loading ..	2 19 0	2 2 0	2 18 0	3 2 0	4 4 0
TOTAL Harvesting Costs	8 19 0	8 2 0	9 14 0	10 6 0	11 4 0
Transport to Factory ..	3 13 0	4 13 0	4 15 0	4 6 0	6 5 0
TOTAL Gross Costs..	36 11 0	—	—	46 18 0	50 15 0
Less Credits—					
Net Manurial Residues	2 12 0	(*a*)	(*a*)	3 1 0	4 3 0
Tops and Cleaning Value	2 13 0	2 18 0	3 2 0	2 9 0	3 12 0
TOTAL Credits ..	5 5 0	—	—	5 10 0	7 15 0
TOTAL NET COSTS	31 6 0	31 16 0	33 3 0	41 8 0	43 0 0

(*a*) Only net manure costs available.

(*b*) Weighted average of Heavy and Light Land Groups.

The connection between costs per ton and yield per acre was studied in some detail in the 1948 and 1949 investigations. Table LI gives the results of this analysis. It will be seen from the table that increases in yield went with a decrease in cost per ton and the differences in costs per ton between farms with high yields and those with low yields is considerable.

On the farms studied, costs per acre did not increase proportionally with increases in yields. Growers had very similar rates of expenses per acre whether their crop was good or mediocre. The cost differences between those with the better yields and those with the poorer are little more than would be expected from the increased costs of harvesting the heavier crops. The level of expenditure on the great majority of fields costed was sufficient to cover normal cultivations and manurial practices. This would suggest that poor yields were not necessarily the result of doing the crop badly by skimping on cultivations and manures.

The average costs of the investigations are broken down into their constituent items in Tables LII and LIII. The first table is concerned with costs per acre. The second with the percentage breakdown of costs. The cultivation and harvesting costs given in the first table are further subdivided in the second, and items for manual labour, horse and tractor work separated out.

TABLE LIII

SUGAR BEET

Percentage Breakdown of Cost Structure.(1)

Investigation	Total	Manual Labour	Net Manures & Seed	Horse work	Tractor work	Rent & Rates	Other Costs
1944 ..	100	45	23	5	4	4	19
1946 ..	100	46	20	5	4	4	21
1948 ..	100	43	23	2	6	3	23

(1) The 1948 figures are based on composite average costs. Manual labour, horse and tractor work costs are available for the majority of light land farms. Averages relating to these farms have been used together with average costs for net manures, rent and rates and other costs from the whole sample. Costs from mechanically harvested acreages are excluded.

A large proportion of the total costs is accounted for by cultivations and harvesting. Most of the expenditure in these operations consists of the costs of manual labour. The sugar beet crop makes heavy demands on labour, a point which is discussed more fully at a later stage.

Expenditure on manures and fertilisers is at a fairly high level and the land has been left richer in manurial residues, hence the credit item which is deducted from total costs. Other credits are allowed for the cleaning value of the crop and for the value of the sugar beet tops. Beet fulfils the function of a cleaning crop in the rotation. The credit allowed for the tops is based on their value as manurial residues rather than on their value as stockfeed. In all the investigations a proportion of the tops were fed to stock.[1]

As growers have to deliver the beet to the factory at their own expense, an item for transport costs is included in Table LII. These costs are quite considerable, amounting to £6 5s. an acre in 1949.

The results for light and heavy land growers are given separately in the 1948 and 1949 investigation; costs and returns are fairly similar. In both years the heavy land farms had the higher costs and returns but slightly lower rates of profit. Yields tended to be slightly higher than those obtained by light land growers. The main differences in costs lay in the expenses of harvesting and in rent and rates. The higher harvesting costs—particularly in ploughing out the beet—are probably due to the heavier type of soil, while the rent and rates item includes drainage rates which are considerable in a Warpland district.

Estimates of the average man labour requirements of four investigations are given in Table LIV. The average numbers of horse and tractor hours are also given. Except for 1944, all these figures are estimates, based on the financial costs divided by a standard hourly charge. For 1944 the actual figures are available.

TABLE LIV
SUGAR BEET
Estimated Labour Requirements per Acre to nearest hour[2]

	1944	1946	1948	1949
Man Hours ..	185	175	168	158
Tractor Hours ..	10	10	18	21
Horse Hours ..	46	38	18	17

(1) The utilisation of sugar beet tops is given in some detail in Report 91. On the light land farms only a few growers ploughed their tops in ; the great majority fed them to cattle and sheep. The usual practice was to cart the tops away for feeding to cattle but to let the sheep eat them off in the field. Few heavy land farmers fed their tops to sheep; most either carted them off for cattle or else ploughed them in.

(2) 1945 figures not available. Other figures included do not relate to mechanically harvested crops.

Table LIV illustrates the tendency to replace horses with tractors, a change which leads to a reduction in the man labour involved in farming operations.[1] Probably this change is the main reason for the reduction in manual labour requirements shown in the table.

TABLE LV

SUGAR BEET

Estimated Manual Labour Requirements per Acre Some Light Land Farms. 1949 Investigation

	Man Hours
Cultivations carried out before the crop comes up	26
Singling and Cleaning	59
Total Cultivations up to Harvest ..	85
Ploughing out, Lifting and Topping ..	51
Carting and Loading	22
Total Harvest	73
Total Growing and Harvesting	158

In order to give an idea of the relative demand for labour at different times of the crop's life, some composite figures are given in Table LV. They are based on averages of certain light land farms for various operations carried out in 1949.

Thirteen of the 26 man hours involved in the cultivations carried out before the crop comes up, were for time spent carting and spreading muck. Of the time involved in the singling and cleaning operations 55 hours were for hand hoeing.

Peak labour demands are at singling and harvesting times. The labour hours and cost figures given in this section refer only to beet which has been harvested by hand. Some of 1949 crop was harvested mechanically.[2] The whole subject of the mechanical harvesting of beet is dealt with in Section 16.

[1] Considerable information about the time taken to carry out various operations according to whether a horse or a tractor is used, is given in Reports 83 and 91.

[2] Data from mechanically harvested crops are included in the averages of Tables L, LI and LII but excluded from Tables LIII, LIV and LV.

5 light land growers with a total of 127 acres used mechanical harvesters in 1949.

References

Farmers' Report No. 57.
Sugar Beet Costs and Returns on 27 Yorkshire Farms. 1944.

Farmers' Report No. 62.
Sugar Beet Costs and Returns. 1945.

Farmers' Report No. 70.
Sugar Beet Costs and Returns. 1946.

Farmers' Report No. 83.
Some Yorkshire Sugar Beet Costs. 1948.

Farmers' Report No. 91
Some Yorkshire Sugar Beet Costs. 1949.

13. CARROTS

The district around Market Weighton and Pocklington is one of the most important carrot growing areas in the country. In the late 1930's and early 1940's some 1,500 to 2,000 acres of carrots were grown annually in the locality where soil conditions are especially favourable to carrot growing, the soil being a deep, easy working sand.

In 1942 an investigation was made into the costs of growing carrots in the Market Weighton area and information was obtained from growers in some 19 parishes.(1) The sample probably represented about one-quarter of the growers and one-third of the acreage involved; it tended, however, to be biased in favour of the large growers since all farms under 50 acres in size were excluded. The average acreage of carrots grown per farm in the sample was between 9 and 10 acres.

Cultural practices are given in some detail in the report. No uniformity was observed as regards the place of the crop in the farm rotation. About half the crops costed were grown on the flat and the other half on the ridge.

The general practice was to apply 6 to 10 cwts. per acre of compound tillage—usually a special potato or sugar beet mixture. The land was seldom mucked directly for carrots. Fresh manure is believed to cause fangy and split roots. Most of the land concerned probably had a high level of organic content since it was usual to muck heavily for sugar beet and potatoes, two of the main crops grown on the farms costed.

Seeding rates averaged between 3 and 4 lbs. an acre. Only one variety of carrot was grown, Stumped Root Intermediate. Sowing was carried out in late April and early May.

Cleaning the crop is a complicated matter calling for considerable skill and judgment on the part of the grower, especially in connection with the first hoeing operation when the land is cleaned just before the crop is properly up. Crops are generally horse-hoed about half-a-dozen times and the carrots in the rows themselves hand weeded. Lifting is usually done in November, and on the farms costed in 1942, was all done by hand. The carrots are topped, carted and pied and after sorting and bagging, finally sold off the farm in late winter and early spring.

(1) The 19 parishes are:—

Allerthorpe	Full Sutton	Seaton Ross
Barmby Moor	Hayton	Shipton Thorpe
Bielby	Market Weighton	South Cliffe
Catton	Melbourne	Stamford Bridge
Everingham	Pocklington	Sutton-upon-Derwent
Fangfoss	Sancton	Thornton
		Wilberfoss

Hand weeding and lifting make heavy demands on labour. In the 1942 investigation most of this work was done by casual labour employed on piece rates. Many of these casual workers were women from Goole.

No figures are available for returns and profits but details of costs are given in Table LVI. These relate only to successful crops. Crop failures were excluded since it was felt that to use the costs relating to them would distort the average figures, especially those per ton of carrots grown.(1)

Manual labour is the most important item of cost, accounting for about 60 per cent. of the total. Next comes the costs of net manures and seeds. The haulage charge arises from the fact that most growers bore the cost of transporting their carrots to the nearest railway station.

In the absence of data relating to financial returns it is not possible to say much about profits. Analysis of individual costs, however, shows that a high yield per acre was associated with a comparatively low cost per ton. This suggested that good crops do not cost very much more to grow per acre than poor crops, consequently the better crop would leave a proportionally greater rate of profit on the costs incurred.

TABLE LVI

CARROTS. BREAKDOWN OF COSTS

1942 Investigation

	Per Acre
	£ s. d.
Growing Costs to Harvest—	
Cultivations	11 3 0
Net Manures and Seeds	8 2 0
Rent	1 11 0
Overheads	2 0 0
TOTAL TO HARVEST	22 16 0
Harvesting Costs—	
Lifting and Pieing	11 1 0
Dressing and Bagging	4 3 0
Haulage	2 11 0
TOTAL NET COSTS	40 11 0
Average Yield per acre	14·1 tons
	£ s. d.
Average Net Cost per Ton	2 17 3

(1) Out of 51 farms costed, 5 had crop failures.

Since 1942—the date of this investigation—considerable changes have taken place in the techniques of carrot growing. It is now possible to clean the crop by spraying and to top and lift the roots mechanically. All this of course leads to a considerable saving in manual labour. How widespread these new practices are and how their costs compare with the older methods has not yet been investigated.

Reference

Farmers' Report No. 41.
Carrot Costs in the East Riding of Yorkshire.

14. FARM MACHINERY AND FARMING SYSTEM. 1950

From the late 1930's onwards a revolution was taking place on the farms of this country. One of its main features was the replacement of horses and horse-drawn implements by tractors and their ancillary equipment. On some of the larger farms such expensive machinery as combine harvesters became a familiar sight.

The gradual revolution is shown in the accounting data collected from Yorkshire farms. Many farmers, especially those concerned with arable types of farming systems, were re-equiping their farms in the period 1940-50 and considerable sums were invested in new machinery.(1)

This section is concerned with the results of an investigation into the number and types of machines found on farms co-operating in the Farm Management Survey in 1950; a date when the re-equipment was by no means over.

The investigation was designed to show what machinery was normally found on farms of varying sizes following seven different types of farming systems. The seven systems are :—

Cash Roots.
Heavy Land Arable–Non-Intensive Livestock.
Mixed without Milk.
Wold.
Mixed with Milk.
Small Cash Roots—Milk.
Small Cash Roots—Non-Milk.

The Swaledale and Intensive Milk Groups are excluded. The number of machines found on these farms in 1950 was small—the usual complement was a couple of carts and a grass reaper. Tractors were few and far between.

Shortage of space does not permit the inclusion of the machinery lists here, so for further details the reader is referred to the original report.(2)

The complements are classified first according to the type of farming followed and then according to the acreages of arable land and of the different crops grown. This classification has been adopted because the type of farming followed is of greater importance than farm size in determining what machinery is found. Within a farming system, the effect of farm size is shown by the variation in the size of the arable and other crop acreages.

(1) Most of the emphasis was on buying tractors and their ancillary equipment, i.e. tractor ploughs, trailers, etc. On an identical sample of 15 Cash Root farms, a total of £11 4s. an acre was spent from 1940-41 to 1949-50 on new machinery, 60 per cent. of the amount going on tractors and their ancillary equipment. Corresponding figures for an identical sample of Wold farms are £6·9 an acre, 55 per cent. of this going on tractors and their ancillary equipment.

(2) Machinery complements include most of the common types of machines found on farms. Excluded, however, are handtools, items of livestock equipment such as hen houses, drinking and feeding troughs and tenants' fixtures such as Dutch barns, etc. All these items are included in the machinery and equipment valuation figures of the Farm Management Survey.

Within a farming system the number of tractors varied with the size of the arable acreage; the number of tractor ploughs and tractor trailers with the number of tractors. The types and numbers of harvesting machines bore a distinct relationship to the acreages of the relevant crops grown. On the other hand most of the other types of farm machinery appear to have little relationship to the size of the farm.

An idea of the tractor position on the co-operating farms in 1950 is given in Table LVII. It will be noted that tractor numbers are related to sizes of arable acreages. The original report also contains tables relating the sizes of corn, sugar beet and potato acreages to the types of harvesting equipment found.

TABLE LVII

TRACTORS 1950

Arable Acreages at which the 1st, 2nd, 3rd and 4th tractors tend to appear

	Cash Roots	Heavy Land Arable Non-Intensive Livestock	Mixed Without Milk	Wold	Mixed With Milk	Small Cash Roots (both groups)
1st Tractor	All have 2	All have 1	All have 2	50 acres	All have 1	35
2nd Tractor	All have 2	100 acres	All have 2	100 acres	75 acres	—
3rd Tractor	150 acres	200 acres	150 acres	250 acres	200 acres	—
4th Tractor	250 acres	350 acres	—	400 acres	—	—

In 1950 Cash Roots farms were the most mechanised in relation to the sizes of their arable and crop acreages. They were more intensively equipped with tractors, land working, seeding, fertilising and carting equipment than were farms of the other groups, but perhaps one of the most interesting features of their machinery complements was the amount of specialised harvesting machinery found. Where these farms had relatively large corn, potato and sugar beet enterprises, combines, pick-up balers, sugar beet and potato harvesters were found.(1) Another surprising feature is that although the Cash Roots farms had the most tractors, they also had the most working horses. These were presumably kept for carting at root harvest and for row crop work.

(1) On Cash Roots farms in 1950 where there were over 200 acres of corn a combine was usually used; where there were over 50 acres of potatoes a potato harvester generally appeared; where the sugar beet acreage was over 20 acres separate topper-lifters tended to be used and where the beet acreage was over 50 a complete sugar beet harvester.

Table LVIII below is designed to give some idea of the costs of equipping farms with the machinery complements of the 1950 investigation. All machinery is priced at its value new in 1950. Table LVIII therefore overstates the amount of capital invested in machinery on farms except those just starting with completely new machinery. Another purpose of the table is to give a comparison of the degree of mechanisation on farms of various sizes following different farming systems. The greater extent of the mechanisation of Cash Roots farms is shown. Within a farming system the smaller farms have more capital per acre invested in machinery, with the exception of the Cash Roots Group where the appearance of expensive specialised harvesting machinery tends to force up the per acre figure on the larger farms.

TABLE LVIII

ESTIMATED CAPITAL INVESTMENT IN FARM MACHINERY.(1)

(New Prices 1950)

	Cash Roots		Heavy Land Arable Non-Intensive Livestock		Mixed Without Milk		Wold		Mixed With Milk	
	Gross	Per Acre	Gross	Per Acre	Gross	Per Acre	Gross	Per Acre	Gross	Per Acre
acres	£	£	£	£	£	£	£	£	£	£
100	2,900	29	1,600	16	2,300	23	1,700	17	1,600	16
200	3,500	18	2,300	12	2,400	12	2,400	12	2,400	12
300	4,600	15	3,300	11	3,200	11	3,300	11	3,300	11
400	5,000	13	3,300	8	3,200	8	3,300	8	—	—
500	5,600	11	4,100	8	—	—	3,900	8	—	—
600	6,600	11	4,100	7	—	—	3,900	7	—	—
700	8,900	13	5,100	7	—	—	4,300	6	—	—

(1) The gross cost of mechanising a Small Cash Root farm is estimated at £400 with the minimum equipment and at £1,700 with the maximum equipment shown in the relevant machinery complement lists. The minimum sum does not allow for a tractor. The average size of these farms was about 50 acres.

Reference

Farmers' Report No. 103.

A Study of Farm Machinery found in Different Farming Systems in Yorkshire, 1950.

15. COMBINE HARVESTERS, PICK-UP BALERS AND CORN HARVESTING.(1)

In the Wheat Section considerable attention is given to the alternative methods of corn harvesting. Various difficulties which arise in making comparisons between binders and combines are pointed out, especially those arising from the lack of uniformity in the process of combine harvesting. Considerable differences are found from farm to farm in the methods of straw disposal and grain storage. This section is concerned with three investigations into combine costs and one into the costs of operating pick-up balers. In all these investigations the emphasis is on the costs of operating the necessary machines rather than on the costs of the harvesting process as a whole.

In the costing of expensive machinery such as combines, depreciation is important. The actual depreciation of a machine on a particular farm is not known until the machine is either sold or scrapped. With machines in current use all depreciation charges are estimates. A further complication is that considerable controversy exists over depreciation methods and the choice of method can have an appreciable effect on the amount of depreciation charged in a particular cost study.

In these studies depreciation is computed at the annual rate of 15 per cent. on written down values. The yearly charge has then been divided amongst the work done in the particular year on an hourly basis. The hourly depreciation charge for each machine is thus determined by the original price of the machine, its age and the number of hours it worked in the year concerned. But there is no proof that the real cost of depreciation is correctly represented by this calculation.

All this discussion may seem rather artificial to a farmer who owns a combine since once he has bought his machine he probably assesses its depreciation in terms of its second hand market value. It is the potential purchaser of a machine who should go into the whole problem of depreciation very carefully when studying the merits and demerits of mechanising say the corn harvest.

In the tables given here it will be seen that depreciation charges form a large proportion of the total costs. It should be stressed, however, that while these depreciation charges are estimates, the other costs—for example those for labour, fuel and repairs—are factual.

(1) The presentation of this section especially as regards the tables, differs considerably from that adopted in the original reports.

Combine Harvesters

The number of combines costed in each investigation was small, 7 in 1943, 20 in 1949 and 17 in 1950. Machines of various types were included ranging from large self-propelled models with 12 foot cutter bars to the smaller 5 foot cutter bar tractor-drawn machines. The larger type of machine predominated. The majority of machines were baggers ; only a very few tankers were costed. Details of the various types of machines are given in a footnote to Table LIX. Most of the machines were fairly new, the ages of the combines of the 1949 and 1950 investigations averaged 3 and 2½ years respectively.

Table LIX contains details of the costs and performances of the " average machine " costed in each investigation. It will be seen that the main reason for the higher level of average hourly costs in 1950 compared with 1949 is that the hourly depreciation charge is considerably higher.

Table LX contains details of the average costs and performances of 10 large self-propelled 12 foot cutter bar models and 5 tractor-drawn 5-6 foot cut machines included in the 1949 investigation. Average running costs, depreciation and total costs per hour are much the same for both types of machine. The similarity in running costs is the more interesting feature since there is a somewhat fortuitous element in the similarity of the hourly depreciation charge.(1) Although the average running costs per hour are much the same, their breakdown among their constituent items is different. The larger machines have no charge for tractor work but have instead a higher fuel bill.(2) Both types use the same labour force, two men. The charge for repairs is also similar but with such a small sample the incidence of repairs must be largely a matter of chance.

The main point of interest is that both models took about the same time to cut and thresh an acre of corn. Wheat and barley were the main crops combined and the acreages cut by the two models consisted of much the same proportions of these crops. Average grain yields were similar. Consequently costs per acre and costs per ton were much the same for the two machines.

It might be thought that a greater length of cutter bar would give a considerable advantage in the time taken to cut and thresh an acre of corn. The smaller machines studied, however, tended to move round the field at a faster rate than did the larger machines so offsetting the disadvantage of a smaller cutter bar. This tendency

(1) The smaller machine has an annual depreciation charge approximately half that of the larger machine (mainly caused by differences in initial purchase prices) and worked only half the number of hours per season.

(2) Petrol consumption of the 12 foot self-propelled machines averaged 1·92 gallons an hour.

TABLE LIX

COMBINES OPERATIONAL COSTS AND PERFORMANCES PER MACHINE(1)

Average of Various Types of Machines

	1943	1949	1950
Number of Combines Costed	7	20	17
Average annual acreage harvested	132	167	146
Average number of hours used per year	132	153	123
Acres combined per hour	1·0	1·09	1·19
Average grain yield per acre	18½ cwts.	21½ cwts.	22 cwts.
Average annual depreciation charge	(*a*)	£110	£135
	£ s. d.	£ s. d.	£ s. d.
Average Costs per Hour—			
Manual labour	0 3 9	0 5 9	0 5 9
Tractor work	0 1 9	0 1 3	0 0 9
Fuel, Oil and Grease for combine(2)	0 2 0	0 3 0	0 4 0
Repairs	(*a*)	0 4 3	0 1 6
TOTAL RUNNING COSTS	—	0 14 3	0 12 0
Depreciation	(*a*)	0 14 6	1 2 0
TOTAL COSTS PER HOUR	0 15 9	1 8 9	1 14 0
Average Total Costs per Acre	0 15 9	1 6 6	1 8 6
Average Total Costs per Ton of grain	0 17 0	1 4 6	1 6 0
Running Costs as a percentage of Total Costs	—	50	35
Depreciation as a percentage of Total Costs	—	50	65

(*a*) Depreciation not given separately. Repairs and depreciation together amount to 8s. 3d. an hour.

(1) *Types of combines costed;*—

1943 *Tractor-Drawn* 3 five foot cut, 1 eight foot cut
Self-Propelled 1 ten foot cut, 2 twelve foot cut

1949 *Tractor-Drawn* 5 five to six foot cut, 3 eight foot cut
Self-Propelled 2 eight foot cut, 10 twelve foot cut

1950 *Tractor-Drawn* 2 five foot cut, 1 eight foot cut.
Self-Propelled 6 eight and half foot cut, 8 twelve foot cut.

(2) Charge for petrol for self-propelled combines is net in 1950. In that year a petrol rebate of £12 was granted on self-propelled machines as an allowance for the increased petrol tax.

TABLE LX

COMBINES. OPERATIONAL COSTS AND PERFORMANCES PER MACHINE 1949

12 foot Cutter Bar, Self-Propelled and 5-6 foot Cutter Bar Tractor-Drawn Machines

	5-6 foot Cutter Bar Machines	12 foot Cutter Bar Machines
Number of Combines Costed	5	10
Average annual acreage harvested	97	215
Average number of hours used per year	96	195
Acreage combined per hour	1·01	1·10
Average grain yield per acre	21½ cwts.	22 cwts.
Average annual depreciation charge	£62	£139
	£ s. d.	£ s. d.
Average Costs per Hour—		
Manual labour	0 5 6	0 6 0
Tractor work	0 3 0	—
Fuel, Oil and Grease for Combine	0 1 9	0 4 0
Sundries	—	0 0 6
Repairs	0 3 0	0 3 6
TOTAL RUNNING COSTS	0 13 3	0 14 0
Depreciation	0 13 0	0 14 3
TOTAL COSTS PER HOUR	1 6 3	1 8 3
Average Total Costs per Acre	1 6 0	1 5 9
Average Total Costs per Ton of grain	1 4 3	1 3 3
Running Costs as a percentage of Total Costs	50	50
Depreciation as a percentage of Total Costs	50	50

is well borne out by experience elsewhere. Both types of machine had approximately the same size of drum and with heavy crops, especially those with long straw, it is the size of the drum rather than the length of cutter bar which determines the time taken to harvest an acre.

Although wheat and barley accounted for the larger part of the acreage combined, a modest acreage of oats was cut in each of the three years. Other crops combined included peas, rye, clover for seed and beans. The acreages of these latter crops were very small. Wheat took longer to combine than barley, the difference in straw length being the responsible factor.

The labour force required to operate a combine usually included a man to bag the grain and another man to drive the combine if it was self-propelled, or to drive the tractor when a tractor-drawn machine was used. Labour costs also include allowances for the time spent on routine maintenance—such as greasing—on field repairs and in moving the machines from field to field. In the 1949 investigation for every 7½ hours hours a combine was in use, the equivalent of two man hours was spent on an average on such tasks.

Pick-up Balers

Most farmers co-operating in the 1949 and 1950 combine investigations used pick-up balers to deal with the straw left behind by the combine. Table LXI contains details of the costs and performances of the "average machine" of the 1950 investigation. The balers costed were a fairly uniform set of machines, being of similar size and type (engine driven, high density balers) and with one exception were all new in 1950 and cost much the same amount.

The balers were used for both hay and straw. In calculating the average costs the assumption is made that the hourly costs of baling hay and straw are identical except for the charge for twine. Hay forms a denser and heavier bale than straw, consequently a ton of hay requires less twine than does a ton of staw and twine is a large item in the costs of baling.

From Table LXI it will be seen that hay cost more to bale per hour and per acre but less per ton than did straw. Hay yields per acre were higher and the average quantity of hay baled per hour was 54 cwt. against 32 cwt. of straw. Straw cost more per ton to bale since it took longer to bale a ton of straw and more twine was needed.

Straw yields in the 1950 investigation averaged only 15 cwt. an acre, a very low figure. In combining the tendency is to cut corn at a greater height from the ground than is usual with a binder. Balers also tend to leave quite a lot of loose straw on the field.(1)

Table LXI shows that the charge for twine was the largest single item in running costs comprising over half the total. Other charges include those for tractor work and manual labour. The balers were tractor drawn and were controlled entirely by one man—the driver of the tractor.

(1) See also Agriculture Vol. LX No. 7, October, 1953. Page 331 "Thus it would seem that compared with the binder, the pick-up baler removes only half as much straw from the field."

TABLE LXI

COSTS AND PERFORMANCES OF PICK-UP BALERS, 1950

Estimated Average Costs for Baling Hay and Straw

	Straw	Hay
	£ s. d.	£ s. d.
Average Costs per Hour—		
Manual labour	0 3 0	0 3 0
Tractor work	0 4 0	0 4 0
Twine	0 12 9	0 14 9
Fuel for Baler	0 2 0	0 2 0
Repairs	0 1 3	0 1 3
TOTAL RUNNING COSTS	1 3 0	1 5 0
Depreciation	0 10 6	0 10 6
TOTAL COSTS PER HOUR	1 13 6	1 15 6
Total Costs per Acre	0 16 0	1 1 0
Total Costs per Ton	1 1 0	0 13 0
Depreciation as a percentage of Total Costs	31	30
Average acreage baled a year	177	130
Average acreage baled an hour	2·1	1·7
Average yield per acre	15 cwt.	32 cwt.
Average output per hour per baler	32 cwt.	54 cwt.
Number of Balers Costed	7	
Total Hours worked per year per baler	161	
Average annual depreciation charge	£85	

(') The charge for the baler's petrol is net. In 1950 an allowance of £6 per machine was granted as a rebate on the petrol tax. Petrol consumption of the machines costed averaged about 0·8 gallons an hour.

Combines and Corn Harvesting

None of the costs given so far include the costs of hauling grain from the combine to the farm or the costs of collecting and stacking straw bales. Other additional costs incurred by some of the co-operating farmers include charges for dressing and drying grain and for sack hire. Six Farmers had their grain dried by contract in 1950 at a cost ranging from 30s. to 42s. 6d. a ton.

Table LXII gives the average cost per acre for each operation. The individual averages are based on the number of farms on which such operations were actually performed. The totals are composites, consisting of the averages for each operation. *The importance of depreciation must be stressed again, 65 per cent. of the combining cost and 31 per cent. of the baling cost given in the table consist of depreciation charges.*

The drying costs are contract charges ; what they would have been if the farmers concerned had dried their own grain, is not known. Except for sack hire charges no costs for grain storage are included. Also excluded from the costs given here are interest charges on the capital involved in the purchase of a combine and baler.

TABLE LXII

CORN HARVESTING

Some Average Costs per Acre given in the 1950 Combine Investigation

	Grain sold direct from combine	Grain dressed and then sold	Grain dried and then sold
	£ s. d.	£ s. d.	£ s. d.
Combining	1 11 3	1 11 3	1 11 3
Hauling Grain	0 5 3	0 5 3	0 5 3
Baling Straw	0 16 0	0 16 0	0 16 0
Hauling and Stacking Bales	0 7 0	0 7 0	0 7 0
Dressing Grain	—	0 9 6	—
Sack Hire	—	0 2 3	0 2 3
Drying Grain	—	—	1 15 0
TOTAL AVERAGE COSTS	2 19 6	3 11 3	4 16 9

The saving in manual labour is generally the main advantage secured by using a combine for corn harvesting. The manual labour requirements of the 1950 investigation are given in Table LXIII. The total labour requirements are composite averages, but no allowance has been made for the additional labour involved when grain is dressed, dried or stored on the farm.

The 1950 wheat investigation gave an average of 23 man hours an acre for cutting with a binder and threshing; manual labour requirements at harvest time were 14 hours an acre and threshing required 9 man hours an acre.(1) Combines secure a great reduction in labour but not all this labour is saved at the peak time of harvest; some represents the labour used in threshing which is usually done at a slack time of the year. To get the full advantage from the use of a labour saving machine it is necessary to find other work on the farm for the labour displaced or to reduce the size of the farm staff.

TABLE LXIII

CORN HARVESTING BY COMBINE
MANUAL LABOUR REQUIREMENTS—1950 INVESTIGATION

Per Acre

	Man Hours
Combining	2·2
Hauling Grain	1·3
Baling Straw	0·6
Hauling and Stacking Bales ..	1·9
	6·0

The costs of mechanised corn harvesting are reduced when grain is sold straight from the combine and the expense of installing a drier and storage plant is avoided. In Table LXII the average costs of those co-operating farmers who had their grain dried are considerably greater than those who sold their grain directly off the combine. The present tendency (1954) is for combine owners to encounter increasing difficulty in selling their corn direct from the combine. The return to a freer grain market may well mean that corn prices at harvest time will be comparatively depressed by the large quantities of combined grain coming on the market and it may be impossible to move some of the poorer quality high moisture content grain. Combine owners may be faced with the alternatives of either installing their own drying and storage plant or having their grain dried and stored by outside agencies at a price.

(1) Wheat Section. Table XXXIX, Page 76.

The more elaborate the combine process the higher the cost and the more comparable the end products are with those of the conventional method of harvesting. In comparing the costs of the two methods the difficulty of assessing depreciation arises. One point, however, can be made. Most of the depreciation on a machine is in all probability an overhead charge and overhead charges per hour or per acre are reduced to their minimum when a machine is used to its full capacity. The potential combine owner should therefore consider whether the acreage to be harvested justifies the use of such an expensive machine.

References

Farmers' Report No. 47
Some Yorkshire Combine Harvesting Costs in 1943.

Farmers' Report No. 85
A Study in the Costs of Operating Combine Harvesters and One Man Pick-up Balers in Yorkshire, 1949.

Farmers' Report No. 95
A Study in the Costs of Operating Combine Harvesters and One Man Pick-up Balers in Yorkshire, 1950.

16. SUGAR BEET HARVESTERS

In 1949 and 1950 investigations were made into the costs and performances of sugar beet harvesters. The results, however, were not published in separate Farmers' Reports but instead a summary of the 1949 investigation was given in an appendix to a Sugar Beet Report[1] while an article based on the 1950 results appeared in the Farmers' Weekly.[2] This section, therefore, is an expansion of a point made in one individual report.

One way of harvesting sugar beet mechanically is to use two separate machines, one to top and the second to lift the beet; another way is to use a complete harvester which performs both operations. Three types of machines were costed in the investigations, separate toppers, separate lifters and complete harvesters. Within each of these classes nearly all the machines concerned were of the same model, make and age. No machines with top saving devices or loading mechanisms were studied; the tops lay on the field where they were severed and the roots were deposited in small heaps at regular intervals. All the machines worked only one row at a time. The majority of the machines were new in 1949 and in their second season in 1950. A set of a separate topper and lifter cost about £150 new and a complete harvester about £550.

In costing sugar beet harvesters the problem of how to assess depreciation arises. The method adopted here is the annual rate of 15 per cent. on written down values. There are two important implications of this method. Firstly the annual depreciation charge decreases in amount each year of the machine's life, and secondly in any one year the average depreciation charge per hour or per acre is determined by the size of the annual depreciation charge and the number of hours or acres that the machine works in the year concerned. For a fuller discussion of depreciation the reader is referred to the Combine Section (Pages 105-113).

(1) Farmer's Report 91, Pages 20-22. Figures given in Table F, Page 21, have since been revised.

(2) The Farmers' Weekly, 14.9.1951. "To Buy or not to Buy."

TABLE LXIV

SUGAR BEET HARVESTERS

COSTS AND PERFORMANCES OF SEPARATE TOPPERS

Per Machine

	1949 Investigation	1950 Investigation
Number of Machines Costed	10	23
Average number of hours used a year	84	48
Average number of acres worked a year	24	12
Time taken to work an acre	3·5 hours	4·0 hours
Average annual depreciation charge	£ s. d. 6 6 0	£ s. d. 5 4 0
Costs per Hour—		
Manual labour	0 2 6	0 2 6
Horse Work	0 1 3	0 1 3
Repairs	0 0 4	0 0 3
TOTAL Running Costs	0 4 1	0 4 0
Depreciation	0 1 6	0 2 2
TOTAL Costs	0 5 7	0 6 2
Per Acre—		
TOTAL Running Costs	0 14 4	0 16 0
TOTAL Costs	0 19 7	1 4 8
Depreciation as a percentage of Total Costs	27	35

NOTE. These costs refer to a horse-drawn topper worked by one man. The depreciation charges and repair costs are the averages for the sample costed. Most machines were new in 1949.

Tables LXIV, LXV and LXVI are concerned with separate toppers, lifters and complete harvesters respectively. The costs given are those incurred in the actual working of the machines, not the costs of harvesting sugar beet. Collecting and carting beet and tops from the field together with other incidental expenses, represent harvesting costs additional to those shown in the Tables.

One form of incidental expense not included in Table LXIV is the cost of pushing tops aside after they have been severed by a separate topper. Unless these are removed from the path of the oncoming lifter, they are likely to get damaged and lose some of their feeding value. Of the 33 toppers costed, only in two cases were the tops left where cut. The usual method of pushing them aside was to use a side delivery rake although some growers had the work done entirely by hand.(1)

(1) 3 to 4 men were employed for pushing the tops aside by hand. Where a horse drawn side delivery rake was used only one man was necessary. It is interesting to note that where complete harvesters were used no operators bothered to have the tops pushed aside, although these would be damaged by the machine when it came round the field again.

TABLE LXV

SUGAR BEET HARVESTERS

COSTS AND PERFORMANCES OF SEPARATE LIFTERS

Per Machine

	1949 Investigation	1950 Investigation
Number of Machines Costed	11	23
Average number of hours used a year ..	79	48
Average number of acres worked a year ..	22·5	12
Time taken to work an acre	3·5 hours	4·0 hours
Average annual depreciation charge ..	£ s. d. 14 16 3	£ s. d. 12 16 0
Costs per Hour—		
Manual Labour	0 5 0	0 5 0
Tractor Work	0 4 0	0 4 0
Repairs	0 0 2	Nil
TOTAL Running Costs	0 9 2	0 9 0
Depreciation	0 3 9	0 5 4
TOTAL Costs	0 12 11	0 14 4
Per Acre—		
Running Costs	1 12 1	1 16 0
TOTAL Costs	2 5 3	2 17 4
Depreciation as a percentage of Total Costs	29	37

NOTE. These costs refer to a tractor-drawn lifter worked by two men, one man on the tractor, and one following the lifter. The depreciation charges and repairs bills are the averages for the sample costed. Most machines were new in 1949.

The cost figures given in Table LXIV, LXV and LXVI are not averages for the investigation concerned. They relate to actual machines (i.e. machines of the same make and age), to standard working speeds and standard working teams. Most toppers were drawn by horses, so the standard team adopted for a topper is a horse and one man—if the average costs of operating toppers were taken both horse and tractor labour would be included. The standard teams for the separate lifter and complete harvester were drawn up similarly; two men and a tractor for each machine. All growers with separate lifters used a tractor and two men to work their machines, but there was less uniformity as regards the teams for the complete harvesters. A few growers employed an extra man for topping odd beet, while one farmer faced with very wet conditions, used two tractors to pull his machine and three extra men to hand lift the beet in the wetter parts of the field. All these extra costs are excluded from the figures given in the Tables.

TABLE LXVI

SUGAR BEET HARVESTERS

COSTS AND PERFORMANCES OF COMPLETE HARVESTERS

Per Machine

	1949 Investigation	1950 Investigation
Number of Machines Costed	5	15
Average number of hours used a year ..	252	328
Average number of acres worked a year ..	72	82
Time taken to work an acre	3·5	4·0
Average annual depreciation charge ..	£ s. d. 77 14 0	£ s. d. 68 6 9
Costs per Hour—		
Manual Labour	0 5 0	0 5 0
Tractor Work	0 4 0	0 4 0
Repairs	0 1 10	0 4 6
TOTAL Running Costs	0 10 10	0 13 6
Depreciation	0 6 2	0 4 2
TOTAL Costs	0 17 0	0 17 8
Per Acre—		
Running Costs	1 17 11	2 14 0
TOTAL Costs	2 19 6	3 10 8
Depreciation as a percentage of Total Costs	36	24

NOTE. These costs refer to a tractor-drawn harvester worked by two men, one man on the tractor the other on the harvester. The depreciation charges and repair bills are the averages for the sample. Most machines were new in 1949.

The average time taken to work an acre by all the types of machines was 3.5 hours in 1949 and 4.0 hours in 1950. This latter speed differs very little from the generally accepted standard speed for these machines—i.e. approximately four hours an acre under *normal* working conditions. The faster rate attained in 1949 is probably due to the exceptional weather conditions in the late autumn and early winter—seldom have such dry conditions been experienced at sugar beet harvest time.

The labour requirement figures given in Table LXVII are based on standard teams working at the speed of four hours an acre. The figures for hand pulling and topping given for comparison are from the 1949 Sugar Beet Report.

TABLE LXVII

ESTIMATED LABOUR REQUIREMENTS, LIFTING AND TOPPING SUGAR BEET(1) 1950

Per Acre

	Ploughing out, hand lifting and topping	Separate toppers and lifters	Complete harvesters
Man Hours ..	50	12	8
Tractor Hours ..	2½	4	4
Horse Hours ..	—	4	—

(1) Labour involved in pushing tops aside, collecting and carting beet or tops from the field, is excluded.

The saving in manual labour is the main advantage that the use of a mechanical harvester affords. Another advantage is that the whole process is speeded up, provided no serious breakdowns and other delays occur.

Against the saving in manual labour must be offset tractor costs, the repair bills incurred by the machines, and depreciation charges. With a fixed annual depreciation charge, it is obvious that depreciation costs per acre are higher when only a small acreage a year is done than when a large acreage is worked. With small acreages it is clearly uneconomic to use an expensive machine with a high annual depreciation charge. In these investigations the average annual acreage dealt with by a complete sugar beet harvester was in the region of 75 acres. Very few farmers would have a beet acreage of such a size so it is probably no coincidence that most of these machines costed belonged to agricultural contractors.

17.—LAND OWNERSHIP IN THREE DISTRICTS OF YORKSHIRE

This study is based on data relating to individual farms given in the National Farm Survey of England and Wales, 1941-43, which was designed " to form a permanent and comprehensive record of the conditions on the farms of England and Wales—the compilation of a modern Domesday Book."[1]

Individual farm returns were taken for three Yorkshire districts, the eastern portion of the West Riding, the Wolds and Wensleydale. Information relating to farm sizes, land tenure and ownership and allied subjects was abstracted and tabulated.[2]

The choice of districts was made with the aim of getting areas with widely contrasting natural conditions. Part of the Vale of York comes into the West Riding area chosen, the chalk Wolds are a distinct natural region, while Wensleydale is Pennine country.

This study is divided into two parts, one directed to the farm as a unit, the other to the estate. All the acreage figures used in the analysis refer to crops and grass only. Rough grazings are omitted a point to remember in connection with Wensleydale where the proportion of rough grazings is high in comparison with the other two areas.[3]

Farms

Table LXVIII gives the size distribution of farms in the three districts. Ignoring rough grazing, both the West Riding and the Wensleydale sample areas are districts of small farms. By comparison the Wolds area is one of large farms. But while small farms are predominant in the first two districts, it does not follow that they contain a large proportion of the total acreage. In fact in both districts nearly three-quarters of the total acreage is contained in farms of over 100 acres in size, while about 60 per cent. of the farms are less than 100 acres. On the Wolds 55 per cent. of the total acreage is included in farms of over 300 acres in size compared with the corresponding figure of 16 per cent. for the two other districts.

(1) National Farm Survey of England and Wales. A Summary Report. H.M. Stationery Office, 1946: Page 2.

(2) The West Riding sample area accounted for 28 per cent. of the total area of that county, the Wold area 28 per cent. of the East Riding and the Wensleydale sample area 10 per cent. of the North Riding.

(3) By area the proportion of crops and grass to rough grazings were:—
24:1 in the West Riding sample
44:1 in the Wold sample
2½:1 in the Wensleydale sample.

TABLE LXVIII

DISTRIBUTION OF FARMS ACCORDING TO SIZE IN THREE SAMPLE AREAS

Crops and Grass only

Size Distribution of Farms	West Riding		Wolds		Wensleydale	
	Percentage of		Percentage of		Percentage of	
	Total Farms	Total Acreage	Total Farms	Total Acreage	Total Farms	Total Acreage
50 acres and less ..	40	9	26	3	40	9
51-100 acres ..	23	18	14	5	23	18
101-300 acres ..	33	57	37	37	33	57
Over 300 acres ..	4	16	23	55	4	16
TOTAL ..	100	100	100	100	100	100

TABLE LXIX

LAND TENURE IN THE THREE SAMPLE AREAS, 1941

Crops and Grass only

Type of Tenure	West Riding		Wolds		Wensleydale	
	Percentage of		Percentage of		Percentage of	
	Total Farms	Total Acreage	Total Farms	Total Acreage	Total Farms	Total Acreage
Owner Occupied..	18	21	14	21	16	19
Rented	74	79	78	79	76	81
Part Owned and Part Rented ..	8	—	8	—	8	—
TOTAL ..	100	100	100	100	100	100

Table LXIX gives details of the forms of land tenure. In all three districts approximately three-quarters of both the farms and the total crop and grass acreage were occupied by tenants.

TABLE LXX

RENT PER ACRE AND FARM SIZE. AVERAGE RENT PER ACRE

Crops and grass only

Size of Farm	West Riding	Wolds	Wensleydale
	£ s. d.	£ s. d.	£ s. d.
10 acres or less	3 2 0	2 19 6	3 4 0
11-25 acres	2 5 3	2 0 0	2 5 0
26-50 acres	1 14 3	1 9 0	2 0 3
51-100 acres..	1 6 6	1 6 9	1 11 3
101-200 acres	1 2 3	1 0 9	1 2 3
201-300 acres	1 2 0	0 18 9	0 18 3
Over 300 acres	0 18 9	0 15 6	0 17 6
Average Rent per acre ..	1 4 6	0 18 3	1 4 3
Average Size of Farms ..	94 acres	189 acres	98 acres

Table LXX gives the incidence of rent per acre according to farm size. Rent falls with the increase in farm size. There was little difference in the rents paid in the West Riding and Wensleydale but rents on the Wolds tended to be lower. It must be remembered, however, that no allowance is made for rough grazing.

(1) The average size of farms in the sample areas were:—

West Riding	94 acres of crops and grass and 4 acres of rough grazing.
Wolds	189 acres of crops and grass and 4 acres of rough grazing.
Wensleydale	98 acres of crops and grass and 39 acres of rough grazing.

Estates

The National Farm Survey returns give the names and addresses of the individual owners of land. From this information it is possible to calculate the numbers and sizes of individual estates within the sample areas.

In the report the holding rather than the farm is used as the basic unit for the calculation of estate size. A holding is defined as that part of a farm owned by one landlord. In most cases one landlord usually owns the whole farm, but sometimes a farm consists of parcels of land each owned by a different landlord.(1) Consequently in the sample area there were more holdings than there were farms.

In all three districts the great majority of the estates comprised only one holding and as would be expected a large proportion of the total number of estates was below 100 acres in size. This is shown in Table LXXI. But while the great majority of estates were small, a few were quite considerable and accounted for a relatively large proportion of the total crops and grass acreage.

(1) In the sample areas the percentages of the total number of farms which consisted of more than one holding were:—
16 per cent. in the West Riding
14 per cent. in the Wolds
17 per cent. in Wensleydale.

TABLE LXXI

THE SIZE DISTRIBUTION OF ESTATES

Crops and Grass only

	West Riding		Wolds		Wensleydale	
	Percentage of		Percentage of		Percentage of	
	Total Estates	Total Acreage	Total Estates	Total Acreage	Total Estates	Total Acreage
100 acres and less	71	13	57	4	69	13
101-300 acres ..	21	20	23	12	22	22
301-1000 acres ..	6	18	15	19	7	21
Over 1,000 acres ..	2	49	5	65	2	44
TOTAL	100	100	100	100	100	100
Average Size of Estate	168 acres		385 acres		170 acres	

TABLE LXXII

ANNUAL RENT ROLLS OF ESTATES

Annual Rent Roll	Percentage of Total Estates		
	West Riding	Wolds	Wensleydale
£50 and less	48	43	39
£51-£100	20	14	20
£101-£200	16	17	22
£201-£500	8	18	11
£501-£1,000	2	4	5
Over £1,000	6	4	3
TOTAL	100	100	100

An analysis of the annual rent rolls of estates is given in Table LXXII. The majority of estates had an annual rent roll of less than £100 but at the other end of the scale there were a few estates with rental incomes of £1,000 a year and over.

The great majority of the landlords were private persons.(1) Estates owned by Institutions such as the Established Church, Colleges, Schools, Local Authorities and the like, were fairly uncommon and accounted for only a small proportion of both the total numbers of estates and of total acreage.

(1) In all three areas, over 90 per cent. of the estates and over 88 per cent. of the total crops and grass area belonged to private owners.

Reference

Farmers' Report No. 94
Landownership in Three Districts of Yorkshire.

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1938-39
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1943-44
A. McLarty, N.D.A., Plant Protection, Ltd.

1944-45
A. M. M. Rees, B.Sc.(Wales), Agricultural Economist, Southern Rhodesia.

1945-46
A. E. Cox, B.Sc.(Reading), District Advisory Officer, N.A.A.S., Colchester.

A. L. Firth, B.Sc.(Durham), N.A.A.S., Castle Hill House, Huntingdon.

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