Wheat
Cost of production

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SCHOOL OF AGRICULTURE

A STUDY OF WHEAT PRODUCTION IN THE BOSTON AREA OF LINDSEY IN 1951-52.

DEPARTMENT OF AGRICULTURAL ECONOMICS
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INTRODUCTION

Since 1939 the wheat acreage of England and Wales has varied considerably from year to year. Between 1939 (about 1,683,000 acres) and 1943 (3,280,000 acres) it almost doubled but it then fell continously until 1947 (1,982,000 acres). Since 1947 there have been smaller movements with nc definite upward or downward trend.

In the early war years the tillage acreage was expanding rapidly, but the proportion of the tilled land which was under wheat did not increase until 1943. Cropping arrangements during the war were affected by appeals and directions as well as the more normal economic and technical considerations.

FIGURE I. WHEAT IN RELATION TO "ALL FARM CROPS", ENGLAND AND WALES, 1939-40 to 1951-52.

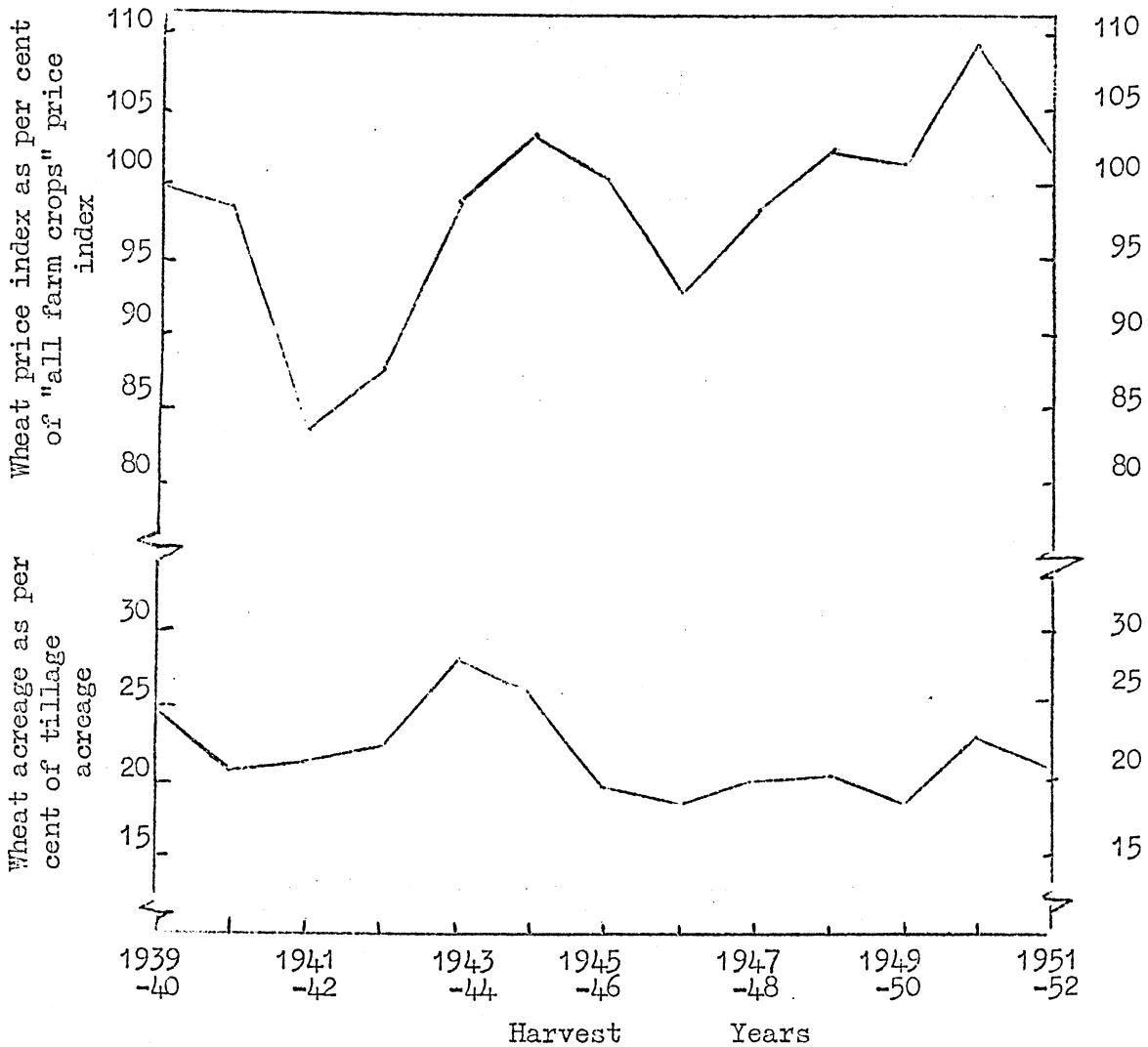

Figure 1 shows that between 1940 and 1941 the proportion of land under wheat rose although from economic considerations it could have been expected to fall. From 1943 to 1944 the opposite was true, probably because relative acreages and prices had been out of balance since 1941.

For the last seven years, the proportion of the tillage acreage under wheat has always moved in the same direction as the relative wheat price (i.e. relative to the general price level of all farm crops). But it has not moved at the same rate as the relative wheat price, for farmers take into account other factors, both technical and economic. On the economic side the wheat price is not the only consideration - the farmer is equally concerned with the costs of growing wheat, and this report discusses the costs of and returns from wheat grown in the Boston (Lincs.) area for the 1951 harvest.

The farms

Information was collected from 30 farms, most of which were in the extreme south of Lindsey. The farms were not typical of the county, but were fairly representative of the Boston area. They varied in size from nine to 735 acres, but five were less than 20 acres and 13 were between 20 and 100 acres. Most of them provided information relating to one field - in many cases their only wheat field - but one farmer kept separate records for each of three fields, so that the total number of records was 32.(1)

The size of fields recorded ranged from one acre to 33 acres, with 12 of five acres or less and the 32 records covered 332 acres.

Physical information

The Autumn of 1950 in the area concerned was rather dry until November, but from mid-November onwards the land was very wet. Most of the 32 fields in this study were drilled in early November, but one was not drilled until January and three until February. Spring 1951 was cold and wet, and growth was slow - there were wheat fields which would not "hide a hare" in May, let alone March. But from May onwards the weather was favourable and crops improved remarkably. Most of the 32 fields were relatively free from lodging - where it did occur it was not sufficiently serious to have any marked effect on yield or on costs of harvesting.

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(1) Initially there were 34 records. On two fields ($8\frac{3}{4}$ acres) the crop failed after expenses of £64. 8s. 6d. had been incurred. These fields were then drilled with oats and barley and no further costs collected. Their costs have not been included in this report. If the costs which they incurred for wheat were included they would raise the average cost of growing wheat for the whole sample by 3s.11d. per acre.

Hybrid 46 was the most popular variety (17 farms) followed by Bersee (sixfarms) and Atle (three farms) and Nord Desprez, Eclipse, Holdfast and Jubilee Gem were each grown on one farm.

On 19 fields the wheat followed potatoes; nevertheless only one field was drilled without being ploughed. Seed rates varied from nine stones per acre to 18 stones per acre, but 21 farmers drilled exactly 12 stones per acre, seven drilled less than 12 stones and two drilled more than 12 stones. Four farmers drilled seed which they had saved from one of their own crops.

One farmer applied F.Y.M. before the wheat crop, and only three farmers applied fertilisers either to the seed-bed or as top dressing.

Three fields were both hand-weeded and sprayed against weeds, 13 others were hand hoed, 11 sprayed or dusted and three were neither hand hoed or sprayed.

Several of the farmers mentioned that loose smut occurred in their crop, but thought it would not have any appreciable affect on the yield. Parts of one field suffered from wheat bulb fly damage, and in this case the yield was thought to be affected.

The 32 records include three where wheat was combined, four where it was threshed from the stook, two where it was threshed from a stack in the field and 23 where it was carted to the stackyard. Where wheat was stacked most of it was threshed and sold before the year end, although one stack was left until March.

Costs and returns

The total costs were £6,838 and the total returns £14,731. Table 1 shows the costs and returns and the structure of costs, on a per acre basis.

COSTS AND RETURNS FROM GROWING WHEAT ON 332 ACRES IN THE BOSTON AREA, 1951 HARVEST.

TABLE 1

Cost of work	£. s. d.	Per acre Per cent
Manual labour	5. 2. 3.	24.1
Horse labour	3.11.	0.9
Tractor labour	1.14. 5.	8.1
Contract machine labour	1.13. 7.	7.9
TOTAL OPERATIONAL COST	8.14. 2.	41.0
Other costs		
Rent	3. 8. 7.	16.2
Seed	3. 0. 6.	14.3
Manures (including lime and farmyard manure)	6. 8.	1.6
Net manurial residues	1.14. 9.	8.2
Spray or dust	7. 5.	1.7
Miscellaneous costs (1)	17. 9.	4.2
Machinery depreciation and repairs	1. 7.11.	6.6
Overheads: (2)	1. 6. 5.	6.2
TOTAL OTHER COSTS	12.10. 0.	59.0
TOTAL COSTS	21. 4. 2.	100.0
TOTAL RETURNS	45.13. 9.	-
MARGIN	24. 9. 7.	115.4
No. of records	32	
Average yield of millable wheat (cwts.)	31.8	
Average yield of tail wheat (cwts.)	.6	
Cost per cwt.	13s. 4d.	
Return per cwt.	£1. 8s. 5d.	

(1) Includes twine, petrol, T.V.O., sack hire, etc.

(2) Includes a charge for hedging, ditching, upkeep of buildings and other expenses,

Manual labour at £5. 2s. 3d. was by far the largest single item of costs. The variations in harvesting methods and in the distances from field to stackyard and many other relevant factors make a detailed analysis of labour costs valueless. But it is interesting to note that manual labour costs up to the beginning of harvest were only £1.11s. 1d. per acre and that this included some high costs for hand weeding, which, averaged over the 332 acres, amounted to 10s. 7d. per acre.

At first the cost of spray or dusting materials at 7s. 5d. per acre seems very low. There are two reasons for this. Firstly, the figures in Table 1 are averages for the whole group - only 160 acres were sprayed or dusted and the costs were spread over the whole 332 acres. Secondly, much of the spraying was done by contract, and in some cases it was impossible to separate the charge into cost of materials and the cost of work, and as a result part of the cost of spray material is included under the item "contract machine labour".

Tail corn, where kept on the farm for feeding was valued at £1 per cwt., and no record had more than 1½cwts. per acre. All other wheat produced was millable. The price of millable wheat was fixed, with only a slight increase to compensate for storage costs, so returns depended almost entirely on the yield. The average yield of 31.8 cwts. of millable wheat and .6 cwts. of tailings, gave average returns of £45.13s. 9d. leaving a margin of £24. 9s. 7d. per acre.

Variations in margins

There are big differences between the individual figures which make up the average. The total costs per acre varied between £14. 1s. 1d. and £39. 2s. 0d. and the total returns varied between £11.13s. 4d. and £79.10s. 2d. The highest margin per acre was £51.12s. 9d. and the lowest a loss of £15.19s. 5d. and the distribution was as follows:-

Margin per acre	No. of records
From £50 up to £60	2
" £40 " " £50	3
" £30 " " £40	5
" £20 " " £30	3
" £10 " " £20	9
" £ 0 " " £10	6
" -£10 " " £ 0	3
" -£20 " " -£10	1

A comparison of the four most profitable records and the four least profitable records is made in Table 2, and the average figures are repeated for comparison.

COMPARISON OF THE FOUR MOST AND FOUR LEAST PROFITABLE RECORDS- WHEAT INVESTIGATION, 1951 HARVEST

TABLE 2

	Average (from Table 1)	Four most profitable records	Four least profitable records
Per acre	£. s. d.	£. s. d.	£. s. d.
Total costs	21. 4. 2.	21.12. 8.	29. 3. 8.
Total returns	45.13. 9.	69. 4. 4.	23.11.11.
Margin	24. 9. 7.	47.11. 8.	- 5.11. 9.
Yield (cwts.)	31.8	47.2	16.2
Cost (cwts.)	13s. 4d.	9s. 1d.	£1.16s. 1d.
Return per cwt.	£1. 8s. 5d.	£1. 9s. 1d.	£1. 9s. 2d.

The most profitable group had costs which were slightly below average but their yield (and therefore return) was much higher than average, and this was the most important cause of their high profit. In the low profit group costs were considerably above average, but even here low yields were the more important cause of low profitability.

Effect of yield on margin

The fact that yield was the most important factor affecting profitability is again shown in Table 3, for which the records were arrayed in order of yield and then divided into eight groups, with the four lowest yields in the first group and so on up to the four highest yields which make up the last group.

EFFECT OF YIELD ON COSTS, RETURNS AND MARGINS - WHEAT INVESTIGATION, 1951 HARVEST

TABLE 3

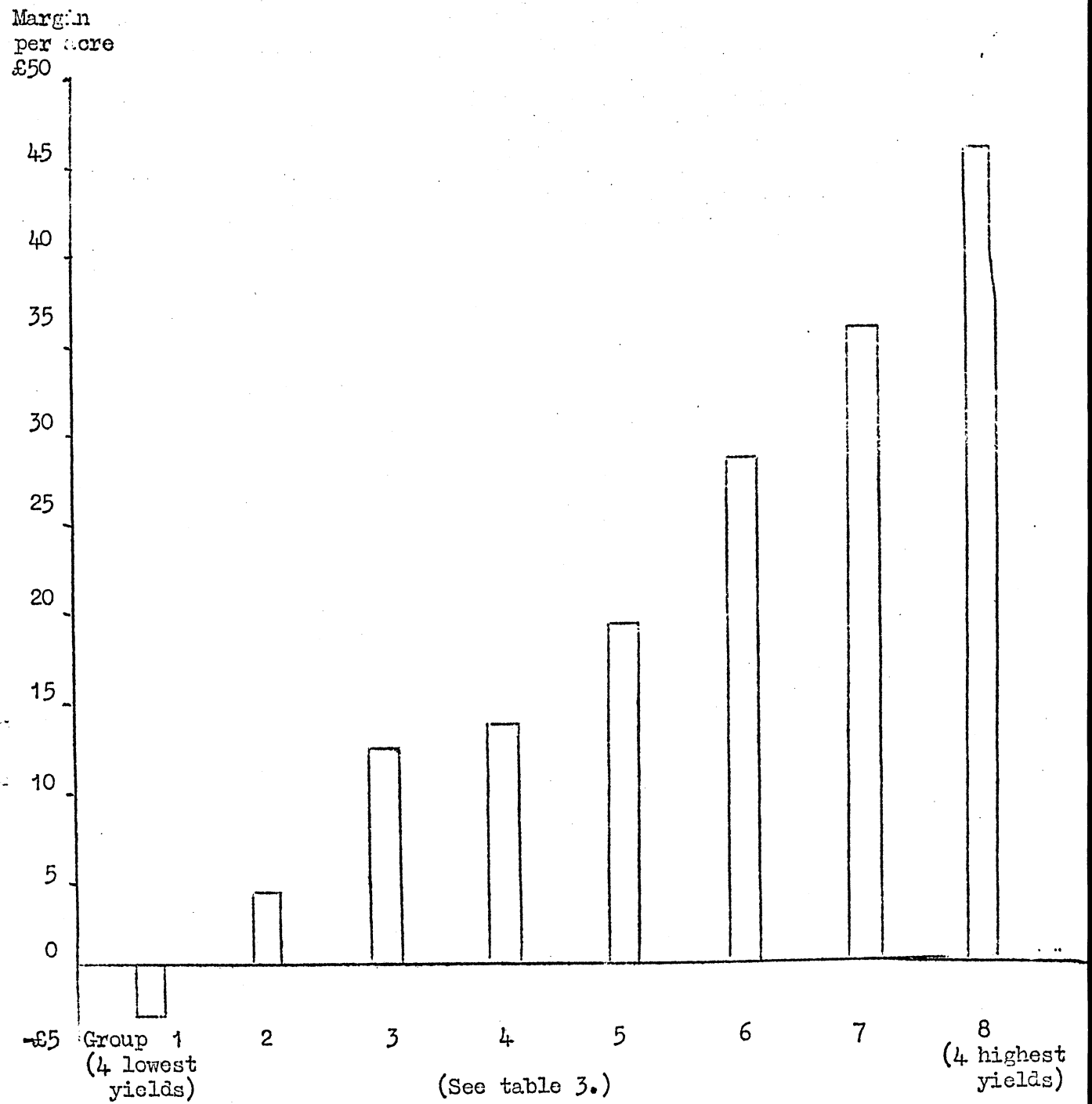
Group	Average yield (cwts. per acre)	Average costs	Average returns	Average margin
		Per acre		
1 (Four lowest yields)	11.6	£. s. d. 20.12. 2	£. s. d. 17. 3. 3.	£. s. d. -2.18.11.
2	20.5	24.19. 0.	28.13.11.	3.14.11.
3	25.4	24.18. 2.	36.18. 4.	12. 0. 2.
4	27.1	24. 2.11.	38. 1. 2.	13.18. 3.
5	30.9	25. 2. 7.	44.14.10.	19.12. 3.
6	33.5	20.19. 3.	49.11. 7.	28.12. 4.
7	39.0	19. 0.11.	54.17. 4.	35.16. 5.
8 (Four highest yields)	47.4	24. 0. 8.	69.13. 9.	45.13. 1.

As yields increase, returns increase proportionately, and as variations in costs are small and irregular the margins increase tremendously with increases in yield. (Fig.2). The costs bear no apparent relationship to the yield. This is understandable, for many factors affecting yield are hardly related to costs (e.g. date of drilling, variety, damage by pests and disease.)

Yields were probably adversely affected by the dry autumn, wet winter and cold wet spring, for drilling dates were rather later than are normally recommended, and growth was very slow until May.

The weather is beyond the farmer's control, but fertiliser application is not and the fact that only three farmers applied fertiliser to their wheat calls for comment. Experimental evidence has consistently shown that a top-dressing of about 1½cwts. of sulphate of amonia can be expected to increase the yield of grain by over three cwts. - a return of about £4.10s. 0d. for an expenditure of only £1.10s. 0d. The response varies considerably with the rainfall after application, but it is usually greater on fertile soils than on less fertile ones.

FIGURE 2. MARGIN PER ACRE - WHEAT INVESTIGATION, 1951 HARVEST.



Most of the farmers gave fear of lodging as the reason for not applying nitrogen. But nitrogen applied after the end of April has little effect on the yield of straw - a top dressing given when the plant is running up to ear increases the grain yield without appreciably increasing liability to lodging. No field received phosphate or potash, which tend to reduce lodging, and 20 per cent of them grew Bersee, although there are varieties which are more resistant to lodging. There were only nine fields on which the yield exceeded 35 cwts. - on the remaining 23 fields the fear of lodging was hard to understand and it is very doubtful whether a dressing of 1½cwts. per acre of sulphate of ammonia in early May would have caused lodging on any field in the records.

APPENDIX I

STANDARD CHARGES USED AND PROCEDURES ADOPTED IN THIS INVESTIGATION

LABOUR

The charges for labour were as follows, unless the farmer paid more than the standard rate, when the full amount was charged:-

Per hour	To 11.11.50.	From 12.11.50.	From 22.10.51.
	s. d.	s. d.	s. d.
Men	2. 4.	2. 6.	2. 9.
Women	1.11.	2. 0.	2. 1.
Youths	1. 7.	1. 8.	1. 9.

	s. d.
Wheel tractor	4. 0.
Tracklaying tractor	5. 6.
Lorry	4. 6.
Horse	1. 2.

Contract work was taken at cost.

MANURES

Artificials were taken at cost and farmyard manure was charged at £1 per ton. Lime was charged at cost, less the subsidy.

MANURIAL RESIDUES

The residual debit or credit was reached by deducting any residues chargeable from previous crops from the sum of residues to be credited to the present crop. The residual value of artificials was calculated according to "Residual Values of Fertilisers and Feeding Stuffs" - Second and Third Reports (1950 and 1951) of the Scottish Standing Committee.

MACHINERY DEPRECIATION AND REPAIRS

Combine harvesters were depreciated at a rate of 18.75 per cent per annum on the diminishing value.

A charge of 2s. 6d. per hour of tractor work was made in order to cover depreciation of and repairs to all other machinery.

OVERHEADS

A charge of 5s. 6d. per £1 of direct manual labour was made to cover overheads. Overheads were taken to include hedging and ditching, building and road repairs and all other farm expenses which cannot be allocated to a particular enterprise.

WHEAT RETAINED ON FARM

Where this was of ordinary quality it was valued at the same price as the wheat which was sold. But where the wheat retained was classified as "seconds" it was valued at £1 per cwt.

W.S.S.