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Wheat - Cost of production

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WHEAT AND BARLEY PRODUCTION

An Economic study of the
1959 and 1960 Crop Results

by

W. L. HINTON

A. J. PLAISTER

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WHEAT AND BARLEY PRODUCTION IN THE EASTERN COUNTIES

AN ECONOMIC STUDY OF THE 1959 AND 1960 CROP RESULTS

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CHAPTER I. COSTS AND RETURNS

The Seasons

Few seasons could provide more contrasting weather conditions for cereal production than those of 1959 and 1960. Prolonged rain in the autumn of 1958 made drilling so difficult that many farms were obliged to plant spring barley instead of winter wheat. The spring weather however favoured the growth of autumn sown corn and the planting of spring cereals. The ensuing summer of 1959, one of the driest and warmest of the century, resulted in ideal harvesting conditions.

Weather conditions were good for the sowing of autumn and spring corn for the 1960 harvest, though lack of moisture affected the germination of spring barley on light land. In contrast with 1959, heavy rainfall in August and September made harvesting very difficult.

The Sample

Costs and returns were obtained from 120 farms in 1959, and 95 farms in 1960. The four districts covered by the survey include West Norfolk and South East Cambridge on light land, and Central Essex and the Skirtlands of Holland (Lincs.) on heavier soil. Within the districts the farms were chosen at random and equal representation of farm size was sought. The farm size groups chosen were small (40 - 99 acres), medium (100 - 299 acres), and large (300 acres and over). Further details of the sample and the type of farm it represents are shown in appendix A.

Varieties

Throughout the area Cappelle was the most popular variety of winter wheat, with Hybrid 46 as a notable second choice in the northern districts. Proctor outstripped all other spring barleys in popularity. Appendix A table 4 gives full details of varieties of Winter Wheat and Spring Barley grown in the two seasons. The barley crop results presented in this report relate exclusively to spring barley and the wheat results concern winter wheat only.

Yields

Yields per acre of wheat and barley were good in both years. The continued warm summer of 1959 resulted in the highest yields ever recorded in this country. Despite the less favourable summer the 1960 yields were appreciably above the 1956 - 1960 five year average. The official estimates of yield for England and Wales and the average yield in the sample of costed fields are shown overleaf in table 1.

Table I. Wheat and Barley Yields - cwts per acre

	WHEAT		BARLEY	
	1959	1960	1959	1960
	cwts	cwts	cwts	cwts
The Sample	35.1	33.4	27.6	28.8
England and Wales	28.8	28.4	26.1	25.0

In both years corn yields in the sample were well above the average for the country as a whole. This situation reflects the superiority of the Eastern counties for corn production over other regions of England and Wales.

Table II. Range in Yields. (No. of Fields)

Yield per Acre	WHEAT		BARLEY	
	1959	1960	1959	1960
Over 45 cwts	14	4	5	1
40 - 44.9 cwts	13	13	4	7
35 - 39.9 cwts	24	24	13	15
30 - 34.9 cwts	29	21	23	24
25 - 29.9 cwts	15	7	30	20
20 - 24.9 cwts	9	8	28	15
15 - 19.9 cwts	1	3	5	6
Under 15 cwts	-	1	6	5
Average - overall	35.1 cwts	33.4 cwts	27.6 cwts	28.8 cwts
Average - Norfolk	31.8 cwts	18.7 cwts	23.4 cwts	19.3 cwts
Cambs.	33.7 cwts	31.3 cwts	27.3 cwts	29.5 cwts
Essex	36.4 cwts	35.0 cwts	30.5 cwts	32.2 cwts
Holland	36.3 cwts	37.0 cwts	28.0 cwts	32.1 cwts

There was considerable variation in yield per acre of both crops. The highest yield of wheat per acre was 53 cwts in each year, the lowest in 1959 was 15.8 cwts, while the lowest in 1960 was 8.5 cwts. Barley yields varied from 11 cwts to 52 cwts in 1959 and from 10 cwts to 53 cwts in 1960. In both years three quarters of the total wheat sample had yields exceeding 30 cwts per acre. In 1959 two-fifths of the barley sample had yields of over 30 cwts but in 1960, when average barley yields in the sample were somewhat higher, half of the farms had yields of 30 cwts or more.

The figures for yields by district reveal a large seasonal fluctuation in wheat yields in West Norfolk. In West Norfolk too, barley crops were poor in both years. The wet autumn conditions in 1958 favoured the 1959 wheat crop in this area of light soil but dry autumn conditions in 1959 had the reverse effect on the 1960 crop. Low barley yields in West Norfolk and particularly the poor 1960 crop were probably due to insufficient rainfall in the spring. In the other areas the effects of seasonal rainfall on yield were much less marked.

Profitability

On average, winter wheat gave a profit per acre of £20. 4s. in 1959 and £17. 14s. in 1960. Profits on spring barley were lower, £14. 2s. in 1959 and £13. 12s. in 1960.

Table III. Range in Profits per Acre. (No. of Fields)

Profit or Loss	WHEAT		BARLEY	
	1959	1960	1959	1960
Profit over £30 per Acre	24	9	5	2
" £25 - £29. 19s.	15	14	6	5
" £20 - £24. 19s.	11	13	18	14
" £15 - £19. 19s.	20	14	22	20
" £10 - £14. 19s.	16	12	26	26
" £5 - £9. 19s.	8	9	15	12
" £0 - £4. 19s.	6	5	19	6
Loss £0 - £4. 19s.	3	2	3	4
" £5 - £9. 19s.	1	3	-	2
" over £10	1	-	-	2
Average Profit	£20. 4s.	£17. 14s.	£14. 2s.	£13. 12s.

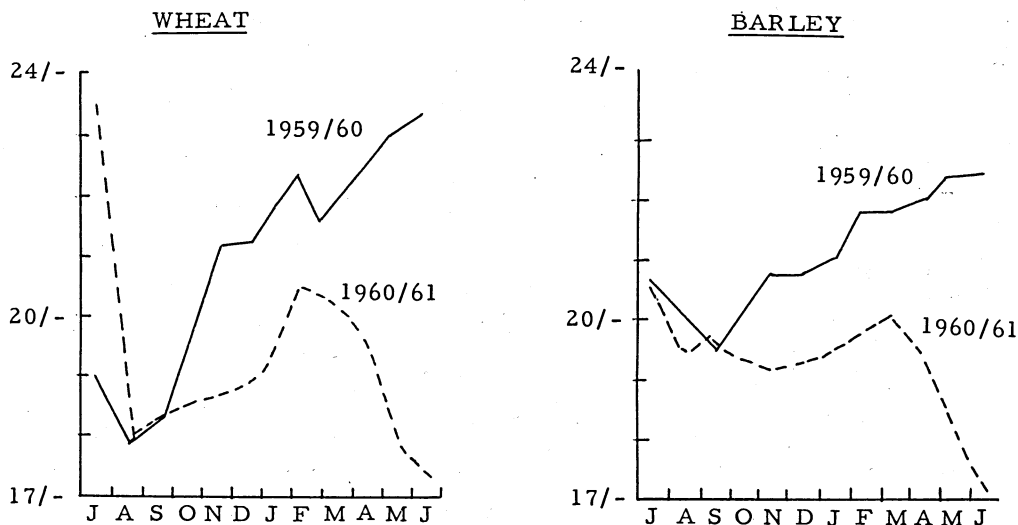
Since yield per acre, rather than costs or prices, is the most important factor influencing profitability, it follows that the range in profits follows a similar pattern to the range in yields.

Analysis of the data showed no general tendency for increased expenditure to be associated with better yields either in the case of wheat or barley. In one district for instance, 15 out of 28 fields received no fertiliser, yet the average yield on the 15 fields was above that of the fields treated with fertiliser. This difference in yield could not be attributed to the effect of manurial residues as calculated either, since the net cost of manure per acre was in fact less in the case of the 15 fields than in the case of the other fields. Fields with yields above the average for the district actually showed lower expenditure on seed. Again, fields not sprayed in the district showed better yields than fields sprayed.

This lack of correlation between expenditure and yield for a group of fields does not mean that individual growers are failing to follow practices which promote yield in their own circumstances.

Prices

Fig. 1 Market Prices per cwt



The standard price for wheat per cwt was 27s. 7d. for the year 1959-60 and 26s. 11d. for 1960-61, and to encourage storage the standard price was graduated over the sales period. In the first period (July - Sept.) of 1959-60 it was 25s. rising to 30s. in the last period (May - June); in 1960-61 the rising scale started at 24s. 5d. and ended at 29s. 5d. In 1959-60 market prices of wheat were generally on a rising trend throughout the season, with the result that deficiency payments per cwt varied little from one sales period to another and never exceeded 7s. 8½d. per cwt. In 1960-61 market prices for wheat were on a rising trend until February when they fell off sharply. Consequently deficiency payments were at the moderate level of the previous season until February when they rose considerably reaching a peak of 11s. 6d. per cwt in the final period (May - June).

The standard price for barley per cwt was 29s. in 1959-60 and 25s. 9d. in 1960-61. Market prices for barley in 1959-60 like those of wheat were on a rising trend throughout the period. In 1960-61 market prices showed little variation until March but there was a sharp decline in the last three months resulting from unusually heavy supplies of imported barley.

If no subsidy had been given, 90 out of 105 growers would have shown a profit on the 1959 wheat crop and 53 out of 81 would have shown a profit in the 1960 wheat crop. Similarly 56 growers out of 114 would have shown a profit on their 1959 barley crop and 49 out of 93 would have shown a profit on their 1960 crop.

Returns

Returns per acre for wheat averaged £48. 8s. in 1959 and £45. 13s. in 1960. Returns for barley averaged £39. 3s. in 1959 and £38. 3s. in 1960. Details are given below in Table IV.

Table IV. Average Returns per Acre

	WHEAT				BARLEY			
	1959		1960		1959		1960	
	£	s	£	s	£	s	£	s
Value of Head Corn	34	9	30	7	27	18	26	7
Value of Tail Corn		9		8		7		5
Subsidy	11	9	13	8	9	5	10	8
Straw	2	1	1	10	1	13	1	3
Total Value	48	8	45	13	39	3	38	3

Costs

The average costs per acre were strikingly similar in the two years despite the differences in seasonal weather conditions. Costs per acre (shown in table V) for wheat were £28. 9s. in 1959 and £28. 0s. in 1960 and for barley, £25. 2s. in 1959 and £24. 11s. in 1960. Since the last corn survey (1956 crop) costs per acre have risen in the same proportion as wages (17 per cent).

Factor Costs

Factor costs per acre are shown in Appendix B on a basis comparable with crop studies carried out by other departments of agricultural economics in England and Wales. Taking the two years together the costs for wheat comprise labour and machinery (including contract work) - 38 per cent, rent and overheads - 25 per cent, manures - 22 per cent, seed - 12 per cent, and sundries including sprays - 3 per cent. Similarly for barley the costs comprise labour and machinery - 38 per cent, rent and overheads - 27 per cent, manures - 21 per cent, seed - 10 per cent, and sundries including sprays - 4 per cent.

Table V. Cost of Producing Wheat and Barley per Acre

	WHEAT		BARLEY	
	1959	1960	1959	1960
	£ s	£ s	£ s	£ s
Stubble Cultivation		2	4	6
F. Y. M.	15	16	11	11
Applying F. Y. M.	9	10	1	1
Ploughing	1 5	1 6	1 10	1 12
Seedbed Cultivation	14	15	16	18
Fertiliser	3 5	2 18	2 18	2 16
Seed	3 8	3 3	2 11	2 9
Drilling and Applying Fertiliser	15	14	15	14
Cults. after Drilling	11	13	8	9
Top Dressing	6	6	3	2
Spraying	1 2	17	19	16
Total Cults., Manures and Seed	12 10	12 0	10 16	10 14
Total Harvesting	6 12	6 14	5 18	5 12
Rent	3 18	4 2	3 12	3 16
Overheads	3 0	3 0	3 0	3 0
Cash Cost	26 0	25 16	23 6	23 2
Add Residues B/F	3 10	3 5	2 12	2 7
Deduct Residues C/F	1 1	1 1	16	18
Total Cost.	28 9	28 0	25 2	24 11

CHAPTER 2 GROSS MARGINS ON WHEAT

Gross Margins in the Sample - overall and district margins

Production costs are of more value as a guide to management when costs are divided into fixed and variable elements. Regular labour and machinery expenses together with other overhead items are more or less fixed, irrespective of the acreage of cereals grown. Variable costs on the other hand, such as those of fertilisers or seed, depend on the acreage of the crop grown. Thus if we deduct the variable costs from receipts, we can find the contribution the crop makes to cover fixed costs and leave a profit. The difference between the variable costs and the receipts is known as the gross margin. Profitable crop production depends on the choice of crops which give higher rather than lower gross margins per acre, while the acreage put down to crops so selected depends on their seasonal labour requirements. This chapter deals with gross margins on wheat. Gross margins on barley are the subject of chapter 3 and labour requirements for wheat and barley are dealt with in chapter 4.

Table VI. Gross Margin per Acre - Wheat

<u>Variable Costs</u>	1959	1960
	£ s	£ s
Seed	3 8	3 4
Fertilisers	3 5	2 18
Sprays	12	9
Contract work	1 11	1 14
Casual labour	10	9
Other (twine and sack hire)	15	11
<u>Total Variable Costs</u>	<u>10 1</u>	<u>9 5</u>
GROSS MARGIN	<u>38 7</u>	<u>36 8</u>
<u>Receipts</u>	48 8	45 13
Yield (cwts)	35.1	33.4

For the sample as a whole the gross margin (£38. 7s. in 1959 and £36. 8s. in 1960) per acre was well above average in both years. Variable costs were 16s. lower in 1960 principally because less was spent on seeds and fertilisers, but due to lower yields in 1960 receipts per acre were 55s. lower so depressing the gross margin in 1960.

Variation in yield and, to a lesser extent, variation in variable costs on the individual farms, resulted in wide variations in gross margin per acre in each of the districts surveyed. The gross margins and variable costs for each district are shown overleaf in tables VII and VIII. Table IX gives the distribution of gross margins for the whole sample in each year and figure 2 shows the range in gross margins in each district. This wide range in gross margin per acre, which is not readily apparent unless it is brought out by an economic survey of the enterprise in question, in no way invalidates the gross margin approach as an advisory technique. It does however underline the principle so fundamental to the analytical

method, namely that variable costs and returns per acre selected for planning must relate very closely to the conditions on the individual farm.

Table VII. Gross Margin per Acre - Wheat 1959 by district

District	Norfolk	Cambs.	Essex	Holland
Variable Costs	£ s	£ s	£ s	£ s
Seed	3 17	3 7	3 5	3 6
Fertilisers	4 10	3 18	3 16	1 4
Sprays	10	9	15	15
Contract work	16	1 10	1 13	1 16
Casual labour	3	6	1	1 9
Other	13	13	14	1 5
Total Variable Costs	10 9	10 3	10 4	9 15
GROSS MARGIN	31 7	35 19	40 7	42 10
Receipts	41 16	46 2	50 11	52 5
Yield (cwts)	31.8	33.7	36.4	36.3

Table VIII. Gross Margin per Acre - Wheat 1960 by district

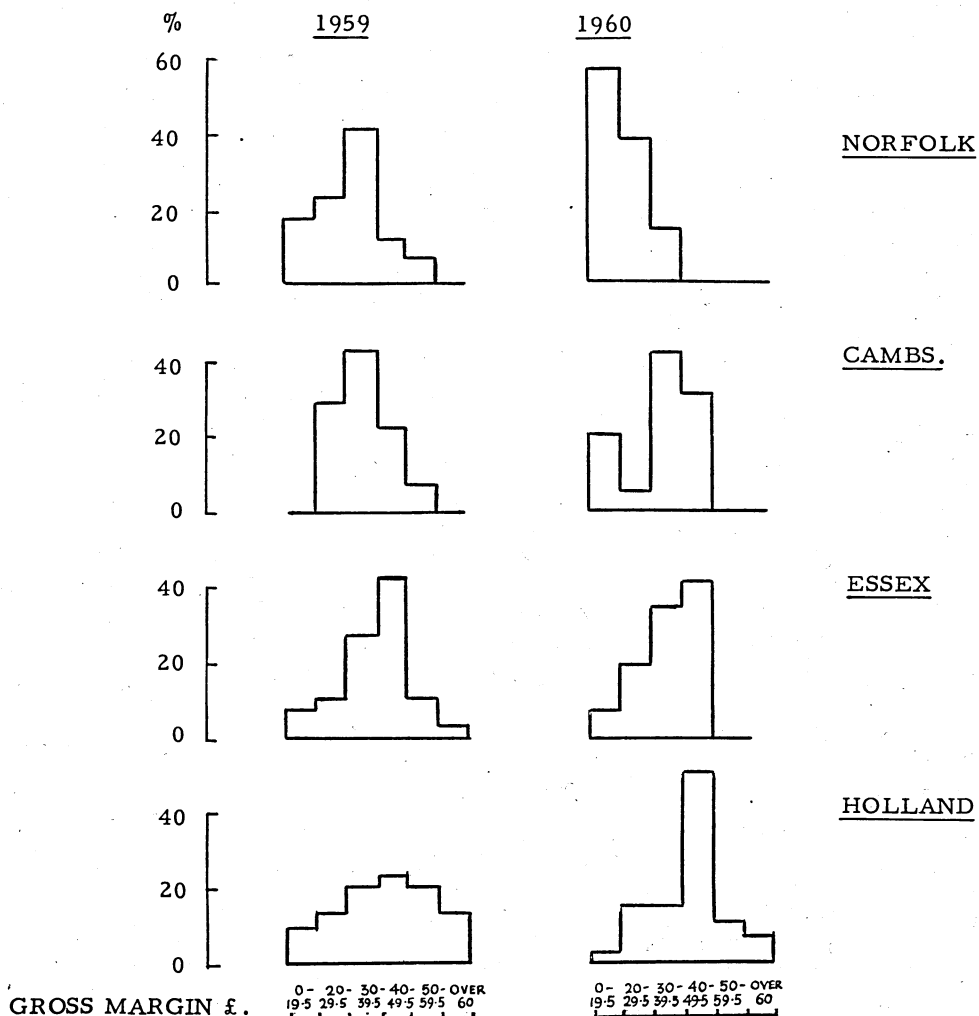
District	Norfolk	Cambs.	Essex	Holland
Variable Costs	£ s	£ s	£ s	£ s
Seed	3 0	3 2	3 3	3 5
Fertilisers	3 14	4 12	3 10	1 0
Sprays	9	7	10	12
Contract work	9	14	1 14	2 13
Casual labour	4	8	1	17
Other	14	14	12	11
Total Variable Costs	8 10	9 17	9 10	8 18
GROSS MARGIN	17 10	33 2	36 8	43 5
Receipts	26 0	42 19	45 18	52 3
Yield (cwts)	18.7	31.3	3.5	3.7

Table IX. Wheat - Distribution of Gross Margin per Acre

(No. of Farms)

<u>GROSS MARGIN</u>	<u>1959</u>	<u>1960</u>
Over £60	5	2
£50 - £59. 19s.	12	3
£40 - £49. 19s.	28	31
£30 - £39. 19s.	33	22
£20 - £29. 19s.	19	12
Under £20	8	11
	<u>105</u>	<u>81</u>

Fig. 2 Range in Gross Margins on Wheat in each district



Prior to giving examples of the application of the Gross Margin technique in practice, it is useful to present the analysis on the basis of harvesting method.

Gross Margins according to system of harvesting

Farmers who have their combining done on contract and those who hire threshing machines have higher variable costs and would expect lower gross margins on the same yield than farmers who rely on their own equipment. The breakdown of the sample in each year according to the system of harvesting is shown below.

Harvesting Method	1959		1960	
	Per cent acreage	Per cent fields	Per cent acreage	Per cent fields
Farm Combine	78	69	76	72
Contract Combine	8	11	11	14
Binder	14	20	13	14

The gross margins per acre for wheat harvested by different methods are shown below in Table X. The figures given are the average of the two years production.

Table X. Gross Margin per Acre - Wheat - Different harvest methods

	Farm Combine		Contract Combine		Binder	
	£	s	£	s	£	s
<u>Variable Costs</u>						
Seed	3	5	3	6	3	10
Fertiliser	3	7 ^{a1}	2	11 ^{a2}	2	3 ^{a3}
Spray		13 ^{b1}		5 ^{a2}		8 ^{b2}
Contract work		11 ^{b1}	6	16 ^{c2}	2	3 ^{b2}
Casual labour		1 ^{c1}		7 ^{c2}	2	5 ^{c3}
Other (twine and sack hire)		13		7	1	2
<u>Total Variable Costs</u>	<u>8</u>	<u>10</u>	<u>13</u>	<u>12</u>	<u>11</u>	<u>11</u>
GROSS MARGIN	<u>39</u>	<u>4</u>	<u>33</u>	<u>8</u>	<u>32</u>	<u>15</u>
<u>Receipts</u>	47	14	47	0	44	6
Yield (cwts)	34.7		35.7		31.5	
<u>Notes:-</u>						
a1 80% sprayed, a2 40% sprayed, a3 60% sprayed.						
b1 64% had no contract work done; b2 33% had no contract work done.						
c1 93% no casual labour; c2 70% no casual labour; c3 27% no casual labour.						

On average, variable costs per acre where the wheat is combined on contract exceed those for farmers using their own combines by £5 per acre. Variable costs of binder harvested wheat are some £3 above those for farm combined wheat. From one farm to another the variable costs differ according both to the levels of expenditure on seed and fertiliser and also to the degree to which the farmer relies on casual labour assistance and on contractors for specific operations. The receipts vary too according to the yield and time of sale, and the resulting gross margin is of significance only for the individual farm for which it is calculated. Because of the wide range and choice of expenditure on variable items and the variation in yield and time of sale, examples covering a wide range of conditions are given below. Prices are those for the 1962-3 season. All figures are given on a per acre basis.

Wheat combined with farmer's own combine:-

1. Grain sold off field (no contract work)

<u>Receipts</u>	£	s	d	£	s	d
Grain 36 cwts at 24s. 6d.	44	2	0			
Straw 1 ton at 50s.	<u>2</u>	<u>10</u>	<u>0</u>	46	12	0
 <u>Variable Costs</u>						
Seed 1½ cwts at £4 per cwt.	6	0	0			
Fertiliser 3 cwts compound at 18s.	2	14	0			
2 cwts Nitrochalk at 14s.	1	8	0			
Spray 5 pints at 3s.		15	0			
Baler twine ⅓ of 28 lb. bulk (24s.).	<u>8</u>	<u>0</u>	<u>0</u>	<u>11</u>	<u>5</u>	<u>0</u>
 <u>GROSS MARGIN</u>				 <u>£35</u>	 <u>7</u>	 <u>0</u>

2. Grain sold March - April (drying and straw baling on contract)

<u>Receipts</u>	£	s	d	£	s	d
Grain 36 cwts at 29s.	52	4	0			
Straw 1 ton at 50s.	<u>2</u>	<u>10</u>	<u>0</u>	54	14	0
 <u>Variable Costs</u>						
Seed, fertiliser, and sprays (as above)	10	17	0			
Drying at 2s. per cwt (3% water extraction)	3	12	0			
Sack hire 16 sacks for 26 weeks at 1d. per week	1	14	8			
Baling straw 50 (45 lb) bales at 6d. per bale.	1	5	0	<u>17</u>	<u>8</u>	<u>8</u>
 <u>GROSS MARGIN</u>				 <u>£37</u>	 <u>5</u>	 <u>4</u>

Wheat combined on contract:-

1. Grain sold off field

<u>Receipts</u>	£	s	d	£	s	d
Grain 27 cwts at 24s. 6d.	33	1	6			
Straw burnt				33	1	6
<u>Variable Costs</u>						
Seed 1 $\frac{1}{4}$ cwts at £3 per cwt	3	15	0			
Fertiliser 4 cwts compound at 18s.	3	12	0			
Spraying (contract) 25s. per acre	1	5	0			
Combining £5 per acre	5	0	0			
				13	12	0
<u>GROSS MARGIN</u>				£19	9	6

2. Grain sold May - June (ploughing and harrowing also done on contract)

<u>Receipts</u>						
Grain 27 cwts at 29s. 6d.	39	16	6			
Straw burnt				39	16	6
<u>Variable costs</u>						
Seed, fertiliser and sprays (as above)	8	12	0			
Combining £4 per acre	4	0	0			
Drying at 1s. 6d. per cwt (2% water extraction)	2	0	6			
Sack hire 12 sacks for 30 weeks at 1d. per week	1	10	0			
Cultivations done on contract:-						
Ploughing £3 per acre						
Harrowing £1 per acre	4	0	0			
				20	2	6
<u>GROSS MARGIN</u>				£19	14	0

Wheat binder harvested and threshed:

1. Grain sold Dec. - Feb. (regular labour for threshing)

<u>Receipts</u>	£	s	d	£	s	d
Grain 36 cwts at 27s. 6d.	49	10	0			
Straw 2 tons at £1	<u>2</u>	<u>0</u>	<u>0</u>	51	10	0
<u>Variable Costs</u>						
Seed 1½ cwts at £5	7	10	0			
Fertiliser 2 cwts compound at 18s.	1	16	0			
3 cwts Nitrochalk at 14s.	2	2	0			
Spray 5 pints at 3s.		15	0			
Binder twine 1 ball (9 lbs) at 12s. 6d		12	6			
Thatching materials		<u>9</u>	<u>0</u>	13	4	6
<u>GROSS MARGIN</u>				£38	5	6

2. Grain sold Dec. - Feb. (casual labour and hired drum for threshing)

<u>Receipts</u>	£	s	d	£	s	d
Grain 36 cwts at 27s. 6d.	49	10	0			
Straw 2 tons at £1	<u>2</u>	<u>0</u>	<u>0</u>	51	10	0
<u>Variable Costs</u>						
Seed, fertiliser, sprays, etc. (as above)	13	4	6			
Hire of drum	1	10	0			
Casual labour - 7 men	<u>2</u>	<u>8</u>	<u>0</u>	17	2	6
<u>GROSS MARGIN</u>				£34	7	6

CHAPTER 3. GROSS MARGINS ON BARLEY

Gross Margins in the Sample - overall and district margins

Gross margins per acre on barley in both years were between £30 and £31 per acre, some £6 lower than gross margins on wheat, (see table XI below). The lower gross margin on barley stems mainly from the lower return per acre. Barley returns were £9. 5s. lower than wheat in 1959 and £7. 10s. lower than wheat in 1960. Total returns for barley were £39. 3s. in 1959 and £38. 3s. in 1960 on yields of 27.6 cwts and 28.8 cwts per acre respectively. Variable costs for barley are on average £1. 10s. lower than variable costs for wheat on account of lower expenditure on seed and fertilisers.

Table XI. Gross Margin per Acre - Barley

<u>Variable Costs</u>	1959 £ s	1960 £ s
Seed	2 11	2 8
Fertilisers	2 18	2 16
Sprays	10	8
Contract work	1 7	1 8
Casual labour	6	4
Other (twine and sack hire)	14	12
<u>Total Variable Costs</u>	<u>8 6</u>	<u>7 16</u>
GROSS MARGIN	<u>30 17</u>	<u>30 7</u>
<u>Receipts</u>	39 3	38 3
Yield (cwts)	27.6	28.8

Tables XII and XIII show the gross margins on Barley by district for each of the two years. Gross margins for the 1959 crop are highest in the districts having the highest yield - Essex and Holland (Lincs.). High returns per acre in the Cambridge district for the 1960 crop brought the gross margin per acre up to the level of that in Essex and Holland, though Cambridge yields were 2½ cwts lower. Norfolk showed the lowest gross margin in both years, the gross margin falling to the low level of £21. 16s. per acre in 1960 when the average yield was 19.3 cwts.

Variable costs show a different pattern from one district to another and the most significant differences arise from expenditure on seed and fertiliser. Norfolk growers spend up to £1 less on seed than growers in other districts, while Holland growers spend considerably less on fertiliser and depend more on residues in the ground from former crops. Yields in Holland suffered slightly in the first year but in the second year yields were equal to those in the Essex district which also had the best district average yields in 1959. Table XIV gives the distribution of gross margins per acre in each year and figure 3 shows the range in gross margins in each district.

Table XII. Gross Margin per Acre - Barley 1959 by district

District	Norfolk	Cambs.	Essex	Holland
Variable Costs	£ s	£ s	£ s	£ s
Seed	2 1	2 10	2 17	2 19
Fertilisers	3 16	3 4	3 4	1 5
Sprays	10	8	11	13
Contract work	16	1 5	1 11	1 16
Casual labour	7	3	1	10
Other	16	13	11	12
Total Variable Costs	8 6	8 3	8 15	7 15
GROSS MARGIN	27 6	30 6	34 11	31 2
Receipts	35 12	38 9	43 6	38 17
Yield (cwts)	23.4	27.3	30.5	28.4

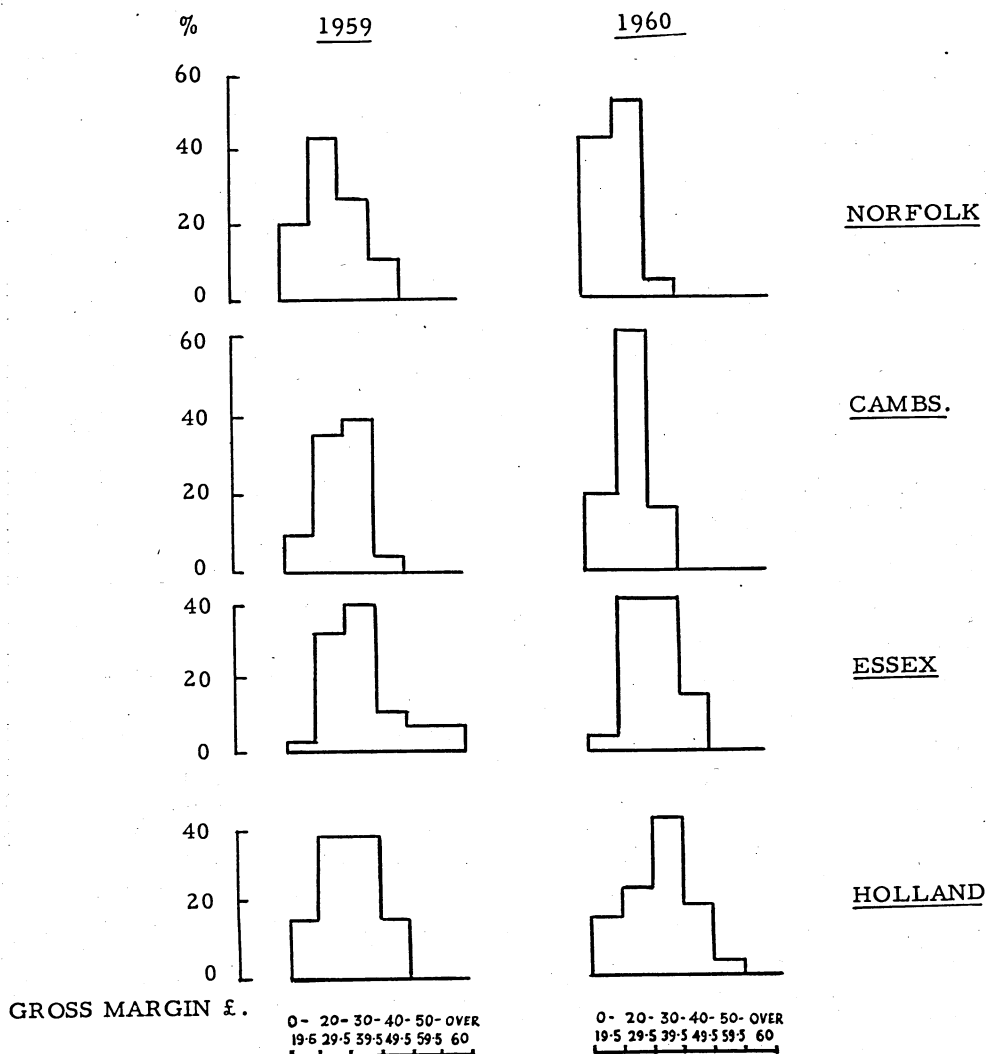
Table XIII. Gross Margin per Acre - Barley 1960 by district

District	Norfolk	Cambs.	Essex	Holland
Variable Costs	£ s	£ s	£ s	£ s
Seed	1 19	2 8	2 8	2 17
Fertilisers	3 7	3 7	3 1	1 14
Sprays	10	6	10	6
Contract work	1 2	10	1 16	1 15
Casual labour	2	5	1	10
Other	9	14	14	8
Total Variable Costs	7 9	7 10	8 10	7 10
GROSS MARGIN	21 16	33 5	32 4	33 3
Receipts	29 5	40 15	40 14	40 13
Yield (cwts)	19.3	29.5	32.2	32.1

Table XIV. Barley - Distribution of Gross Margin per Acre
(No. of Farms)

<u>GROSS MARGIN</u>	<u>1959</u>	<u>1960</u>
Over £60	2	-
£50 - £59s. 19s.	2	-
£40 - £49s. 19s.	10	12
£30 - £39s. 19s.	44	34
£20 - £29s. 19s.	43	34
Under £20	13	13
	<u>114</u>	<u>93</u>

Fig. 3 Range in Gross Margins on Barley in each district



Gross Margins according to system of harvesting

From the breakdown of the barley sample according to the system of harvesting (see below), it is evident that combining of barley is even more widespread than combining of wheat. Of the 93 fields in the sample in 1960 only 12 were cut by binder and 6 of these were in Norfolk

<u>Harvesting Method</u>	1959		1960	
	Per cent acreage	Per cent fields	Per cent acreage	Per cent fields
Farm Combine	86	78	86	78
Contract Combine	8½	15	11	17
Binder	5½	7	3	5

Table XV shows the average gross margins for the sample over the two years according to the method of harvesting.

Table XV. Gross Margin per Acre - Barley - Different harvest methods

<u>Variable Costs</u>	Farm Combine		Contract Combine		Binder	
	£	s	£	s	£	s
Seed	2	10	2	8	2	16
Fertiliser	2	19 ^{a1}	2	8 ^{a2}	2	7a3
Sprays		10 ^{a1}		6 ^{a2}		6 ^{b2}
Contract work		11 ^{b1}	5	5 ^{c2}	1	12 ^{b2}
Casual labour		1		6 ^{c2}	2	11 ^{c3}
Other (twine and sack hire)		13		8	1	1
<u>Total Variable Costs</u>	7	4	11	1	10	13
<u>GROSS MARGIN</u>	32	0	27	4	21	12
<u>Receipts</u>	39	4	38	5	32	5
Yield (cwts)	29.0		28.5		22.5	

Notes:-
a1 80% sprayed; a2 60% sprayed; a3 60% sprayed.
b1 70% had no contract work done; b2 8% had no contract work done.
c1 92% no casual labour; c2 80% no casual labour; c3 15% no casual labour.

As with wheat, variable costs per acre for barley combined on contract are £5 per acre higher than when farmers use their own combines. The variable costs of binder harvester barley exceed those of farm combined barley by £3. 9s. per acre. No farm has average gross margins, however, since the variable costs and the receipts selected must reflect the practice and the circum-

stances on the individual farm on which planning is being considered. Accordingly, examples covering a wide range of conditions are set out below. The prices quoted relate to the 1962-3 season. All figures are given on a per acre basis.

Barley combined with farmer's combine:-

1. Grain sold off field (no contract work)

<u>Receipts</u>	£	s	d	£	s	d
Grain 30 cwts at 26s. 10d.	40	5	0			
Straw $\frac{1}{2}$ ton at 50s.	<u>1</u>	<u>5</u>	<u>0</u>	41	10	0
<u>Variable Costs</u>						
Seed $1\frac{1}{2}$ cwts at £3	4	10	0			
Fertiliser 3 cwts compound at 18s.	2	14	0			
2 cwts Nitroshell at 15s.	1	10	0			
Spray 5 pints at 3s.		15	0			
Baler twine $\frac{1}{3}$ of 28 lb. ball (24s.)	<u>8</u>	<u>0</u>		<u>9</u>	<u>17</u>	<u>0</u>
<u>GROSS MARGIN</u>				£31	13	0

2. Grain sold November - December (drying and straw baling on contract)

<u>Receipts</u>	£	s	d	£	s	d
Grain 30 cwts at 27s. 7d.	41	7	6			
Straw $\frac{1}{2}$ ton at 50s.	<u>1</u>	<u>5</u>	<u>0</u>	42	12	6
<u>Variable Costs</u>						
Seed, fertiliser, and sprays (as above)	9	9	0			
Drying at 2s. 9d. per cwt (5% water extraction)	4	2	6			
Baling straw 28 (40 lb.) bales at 4d. per bale		9	4			
Sack hire 15 sacks for 8 weeks at 1d. per week	<u>10</u>	<u>0</u>		<u>14</u>	<u>10</u>	<u>10</u>
<u>GROSS MARGIN</u>				£28	1	8

Barley combined on contract:-

1. Grain sold off field

<u>Receipts</u>	£	s	d	£	s	d
Grain 26 cwts at 26s. 10d.	34	17	8			
Straw burnt				34	17	8
<u>Variable Costs</u>						
Seed 1 $\frac{1}{4}$ cwts at £3. 10s.	4	7	6			
Fertiliser 2 cwts compound at 18s.	1	16	0			
2 cwts Sulphate of Ammonia at 11s.	1	2	0			
Spraying (contract) 25s. per acre	1	5	0			
Combining £5 per acre	5	0	0			
				13	10	6
<u>GROSS MARGIN</u>				£21	7	2

2. Grain sold November - December (ploughing and discing also done on contract)

<u>Receipts</u>	£	s	d	£	s	d
Grain 26 cwts at 27s. 7d.	35	17	2			
Straw burnt				35	17	2
<u>Variable Costs</u>						
Seed, fertiliser and sprays (as above)	8	10	6			
Combining £4 per acre	4	0	0			
Drying at 1s. 6d. per cwt (2% water extraction)	1	19	0			
Sack hire 13 sacks for 12 weeks at 1d. per week		13	0			
Cultivations done on contract:-						
Ploughing £2. 5s. per acre	3	15	0			
Discing £1. 10s. per acre				18	17	6
<u>GROSS MARGIN</u>				£16	19	8

Barley binder harvested and threshed:-

1. Grain sold January - February (regular labour for threshing)

<u>Receipts</u>	£	s	d	£	s	d
Grain 32 cwts at 28s. 7d.	45	14	8			
Straw 2 tons at £1	2	0	0	47	14	8
<u>Variable Costs</u>						
Seed 1 $\frac{1}{4}$ cwts at £3	3	15	0			
Fertiliser 2 cwts triple Superphosphate at £1	2	0	0			
2 cwts Sulphate of Ammonia at 11s.	1	2	0			
Spray 5 pints at 3s.		15	0			
Binder twine 1 ball (9 lbs) at 12s. 6d.		12	6			
Thatching materials		9	0			
				8	13	6
<u>GROSS MARGIN</u>				£39	1	2

2. Grain sold January - February (casual labour and hired drum for threshing)

<u>Receipts</u>	£	s	d	£	s	d
Grain 32 cwts at 28s. 7d.	45	14	8			
Straw 2 tons at £1	2	0	0	47	14	8
<u>Variable Costs</u>						
Seed, fertiliser, sprays, etc. (as above)	8	13	6			
Hire of drum	1	5	0			
Casual labour - 7 men	2	8	0			
				12	6	6
<u>GROSS MARGIN</u>				£35	8	2

CHAPTER 4. LABOUR REQUIREMENTS FOR CORN PRODUCTION

Standard Labour Requirements

The records of wheat and barley production from such a wide area over two seasons permit the drawing up of standard labour requirements with some confidence. Actual rates of operating time on cultivations varied little from season to season. Table XVI shows the labour and tractor hours required for the various operations on winter wheat and the period when the operations are carried out. Table XVII shows cultivations for spring barley set out in a similar way. Operations and rates of work listed are those experienced by the majority of growers in the sample. The harvest labour requirements are given separately for combined corn and for corn cut by a binder and subsequently threshed.

Table XVI. Wheat - Labour Requirements per Acre

<u>Operation</u>	<u>No. of times</u>	<u>Man hours</u>	<u>Tractor hours</u>	<u>Period</u>
Ploughing	1	2.3	2.3	July-Oct.
Seedbed cultivations	3	1.5	1.5	Sept. -Oct.
Combine drill	1	1.4	.7	Oct. -Nov.
Spring cultivations	3	1.0	1.0	March-April
Top Dress	1	.4	.4	March-April
Spray	1	.3	.3	April-May
<u>Pre-harvest total</u>		<u>6.9</u>	<u>6.2</u>	
<u>Harvesting with Combine</u>				
Combine (self propelled tanker)		1.3	-	Aug. -Sept.
Cart grain, weigh and load		2.7	1.0	Aug. -Sept.
Baling straw (pick up baler)		2.0	1.0	Aug. -Sept.
Cart and stack straw		2.0	1.0	Aug. -Sept.
Harvesting		<u>8.0</u>	<u>3.0</u>	
<u>Harvesting with Binder</u>				
Cutting corn		2.0	1.0	Aug. -Sept.
Stooking		4.0	-	Aug. -Sept.
Carting		8.0	4.0	Aug. -Sept.
Thatching		3.0	-	September
Threshing		8.0	-	During winter
Harvesting		<u>25.0</u>	<u>5.0</u>	
Total - Combine harvested		14.9	9.2	
Binder harvested		31.9	11.2	

Total man and tractor hours normally required for winter wheat production up to harvest time are 6.9 hours, and 6.2 hours respectively. Stubble cultivation and the application of F. Y. M. are not included in the operations listed, as most winter wheat crops are not so treated. Stubble cultivation in preparation for spring barley was fairly common however, and this operation is included in the cultivations for the barley crop (see below). Thus the standard pre-harvest labour requirement for barley is greater than that for winter wheat by 1 man hour and 1 tractor hour per acre, which allows for double stubble cultivation. There were a few cases where F. Y. M. was applied for the corn crop. Where this operation is done an additional 10 man hours and 5 tractor hours should be allowed for an application of 10 tons per acre.

Table XVII. Barley - Labour Requirements per Acre

<u>Operation</u>	<u>No. of times</u>	<u>Man hours</u>	<u>Tractor hours</u>	<u>Period</u>
Stubble cultivation	2	1.0	1.0	Oct. -Nov.
Ploughing	1	2.3	2.3	Oct. -Jan.
Seedbed cultivations	3	1.5	1.5	March-April
Combine drill	1	1.4	.7	March-April
Cults. after drilling	3	1.0	1.0	April
Top Dress	1	.4	.4	April
Spray	1	.3	.3	May
<u>Pre-harvest total</u>		<u>7.9</u>	<u>7.2</u>	
Harvesting with combine		8.0	3.0	As for wheat
Harvesting with binder		25.0	5.0	"
Total - Combined harvested		15.9	10.2	
- Binder harvested		32.9	12.2	

The labour requirement for harvesting relates to both wheat and barley. In order to state harvesting labour requirement quite simply the combining operation given is for the most common type of combine, a self propelled tanker machine with a ten foot cutter-bar. The straw is baled by a pick up baler with a skid. This method of combining and straw baling has a total labour requirement of 8 man hours and 3 tractor hours (see table). Total labour requirements for wheat production per acre under this system are 14.9 man hours and 9.2 tractor hours.

Harvesting with a binder, and subsequent threshing, has a much higher labour requirement, 25 man hours and 5 tractor hours. In fact most of the wheat and practically all the barley is combined and binder harvesting is rapidly declining. Total labour requirements for wheat production where this system still applies amount to 31.9 man hours and 11.2 tractor hours per acre. Despite the heavy labour requirement for threshing, farmers who maintain a large regular labour force resist using a combine in order to keep their men more fully occupied in the winter period by threshing corn stacks. On the other hand, many farmers in the sample with only 30 acres of cereals find it profitable to buy a second-hand combine because of the great reduction in labour needs.

APPENDIX
Costing Methods

Labour was charged at the actual rates paid, with allowances made for employers' insurance contributions, holidays with pay, and perquisites. The weekly minimum wage for men was £7. 16s. before mid February 1960, £8. 0s. from then until 1st October 1960, and £8. 9s. after that date, but wage payments in excess of the minimum were common. The farmer's own labour and that of his family were charged at minimum rates with an extra 2d per hour for tractor driving.

Tractors. Rates varying between 4s. 3d. and 4s. 9d. per hour were charged for wheeled tractors, according to the type and size. Tracklayers were charged at rates varying between 8s. 0d. to 16s. 0d. per hour according to size.

Implements and machinery. Standard rates were charged varying with the initial cost, durability, life and use of each particular implement. Larger machines such as combines were costed separately on each farm.

Seed, Fertiliser, Spray Materials were all charged at cost (net of subsidy in the case of fertilisers). Home-grown seed was charged at £1. 5s. for barley and £1. 10s. for wheat-per cwt.

Farmyard Manure was charged at 15s. 0d. per ton.

Manurial Residues. Half the total farmyard manure cost including application was carried forward to subsequent crops. Residues from farmyard manure applied in the three previous years were brought forward to the current crop at 7s. 6d., 4s. 0d. and 2s. 0d. per ton respectively. Fertiliser residues were brought or carried forward as follows (one year only): compounds $\frac{1}{4}$, straight phosphatic or potassic fertilisers $\frac{1}{2}$. The cost of lime was spread over eight years. No cultivation residues were allowed except when a bare fallow was taken during the previous three years. Allowance was made for crop residues ploughed in and for grazing residues.

Overheads. A "rounded" estimate of £3 per acre was charged to cover those general farm costs which cannot be specifically allocated to any particular enterprise. These include labour-time lost owing to bad weather, labour employed on general maintenance, such as hedging and ditching, and such miscellaneous items as telephone bills and use of the farm car.

APPENDIX A

Table 1. The Wheat Sample - Number of fields in the Survey

Farm Size	40-99 acres		100-299 acres		300 acres and over		Total	
<u>District</u>	1959	1960	1959	1960	1959	1960	1959	1960
W. Norfolk	2	1	6	2	9	4	17	7
S. E. Cambs.	9	6	10	6	9	7	28	19
C. Essex	10	9	10	10	10	8	30	27
Holland	10	9	10	10	10	9	30	28
Total	31	25	36	28	38	28	105	81

Table 2. The Barley Sample - Number of fields in the Survey

Farm Size	40-99 acres		100-299 acres		300 acres and over		Total	
District	1959	1960	1959	1960	1959	1960	1959	1960
W. Norfolk	10	10	10	5	10	6	30	21
S. E. Cambs.	10	6	10	6	10	7	30	19
C. Essex	10	9	8	10	10	8	28	27
Holland	7	7	9	10	10	9	26	26
Total	37	32	37	31	40	30	114	93

Table 3. Farm Acreage and Cereal Acreage per Farm - 1959 and 1960

District	1959				1960			
	Arable	Wheat	Barley	Total	Arable	Wheat	Barley	Total
W. Norfolk	314	26	123	357	268	13	137	329
S. E. Cambs.	264	48	95	285	263	59	104	292
C. Essex	240	69	71	247	236	80	65	255
Holland	240	72	27	262	250	77	32	250

Table 4. Varieties. (Percentage of Total Area on Surveyed Farms)

	1959	1960
<u>Winter Wheat</u>	%	%
Cappelle	81.7	81.4
Hybrid 46	14.2	13.7
Flamingo	1.7	2.2
Others	2.4	2.7
	<u>100.0</u>	<u>100.0</u>
<u>Spring Barley</u>		
Proctor	90.5	89.3
Rika	3.1	6.9
Herta	3.3	2.1
Earl	2.1	1.1
Others	1.0	.6
	<u>100.0</u>	<u>100.0</u>

APPENDIX B - WHEAT

The figures for the 1959 crop in these tables are based on 105 records, on 1681 acres, on 105 farms. The figures for the 1960 crop are based on 81 records, on 1167 acres, on 81 farms.

Table 1. Summary of Average Costs per Acre

Item of Cost	1959		1960	
	Hours 1959	Hours 1960	£	s
Regular Labour	14.7	14.9	3	7
Casual Labour	2.6	2.4		10
Tractor	7.5	7.9	1	19
Machinery Depreciation & Repair Allowance			2	19
Contract Services			1	11
Materials: Seed			3	8
Fertilisers & Manures applied			4	0
Sundries			1	8
Rent			3	18
TOTAL DIRECT COSTS			23	0
plus share of General Farm Expenses			3	0
Adjustment for Manurial Residues			+ 2	9
GROSS COST			28	9
Credit Value of Straw			2	1
NET COST OF GRAIN			26	8

Table 2. Summary of Average Yields & Receipts

	1959		1960	
	Quantity per acre cwts	Value per cwt	Quantity per acre cwts	Value per cwt
Head Corn Sold	34.0	s d 20 0	32.5	s d 18 9
" " used on farm	.5	18 6	.4	18 0
Tail Corn Sold	-	-	-	-
" " used on farm	.6	14 6	.5	14 6
Deficiency Payment Receipts	-	6 8	-	8 0

Table 3. Summary of Average Quantities of Material & Yields per Acre

Material	Overall Average	
	1959	1960
Seed: purchased	1.33 cwts	1.21 cwts
home-grown	.17 "	.29 "
F. Y. M.	1.00 ton	1.11 tons
Artificials: Straights-		
Nitrogenous	2.30 cwts	2.12 cwts
Potassic	.08 "	.09 "
Phosphatic	.07 "	.03 "
Compounds	1.83 "	1.74 "
Yield of Grain: Head Corn	34.5 cwts	32.9 cwts
Tail Corn	.6 "	.5 "
Yield of Straw	18.9 "	13.3 "
	(23.1 cwts on 86 fields)	(20.7 cwts on 52 fields)
Average Quantities of F. Y. M. & Fertiliser on Area dressed only		
F. Y. M.	288 acres 8.7 tons	153 acres 10.0 tons
Artificials: Straights-		
Nitrogenous	1289 " 3.13 cwts	940 " 2.73 cwts
Potassic	71 " 2.06 "	30 " 3.50 "
Phosphatic	58 " 1.00 "	39 " 1.25 "
Compounds	1131 " 2.82 "	816 " 2.82 "

APPENDIX B - BARLEY

The figures for the 1959 crop in these tables are based on 114 records, on 2156 acres, on 114 farms. The figures for the 1960 crop are based on 93 records, on 1520 acres, on 93 farms.

Table 1. Summary of Average Costs per Acre

Item of Cost			1959	1960
	Hours			
	1959	1960	£	s
Regular Labour	13.3	14.0	2	15
Casual Labour	1.6	1.1		6
Tractor	8.3	8.3	1	19
Machinery Depreciation & Repair Allowance			3	2
Contract Services			1	7
Materials: Seed			2	11
Fertilisers & Manure applied			3	9
Sundries			1	5
Rent			3	12
TOTAL DIRECT COSTS			20	6
plus share of General Expenses			3	0
			23	6
Adjustment for Manurial Residues			+ 1	16
			25	2
GROSS COST			1	13
Credit Value of Straw				1
			23	9
NET COST OF GRAIN			23	8

Table 2. Summary of Average Yields & Receipts

	1959		1960	
	Quantity per acre cwts	Value per cwt	Quantity per acre cwts	Value per cwt
Head Corn Sold	24.0	s d 20 0	23.7	s d 19 0
" " used on farm	3.0	19 0	4.6	18 0
Tail Corn Sold	-	-	-	-
" " used on farm	.6	10 6	.5	10 6
Deficiency Payment Receipts	-	6 8	-	7 3

Table 3. Summary of Average Quantities of Material & Yields per Acre

Material	Overall Average	
	1959	1960
Seed: purchased home-grown	.92 cwts .41 "	.83 cwts .55 "
F. Y. M.	.77 ton	.80 ton
Artificials: Straights- Nitrogenous	.78 cwts	.75 cwts
Potassic	.04 "	.18 "
Phosphatic	.03 "	.09 "
Compounds	2.56 "	2.45 "
Yield of Grain: Head Corn Tail Corn	27.0 cwts .6 "	28.3 cwts .5 "
Yield of Straw	14.1 " (17.4 cwts on 93 fields)	9.7 " (14.1 cwts on 64 fields)
Average Quantities of F. Y. M. & Fertiliser on Area dressed only		
F. Y. M.	225 acres 9.7 tons	122 acres 10.6 tons
Artificials: Straights- Nitrogenous	956 " 1.87 cwts	640 " 1.88 cwts
Potassic	33 " 5.00 "	78 " 4.12 "
Phosphatic	51 " 1.17 "	61 " 2.00 "
Compounds	1863 " 3.17 "	1304 " 3.08 "

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