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# WINTER WHEAT IN 1963 AND 1964

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## Costs and Returns for 60 farms in the North-West

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Table 1

Trends in Wheat acreage, N.W. Province and

England and Wales, 1955-1964

| | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 000's acres | | | | | |
| Cheshire | 14.2 | 23.4 | 22.0 | 20.3 | 16.2 | 18.2 | 14.9 | 17.3 | 14.8 | 16.8 |
| Lancashire | 21.7 | 35.4 | 31.3 | 31.4 | 27.2 | 28.4 | 25.7 | 27.5 | 23.0 | 23.5 |
| Shropshire | 32.4 | 42.2 | 44.7 | 46.5 | 37.5 | 42.3 | 39.4 | 47.6 | 41.1 | 50.9 |
| Staffordshire | 29.6 | 39.3 | 37.9 | 35.8 | 30.0 | 32.1 | 25.6 | 32.5 | 25.6 | 29.2 |
| Provincial Total | 97.9 | 140.3 | 135.9 | 134.0 | 110.9 | 121.0 | 105.6 | 124.9 | 104.5 | 120.4 |
| England & Wales | 1878.0 | 2214.0 | 2032.0 | 2115.0 | 1843.0 | 2004.0 | 1731.0 | 2144.0 | 1837.0 | 2111.0 |
| | | | | | as a percentage of total cereal acreage | | | | | |
| Cheshire | 18.2 | 28.4 | 28.0 | 27.2 | 23.8 | 25.8 | 22.1 | 24.7 | 20.2 | 21.5 |
| Lancashire | 22.9 | 36.0 | 33.7 | 35.0 | 31.1 | 32.4 | 29.4 | 32.2 | 26.6 | 26.5 |
| Shropshire | 21.6 | 29.7 | 32.0 | 33.7 | 29.0 | 31.5 | 29.7 | 33.5 | 27.9 | 31.1 |
| Staffordshire | 34.6 | 43.5 | 43.0 | 47.8 | 36.5 | 37.7 | 30.8 | 37.3 | 28.4 | 29.3 |
| Provincial Total | 24.8 | 34.0 | 34.1 | 35.6 | 30.8 | 32.1 | 28.5 | 32.5 | 26.0 | 27.9 |
| England & Wales | 31.5 | 35.4 | 33.3 | 34.2 | 30.7 | 31.5 | 27.9 | 32.6 | 27.4 | 29.6 |

# Winter Wheat in 1963 and 1964

## Costs and Returns for 60 Farms in the North-West

### INTRODUCTION

The wheat acreage in England and Wales fluctuated, during the decade up to 1964, between 1,731,000 acres and 2,214,000 acres. Apart from these two years (1961 and 1956 respectively), however, the acreage has been well within ten per cent of the two million acres average for the period. Although the acreage of wheat was much the same at the beginning and the end of the decade, the general pattern was of a decline and recovery of total acreage during the period.

In the North-Western Province the pattern of wheat growing has been rather different. Shropshire, which has a fairly high proportion of arable land, has had an overall increase of its wheat acreage amounting to approximately 20 per cent. The other three counties (Lancashire, Cheshire and Staffordshire) have all, at varying rates, experienced a decline in their wheat acreages of about twenty per cent. As Table 1 shows, less wheat was grown in the Province at the end of the period (1963-64) than at the beginning (1955-56).

Cereals in general, including wheat, occupy a smaller proportion of the acreage of crops and grass in the North-West, than they do nationally. (Table 2). Nevertheless, with over 100,000 acres the Province has 5.7 per cent of the national wheat acreage. Given reasonable weather and soil

Table 2

Crops and Grass, N.W. Province and England and Wales 1964

| | Cheshire | Lancashire | Shropshire | Staffordshire | N.W. Province | England & Wales |
|---|---|---|---|---|---|---|
| | | | 000's Acres | | | |
| Wheat | 16.8 | 23.0 | 50.9 | 29.2 | 119.9 | 2,111.5 |
| Barley | 44.8 | 42.4 | 95.0 | 61.8 | 244.0 | 4,385.5 |
| Oats | 12.5 | 22.2 | 12.5 | 5.9 | 53.1 | 530.1 |
| Mixed Corn | 4.1 | 0.6 | 5.1 | 2.3 | 12.1 | 75.3 |
| Rye | 0.1 | 0.1 | 0.3 | 0.2 | 0.7 | 20.9 |
| Total Cereals | 78.3 | 88.3 | 163.8 | 99.4 | 429.8 | 7,123.3 |
| Other Crops & Fallow | 23.6 | 43.5 | 48.6 | 29.1 | 144.8 | 2,484.2 |
| Total Tillage | 101.9 | 131.8 | 212.4 | 128.5 | 574.6 | 9,607.5 |
| Temporary Grass | 111.1 | 72.9 | 141.3 | 84.6 | 409.9 | 4,340.3 |
| Permanent Grass | 241.2 | 411.1 | 340.9 | 289.7 | 1,282.9 | 10,430.6 |
| Total Crops & Grass | 454.2 | 615.8 | 694.6 | 502.8 | 2,267.4 | 24,378.4 |
| | | | As a Percentage of Total Crops and Grass | | | |
| Wheat | 3.7 | 3.7 | 7.3 | 5.8 | 5.3 | 8.6 |
| Barley | 9.9 | 6.9 | 13.7 | 12.3 | 10.8 | 18.0 |
| Oats | 2.8 | 3.6 | 1.8 | 1.2 | 2.4 | 2.2 |
| Mixed Corn | 0.8 | 0.1 | 0.7 | 0.5 | 0.5 | 0.3 |
| Rye | - | - | 0.1 | - | - | 0.1 |
| Total Cereals | 17.2 | 14.3 | 23.6 | 19.8 | 19.0 | 29.2 |
| Other Crops & Fallow | 5.2 | 7.1 | 7.0 | 5.8 | 6.4 | 10.2 |
| Total Tillage | 22.4 | 21.4 | 30.6 | 25.6 | 25.4 | 39.4 |
| Temporary Grass | 24.5 | 11.8 | 20.3 | 16.8 | 18.0 | 17.8 |
| Permanent Grass | 53.1 | 66.8 | 49.1 | 57.6 | 56.6 | 42.8 |
| Total Crops & Grass | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

conditions in autumn approximately seventy per cent of the provincial wheat acreage is usually sown with winter varieties by the end of December.

This report relates to the costs, methods and receipts of winter wheat production on the same sixty farms in 1963 and 1964. The main wheat growing areas in the Province are in Central and South Shropshire, South and South-West Staffordshire, South West Lancashire and North Cheshire. The distribution of the farms amongst the Counties is shown in Table 3, which also indicates the size distribution of the crops surveyed. The farms themselves ranged from under 75 acres to over 800 acres in extent, whilst the winter wheat crops varied from 4 acres to 158 acres per farm. In total the Survey relates to 2,543 acres of wheat in 1963 and 2,633 acres on the same farms in 1964. All of this wheat was combine-harvested, either by the farmers' own machines or by contractor.

Table 3

Distribution of Sample on Size and County Basis

| County | Winter Wheat Acreage | | | | Total | Total Winter Wheat Acreage | | Total Farm Acreage |
|---|---|---|---|---|---|---|---|---|
| | 0-40 | 41-80 | 81-120 | 121-160 | | 1963 | 1964 | |
| | No. of Farms | | | | | | | |
| Cheshire | 13 | 4 | 1 | - | 18 | 428 | 419 | 3,328 |
| Lancashire | 7 | 1 | - | - | 8 | 251 | 195 | 1,450 |
| Shropshire | 9 | 10 | 5 | 3 | 27 | 1,548 | 1,737 | 10,858 |
| Staffordshire | 4 | 3 | - | - | 7 | 316 | 282 | 2,411 |
| Total | 33 | 18 | 6 | 3 | 60 | 2,543 | 2,633 | 18,047 |

Table 4

Costs, Returns and Net Margins per acre

| | 60 Farms | |
|---|---|---|
| | 1963 | 1964 |
| Costs | £ s. | £ s. |
| Manual Labour | 3 3 (12.3 hrs.) | 2 19 (11.1 hrs.) |
| Tractor Labour | 1 12 (7.8 hrs.) | 1 10 (7.4 hrs.) |
| Contract Work | 1 3 | 1 4 |
| Machinery depreciation & repairs | 4 16 | 4 14 |
| Fuel (other than tractor) and power | 10 | 7 |
| Artificial fertilisers applied | 3 9 | 3 6 |
| F.Y.M. and Lime applied | 1 1 | 1 4 |
| Seed | 3 16 | 3 15 |
| Sprays | 12 | 13 |
| Rent | 5 2 | 5 3 |
| Sundries | 10 | 12 |
| Total Direct Costs | 25 14 | 25 7 |
| Share of General Farm Expenses | 2 1 | 2 1 |
| Total Costs | 27 15 | 27 8 |
| Adjustment for residual manurial value | 1 16 | 1 12 |
| Gross Cost | 29 11 | 29 0 |
| Credit Value of Straw | 3 4 | 2 14 |
| Net Cost of grain | 26 7 | 26 6 |
| Returns | | |
| Grain Sold | 38 6 | 39 10 |
| Grain Retained on farm | 4 | 8 |
| Deficiency payment | 9 4 | 8 10 |
| Total Receipts | 47 14 | 48 8 |
| Net Margin | 21 7 | 22 2 |
| Average Yield per acre | 34.8 cwts | 36.0 cwts |

Whilst the weather differed in the two seasons, crops were sown each autumn in generally satisfactory conditions. The winter of 1962-63, however, was hard and prolonged; there was mixed weather during the growing season; and harvesting was difficult with a wet August and September. A high proportion of the 1963 wheat crop had to be dried. Apart from a cold wet spell in the late spring of 1964, the 1963-64 season was generally mild and congenial with harvesting conditions the best for some years. The effect of the differing weather upon results was surprisingly small. Even at constant costs and prices there would only have been a little over £2 increase in 1964 in net margin over 1963; allowing for the varying changes which occurred, the kindly season only benefitted growers on average to the extent of fifteen shillings per acre.

COSTS, RETURNS AND NET MARGINS

The average costs, returns and net margins per acre for the 60 farms for the two years are given in Table 4. Component costs differed between the years by a few shillings at the most, resulting in a difference in gross cost of eleven shillings per acre. The average yield per acre was up slightly in 1964 but the average price received, including deficiency payments, was down by 8½d. per cwt.

The cost of the material inputs, i.e. seed, fertilisers and sprays, amounted to 27% of the gross cost. These inputs are the ones over which the farmer has most control as regards quantity, and it would seem appropriate to discuss them first.

Seed

The average rate of seed application was 1.6 cwts per acre in both years with actual rates ranging from 1 cwt to 2 cwts per acre. Seed was purchased at prices from 33/- to 80/- per cwt, the average price in both years being 47/6d. per cwt. In the main, farmers tended to keep to the same seed rate.

The main varieties used and their acreages expressed as a percentage of total acreage, are shown in Table 5. Cappelle, a well tried favourite for many years, was the dominant variety in both years, but the striking increase in the use of Champlein is an indication of the very good yields obtained with this variety by farmers in the survey. It was not found possible in all cases to obtain accurate yields for individual varieties. However, when the results for the two years are put together, from 62 records Cappelle averaged 34.0 cwts per acre, from 18 records Champlein averaged 41.2 cwts per acre and from 11 records Professeur Marchal averaged 39.5 cwts per acre.

Table 5

Varieties grown, expressed as a percentage of total acreage costed

| Variety | 1963 | 1964 |
|---|---|---|
| Cappelle | 67 | 53 |
| Champlein | 13 | 32 |
| Prof. Marchal | 11 | 8 |
| Viking | 7 | 5 |
| Other varieties | 2 | 2 |
| | 100 | 100 |

Artificial fertilisers

The charges for artificial fertilisers of £3 9s. 0d. and £3 6s. 0d. in the two years represent a simple average use over the 60 farms of 2 cwts to 2½ cwts of a compound fertiliser and 1½ to 2½ cwts of a nitrogenous fertiliser. Straight phosphatic fertilisers were applied on one farm only, in 1964, and straight potassic fertilisers on none.

Fertiliser practice on the farms relative to previous cropping is given in Table 6. The treatment of wheat following cereals and wheat following grassland appears to be similar. Seventy-two per cent. of the wheat followed these crops and three-quarters of this acreage received dressings of compound and nitrogenous fertilisers. Twenty-eight per cent. of the wheat followed potatoes, sugar beet, peas, beans (for canning) or market garden crops, all of which had received fairly heavy applications of artificial fertilisers and most a dressing of farm yard manure. Despite this, only on a very small proportion of the following wheat crop was it deemed advisable not to apply artificial fertilisers.

Table 6

Percentage Distribution of Fertiliser practice in relation to previous cropping for 1963 and 1964

| Previous Crop | No Fertilisers Used | Nitrogenous Fertilisers Only | Compound Fertilisers Only | Compound & Nitrogenous Fertilisers | Total |
|---|---|---|---|---|---|
| | % | % | % | % | % |
| Grassland | 1.4 | 4.1 | 5.8 | 25.7 | 37.0 |
| Cereals | - | 2.2 | 4.4 | 28.8 | 35.4 |
| Potatoes and Sugar Beet | 2.4 | 5.4 | 5.5 | 7.5 | 20.8 |
| Peas, Beans & Market Garden | - | 1.9 | 1.0 | 3.9 | 6.8 |
| TOTAL | 3.8 | 13.6 | 16.7 | 65.9 | 100.0 |

Sprays

The charges of 12/- and 13/- per acre for sprays are calculated on the total acreages of wheat in the survey, including unsprayed fields. The acreages actually sprayed were 2,146 acres (84 per cent. of total acreage) in 1963 and 2,131 acres (81 per cent. of total acreage) in 1964. The average costs per acre sprayed were 16/- and 17/- respectively.

Operational Costs

The amounts of operational inputs, namely manual and tractor labour and machinery costs, are to a large extent dictated by the necessities of providing favourable soil conditions for the crop to grow, and of harvesting the grain and straw. Together they amount to 38 per cent of the gross cost. Table 7 shows how these costs are distributed amongst the three main groups of operations. The small difference between the two contrasting harvest seasons in the labour requirements for harvesting the grain emphasizes the extent to which modern harvesting and drying equipment has enabled farmers to cope with the cereal crop in difficult weather conditions.

Table 7

Labour and Machinery Costs per Acre

| Operation | 1963 | | | 1964 | | |
|---|---|---|---|---|---|---|
| | £ s. | Manual Labour Hours | Tractor Hours | £ s. | Manual Labour Hours | Tractor Hours |
| Pre-harvest Cultivations | 4 1 | 5.5 | 5.2 | 3 19 | 5.3 | 5.0 |
| Harvesting, drying & storage of grain | 4 19 | 3.7 | 1.1 | 4 15 | 3.1 | 1.0 |
| Harvesting of straw | 2 4 | 3.1 | 1.5 | 2 0 | 2.7 | 1.4 |
| Total Operational Costs | 11 4 | 12.3 | 7.8 | 10 14 | 11.1 | 7.4 |

The charge for machinery depreciation and repairs is, with the exception of rent, the largest single item of cost. This is admittedly a calculated charge based on standard costs and standard rates of depreciation. It is nevertheless believed to give a reasonably accurate representation of the relative importance of machinery and equipment operating costs. Of the £4 16s. 0d. charged in 1963 and £4 14s. 0d. in 1964, £2 14s. 0d. and £2 12s. 0d. respectively were attributable to combines, balers and drying and storage facilities.

Table 8

Distribution of costs, returns and net margins per acre

1963

| Range in £'s per acre | Total Costs | | | Total Returns | | | Net Margins | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. of Farms | Average | | No. of Farms | Average | | No. of Farms | Average | |
| | | £ | s. | | £ | s. | | £ | s. |
| Under £10 | | | | | | | 6 | 5 | 13 |
| £10 and under £20 | 6 | 17 | 17 | | | | 25 | 16 | 2 |
| £20 and under £30 | 40 | 25 | 9 | 1 | 28 | 3 | 18 | 25 | 0 |
| £30 and under £40 | 14 | 32 | 10 | 10 | 37 | 7 | 8 | 32 | 1 |
| £40 and under £50 | | | | 28 | 45 | 6 | 3 | 45 | 9 |
| £50 and under £60 | | | | 17 | 54 | 3 | | | |
| £60 and over | | | | 4 | 67 | 8 | | | |
| | 60 | 26 | 7 | 60 | 47 | 14 | 60 | 21 | 7 |

Table 9

Distribution of costs, returns and net margins per acre

1964

| Range in £'s per acre | Total Costs | | | Total Returns | | | Net Margins | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. of Farms | Average | | No. of Farms | Average | | No. of Farms | Average | |
| | | £ | s. | | £ | s. | | £ | s. |
| Under £10 | | | | | | | 4 | 5 | 4 |
| £10 and under £20 | 3 | 18 | 4 | | | | 22 | 15 | 14 |
| £20 and under £30 | 46 | 25 | 7 | | | | 23 | 24 | 4 |
| £30 and under £40 | 11 | 32 | 10 | 7 | 35 | 18 | 8 | 34 | 6 |
| £40 and under £50 | | | | 32 | 45 | 11 | 3 | 43 | 14 |
| £50 and under £60 | | | | 15 | 53 | 17 | | | |
| £60 and over | | | | 6 | 64 | 13 | | | |
| | 60 | 26 | 6 | 60 | 48 | 8 | 60 | 22 | 2 |

## DISTRIBUTIONS OF COSTS, RETURNS AND NET MARGINS

The distributions of costs, returns and net margins per acre are given in Tables 8 and 9 and serve to fill in the background to the average figures. The range of costs is not great; in both years at least two-thirds of the farms incurred costs of between £20 and £30 per acre. The total returns and net margins are distributed more widely and indicate the extent to which yields varied over the sample of farms.

The effect of the variation in yields on the returns and hence on the net margins is shown in Table 10. High yields do not apparently necessarily entail high costs but are themselves necessary for high net margins.

Table 10

Distribution of costs, returns and net margins per acre in relation to yield per acre

| Yield per acre | No. of farms | Average cost per acre | | Average return per acre | | Average net margin per acre | |
|---|---|---|---|---|---|---|---|
| cwts | | £ | s. | £ | s. | £ | s. |
| 20 - 24.9 | 5 | 26 | 19 | 32 | 8 | 5 | 9 |
| 25 - 29.9 | 12 | 27 | 0 | 38 | 8 | 11 | 8 |
| 30 - 34.9 | 41 | 26 | 8 | 44 | 8 | 18 | 0 |
| 35 - 39.9 | 41 | 26 | 4 | 50 | 10 | 24 | 6 |
| 40 - 44.9 | 16 | 26 | 7 | 56 | 4 | 29 | 17 |
| 45 and over | 5 | 24 | 4 | 69 | 4 | 45 | 0 |

The obvious question is therefore - what are the factors which influence yield? A survey of this kind is concerned primarily with quantitative data and can attempt to answer the question only on this basis. Taking the sample as a whole, no relationships were found between yield and material and operational inputs, either individually or in combination.

Two other approaches were therefore made to the problem.

The first approach was to compare the costs of materials and labour prior to harvesting of two groups of farms in the survey on which in the two years in question the yields had been consistently higher and lower respectively than the average yields of the whole sample. The results of this comparison are shown in Table 11. The high yields have apparently been achieved at a slightly lower cost per acre for these items than have the low yields. There were no significant differences between the two groups in choice of variety, seed rate or type of fertilisers. Two obvious points of difference concerned location and previous cropping. The higher yielding group was comprised mainly of Shropshire farms on which over eighty per cent. of the wheat acreage followed grassland or cereals. The lower yielding group was composed of Cheshire and Lancashire farms on which over eighty per cent. of the wheat acreage followed potatoes, vining peas or market garden crops.

Table 11

Comparison of certain direct pre-harvest costs per acre for farms with consistently high and low yields per acre in 1963 and 1964

| | 1963 | | 1964 | |
|---|---|---|---|---|
| Costs | Group A | Group B | Group A | Group B |
| | £ s. | £ s. | £ s. | £ s. |
| Manual Labour | 1 8 (5.3 hrs) | 1 10 (5.8 hrs) | 1 8 (5.2 hrs) | 1 9 (5.4 hrs) |
| Tractor Labour | 1 0 (4.8 hrs) | 1 1 (5.3 hrs) | 1 0 (4.8 hrs) | 1 0 (5.0 hrs) |
| Seeds | 3 16 | 3 16 | 3 17 | 4 0 |
| Artificial fertilisers | 3 1 | 4 1 | 3 0 | 3 12 |
| Sprays | 11 | 16 | 12 | 14 |
| Average Yield per acre | 40.1 cwts | 29.0 cwts | 41.3 cwts | 31.4 cwts |

Group A:- Crops which yielded higher than the average yields of the sample in both years.

Group B:- Crops which yielded lower than the average yields of the sample in both years.

The second approach was to look at the variation in yields which occured on individual farms in the two years. On approximately one-third of the farms variation in yield was in the order of 3 cwts. per acre of less; on one-third between 3 cwts. and 7 cwts. per acre; and on the remaining third over 7 cwts. per acre.

The last group, showing the largest variation in yield, would appear to offer the best likelihood of explaining year to year variation in yields on individual farms. In this group half the farms showed an increase and half a decrease in yield in 1964 as compared with 1963. The costs of material and labour inputs prior to harvesting for these two sub-groups for the two years are shown in Table 12.

Table 12

Comparison of certain direct pre-harvest costs per acre for farms which experienced large variation in yield in 1963 and 1964

| | Group C | | Group D | |
|---|---|---|---|---|
| Costs | 1963 | 1964 | 1963 | 1964 |
| | £ s. | £ s. | £ s. | £ s. |
| Manual Labour | 1 9 (5.8 hrs) | 1 7 (5.2 hrs) | 1 9 (5.6 hrs) | 1 8 (5.0 hrs) |
| Tractor Labour | 1 3 (5.6 hrs) | 1 0 (5.1 hrs) | 1 0 (5.1 hrs) | 18 (4.5 hrs) |
| Seeds | 3 19 | 3 11 | 3 19 | 4 1 |
| Artificial fertilisers | 3 9 | 3 7 | 4 0 | 3 7 |
| Sprays | 8 | 11 | 12 | 12 |
| Average yield per acre | 39.5 cwts | 32.1 cwts | 29.9 cwts | 39.3 cwts |
| Av. yield per acre over 2 yrs | 35.8 cwts | | 34.6 cwts | |

Group C:- Farms on which yield was at least 7 cwt per acre less in 1964 than in 1963.

Group D:- Farms on which yield was at least 7 cwt per acre more in 1964 than in 1963.

Once again this information appears to offer little in the way of an explanation for such large variations in yield. Both sub-groups show a similar decrease in the amount of manual and tractor labour used, and a decrease in the costs of artificial fertilisers applied. Seed rate and variety and grade of seed varied very little on individual farms and the differences in the per acre costs are mainly due to variations in prices paid for the same type of seed. One interesting point is that despite the large differences in yield from year to year, the average yields for the two years for both groups are within 1 cwt. of the average yield of the whole sample for the two years - namely 35.4 cwts. per acre.

This survey has therefore not found an answer to the question posed earlier. It has shown that inputs of seed, fertiliser and sprays are more or less standard and that what small variations are practised have little effect on yield. One can only assume that the variations in yield which occur between farms and from year to year on the same farm must be caused by factors outside the scope of the survey; factors such as soil type, soil fertility, management ability, local weather conditions at time of planting and harvest or other purely fortuitous happenings.

In fact, it is doubtful whether this kind of survey, in which the farmers' actions are beyond the control of the investigator can ever yield fully convincing explanations as to why individual performances vary. For example, one farmer may apply a large dose of fertiliser because he is convinced that he is getting a worth-while response at the higher level, while another may do so because he is convinced that the fertility

of the field in question is low and needs a high dose of fertiliser for the particular crop grown as well as in the interest of good general husbandry for his farm. On the other hand a farmer who knows that a field is in a very high state of fertility may apply no fertiliser in the certain knowledge that a very good yield will be obtained. It may thus transpire that two fields which have given exactly the same yield may have received widely different fertiliser treatment or that two fields which have been given the same dose of fertiliser will give widely different yields. It is not to be expected under such conditions that a statistically significant relationship between fertiliser levels and yields will be found under general farming conditions.

Two other approaches might yield more meaningful results on a future occasion. Firstly, we have to remember that we are here dealing with one crop only whereas the real determinant of wheat yield on a farm may be more closely related to the general fertiliser levels used over the whole farm than to those applied to wheat alone. This would require a knowledge of the total fertiliser input on the farm, possibly for several years. Secondly, it might be possible to use a more experimental technique of analysis provided farmers were prepared to vary their fertiliser treatment on the same or similar fields and to record the variation in yield which resulted. It is true that farmers who were prepared to do this might suffer some loss or achieve some gain therefrom but it should give closer estimates than are now possible of the optimal fertiliser practice. It is difficult to escape the conclusion that much current fertiliser practice is based on intuition rather than

on real knowledge.

Analogous problems of analysis arise in the case of sprays and other cultural practices. Their solution depends on a more complex approach and additional recording in enterprise studies but the gain in knowledge might be well worth while.

SOME COUNTY FIGURES

Average costs, returns, net margins and yields for the individual counties are given in Table 13. In both years the Shropshire farms by virtue of low costs and high yields achieved the highest net margins per acre.

Table 13

Costs, returns and net margins per acre by Counties

| County | Costs | | Returns | | Net Margins | | Av. Yield | |
|---|---|---|---|---|---|---|---|---|
| | 1963 | 1964 | 1963 | 1964 | 1963 | 1964 | 1963 | 1964 |
| | £ s. | £ s. | £ s. | £ s. | £ s. | £ s. | Cwts | Cwts |
| Cheshire | 27 5 | 26 15 | 44 11 | 46 6 | 17 6 | 19 11 | 33.1 | 35.2 |
| Lancashire | 28 12 | 27 10 | 42 6 | 43 2 | 13 4 | 15 12 | 29.7 | 31.4 |
| Shropshire | 25 5 | 26 0 | 51 6 | 52 0 | 26 1 | 26 0 | 37.8 | 38.3 |
| Staffordshire | 25 11 | 25 1 | 47 14 | 46 4 | 22 3 | 21 3 | 34.8 | 34.5 |

The costs for seed, fertiliser and sprays were virtually the same for all the Counties. The main differences in costs between the Shropshire and Staffordshire farms on the one hand and the Cheshire and Lancashire farms on the other lay in the charges for residual manurial values and for specialised machinery depreciation and repairs. In this context it is of

interest to look at Table 14 which gives the average farm size and cropping by county for the farms in the survey.

Table 14

Average Acreage and Cropping of Farms in the Survey

| | Cheshire | Lancashire | Shropshire | Staffordshire |
|---|---|---|---|---|
| | acres | acres | acres | acres |
| Cereals | 74 | 93 | 155 | 151 |
| Potatoes | 16 | 24 | 22 | 4 |
| Sugar Beet | - | - | 30 | 4 |
| Vining Peas | 10 | 13 | - | - |
| Horticultural Crops | - | 10 | - | - |
| Grassland | 102 | 41 | 191 | 185 |
| Total | 202 | 181 | 398 | 344 |

As stated earlier, the bulk of the winter wheat on the Cheshire and Lancashire farms was grown after well manured and fertilised high value cash crops, which by our method of calculation entailed a high charge for residual manurial value. On the Shropshire and Staffordshire farms the tendency was to grow winter wheat after grass or a cereal, with a consequently low charge for residual manurial value. The Cheshire and Lancashire farms were generally much smaller than those of Shropshire and Staffordshire. Less cereals were grown per farm and the charge per cereal acre for the depreciation and repair of specialised machinery, i.e. combine-harvesters, driers and storage facilities, was correspondingly greater. This was especially true of the Lancashire farms on which high-capacity equipment was purchased deliberately in order that the harvesting of the potato and market garden crops would not be jeopardised.

PATTERN OF SALES

The pattern of sales and the average prices per cwt. received are shown in Table 15. Heavy purchases of wheat by Russia from Australia and Canada in the autumn of 1963 caused world prices to rise sharply and on the home market prices reached a peak in December and January. From then on prices declined steadily, the deficiency payments being increased accordingly. Prices for the 1964 crop showed a steady increase over the whole selling period. In both years 46 per cent. of the crop was sold between July and November, 14 per cent. between December and February, and the remaining 40 per cent. from March to June.

Table 15

Distribution of Sales and Average Prices per Cwt.

| Period | 1963 | | | 1964 | | |
|---|---|---|---|---|---|---|
| | % of total sales | Average price rec'd per cwt. | Def.payt. per cwt. | % of total sales | Average price rec'd per cwt. | Def.payt. per cwt. |
| | | s. d. | s. d. | | s. d. | s. d. |
| 1. 1st July to 30th Sept. | 18.3 | 20 3 | 4 3 | 24.9 | 20 4 | 3 10.4 |
| 2. 1st Oct. to 30th Nov. | 27.9 | 22 5½ | 3 7.3 | 20.6 | 21 3 | 4 1.7 |
| 3. 1st Dec. to 28th Feb. | 14.0 | 24 0 | 3 3.6 | 13.8 | 22 3 | 4 10.4 |
| 4. 1st March to 30th April | 8.4 | 22 5½ | 6 9.8 | 21.8 | 22 9 | 5 8.7 |
| 5. 1st May to 30th June | 31.4 | 20 7 | 8 11.5 | 18.9 | 23 3 | 5 2.7 |

SPECIALISED EQUIPMENT

In view of the increasing importance of grain harvesting and storage equipment it was thought of interest to look briefly at the performance and capital cost of such equipment in relation to farm cereal acreage on the farms in the survey.

Combine Harvesters

All the wheat was harvested by combine harvester; on 48 farms with the farmer's own machine and on 12 farms by a contractor. The size of the farmer-owned combines ranged in cutter bar length from 5 feet to 12 feet. Table 16 shows the average amount of work done in 1963 by each size of machine. Also given in the table are the averages of the actual prices paid for the machines. Eighteen combines were purchased second-hand and where applicable the second-hand purchase price has been used. This explains the apparent anomaly in the average capital costs of the 10 ft. and 12 ft. machines.

Table 16

Average Capital Costs of and Work done by Combine Harvesters of different sizes in 1963

| Length of Combine Cutter Bar in Feet | No. of Combines | Average Acreage Combined | Range of Acreages Combined | Average Capital Cost of Combines |
|---|---|---|---|---|
| | | | | £ |
| 5 | 3 | 75 | 50-109 | 537 |
| 6 | 10 | 80 | 44-113 | 735 |
| 7 | 3 | 100 | 97-104 | 1440 |
| $8\frac{1}{2}$ | 19 | 138 | 68-240 | 1566 |
| 10 | 15 | 186 | 106-318 | 2117 |
| 12 | 5 | 180 | 134-220 | 2070 |

The distribution of the different sizes of combine harvester according to the farm cereal acreage, together with the average capital cost of machine per farm cereal acre is shown in Table 17. The high costs shown in the 30 to 80 cereal acreage group for the 7 ft. and 8½ ft. machines were incurred deliberately in order that contract work might be carried out.

Table 17

Average Capital Costs per farm Cereal Acre of Combine Harvesters of Different Sizes

| Length of combine cuttern bar in feet | Total Farm Cereal Acreage | | | | | |
|---|---|---|---|---|---|---|
| | 30-80 | 81-130 | 131-180 | 181-230 | 231-280 | 281-400 |
| | £ | £ | £ | £ | £ | £ |
| 5 | 10.4 (2) | 3.7 (1) | | | | |
| 6 | 13.6 (5) | 8.3 (2) | 8.7 (2) | | 8.1 (1) | |
| 7 | 39.4 (1) | 12.7 (2) | | | | |
| 8½ | 23.0 (3) | 17.6 (6) | 11.5 (3) | 16.1 (3) | 14.4 (2) | 5.3 (2) |
| 10 | | 18.9 (3) | 17.0 (3) | 10.5 (4) | 7.5 (2) | 9.0 (3) |
| 12 | | | 12.2 (2) | | | 11.2 (3) |
| No. of farms | 11 | 14 | 9 | 7 | 3 | 4 |
| No. of combines | 11 | 14 | 10 | 7 | 5 | 8 |

Note: Figures in brackets denote number of combine harvesters.

Grain driers

Of the 48 farms which had combines, 42 were equipped with some form of drying and storage facilities for the grain. In addition, 2 farms on which the grain was harvested by a contractor were so equipped. Table 18 shows how the various types of driers were distributed in relation to farm cereal acreage, and gives the average capital costs per cereal acre incurred by the farmers in the survey in installing this equipment.

Table 18

Average Capital Costs per Farm Cereal Acre of Different Types of Drier

| Type of Drier | Total Farm Cereal Acreage | | | | | | Total No. of Driers |
|---|---|---|---|---|---|---|---|
| | 30-80 | 81-130 | 131-180 | 181-230 | 231-280 | 281-400 | |
| Platform in - sack | 6.2 (5) | 3.5 (2) | 2.7 (1) | 2.5 (2) | | | 10 |
| Tunnel | | 7.9 (2) | | | | | 2 |
| Batch | | 12.4 (3) | | | | | 3 |
| Bulk Floor | | 8.8 (2) | 5.1 (1) | | | 5.8 (1) | 4 |
| Continuous | 29.0 (2) | 23.9 (3) | 15.5 (6) | 11.9 (2) | | 4.1 (1) | 14 |
| In-bin | 27.0 (1) | 30.4 (2) | 20.5 (2) | 15.0 (3) | 13.2 (2) | 11.0 (1) | 11 |

Note: Figures in brackets denote number of driers.

In the in-bin and bulk floor systems the drying facility is an integral part of the storage equipment. In the other systems drying and storage are two distinct operations, and in practice grain was stored in a variety of buildings, little in the way of structural alterations being required.

Any costs so incurred are included in the Table. The high capital costs per cereal acre shown for the in-bin and continuous driers in the 30 to 70 cereal acres and 81 to 130 cereal acres groups were again incurred deliberately because contract drying was envisaged.

It must be stressed that the information given in Tables 17 and 18 relates to capital expenditure incurred up to 1964. Machinery and building costs, especially the latter, have risen since then and the information cannot be used as it stands as a basis for estimating future capital commitments in this respect. One point of interest not brought out in Table 18 concerns the choice of type of drying and storage equipment. On the larger farms the majority of the earlier installations were of the in-bin types, which, while providing both drying and storage facilities, were essentially a one-purpose, usually expensive type of building. The development of more efficient continuous driers and the introduction of bulk floor drying and storage have provided alternative methods which have the comparative advantages of flexibility and lower capital costs, and later installations have tended to be of one or other of these types.

## Appendix I

## WINTER WHEAT - 1963 CROP

The figures in this Appendix are based on 60 records, on 2543 acres, on 60 farms

TABLE 1. SUMMARY OF AVERAGE COSTS PER ACRE

| ITEM OF COST | | £ | s | d |
|---|---|---|---|---|
| Total Labour | 12.3 man hours | 3 | 4 | 0 |
| Power: | | | | |
| Tractor | 7.6 hours | 1 | 10 | 0 |
| Machinery Depreciation & repair allowance | | 4 | 18 | 0 |
| Contract Services | | | 8 | 0 |
| Other Fuel | | | 5 | 0 |
| Materials | | | | |
| Seed | | 3 | 12 | 0 |
| Fertilisers and manures applied | | 4 | 2 | 0 |
| Sundries | | 1 | 14 | 0 |
| Rent | | 5 | 7 | 0 |
| Total Direct Costs | | 25 | 0 | 0 |
| Share of General Farm Expenses | | 2 | 0 | 0 |
| | | 27 | 0 | 0 |
| Adjustment for Residual Manurial Values | | + 1 | 6 | 0 |
| Gross Cost | | 28 | 6 | 0 |
| Less credit value for straw | | 3 | 1 | 0 |
| Net Cost of Grain | | 25 | 5 | 0 |

TABLE 2. SUMMARY OF AVERAGE YIELDS AND RECEIPTS.

| | Quantity per acre | Receipts per cwt. | |
|---|---|---|---|
| | cwts. | s. | d. |
| Grain Sold | 34.96 | 21 | 9 |
| Deficiency Payment Receipts | | 5 | 9 |

Table 3. SUMMARY OF AVERAGE QUANTITIES OF MATERIALS

| Material | | | Overall Average per Acre (2543 acres) |
|---|---|---|---|
| | | | Cwts. |
| Seed | | | 1.6 |
| Fertilisers and Manures. | Area Dressed Only | | |
| | Acres. | Cwts. per Acre | |
| Farmyard manure | 88 | 260 | 9.3 |
| Lime | 191 | 32.2 | 2.5 |
| Artificials: straights; | | | |
| nitrogenous | 1724 | 2.2 | 1.6 |
| potassic | - | - | - |
| phosphatic | - | - | - |
| Artificials: compounds | 1915 | 3.2 | 2.5 |

## WINTER WHEAT - 1964 CROP

The figures in this Appendix are based on 60 records, on 2633.25 acres, on 60 farms

TABLE 4. SUMMARY OF AVERAGE COSTS PER ACRE

| ITEM OF COST | | £ | s | d |
|---|---|---|---|---|
| Total Labour | 10.8 man hours | 2 | 18 | 0 |
| Power: | | | | |
| Tractor | 7.3 hours | 1 | 9 | 0 |
| Machinery Depreciation & repair allowance | | 4 | 15 | 0 |
| Contract Services | | | 9 | 0 |
| Other Fuel | | | 4 | 0 |
| Materials | | | | |
| Seed | | 3 | 15 | 0 |
| Fertilisers and manures applied | | 4 | 3 | 0 |
| Sundries | | 1 | 12 | 0 |
| Rent | | 5 | 7 | 0 |
| Total Direct Costs | | 24 | 12 | 0 |
| Share of General Farm Expenses | | 2 | 0 | 0 |
| | | 26 | 12 | 0 |
| Adjustment for Residual Manurial Values | | + 1 | 3 | 0 |
| Gross Cost | | 27 | 15 | 0 |
| Less credit value for straw | | 2 | 8 | 0 |
| Net Cost of Grain | | 25 | 7 | 0 |

TABLE 5. SUMMARY OF AVERAGE YIELDS AND RECEIPTS

| | Quantity per acre | Receipts per cwt. | |
|---|---|---|---|
| | cwts. | s | d |
| Grain Sold | 37.0 | 22 | 5 |
| Deficiency Payment Receipts | | 4 | 7 |

TABLE 6. SUMMARY OF AVERAGE QUANTITIES OF MATERIALS

| Material | | | Overall Average per Acre (2633.25 acres) |
|---|---|---|---|
| | | | cwts. |
| Seed | | | 1.6 |
| Fertilizers and Manures | Area Dressed Only | | |
| | Acres | Cwts. per Acre | |
| Farmyard manure | 125 | 246 | 11.6 |
| Lime | 79 | 44 | 1.3 |
| Artificials: straights; | | | |
| nitrogenous | 1978 | 2.6 | 2.0 |
| potassic | - | - | |
| phosphatic | 42 | 8.5 | 0.1 |
| Artificials: compounds | 2112 | 2.5 | 2.0 |

## Appendix II

Costing Methods used in Survey.

Manual Labour. The hourly rates were based on actual wages paid on the farms, due allowance being made for holidays, national insurance and pension contributions and overtime working. Work done by the farmer or family was charged at similar rates.

Contract Services. The charges include the hire of the machines and the cost of the operators accompanying the machines. Where spraying was done by contract, the cost of the materials was charged under "sprays".

Tractor Labour. Tractor labour was charged at standard rates as under.

| | | |
|---|---|---|
| Wheeled Tractors | 4s. Od. | per hour |
| Crawler Tractors | 8s. Od. | per hour. |

Machinery Depreciation and Repairs.

(a) Specialised Machinery. For combine-harvesters and balers an annual charge of 15 per cent. of original cost was made to cover depreciation and repairs, this charge being spread over the whole of the acreage covered by the machine in the year in question.

For drying and storage equipment an annual charge of 8 per cent. of original cost was made to cover depreciation and repairs, this charge being spread over the total cereal acreage of the farm in the year in question.

(b) General Machinery. A standard charge was made for depreciation and repairs of 6s. Od. per tractor hour.

Fuel and power. This cost refers to fuel and power other than that used by tractors e.g. fuel and power used by combines, balers, drying and storage equipment.

Seed was charged at cost if purchased and at estimated sale value if homegrown. Where seed was dressed on the farm, the cost of materials and labour incurred is included in charge for seed.

Fertilisers and Manures. Artificial fertilizers were charged at cost net of subsidy; farm yard manure at £1 per ton plus cost of spreading.

Rent. Actual rent paid by tenant farmers or a rental value for owner-occupied farms.

General Farm Expenses were calculated as below.

(a) Fifteen per cent. of the cost of manual labour plus

(b) Six per cent. of total direct costs (including (a)).

Sundries: - includes sack hire, twine and miscellaneous items.

Note: 'Averages'

The information given in the tables in the text of the report is derived from averages of farm 'per acre' figures (simple average).

The information given in the tables in Appendix I is derived by adding the total costs and returns for all farms in the survey and dividing by the total acreage (weighted average).