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THE USE OF FARM RECORDS FOR BETTER MANAGEMENT DECISIONS.

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THE USE OF FARM RECORDS FOR BETTER MANAGEMENT DECISIONS.

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THE USE OF FARM RECORDS FOR BETTER MANAGEMENT DECISIONS.

Farmers are continually being encouraged to increase the efficiency of their farming operations. A great deal is read and heard of the apparent inefficiencies of some farms compared with others. There appears, however, to be a certain amount of confusion between efficiency and maximum output. The farmer's usual objective is to obtain the highest possible profit, whilst maintaining or improving the fertility of the soil and the standard of buildings and fixed equipment. That is his measure of efficiency. And that should be the measure of efficiency used by his adviser. Usually a high profit is achieved by a high output. But there are instances when the highest profit can be obtained by less than maximum output. In these cases, the adviser should encourage the highest profit rather than the highest output. If national policy dictates that a less profitable combination of enterprises should be grown, e.g. wheat in a predominantly grassland area, then the adviser should candidly indicate the fact to farmers. With the exception of such instances, the normal criterion of farm advice is whether the proposed action would increase the profitability not only of the enterprise under consideration, but of the farm as a whole.

This criterion applies equally to the technical and the economic advice given to farmers. Actually, no real distinction can be drawn between technical and economic advice. Both have to be considered when solving a farming problem. Most of the present farm advisers are technical experts, and they naturally give prior consideration to the technical aspects of a farmer's question. But they should also consider the economic implications of any technical advice.

A good illustration is provided in the application of fertilisers to arable crops. A farmer asks how much nitrogen he should apply to his wheat. Using available technical knowledge, the adviser suggests a suitable quantity. But the farmer may say that, owing to the increased price of fertilisers, it is unprofitable to apply the suggested

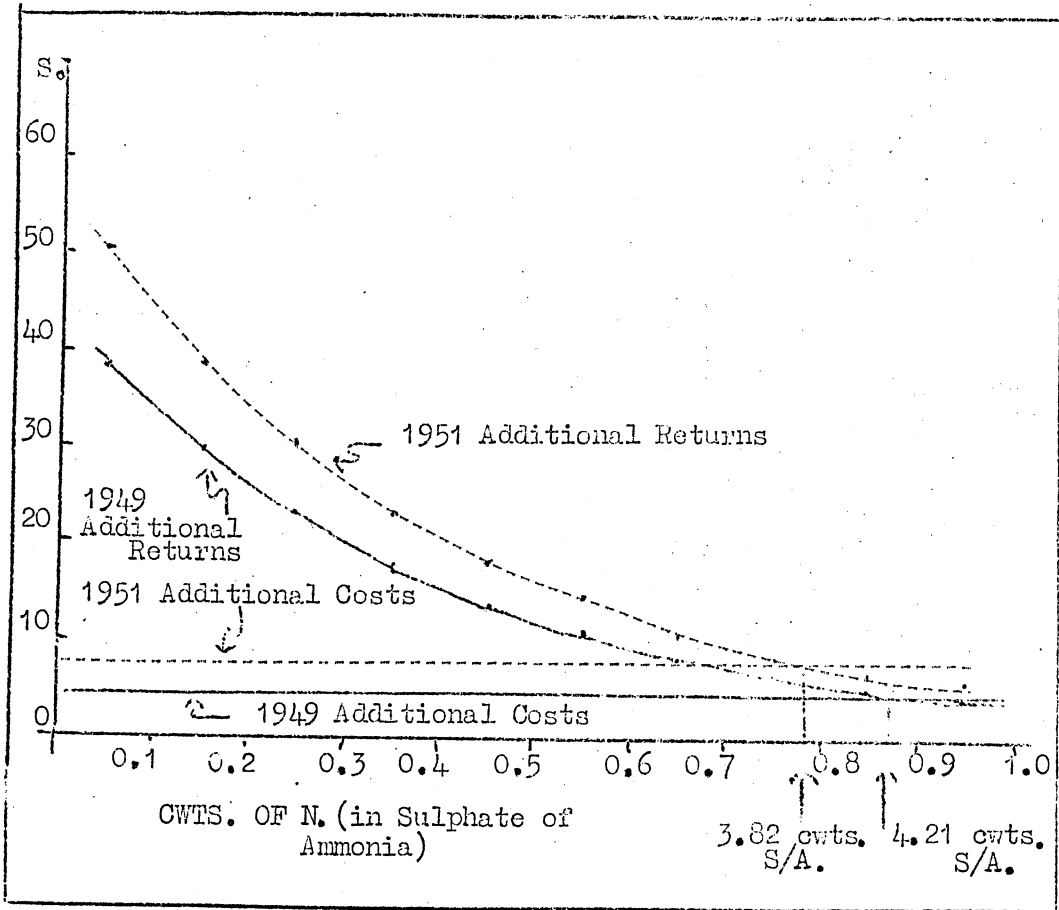
quantity of nitrogenous fertiliser. So, in addition to giving technical information, the adviser should also have some knowledge of the existing relationship between fertiliser prices and wheat prices. The economic optimum dressing of nitrogen for wheat is shown on the accompanying chart (Chart I) for the years 1949 and 1951⁽¹⁾. The difference in the level of prices is due to the increased cost of fertilisers and the corresponding higher price of wheat. At each price level, the additional cost of each unit of nitrogen is, of course, the same. This is shown by the two horizontal lines. The extra yield produced by each additional unit of nitrogen declines. Hence the additional return declines as more nitrogen is applied. The optimum amount of fertiliser to apply is at the point of intersection of the costs and returns curves. At this point, an extra unit of nitrogen yields just sufficient extra wheat to equal its cost. The graphs indicate that the optimum dressing of nitrogen, in terms of sulphate of ammonia, declined from 4.2 cwts. to 3.8 cwts. Such dressings are, however, considerably larger than those commonly used by farmers, due to the danger of lodging. The practical significance of this chart is that, even with the present high prices of fertilisers, it is profitable to apply as much as possible, keeping in mind the limitations caused by the fear of lodging.

A similar chart has been constructed (Chart II) to show the optimum application of nitrogen to potatoes. In this case, there is no possibility of lodging to limit the fertiliser dressing. Again, the intersection of the additional costs lines and the additional returns curves indicates the most profitable amount of fertiliser to apply. This is the point at which an extra unit of nitrogen yields just sufficient extra potatoes to equal its cost. This has declined from 5.6 cwts. of sulphate of ammonia to 5.1 cwts.

(1) Charts 1 and 2 are calculated from figures presented by Crowther and Yates in The Empire Journal of Experimental Agriculture, Vol. IX, January-October 1941.

CHART 1.

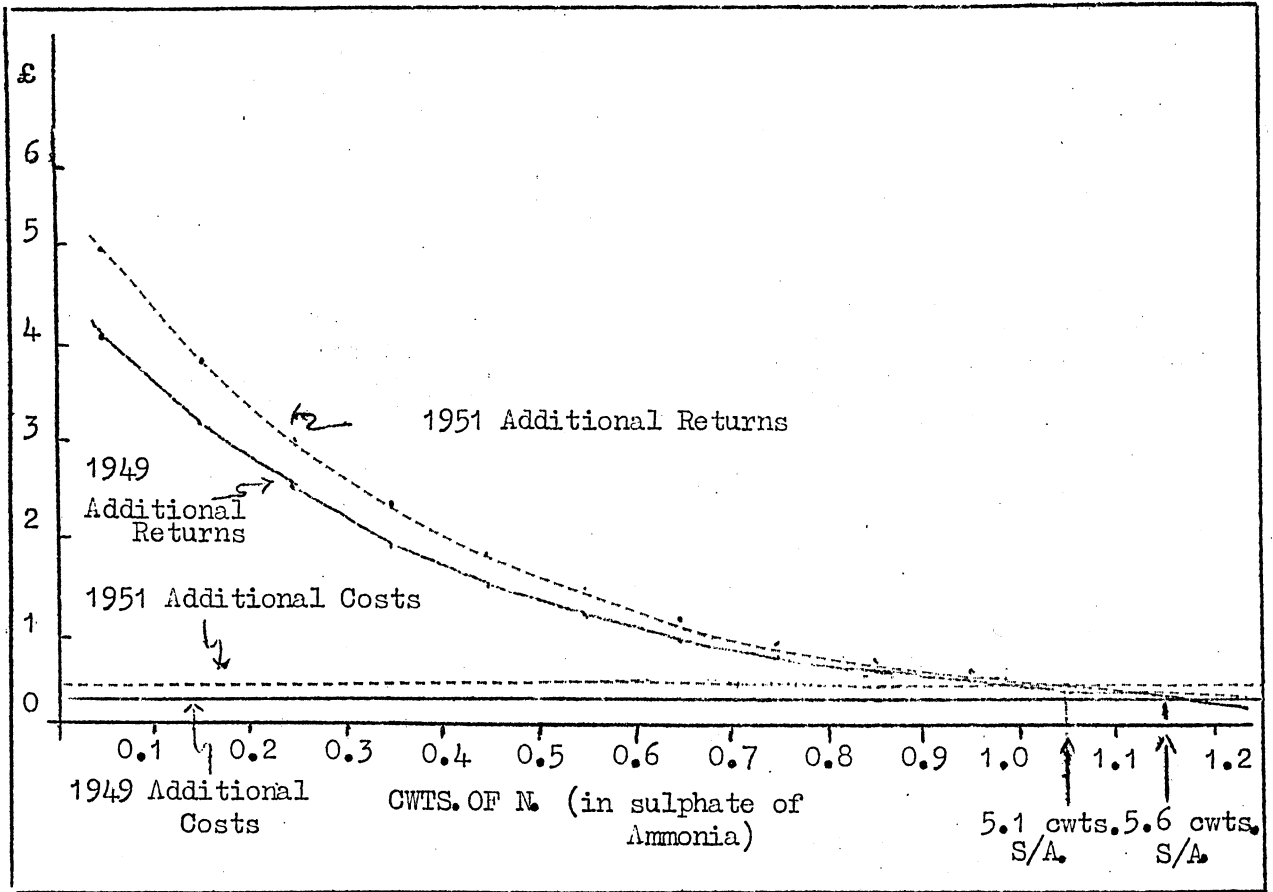
APPLICATION OF NITROGEN TO WHEAT - COSTS AND RETURNS



Cwts of N.	1949 Prices		1951 Prices	
	Additional Cost S/A 10/-a. cwt.	Additional Return Wheat 23/-a. cwt.	Additional Cost S/A 16/-d. cwt.	Additional Return Wheat 30/-a. cwt.
	S.	S.	S.	S.
0.1	4.8	38.6	7.8	50.4
0.2	4.8	29.8	7.8	38.8
0.3	4.8	23.4	7.8	30.5
0.4	4.8	17.5	7.8	23.1
0.5	4.8	13.7	7.8	17.9
0.6	4.8	11.7	7.8	14.4
0.7	4.8	8.0	7.8	10.7
0.8	4.8	7.0	7.8	8.3
0.9	4.8	5.0	7.8	6.5
1.0	4.8	4.0	7.8	5.4

SOURCE: Crowther and Yates. Emp. Jour. Exp. Agric. Vol.IX. Jan-Oct.1941.

CHART 2 APPLICATION OF NITROGEN TO POTATOES - COSTS AND RETURNS



Cwts. of N.	1949 Prices		1951 Prices	
	Additional Cost S/A 10/-d. cwt. £.	Additional Return Potatoes £9.7.6d. ton £.	Additional Cost S/A 16/-d. cwt. £.	Additional Return Potatoes £11.8.6d. ton £.
0.1	0.24	4.05	0.39	4.93
0.2	0.24	3.12	0.39	3.80
0.3	0.24	2.45	0.39	2.98
0.4	0.24	1.86	0.39	2.26
0.5	0.24	1.43	0.39	1.75
0.6	0.24	1.18	0.39	1.44
0.7	0.24	0.84	0.39	1.03
0.8	0.24	0.67	0.39	0.82
0.9	0.24	0.51	0.39	0.62
1.0	0.24	0.42	0.39	0.51

SOURCE: Crowther and Yates, Emp. Jour. Exp. Agric. Vol. IX. Jan.-Oct. 1941.

In terms of nitrogenous content, this is equivalent to a decline from $16\frac{1}{2}$ cwts. to 15 cwts. of National Compound No. 1. A study of potato growing in the East Midlands in 1950 showed that the average application of compound fertiliser on 30 farms was a little over 14 cwts. The conclusion may be drawn that the average farmer may profitably increase rather than reduce the quantity of fertiliser applied to potatoes.

Both charts illustrate the importance of combining economic advice with technical information when answering farmers' queries. This combination of technical and economic advice must also be used when considering the broader aspects of farm management. In this country, the tendency has been to think of each section of the farm in isolation. Advice is given on grassland husbandry, on the feeding of dairy cows, and so on, with little conscious effort to regard the whole farm as an integrated unit. In the United States, on the other hand, much more attention has been given to the problems of the farm as a whole. The integration of farm enterprises, the use of the farm labour force, the capital available for farming are indicative of the type of approach favoured over there. Farm advisers here must develop the habit of thinking of the farm as a whole. The various crop and livestock enterprises are so inter-related that an apparent fault in one enterprise may be due to a weakness in another enterprise. For example, low profits in a beef enterprise may be due to poorly organized arable cropping. To solve the management problems of a farm, one must consider what the farmer puts into the farm as a whole, and what he obtains from the farm as a whole. This may be done by examining the farm records.

Two main types of questions may be answered by studying farm records. These two groups encompass most farm management queries. The first group may be

illustrated by the question, "How can I make my present system of farming more profitable?" The farmer does not usually phrase the question that way. He may ask "Should I buy a pick-up baler?", or "Should I aim for higher milk yields?" But in each case he is really asking for advice to increase the profits from his present system of farming.

The second group of questions are also frequently asked. These concern the problems of changing the system of farming. A farmer may be considering whether to change from milk to beef, or whether to grow all the food for the dairy herd instead of selling arable cash crops. This type of question is rather more difficult to answer, and requires a more detailed analysis of the farm. Essentially, it involves a budget analysis. The adviser and the farmer work out the receipts and expenses under the present system and the estimated receipts and expenses under the proposed system. The system which promises the highest continuous farm profit is the one to adopt. The details of budget analysis, however, are worthy of a separate article. The present article will consider only the first group of questions - where the problem is to find the weak points in an existing farm organisation.

Two points need emphasising. Firstly, as mentioned earlier, under ordinary conditions the criterion to use is farm profit. Some part-time farmers, hobby farmers, and farmers living in semi-retirement may not be wholly concerned with the level of profits. For them farming may be a "way of life". But the typical farmer works for the highest continuous farm profit. The factors which tend to decrease farm profits are those to which the farmer's attention should be directed. Secondly, it is essential to gain the farmer's confidence. Only by freely discussing his profits, his main items of expenditure and his

general financial position can the farmer be given really useful advice. If the farmer is sure that the information divulged will go no further than the advisory officer, then he will be only too pleased to discuss his problems.

Many farm records are incomplete for advisory purposes. Even many accounts prepared for farmers do not give much detailed information. But the adviser, with the help of the farmer, can rapidly work out figures corresponding to those in Tables I and II. Table I compares the records of an average farmer with those of two good, i.e. high profit, farmers. All these are dairy farms in South Derbyshire, roughly comparable in size, topography, climate, and system of farming. The figures apply to the year ending in April 1951. The two good farmers have been averaged for purposes of comparison. Table I is constructed to illustrate how the weak points in a farm may be discovered by comparing the records with those of more profitable farms in the same area. The records do not provide the answers to the management problems, but they do indicate which sections of a farm require closer attention by the farmer and the adviser.

The first two sections of Table I compare the utilisation of land on these farms. Three main differences may be observed:

1. Farmer A devotes less land to cash crops than do the other farmers.
2. Less home grown concentrates are fed and less silage is used on Farm A but more roots are consumed than on the other farms.
3. More livestock are maintained on Farm A, but slightly fewer milking cows are kept. The milk yield per cow is slightly higher on Farm A.

What is the effect of these differences on the financial results of the farms? Total receipts are some £200 per 100 acres lower on Farm A. Although these are predominantly dairy farms, the difference in receipts is due to (a) the larger sales of cash crops and (b) the larger sales of livestock on the more profitable farms. The total expenditure was

approximately £100 per 100 acres more on Farm A. Hence the nett farm income was lower. If an allowance is made for the work of the farmer and wife, the surplus for interest on capital and profit is considerably lower on Farm A.

That briefly describes the differences between these farms. It is now possible to search for the causes of these differences. Labour costs appear to be rather high on Farm A. The difference in labour costs is roughly the equivalent of one man's annual wage. Power and machinery costs and investment in machinery are low in Farm A. Here is a point for the adviser to discuss with the farmer. Could a substantial reduction in labour costs be made if some suitable machinery were purchased? Silage is a crop suitable for mechanised farming. It may be that some labour could be saved on Farm A by substituting more silage for roots.

Expenditure on fertiliser also appears to be very low. Does that explain the smaller total output of Farm A? By using more fertilisers, it may be possible to produce the same amount of feed from a smaller acreage, thus releasing more land for the growing of cash crops. The total number of 'cow-equivalent' units is much higher on Farm A, although the number of dairy cows is no larger. Here is another point which the farmer and the adviser could discuss together.

In short, three main issues appear to require more detailed attention on this farm - labour costs and machinery use, fertiliser use and total output, and the proportion of young stock and followers to dairy cows. As the analysis of the farm proceeds, other factors may be brought to light which effect the conclusions. Perhaps Farmer A is unwilling to use more fertilisers because he believes any more fertiliser would be detrimental to his crops and stock. Or there may be local differences in drainage or topography which necessitates his present policy. The study of the records of a farm does not automatically produce

an improved farm production policy. But farm records provide the means by which the organisation of a particular farm may be systematically examined. Farmers are continually concerned about the financial side of their operations. Farm records help the adviser to fully appreciate the financial position of the farm and provide a basis upon which the farmer and the adviser may construct an improved production policy. By a comparison of the records from several farms, it is possible to glean much information of value to the farmer and the adviser. The main items of receipts and expenses often reveal the strong and weak points of a farm organisation.

Recognizing this, the Department of Agricultural Economics of the University of Nottingham has recently published a Farm Management Manual which provides some bases for the comparison of farm businesses. Section III presents tables giving figures for some East Midland farms of different size and organisation. Table II is designed to show how material such as that in Section III of the Manual may be used for advisory work with farmers.

Material similar to that in Table I is presented. In addition, there are a number of measures of productivity which may prove useful for comparative purposes. The measures used are relatively simple and are largely self explanatory. Livestock output is a measure of the sales of livestock corrected for changes in the valuations, less livestock purchases. Crop output is a similar measure of crop sales. This is not a measure of crop production and is not significant on many livestock farms. Output per £100 of tenant's capital is a useful measure of effective use of capital.

What differences does a comparison of this farm with an average of 11 other farms reveal? First, the rent of Farm B is much lower, which indicates that the farm may be of low inherent productivity. Receipts are much lower than the average. Expenditure, although lower than the average, does not leave such a wide margin for net farm income. The cost of labour is extremely low. Actually, no regular labour is employed, but there is a small amount of casual labour in the busy seasons.

Fertilisers are not so extensively used as on the average farm. The utilisation of land suggests that Farm B is unsuitable for much arable land, although crop yields appear reasonably good. Whether the arable acreage could be increased is a point which could be discussed by the adviser and the farmer. This is, however, doubtful considering the small investment in equipment.

The outstanding point in the livestock organisation on Farm B is the number of sheep, which is surprisingly high.

What weak points in the organisation of Farm B are revealed by comparison with the average of the group? Total output is very low and needs increasing. The livestock output per 'cow-equivalent' unit is only half that of the average. This is the point which needs closer investigation. It is probable that the milk yields are extremely low. This may be due to the sheep preventing the grass from growing away in the spring. More fertilisers may increase the fodder supply for the stock. Perhaps more concentrates could be purchased. Labour also needs attention. One man may be unable to effectively manage all the livestock on Farm B. In short, therefore, livestock output, use of fertilisers and labour use are the sections of this farm business which need closer investigation by the farmer and his farm management adviser.

These two tables have shown how farm records may be used for advisory purposes. A comparative study of farm records does not solve all the problems of farm management. Indeed, it only indicates where the weaknesses in the organisation may be found. The problem of budget analysis and farm planning still has to be tackled, before a long term production policy can be designed for a farm. But farm records are extremely valuable in enabling the farmer to study the farm as one integrated unit and to discover which sectors may be improved to become more efficient and more profitable.

TABLE I

	Farm A	Average of two other farms
1. Acres	232	245
<u>Quantity of Home Grown Foods</u>		
<u>Used:</u>		
	tons	tons
2. Cereals	11½	22
3. Roots	63	47
4. Silage	17	86
5. Hay	32	14
<u>Land Utilisation</u>		
	Acres	Acres
6. Cash Crops	38½	50
7. Other arable crops	25½	10½
8. Silage	9	48
9. Hay	36	18½
10. Grazing	123	118
11. Total	232	245
12. 'Cow equivalent' Units	119	96½
13. Cows in milk and in calf	59.5	63.3
14. Total milk produced	42,625 gals	42,750 gals
15. Milk yield per cow	716 gals	676 gals
<u>Receipts</u>		
	£ per	100 acres
16. Crops	322	526
17. Livestock	357	468
18. Milk, etc.	2,634	2,522
19. Total Receipts	3,313	3,516
20. Valuation change	+ 197	+ 24
21. Total Expenditure	3,182	3,068
22. Net Farm Income	328	472
23. Allowance for farmer and wife	190	163
24. Surplus for interest on capital and profit	138	309
<u>Expenses</u>		
25. Labour	710	565
26. Farmer and wife	190	163
27. Total Labour	900	728
28. Purchased foods	789	821
29. Fertilisers	104	309
30. Power and machinery	296	366
<u>Tenant's Capital</u>		
31. Total	3,747	2,821
32. Livestock	2,738	1,401
33. Crops and produce	153	61
34. Equipment	856	1,359

TABLE II

	Farm B	Average of 11 Farms
1. Acres	149	146
2. Rent	£165	£249
3. Receipts	£3,590	£5,594
4. Expenditure	£3,489	£5,001
5. Valuation Change	+ £498	+ £414
6. Net Farm Income	£599	£1,007
Per 100 acres	£.	£.
7. Rent	111	170
8. Receipts	2,409	3,829
9. Expenditure	2,342	3,423
10. Valuation Change	+ 335	+ 284
11. Net Farm Income	402	690
12. Cost of Hired Labour	37	632
13. Cost of Purchased Foods	736	962
14. Cost of Fertilisers	65	127
15. Machinery Depreciation and Repairs	205	360
<u>Tenant's Capital Per 100 Acres</u>		
16. Livestock	2,346	1,549
17. Crops and Produce	39	166
18. Equipment	293	851
19. Total	2,678	2,566
<u>Crops</u>		
20. Wheat and Barley	-	9.7
21. Potatoes and Sugar Beet	2.0	2.4
22. Other Cash Crops	-	0.9
23. Total Cash Crops	2.0	13.0
24. Other Arable Crops	6.0	15.1
25. Arable Silage	-	1.9
26. Ley - grazed	8.7	2.5
27. Ley - hay	5.4	7.6
28. Ley - silage	-	1.9
29. Permanent Grass - grazed	54.4	45.0
30. Permanent Grass - mown	23.5	11.8
31. Bare fallow, etc.	-	1.2
	100.0	100.0

TABLE II (continued)

	Farm B	Average of 11 Farms
<u>Crop Yields per Acre</u>		
32. Oats	13.0 cwts	17.2 cwts
33. Potatoes	3.2 tons	6.0 tons
34. Kale	15.0 tons	15.8 tons
35. Rotation hay	30.0 cwts	34.1 cwts
36. Meadow hay	20.0 cwts	21.3 cwts
<u>No. of 'Cow equivalent' Units per 100 Acres</u>		
37. Horses	2.7	0.9
38. Dairy cows and bulls	28.2	30.1
39. Cattle over 2 years	6.1	4.2
40. Cattle 1-2 years	0.3	3.9
41. Cattle under 1 year	4.0	3.4
42. Sheep	25.5	3.1
43. Pigs	-	0.7
44. Poultry	0.6	1.3
45. Total 'cow equivalent' units	67.4	47.6
<u>Standard Inputs and Outputs</u>		
<u>Labour</u>		
----- No. per 100 acres -----		
46. Regular (incl. farmer and wife)	1.2	3.4
47. Casual	0.1	0.2
48. Total	1.3	3.6
----- £'s per 100 acres -----		
49. Livestock Output	2,047.7	3,002.0
50. Crop Output	- 6.7	343.0
51. Total Output	2,041.0	3,345.0
----- £'s per Livestock Unit -----		
52. Livestock Output	30.4	63.0
----- £'s per Acreage Tillage -----		
53. Crop Output	0.8	11.0
53. <u>Total Output</u>	£.	£.
54. Per man	1,570	929
55. Per £100 wages	614.3	367
56. Per £100 Expenditure	104.5	112
57. Per £100 Tenant's Capital	76.2	130
58. Rate of Capital Turnover	0.8	1.3

