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PROGRESS IN SANDLAND FARMING 1961-66

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A restropective study of farm business plans and the changes which followed on a group of farms on the Nottinghamshire sandland.

by

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PREFACE

In 1964 this Department published a bulletin entitled "Benefits from Planning", by Michael E. Daw. The author had studied a group of 32 farms in the sandland area of Nottinghamshire and had discussed with the farmers concerned the planning of their future production, with particular reference to the improvement in income which might be achieved.

Mr. Daw left the Department shortly after completing his study, and he therefore had no opportunity to follow up these plans or to discover whether the income prospects envisaged had been realised. Not long afterwards, however, the suggestion was made by Mr. J. S. Hopkins, County Agricultural Adviser for Nottinghamshire, that a further study of these farms might be undertaken by Mr. M. R. Hall who at that time was a member of his staff. I readily accepted this suggestion, and the study was put in hand. Mr. R. B. Jones of this Department co-operated with Mr. Hall at all stages, and contributed additional material which enabled the results to be seen in the context of changes in the agricultural economy of the whole country.

We are glad to have had this opportunity to extend our close and fruitful co-operation with the National Agricultural Advisory Service in the East Midlands, and we are grateful to the farmers by whose assistance it was possible to make comparisons between Mr. Daw's figures and the subsequent situations.

D. K. BRITTON,
Professor of Agricultural Economics
University of Nottingham.

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CHAPTER I

INTRODUCTION

In 1962/63 M. E. Daw carried out a study on a group of sandland farms in Nottinghamshire with the dual aims of examining the economics of sandland farming and the scope for farm management planning to increase profitability.[1] Five years later the opportunity arose to revisit most of the same group of farms to analyse the progress made. The present study looks again at the economics of sandland farming, at the changes which affected sandland farms between 1961/62 and 1966/67 and at the response of the farmers to the farm management plans they were given by Daw.

1. The Study by Daw

For this study Daw chose the Nottinghamshire sandland as an area of relatively uniform soils and conditions where the choice of enterprises was to some extent restricted. He surmised that if there was scope for farm planning in this situation, the scope on better soils with a greater choice of enterprises would be greater. To ensure a sample of farms with broadly similar resources, selection was limited to farms:

(i) between 150 and 350 acres
(ii) at least 75 per cent sandland
(iii) without irrigation

Thirty-two farms prepared to co-operate were selected, distributed as randomly as possible throughout the sandland area. From their tax accounts and any other information available a gross margin analysis was prepared, in most cases based on the 1961/62 financial year. The accounts for the previous two years were consulted to "normalise" the analysis for the base year. Those items most commonly in need of normalisation were crop yields, miscellaneous income and machinery expenses.

For each farm an individual plan was produced aimed at maximising the net farm income. The plan was based on past performance and the estimated potential of both farm and farmer. Because this was an academic exercise, however, the preferences of the farmers were discounted. In preparing the plans a flexible gross margin planning technique was used, aimed at maximising total gross margin within the technical restraints of a sound rotation and of the availability of buildings, labour and machinery. The scope for savings in labour and machinery were investigated but generally intensification proved more profitable than cost-saving. In cases where outmoded techniques resulted in low gross margins, a conservative increase in gross margin was incorporated

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(1) DAW, M. E. *Some economic aspects of sandland farming in Nottinghamshire,* thesis submitted to the University of Nottingham, 1963. Published in a condensed form in *Benefits from planning,* University of Nottingham Department of Agricultural Economics, F.R. No. 155, 1964. (Out of print).

into the plan. Conversely allowance was made for a reduction in gross margin if an enterprise was expanded considerably. Reductions in the guaranteed prices of wheat and barley and in the ploughing grant had been announced between 1961/62 and the time of the planning exercises and were incorporated, but it was not found possible to allow for other likely cost and price changes. In general, the plans involved reducing the permanent grass and increasing barley and suger beet. Pigs and poultry were also increased. Dairying and potatoes without irrigation were reduced.

Daw found that the average net farm income in 1961/62 was £7.2 per acre and that if his plans were adopted, this should increase by 51 per cent to £10.9. He concluded that profits were generally reasonable on the Nottinghamshire sandland farms and that the area would not at that time be classified as marginal for farming. However, an improvement in management would be desirable to consolidate the position. He also concluded that there was considerable scope for farm management advice even when non-profit motives were involved.

2. The Present Study

Most of the same farms have been revisited five years later. Again a normalised gross margin analysis has been prepared for each farm.[2] The farmers have also been questioned about their reasons for deviating from Daw's plans and the factors affecting changes in profitability over the five years have been analysed. Of the original 32 farms, 20 have taken part in the present study. Their distribution over the sandland area is shown on the map at Fig. 1. One of the remaining twelve farmers had moved, three suffered from ill health and eight declined to co-operate for other reasons. Geographically eight of the twelve were situated in the northern half of the area. However, both physically and financially in both the actual situations in 1961/62 and in the plans the sample of 20 and the sample of 32 farms seem very comparable.[3] The average farm acreages were identical. It seems reasonable to assume that conclusions will be equally valid for both samples.

Daw's results are in most cases based on 1961/62 financial year, with some reference to the previous two years. The present results are in most cases based on the 1966/67 financial year, with some reference to the two previous years. In the remainder of the text the two periods will be described by the base cropping years — 1961 and 1966 — for simplicity. Unless otherwise stated, data for 1961 applies to the 20 farms in the present survey only and not to Daw's sample of 32.

3. Analysis

The level of total gross margin depends on the cost/price structure, the farm acreage, the distribution of enterprises and the physical efficiency or productivity of the enterprises. The total fixed costs depend on the level of unit costs, the farm acreage and the organisation or physical

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(2) Details of the conventions used are given in Appendix D.

(3) A comparison of the two samples is given in more detail in Appendix A.

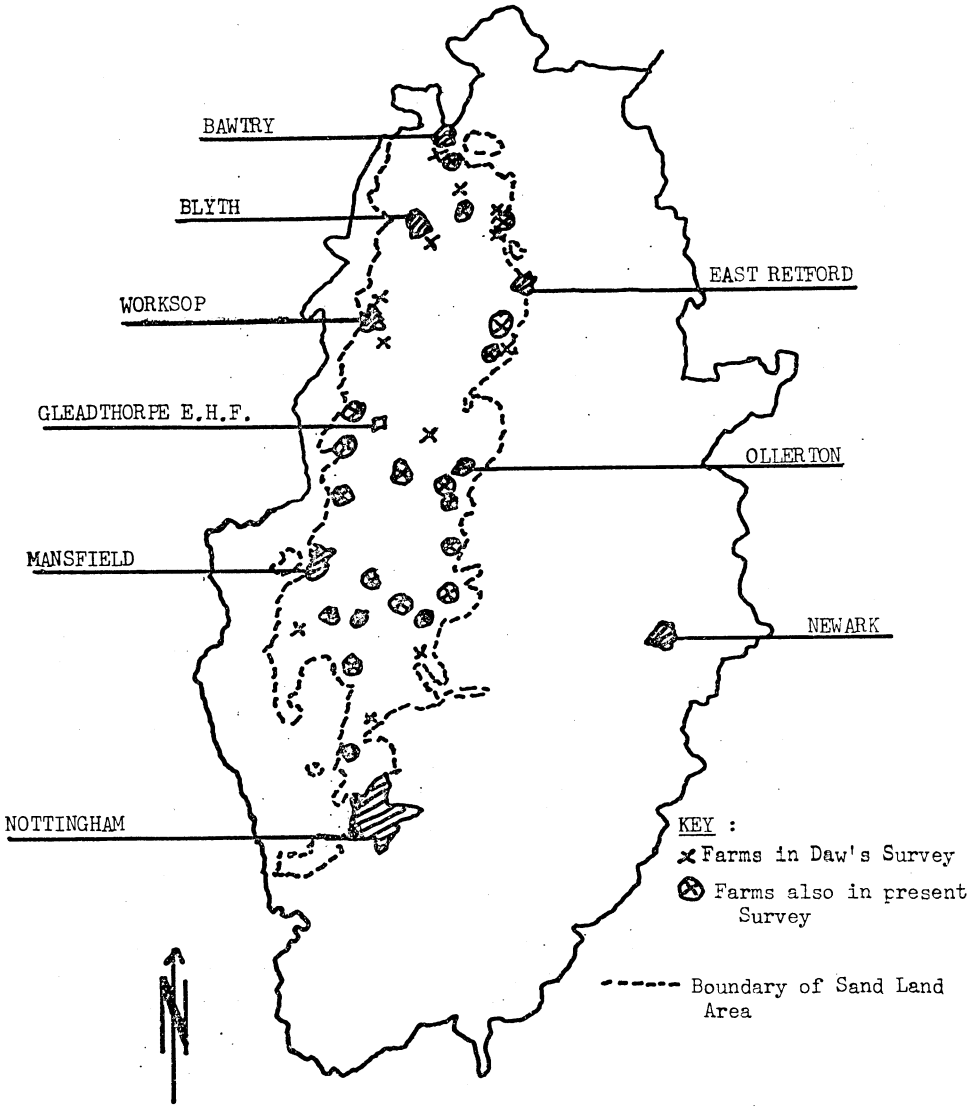

Fig. 1. Map of Nottinghamshire showing the sandland area and location of farmers in Daw's and the present survey.

use of fixed cost items. The financial changes which took place between 1961 and 1966 have been analysed on the basis of changes in these factors. It has been assumed that changes in costs and prices in the sandland area will have broadly followed the national pattern. Table 1 gives the national changes based on data from the "*Annual Abstract of Statistics*". It was possible to calculate the actual percentage increases in unit costs of labour and rent and rates for the farms in this study. These were much higher than the national figures:

Labour +44 per cent
Rent and rates +58 per cent

and these have been used in the analysis.

Table 1. NATIONAL COST AND PRICE PERCENTAGE CHANGES 1959-1961 TO 1964-1966 PERIODS

Commodity prices	*per cent*	*Unit costs*	*per cent*
Wheat	− 7	Fertilisers	+ 5
Barley	− 8	Feedstuffs	+ 9
Oats	+ 7	Labour	(+35)
Potatoes	+11	Rent and rates	(+33)
Sugar beet	+ 5	Depreciation	0
Cattle and milk	+13	Repairs	0
Sheep and wool	+ 1	Fuel and oil	+ 2
Pigs	− 2	Haulage	+15
Poultry and eggs	−14	Sundries	+ 3

Source: *Annual Abstract of Statistics*, H.M.S.O.

The 1961 financial data were adjusted by these percentages to arrive at the amount of change attributable to changes in costs and prices. During the five years interval, there had been a net addition of 600 acres to the 20 farms raising the average acreage by 30 acres from 235 acres to 265 acres. Table 2 shows details of the extra acreage acquired.

Table 2. ANALYSIS OF FARM ACREAGE CHANGES

	Total acreage change	*Number of farms*
Same acreage	0	7
Extra land acquired:		
Rented	239	7
Bought	371	3
Unaccounted for	14	—
Total	624	
Acreage reduced	24	3
Net increase in acreage	600	20

It was assumed that on each farm where there was a change of acreage, the acreage lost or gained would carry the average level of gross margin and fixed cost per acre for that farm. These were corrected for cost and price changes. It is unlikely that this will have been the actual situation as far as fixed costs were concerned but no way was

found of being more realistic. The remaining difference in fixed costs per farm can be attributed to changes in farm organisation: changes in the numbers of men or the hours worked; changes in the numbers or types of machines or the amount they were used.

The financial effect of enterprise distribution on the total gross margin is a more reliable figure to calculate. For each farm the 1966 enterprise distribution corrected for any change in farm acreage was reanalysed using the 1961 gross margins corrected for changes in costs and prices. The remainder of the gross margin change will be largely the effect of enterprise productivity reflecting changes in physical outputs and inputs of variable cost items. It will therefore contain elements of yields, stocking rates, and physical inputs of feed, seed, fertiliser and other variable cost items and any change in the farmer's ability to buy and sell in relation to national costs and prices. With crops the most important element is likely to be yield. With livestock the situation is more complex.

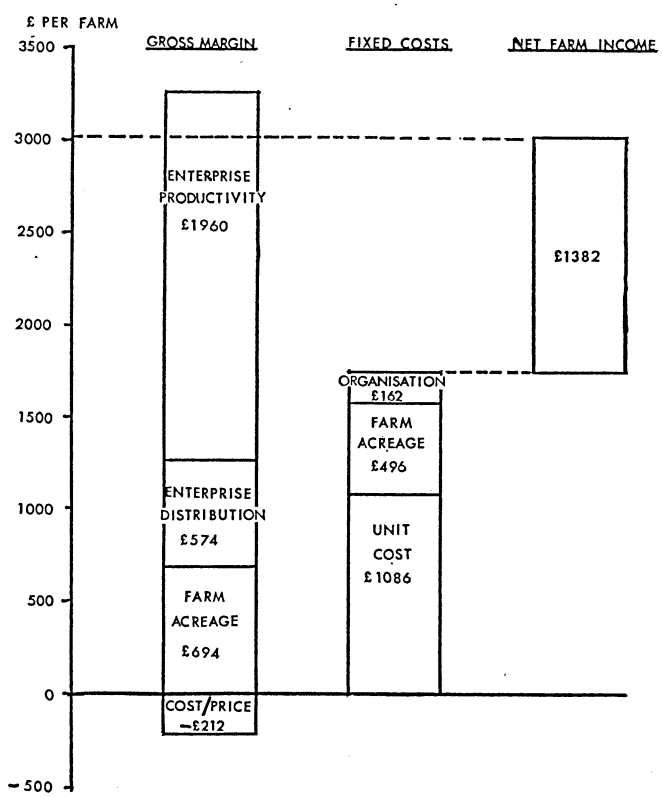

Fig. 2. Analysis of total financial differences per farm between 1961 and 1966.

Where to apportion the credit or blame for these changes is also more difficult to determine. The farmer cannot be responsible for national changes in costs and prices. He is likely to be entirely responsible for changes in farm acreage, enterprise distribution and organisation of fixed cost items. But enterprise productivity can be affected by the weather, by pest and diseases, by improved crop varieties or strains of livestock or pesticides available or by the efficiency with which the enterprise is managed by the farmer or probably by a combination of these factors.

Fig. 2 illustrates graphically the results of this analysis. The net result is an average increase in net farm income of almost £1,400 per farm. Increased unit costs have increased the fixed costs by nearly £1,100 per farm while the effects of increased acreage and organisation of fixed cost items between them account for another £660 increase. To achieve the increase in net farm income despite the increase in fixed costs an increase of over £3,000 in total gross margin per farm was achieved. Cost/price changes had a negative effect. Farm acreage increases and improvements in enterprise distribution both produced useful increases of around £700 and £600 respectively. But the outstanding increase is in enterprise productivity—almost £2,000. The effect of these factors will be considered in more detail later but Fig. 2 shows their relative importance in total.

CHAPTER II

FINANCIAL CHANGES

1. Farm Results

Fig. 2 showed an increase in net farm income of around £1,400 per farm with considerable increases both in gross margin and fixed costs. Fig. 3 shows the actual levels of gross margin, fixed costs and net farm income in 1961 and 1966.

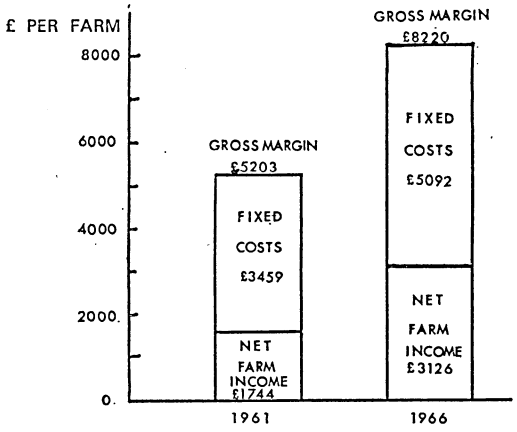

Fig. 3. Average financial results per farm.

The increases represent 58 per cent on gross margin, 40 per cent on fixed costs and 80 per cent on the net farm income — very substantial increases for only five years.

Table 3. FINANCIAL RESULTS PER ACRE
(Unweighted averages of per acre figures)

	1961	*1966*
	£/acre	£/acre
Gross output	42.8	53.4
Variable costs	20.4	22.3
Gross margin	22.4	31.1
Fixed costs	14.8	19.3
Net farm income	7.6	11.8

Expressed per acre in Table 3 the increases are not quite so dramatic because the effect of increased farm acreage is eliminated. The

fact that these figures are unweighted for farm acreage also affects the results since acreage increases were greater on above average farms. However, the increase in net farm income per acre is still 55 per cent.

2. Crop Gross Margins

To be comparable, enterprise results for 1959-61 and 1964-66 are restricted to those farms having the respective enterprises in both periods. Table 4 shows that there were increases in gross margins for all five of the main crops, relatively small in the case of sugar beet but very considerable for potatoes and wheat.

Table 4. CROP GROSS MARGINS

	Number of farms	*1959-61*	*1964-66*
		£ per acre	£ per acre
Wheat	5	22.2	33.4
Barley	20	24.4	27.3
Oats	6	21.0	29.5
Potatoes	5	32.5	89.5
Sugar beet	15	42.8	47.8

Only changes in costs and prices and in enterprise productivity can be responsible for these increases and their relative importance is shown in Fig. 4. In every case the most important factor was enterprise productivity. Cost and price changes alone would have reduced the gross margins of wheat, barley and sugar beet.

	Due to cost/price changes	Due to productivity changes	Net change
	£ per acre		
Wheat	−2.4	+13.6	+11.2
Barley	−2.7	+ 5.6	+ 2.9
Oats	+1.7	+ 6.8	+ 8.5
Potatoes	+0.9	+56.1	+57.0
Sugar beet	−0.2	+ 5.2	+ 5.0

Fig. 4. Analysis of crop gross margin changes. (Average of farms with enterprises in both periods.)

As far as crops are concerned, by far the most important component of enterprise productivity was yield. There were in addition small changes in variable cost items: notably a greater use of fertiliser and a reduction in the contract and casual labour items for all crops except sugar beet.[4] Table 5 shows increases in crop yields which are closely related to the increases in gross margins shown in Table 4.

(4) Details of changes in variable costs can be seen in Appendix C.

Table 5. CROP YIELDS
(averages of farms with the enterprise in both periods)

	1959/61	*1964/66*
	Cwt/acre	Cwt/acre
Wheat	22.6	32.2
Barley	23.0	28.9
Oats	20.2	30.3
	Tons/acre	Tons/acre
Potatoes	6.1	8.8
Sugar beet	11.6	12.0

It is not possible to establish categorically the factors responsible for the yield increases. New improved varieties, the increased fertiliser use and improved cultural methods and pest controls are all possibilities one might expect to have played a part. It is, however, well remembered in the area that 1959 was a particularly dry year and that crops suffered badly from drought on unirrigated farms such as these. 1960 and 1961 were also drier than average, particularly the months most critical for crop growth — May and June. These were the three years on which Daw based his study. Figures from experimental results at Gleadthorpe Experimental Husbandry Farm (Table 6) in the centre of the sandland area suggest a close correlation between yields of barley and the May/June rainfall. They also suggest that barley yields were just as high in 1954-56 five years before Daw's study as they were five years later at the time of the present study.

Table 6. BARLEY YIELDS AND MAY/JUNE RAINFALL (GLEADTHORPE STRAW DISPOSAL EXPERIMENT)

	May/June rainfall	*Barley yield*
	inches	Cwt/acre
1954-56 ...	5.2	28.7
1959-61 ...	2.2	22.2
1964-66 ...	5.3	26.9

The susceptibility of wheat, oats and potatoes to summer drought is also fairly high while that of sugar beet with its deep rooting ability is rather less. It is likely, therefore, that much of the apparent crop yield increase reflects the exceptionally dry conditions of 1959-61.

3. Livestock Gross Margins

With the main livestock enterprises, gross margins have also generally increased (Table 7). The exception is laying hens which have suffered a reduction in gross margin per head.

Table 7. LIVESTOCK GROSS MARGINS
(averages of those farms with the enterprise in both periods)

	1959/61	1964/66
	£ per acre	£ per acre
Dairy	23.1	34.5
Beef	8.4	18.7
Sheep	10.3	17.9
	£ per head	£ per head
Sows	40	61
Hens	0.4	0.3

Cost and price changes, apart from the case of sheep, have had relatively more effect on livestock gross margins than was the case with crops. For dairy and beef enterprises the effect was favourable: for sow and hen enterprises the effect was adverse. In every case there were increases in enterprise productivity although for laying hens this was insufficient to cover the reduction in gross margin from the cost/price squeeze. (Fig. 5).

		Due to cost/price changes	Due to productivity changes	Net change
			£	
Dairy	per acre	+5.6	+ 5.8	+11.4
Beef	per acre	+3.7	+ 6.6	+10.3
Sheep	per acre	0.0	+ 7.6	+ 7.6
Sows	per sow	−9.0	+30.0	+21.0
Hens	per 10 hens	−4.5	+ 3.5	− 1.0

Fig. 5. Analysis of livestock gross margin changes.

The data is not available to analyse further the sources of the improved enterprise productivity in pigs and poultry. It can be concluded, however, that external factors such as weather would have little effect and that the main source is likely to be improved management resulting in greater production per head and/or greater economy of inputs.

Again there is no physical data on the outputs and inputs per head of the grazing livestock enterprises. An important factor influencing the gross margins per acre, however, is the stocking rate, and on this there is some guidance. These enterprises are often mixed. For example the dairy enterprises often include followers and beef animals. Data is only available, however, on the numbers of breeding livestock and it is to these that Table 8 refers. This is the reason for the apparently low stocking rates. On the assumption that the proportion of the non-breeding animals remained approximately the same, Tabe 8 suggests significant improvements in stocking rates, particularly of cattle.

Table 8. STOCKING RATES OF BREEDING LIVESTOCK
(weighted average)

	1961	1966
	Acres per head	Acres per head
Dairy cows	3.2	2.7
Beef cows	4.3	3.3
Ewes	0.57	0.50

4. Fixed Costs

It has already been noted in chapter I that total fixed costs had increased substantially. Apart from the effect of increasing farm acreage, most of the increase was brought about by increases in unit costs. When expressed per acre, the effect of farm acreage is eliminated. Table 9 shows the breakdown of the main fixed cost items per acre. There is a substantial increase in every item.

Table 9. FIXED COSTS PER ACRE
(unweighted averages)

	1961	1966
	£ per acre	£ per acre
Rent and rates	2.0	3.2
Labour	6.8	7.5
Machinery running costs	2.3	3.1
Depreciation	2.6	4.0
Others	1.1	1.5
Total	14.8	19.3

The changes in fixed cost items are analysed in Fig. 6. They show that the largest part of the 30 per cent increase in the total per acre is the result of cost increases but the pattern for the individual items varies.

	Organisation changes	Unit cost changes	Net change
		£ per acre	
Rent and rates	—	+1.2	+1.2
Labour	−3.2	+3.9	+0.7
Machinery running costs	+0.8	0.0	+0.8
Depreciation	+1.4	0.0	+1.4
Others	+0.4	0.0	+0.4
Total fixed costs	−0.6	+5.1	+4.5

Fig. 6. Analysis of changes in fixed costs.

As referred to earlier, the cost increases in rent and labour in this group of farms were greater than the national increases. Rents rose by 58 per cent on average compared with 33 per cent nationally. It is assumed that any increase in rent per acre will be a unit cost increase.[5] The reduction in the amount of labour employed was more than offset by the rise in wage rates. The unit cost of labour — the annual cost of a full time worker — rose by 44 per cent, while Table 10 shows a reduction of approximately half a full time man per farm. Part time workers, boys and the farmer and wife are expressed as fractions of full time men based on a subjective assessment by the farmer of the amount of manual work they do. Bearing this in mind there also appears to have been an increase in the manual work done by the farmers and their wives, partly making up for the reduced paid labour force. Since there was an increase in the average farm acreage as well as a reduction in labour, there must have been a considerable increase in the efficiency of labour use.

Table 10. LABOUR — WORKERS PER FARM

	1961	*1966*
Regular paid labour	2.85	2.38
Farmer and wife	0.62	0.82
Total	3.47	3.20

Machinery repairs and running costs and depreciation increased per acre by more than a third and more than half respectively. According to the national figures there was no increase in machinery unit costs between 1961 and 1966. These increases must then be entirely the result of increased use of machinery or more machinery or more expensive machinery or all three. In view of the cut in the labour force and the increase in acreage this seems reasonable although the increase in machinery use per acre cost a little more than the saving from the reduced labour force per acre.

[5] Although some rent increases may be for new buildings.

CHAPTER III

FARM ORGANISATION

The last chapter dealt with the financial changes which took place on the sample of 20 sandland farms and with the effects of the changes which Daw was largely unable to foresee — changes in the cost/price structure and changes in enterprise efficiency. The purpose of this chapter is to look at the physical changes on the farms which Daw anticipated in the farm plans he drew up.

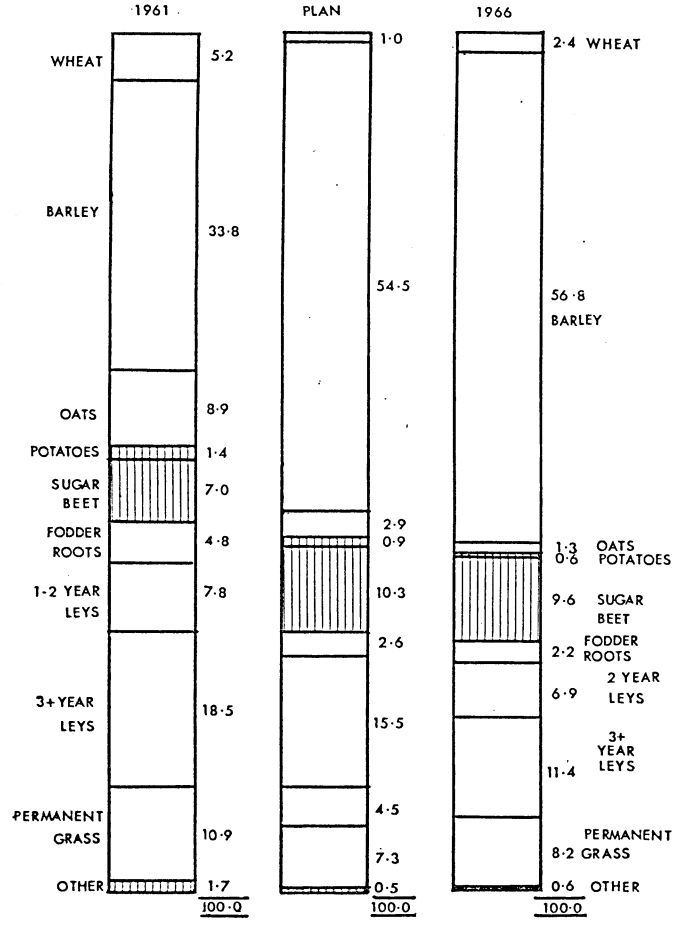

Fig. 7. Cropping percentages (20 farms).

1. Cropping and Stocking

Overall, as far as crops were concerned, Daw's plans involved increasing the acreages of barley, sugar beet and two year leys and reducing the remainder. Fig. 7 shows how close the cropping of the 20 farms in 1966 was to planned cropping.

The percentage of barley was in fact slightly greater than planned, but sugar beet was a little short and the two year ley was very short of the planned percentages. Wheat was reduced but not by as much as the plan. Oats were reduced more than the plan. Other variations were not very significant except the shortfall in two year ley which was largely made up by three year ley so that the total percentage of grass and forage crops was very much as planned. However, the pattern of utilisation of the grass and forage crops was not quite as planned (Fig. 8). The beef cow acreage was down and the store cattle acreage was up. Up too was the small acreage devoted to fattening lambs, hay for sale and let keep.

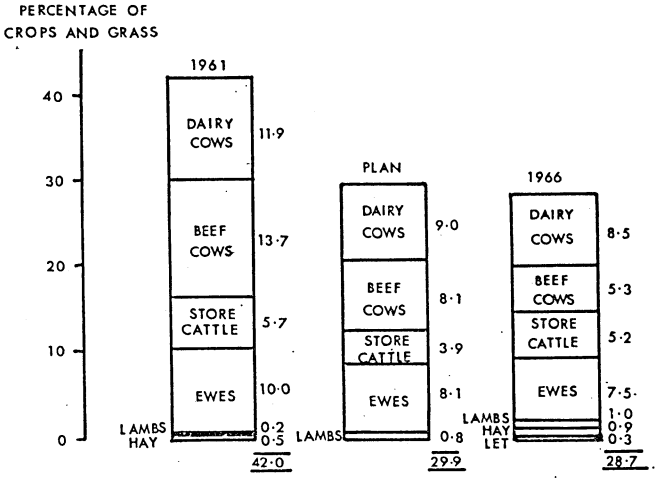

Fig. 8. Utilisation of grass and forage crops.

The plans overall involved reducing cattle but slightly increasing sheep. Exact figures are available only for the breeding livestock as shown in Table 11. The reductions in dairy and beef cows were even greater than planned and the ewes were reduced also.

Table 11. GRAZING LIVESTOCK NUMBERS PER 100 ACRES CROPS AND GRASS

	1961	*Plan*	*1966*
Dairy cows	3.6	3.3	3.1
Beef cows	3.2	2.1	1.6
Ewes	17.6	17.8	15.2

The plans also involved increases in the stocking rates of all three classes of breeding grazing livestock. Table 12 indicates that the planned stocking rate for dairy cows was achieved and for ewes almost achieved but for beef cows it was exceeded appreciably. It should be appreciated that although only the breeding livestock have been considered the acreage attributed to them also supports other classes of cattle or sheep. These stocking rates are therefore only an indication of relative changes.

Table 12. STOCKING RATES OF BREEDING LIVESTOCK
(weighted average)

acres/head

	1961	*Plan*	*1966*
Dairy cows	3.2	2.7	2.7
Beef cows	4.3	3.9	3.3
Ewes	0.57	0.46	0.50

Increases in sows, porkers and laying hens were planned with substantially the same numbers of broilers and reduced numbers of baconers. Table 13 shows that the plans for sows and hens were exceeded, broilers were about as planned but both porkers and baconers were virtually abandoned.

Table 13. PIGS AND POULTRY — TOTAL NUMBERS ON 20 FARMS

	1961	*Plan*	*1966*
Sows	75	109	115
Porkers	984	1,417	100
Baconers(1)	320	210	0
Hens	4,310	4,580	4,700
Broilers(1)	22,480	22,500	22,000

(1) Annual throughput — excluding progeny of breeding herds fattened

One might conclude so far, that while there has been some deviation, the plans have been substantially followed. This is further illustrated in Fig. 9 where calculated effects on the 1961 total gross margin per farm of the improved enterprise distributions are shown. The 1966 pattern of enterprises would have achieved 80 per cent of the planned improvement at the 1961 farm acreage and level of performance.

2. Deviation from Daw's Plans

When considered as a group, the 20 farmers appear to have followed the plans fairly closely. When considered individually a greater degree of deviation from the plans is apparent. Table 14 shows the number of farms with each enterprise and the average size in acres or numbers of the enterprises.

Table 14. ENTERPRISE NUMBERS AND SIZES

Enterprises	1961			Planned			1966		
	Number of farms with enterprise	Average enterprise size		Number of farms with enterprise	Average enterprise size		Number of farms with enterprise	Average enterprise size	
		Acres			Acres			Acres	
Vegetables	1	19		1	24		1	25	
Sugar beet	17	20		17	29		15	34	
Potatoes	6	10		4	11		2	14	
Wheat	10	24		4	12		6	22	
Barley	20	79		20	129		20	151	
Oats	19	22		16	8		6	12	
		Acres	Nos.		Acres	Nos.		Acres	Nos.
Dairy cows	6	93	29	4	105	39	4	112	42
Beef cows	8	80	19	6	63	17	5	56	17
Store cattle	5	53	—	5	37	—	6	46	—
Ewes	12	40	69	7	55	119	10	40	81
Store lambs	1	9	—	4	9	—	2	26	—
		Nos.			Nos.			Nos.	
Sows	6	12		5	22		4	29	
Porkers	4	246(1)		4	354(1)		1	100(1)	
Baconers	2	160(1)		1	210(1)		0	0	
Hens	11	392		5	916		7	671	
Broilers	1	22480(1)		1	22500(1)		1	22000(1)	
Contract work	6	—		5	—		6	—	
Total number of enterprises	135	—		109	—		96	—	
Average number of enterprises per farm	6.75	—		5.45	—		4.80	—	

(1) Annual throughput

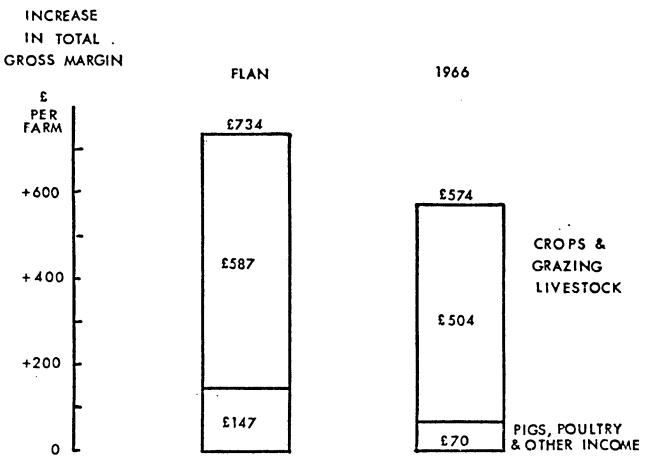

Fig. 9. Enterprise distribution. Calculated effect on total gross margin. (At constant prices.)

In almost every case, the number of farms with the enterprise is less than planned but the average size of the enterprise is greater. The significant exceptions are store cattle and ewes. The store cattle enterprises are greater in both number and size. The ewe flocks are greater in number and smaller in size. The trend, however, is very obviously towards simplification and fewer enterprises. The 6.75 enterprises per farm in 1961 were reduced in the plans by 1.3 enterprises and in 1966 had actually reduced by almost two (29 per cent).

This still does not reveal all the deviation from the plans. If in addition to the 17 enterprises considered in Table 14, forage roots, short leys, long leys and permanent grass are considered as enterprise choices available to each farmer, there would be 21 possible enterprises and on 20 farms the total would be 420. Table 15 shows that of the 160 planned enterprises only 114 appeared on the 20 farms in 1966 together with another 27 unplanned enterprises.

Table 15. PLANNED AND UNPLANNED ENTERPRISE NUMBERS

	Planned enterprises	*Unplanned enterprises*	*Total*
Existing in 1966	114	27	141
Not existing in 1966 ...	46	233	279
Total	160	260	420

Of the 114 planned enterprises which occurred in 1966, only 48 were substantially of the size planned (Table 16).

Table 16. ENTERPRISE VARIATION FROM PLAN

	Enterprises substantially as planned	Enterprises varying from Plans		Totals
		Reasons		
		Technical, Financial	Personal preference	
Planned, and existing in 1966	48	41	25	114
Not planned, but existing in 1966	—	16	11	27
Planned, but not existing in 1966	—	36	10	46
Totals	48	93	46	187

A third of the variation from the plans (46 enterprises) resulted from farmers maintaining the 1961 plans out of personal preference rather than for economic reasons. Apparently sound technical or financial reasons were given for the remaining two thirds (93 enterprises).

The improvements in yields and changes in the cost/price structure had made wheat, oats and potatoes relatively more profitable as was seen in the last chapter. The introduction of the potato variety Pentland Crown with its higher yielding capacity and resistance to common scab on sandland in addition had improved the case for potatoes. Some farmers saw these changes and reacted accordingly. Some who followed Daw's plans to eliminate these enterprises might in fact have been better off had they not done so. The other reasons for deviating from the plans were largely technical: labour problems, potato cyst eelworm and mechanisation problems. Just how far these problems would prove insurmountable with sufficient determination, it is not possible to tell.

3. Comparison with the whole Sandland Area

It is of interest to compare developments on the 20 farms with what took place in the same period throughout the area in which they are situated. The parishes comprising the sandland area total some 55,000 acres of crops and grass. Of this, Daw's influence, by preparing management plans for 32 farms, may be considered to have affected, at least to some extent, about 7,500 acres — about 14 per cent. There is no evidence that indirectly he influenced much additional acreage. Reference to data derived from the Ministry of Agriculture's June Returns for the sandland parishes should therefore give some indication of the way the pattern of farming on the 20 farms might have changed even if Daw had not carried out his planning exercises.

Cropping is compared in Fig. 10. In 1961 on the 20 farms cropping was very similar to the sandland area. There were more oats, more sugar beet but less potatoes and more ley but less permanent grass. It has already been noted that the 1966 cropping on the 20 farms was very similar to that which had been indicated in the plans. In the sandland area, the acreage of cereals had increased considerably although not by quite as much as on the 20 farms. Sugar beet and potatoes together had increased by a similar amount. The reductions in fodder roots and leys

were also very similar. The proportions of wheat and potatoes are greater perhaps because without Daw's plans to reduce these enterprises, the increases in their relative profitability since 1961 was more easily noticed.

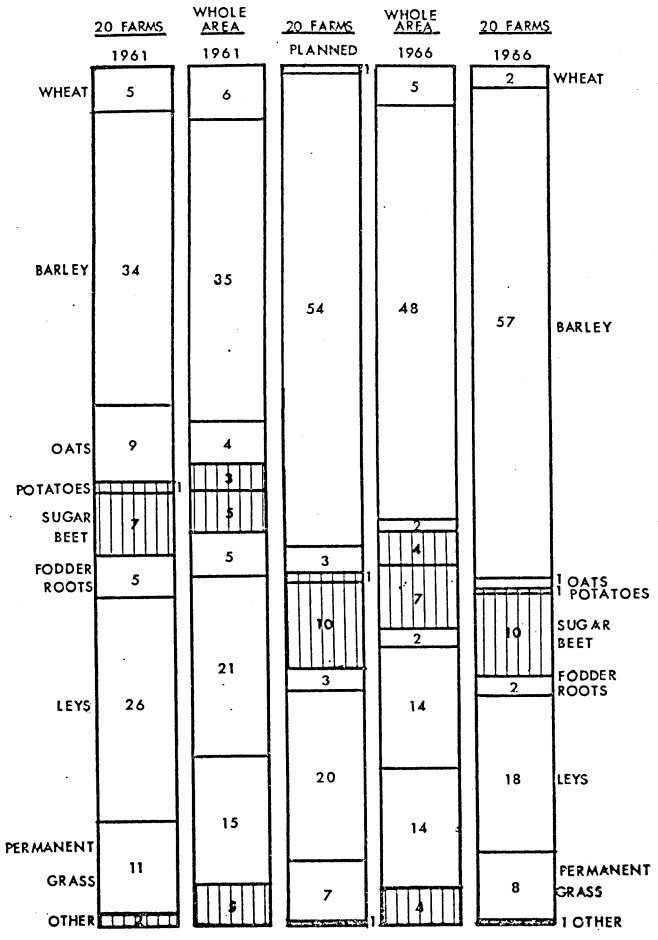

Fig. 10. Cropping percentages on the survey farms and whole sandland area.

Dairy cow numbers in the area were reduced by almost as much as had been suggested in the plans, although not as much as had occurred on the 20 farms by 1966 (Table 17). Ewe numbers in the area also followed the plans with a small increase although the 20 farms had reduced ewe numbers significantly by 1966. The 20 farms did increase sow numbers as planned going against the trend of a reduction in numbers in the area. The numbers of laying hens in the area are distorted by the very rapid increase of one large specialist company.

Table 17. LIVESTOCK NUMBERS PER 100 ACRES CROPS AND GRASS

	20 Farms	*Whole area*	*20 Farms*	*Whole area*	*20 Farms*
	1961	*1961*	*Plan*	*1966*	*1966*
Dairy cows	3.6	3.8	3.3	3.6	3.1
Breeding ewes	17.6	13.7	17.8	14.4	15.2
Sows and gilts	1.6	3.6	2.3	2.8	2.2
Laying hens	92	189	97	890	89

Table 18 indicates that the reduction in the labour force in the area as a whole was very similar to that planned, but the 20 farms had exceeded this significantly by 1966.

Table 18. FULL TIME WORKERS PER 100 ACRES CROPS AND GRASS

20 Farms	*Whole area*	*20 Farms*	*Whole area*	*20 Farms*
1961	*1961*	*Plan*	*1966*	*1966*
1.21	1.41	1.08	1.24	0.90

(Boys under 18 and Women and Girls classed as 75 per cent men over 18)

When compared with the area of which they are part, the main differences on the 20 farms were the greater increases in barley and breeding sows and the greater reduction in wheat grown. Other changes which took place in the whole area, however, were in the same directions and often as close to the planned changes for the 20 farms as were those on the 20 farms themselves. One might conclude that the 20 farms would have been in a very similar position in 1966 had they not been given the plans by Daw. The improved financial position of the 20 farms was certainly no better than that of an identical sample of seven sandland farms costed by the University of Nottingham for the Farm Management Survey (Table 19). Two of the seven farms are also included in the 32 farms and so had the benefit of Daw's management plans.

Table 19. FINANCIAL RESULTS OF THE 20 FARMS AND FARM MANAGEMENT SURVEY SANDLAND SAMPLE
(Identical sample of seven farms)

£ per acre

	1961		*Planned*	*1966*	
	20 Farms	*7 F.M.S. Farms*	*20 Farms*	*7 F.M.S. Farms*	*20 Farms*
Gross output	42.8	35.4	48.6	45.9	53.4
Variable costs	20.4	14.2	22.7	16.4	22.3
Gross margin	22.4	21.2	25.9	29.5	31.1
Fixed costs	14.8	13.4	14.6	16.8	19.3
Net farm income	7.6	7.8	11.3	12.7	11.8

CHAPTER IV

SUMMARY AND CONCLUSIONS

1. Financial Changes

Following up Daw's normalised farm management analyses for 1961 of the group of 20 sandland farms enabled a study to be made of the financial changes which took place between 1961 and 1966. The average total net farm income per farm of £1,744 was found to have risen by 80 per cent to £3,126 despite an increase in fixed costs of 40 per cent. The various factors responsible for these changes were analysed.

Most costs had risen while several prices had fallen. This cost/price squeeze alone would have reduced net farm incomes by about £1,300 or 75 per cent below the 1961 level. This however, was more than offset by other factors. The average farm size was increased by 30 acres worth about £200 per farm in net farm income. The enterprise combinations were improved by the equivalent of about £600 per farm and labour was reduced although this was more than offset by an increase in machinery use. The biggest factor in improving the net farm incomes, however, was enterprise productivity. There were substantial increases in crop yields, largely the result, it is thought, of improved weather conditions. There were also increases in livestock gross margins resulting both from greater productivity and higher stocking rates of grazing livestock. Daw concluded (p. 69) that under 1961 conditions the sandland was better than marginal as a farming area. In 1966 the average net farm income had risen from £7.6 to £11.8 per acre. Most of the 20 farms were enjoying relative prosperity, only one farmer having a net farm income below £5 per acre and seven above £15 per acre.

2. Farm Organisation

Daw also drew up plans for each farm, generally involving increases in the relatively more profitable enterprises, barley, sugar beet, two year leys, pigs and poultry. He also included a few conservative technical improvements, notably increases in the stocking rates of grazing livestock. Fixed costs remained virtually unchanged. On the 20 farms the plans should have produced a calculated average increase in net farm income of 46 per cent.

As a group, the stocking and cropping in 1966 was very much as planned. It is calculated that at 1961 prices, yields and total farm areas this change in stocking and cropping should have produced a 37 per cent improvement in net farm income. Individually, however, the farmers did not follow Daw's plans closely. Little more than a quarter of the planned enterprises were substantially as planned (see Table 16). Comparison with the stocking and cropping of the whole sandland area shows that trends there were very similar, though the increase in barley and reduction in wheat were somewhat greater in the group. Breeding sows in the

area had been reduced, in contrast to the increase shown in the group, and there had been a very large increase in the numbers of laying hens in the area which was not matched at all in the group.

The implication is that Daw's plans had very little direct effect on the farmers. One reason may be that this was a voluntary exercise undertaken at the suggestion of the University and may well have been more closely followed by the farmers if they had made the initial request for advice themselves. Also, there was no opportunity for further visits during the implementation of the plans. For these reasons, the results of this study cannot be considered in any way an evaluation of farm management advice. Even so, Daw probably conveyed in most cases the most important aspects of farm management advice: information on the relative profitability of the farmer's own enterprises and appreciation of the need to intensify.

3. Conclusions

The environment in which farming on the sandland existed changed very considerably between 1961 and 1966. The squeeze between prices and costs got tighter but fortunately the weather improved. There is every likelihood that the cost/price squeeze will continue. Especially if there were another series of dry years like those in 1959 to 1961 the less economically sound farms could run into serious financial difficulties. Those with rented farms employing more labour and relying most on the crops susceptible to drought would obviously be the most vulnerable.

Not only do the weather and costs and prices change but also, largely as a result of these, the relative profitability of the different enterprises also changes. It is important therefore for farmers to retain sufficient diversity to guard against disaster and sufficient flexibility to change the balance of enterprises in response to changes in relative profitability. This is illustrated by the changed profitability in wheat, oats and potatoes which took place between 1961 and 1966. To keep track on these changes more management records than many of the farmers kept in 1966 could prove of value. The pressure of the cost/price squeeze is likely to increase the importance of high levels of management. High levels of technical efficiency will be more important. Intensity will have to be increased. At the same time it will be necessary to guard against excessive increases in fixed costs.

A large part of the "slack" in the distribution of those enterprises already on the farm appears to have been "taken up" on these mixed sandland farms. To achieve more improvement farm management techniques will need to be more sophisticated. More detailed analysis of individual enterprises would be desirable: splitting the dairy enterprises into dairy cows, followers and beef; splitting pig enterprises into breeding sows and fattening to various weights. This was not practical with the information available to Daw and it endorses the need for management records. This study has shown that three years are insufficient to take account of variations in weather. Yet to go back more than three years is likely to involve the complications of older techniques and varieties. More consideration should be given to the potential of each possible

enterprise whether on the farm already or not, taking account of past performance but also taking account of the adviser's experience of the farmer and the area. As fixed costs rise the scope for significant savings will increase. Labour and machinery planning techniques could prove more useful. As intensity increases capital requirements will become greater. Capital planning techniques should also prove more valuable.

Considering these points it might be predicted that farm size in this sample of farms will continue to increase. Scope for further intensification seems greatest now with potatoes, vegetables and intensive livestock, the first two particularly where it is possible to install irrigation. If intensification is carried further, however, there will not be scope for much more reduction in the labour force. It would be interesting to follow the progress of these farms again in another five years.

APPENDIX A

COMPARISON OF SAMPLES

(32 farms in Daw's original survey and the 20 also in the present survey)

Table 20. CROP ACREAGE PER 100 ACRES CROPS AND GRASS

	1961		*Plan*	
	32 farms	*20 farms*	*32 farms*	*20 farms*
Wheat	5.6	5.2	0.7	1.0
Barley	29.6	33.8	53.6	54.5
Oats	8.5	8.9	3.8	2.9
Potatoes	0.9	1.4	0.9	0.9
Sugar beet	6.3	7.0	8.8	10.3
Vegetables	0.4	0.5	0.3	0.5
Fodder roots	4.9	4.8	2.4	2.6
Ley	30.0	26.3	21.1	20.0
Permanent grass	12.8	10.9	8.4	7.3
Other crops	0.6	0.7	—	—
Fallow	0.4	0.5	—	—
	100.0	100.0	100.0	100.0

Table 21. LIVESTOCK NUMBERS PER 100 ACRES CROPS AND GRASS

	1961		*Plan*	
	32 farms	*20 farms*	*32 farms*	*20 farms*
Dairy cows	5.4	3.6	3.2	3.3
Beef cows	2.8	3.2	2.8	2.1
Ewes	16.9	17.6	17.6	17.8
Sows	1.8	1.6	3.2	2.3
Hens	105	92	127	97

Table 22. FINANCIAL RESULTS FOR 20 AND 32 FARMS
(Unweighted averages)

£ per acre

	1961		*Plan*	
	32 farms	*20 farms*	*32 farms*	*20 farms*
Gross output	37.1	42.8	43.4	48.6
Variable costs	15.4	20.4	18.1	22.7
Gross margin	20.4	22.4	24.8	25.9
Fixed costs	14.5	14.8	14.4	14.6
Net farm income	7.2	7.6	10.9	11.3

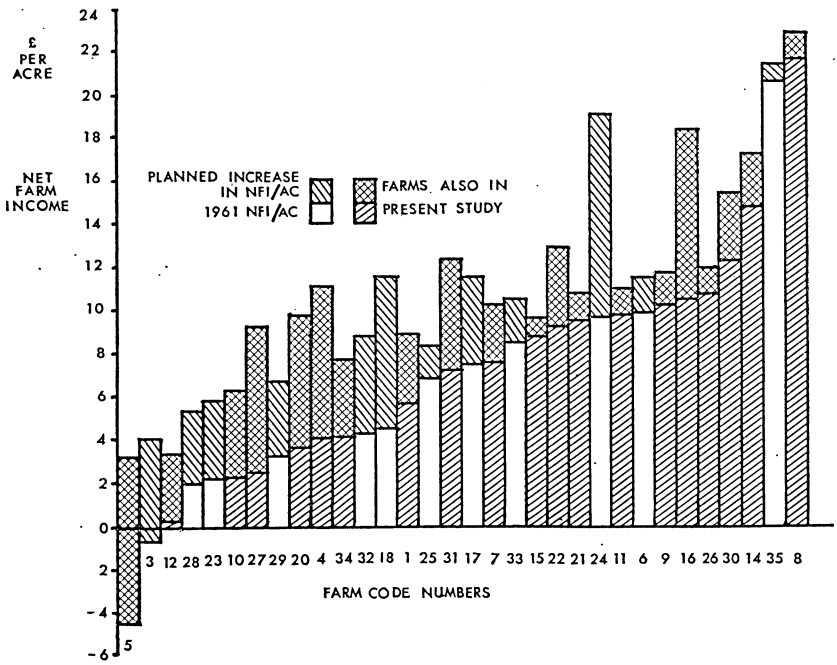

Fig. 11. Individual 1961 and planned net farm incomes per acre in Daw's study.

APPENDIX B

Table 23. SUMMARY OF THE PHYSICAL AND FINANCIAL DATA — 20 FARMS
(Average per farm)

	1961	*Plan*	*1966*	*1961*	*Plan*	*1966*
Crops	acres	acres	acres	£ per farm	£ per farm	£ per farm
Wheat	12.2	2.3	6.4	256	56	205
Barley	79.4	128.2	150.8	1,876	2,793	4,093
Oats	20.9	6.8	3.5	395	130	98
Rye	1.9	0.0	0.0	18	0	0
Potatoes	3.2	2.1	1.5	98	93	185
Sugar beet ...	16.5	24.3	25.6	700	937	1,233
Vegetables ...	1.2	1.2	1.3	88	88	124
Forage costs ...	11.6	6.0	5.8	1	0	10
Grass	87.4	64.4	70.3	13	1	16
Fallow	1.0	0.0	0.2	−1	0	0
Total	235.3	235.3	265.4	3,444	4,098	5,964
Livestock	numbers	numbers	numbers			
Dairy cows(1) ...	8.6	7.7	8.3	543	561	812
Beef cattle(2) ...	7.6	5.0	4.3	363	327	494
Sheep(3)	41.4	41.8	40.4	246	252	370
Sows	3.8	5.5	5.8	145	255	303
Fattening pigs ...	63.9	81.4	5.0	115	152	10
Laying hens ...	215.5	229.0	235.0	63	121	46
Broilers	1,124.0	1,125.0	1,100.0	38	38	49
Total				1,513	1,706	2,084
Other income						
Ploughing grant				89	0	0
Contract work				80	82	57
Sundry income				24	19	75
Private use				54	50	40
Total				247	151	172
Gross Margin				5,203	5,955	8,220
Fixed Costs						
Rent and rates				462	478	864
Paid regular labour				1,613	1,452	1,954
Machinery running costs				529	576	827
Depreciation				599	661	1,051
Sundries				256	240	398
Total				3,459	3,407	5,094
Net farm income				1,744	2,548	3,126
Index of net farm income (1961=100)				100	146	180
Net farm income per acre (£)				7.4	10.8	11.8

NOTES: (1) The gross margin for "Dairy cows" includes any followers and other cattle on the farm, the numbers are only dairy cows.

(2) "Beef cattle" numbers only apply to "Beef cows".

(3) Sheep numbers only apply to breeding ewes.

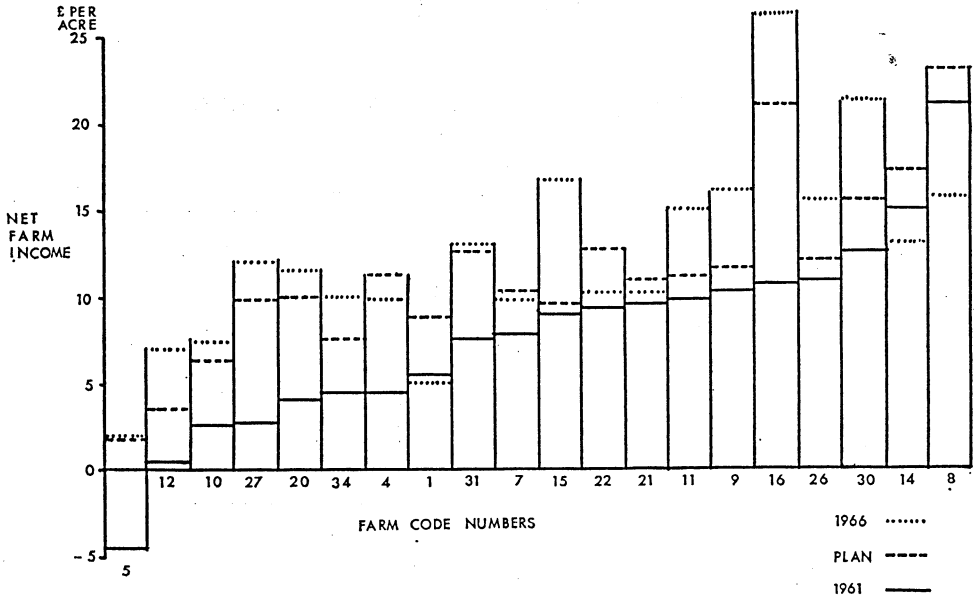

Fig. 12. Individual net farm incomes in 1961, plan, and 1966 (20 farms).

Table 24. FULL GROSS MARGIN DATA

Unweighted average results of farms with the enterprise in both 1961 and 1966

Enterprise	No. of farms	Year	Yield	Gross output	Variable Costs				Gross margin
					Seed	Fertiliser	Other	Total	
Crops			cwt/acre	£ per acre					
Wheat	5	1961	22.6	30.5	2.7	3.5	2.1	8.3	22.2
		1966	32.2	42.2	3.2	3.7	1.9	8.8	33.4
Barley	20	1961	23.0	31.1	2.2	3.0	1.5	6.7	24.4
		1966	28.9	34.5	2.0	3.7	1.5	7.2	27.3
Oats	6	1961	20.2	27.6	2.3	2.5	1.8	6.6	21.0
		1966	30.3	37.3	2.6	3.7	1.5	7.8	29.5
Sugar beet	15	1961	232.0	71.2	1.4	11.3	15.7	28.4	42.8
		1966	240.0	79.1	2.2	10.9	18.2	31.3	47.8
Potatoes	5	1961	122.0	73.6	14.0	12.1	15.0	41.1	32.5
		1966	176.0	128.6	20.8	9.2	9.1	39.1	89.5
					Feed	Forage	Other	Total	
Livestock				£ per acre					
Dairy	4	1961	—	53.1	23.1	4.4	2.5	30.0	23.1
		1966	—	70.2	26.7	7.2	1.8	35.7	34.5
Beef	10	1961	—	22.1	8.7	4.4	0.6	13.7	8.4
		1966	—	33.2	9.0	4.5	1.0	14.5	18.7
Sheep	12	1961	—	18.3	3.4	3.9	0.7	8.0	10.3
		1966	—	29.3	4.5	5.8	1.1	11.4	17.9
				£ per head					
Sows	4	1961	—	164	118	—	6	124	40
		1966	—	174	109	—	4	113	61
Hens	5	1961	—	2.44	2.02	—	0.03	2.05	0.39
		1966	—	2.42	2.12	—	0.01	2.13	0.29

APPENDIX D

PROCEDURES USED FOR ADJUSTING ACCOUNTS FOR GROSS MARGIN ANALYSIS

Gross Output Calculations

1. Yields per acre are averaged for harvest years 1964/65/66.
2. Home grown seed and feed barley and oats are charged and credited at £20 per ton.
3. Deficiency payments standardised at 1966 level.

   Barley £4.60 per acre
   Oats £6.55 per acre
4. Cereals not credited with straw sold or used on the farm but charged for baling. Livestock not charged for straw used, nor crops charged for applications for farmyard manure.
5. Sugar beet is not credited with production of tops and no charge is made to livestock consuming tops.
6. Increase or decrease in tenant rights are omitted unless over £100 when they are omitted after adjusting the relevant cost items.

Variable Costs

1. Fuel — The same costs per acre are used as Daw's. The total is deducted from machinery and fuel costs in fixed costs.
2. Sugar beet haulage — Where own transport has been used it is charged at half the estimate contractors charge and the machinery costs are reduced accordingly.
3. Lime — Allocated to the enterprise in the same way as Daw's charged at 15 shillings per ton spread.

Fixed Costs — These are arranged under the following headings:—

1. Rent and rates
2. Regular labour
3. Repairs, vehicle licences etc.
4. Depreciation
5. Services
6. Professional charges
7. Office expenses

8. Miscellaneous

(a) Rental value inserted for owner occupier was £3.1 per acre being the unweighted average rent of rented land.

(b) Private share of farmhouse rent charged as follows:—
Rates assumed to be 10 shilling per £1 of rateable value. Rates doubled and £15 12s. 0d. subtracted for each farm worker's cottage, three-quarters of the remaining figure then charged out of rent and rates item for private share of farmhouse. (Farm Management Survey convention).

(c) Any payment for the labour of the farmer or his wife was omitted. Other members of the family were charged at the standard rate for their age.

(d) The accountant's figure of depreciation adjusted for profit or loss on sales was used.

(e) A private share of car expenses was deducted from the machinery costs as follows:—

	Fuel	Repairs	Depreciation
1st Car	£15	£5	One quarter plus £20
2nd Car	£50	£20	One quarter plus £70

Lorries, pick-ups and vans charged wholly to the farm.

(f) Private use of electricity was taken as £25 per annum when unknown (FMS Convention).
Solid fuel costs were excluded unless used on the farm.

(g) Schedule A assessments and tithe redemption annuities excluded (FMS Convention).

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