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**BENEFITS FROM PLANNING**

by MICHAEL E. DAW

# BENEFITS FROM PLANNING

A SURVEY OF PROSPECTS FOR SAND LAND FARMS  
IN NOTTINGHAMSHIRE

with wider implications for lowland  
farming in other areas

by

MICHAEL E. DAW



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## P R E F A C E

Many agricultural economists have tried to explain why farm businesses in similar physical situations differ widely from one another in their profitability. In this study Mr. Michael E. Daw has turned attention to a closely related but largely neglected question. How much does the present profitability of a group of similar farms situated in a fairly uniform area differ from that which might reasonably be achieved by better planning?

He first examines the natural features of the Nottinghamshire sand land area, the economic difficulties which its farmers have experienced in the past and the adjustments which they have made to changing circumstances, particularly since 1945. Then he analyses the existing organisation of 32 farms which were selected as a sample to represent the area. Finally, after full personal discussion with each of the farmers individually and a close examination of their accounts and other farm records, he formulates a realistic plan for the economic improvement of each farm.

The results are striking. They suggest that net farm incomes would rise, on average, by 51 per cent by the adoption of the proposed plans. There could hardly be a more powerful demonstration of the scope for management advice within the context of the prices and farming standards of the 1960's.

A more extended version of this report is to be found in Mr. Daw's thesis entitled "Some Economic Aspects of Sand Land Farming in Nottinghamshire" (December, 1963), a copy of which may be consulted at the Library of the School of Agriculture, University of Nottingham, Sutton Bonington, Loughborough.

D. K. BRITTON.

## ACKNOWLEDGMENTS

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To those willing and patient farmers who were subjected to the most searching enquiry I express my sincere thanks. It is my hope that they may personally have received some benefit from their participation in the survey.

MICHAEL E. DAW,  
Pennsylvania State University.

## CONTENTS

<i>Chapter</i>	<i>Page</i>
I INTRODUCTION ... ..	6
1. The Problem ... ..	6
2. Objectives and Methods ... ..	7
II THE NOTTINGHAMSHIRE SAND LAND AREA	
1. Location ... ..	8
2. Urbanisation ... ..	8
3. Natural Features ... ..	8
III THE HISTORY OF SAND LAND AGRICULTURE ... ..	9
IV POST-WAR SAND LAND FARMING ... ..	11
V THE METHODS USED IN THE 1962-63 SURVEY	18
1. Derivation of the Sample ... ..	18
2. The Gross Margin Technique ... ..	20
3. Farm Business Analyses ... ..	21
4. Farm Business Plans ... ..	24
VI ECONOMIC ASPECTS OF SURVEY FARMS UNDER EXISTING ORGANISATION ... ..	27
1. The Survey Farms ... ..	27
2. Cropping and Stocking ... ..	28
3. Overall Financial Results ... ..	30
4. Fixed Costs ... ..	35
VII GROSS MARGINS WITH EXISTING ENTER- PRISES ... ..	36
1. Cereals ... ..	36
2. Cash roots ... ..	38
3. Fodder crops ... ..	39
4. Grassland ... ..	40
5. Cattle ... ..	41
6. Sheep ... ..	42
7. Pigs and poultry ... ..	43
8. Summary ... ..	44
VIII THE SCOPE FOR INCREASING NET INCOMES ON THE SURVEY FARMS ... ..	45
1. Alterations to the Balance of Enterprises ... ..	46
2. Changes to Individual Enterprises ... ..	49
3. Changes to Fixed Costs ... ..	51
4. The Overall Planned Results ... ..	53
5. Implication of Expanded Output ... ..	57
6. Recent Changes on Sample Farms ... ..	59
IX SOME HUMAN ASPECTS OF FARM MANAGE- MENT ... ..	60
1. The Variation in Financial Results ... ..	60
2. The Scope for Income Improvement ... ..	65
3. Implications for Advisory Work ... ..	65
X SUMMARY AND CONCLUSIONS ... ..	67
1. Sand Land Farming in Nottinghamshire ... ..	67
2. Wider Interpretation of Survey Results ... ..	69
3. Suggestions for further Research in this Field ... ..	71
Appendix A: CONVENTIONS AND PROCEDURES USED IN INDIVIDUAL FARM BUSINESS ANALYSES AND PLANS ... ..	72
References ... ..	74

## FIGURES

<i>Figure</i>		<i>Page</i>
1	Sketch Map of Nottinghamshire, showing Sand Land Area ... ..	12
2	Changing Pattern of Land Use, 1947 to 1962, Nottinghamshire Sand Land Parishes ... ..	14
3	Trends in Gross Output and Net Farm Income for average of Eight Sand Land Farms, 1947-48 to 1961-62 ... ..	17
4	Financial Results arrayed in "Profit Groups" ...	
	4A Net Farm Income	32
	4B Gross Output	32
	4C Variable Costs	32
	4D Gross Margin	33
	4E Fixed Costs	33
	4F Total Costs	33
	4G Management and Investment Income	33
5	Individual Present and Planned Net Farm Incomes per acre ... ..	54
6	Gross Outputs per acre and Net Farm Incomes per acre in Present and Planned Results ... ..	56
7	Diagram of Interrelationships ... ..	64

The cover photograph of a farming scene in the Sand Land area was kindly supplied by C. David Edgar, Radcliffe-on-Trent.



## CHAPTER I

### INTRODUCTION

This survey is primarily concerned with the scope for further expansion of management advisory work in the planning of individual farms, with a view to increased profitability.

#### 1. The Problem

Since the mid-1950's, the gradual shift of emphasis in Government policy from maximum agricultural output towards more economic production<sup>(1)</sup> has forced British farmers to become increasingly aware of the importance of economic rather than technical considerations.

Management advisory work, which has been rapidly extended in recent years, has frequently enabled considerable improvement to be made in individual farm incomes, and the wide divergence in economic performance between farms is often stated to be due to managerial weaknesses. It is generally acknowledged that "there is plenty of scope for improvement in management"<sup>(2)</sup> on our farms and, recognising this in 1958, Jones<sup>(3)</sup> predicted the future role of advisory officers to be in balancing technical advice with the application of sound business principles. The Minister of Agriculture has also stressed the importance of high levels of management in modern competitive farming, drawing attention to the wide variation in this essential attribute.<sup>(4)</sup>

Behind these assertions, which are usually couched in general terms, lies the implication that many farm businesses have been, and still are, operated below their economic potential. Somewhat surprisingly, however, few attempts have been made in this country to offer experimental evidence showing how frequently farm incomes may be improved. Still less have the extent, direction and effect on output of such management improvements been measured systematically, even for a limited geographical area. An approach to the subject has been made by a number of studies where "typical" farms (either synthetic models or actual cases) for a given area were replanned to discover what profitable adjustments could be made. Though these investigations may show the generally desirable trends for some local farms, they do not provide an accurate estimate of the scope for improvement, either for the whole locality or for individual farms.

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(1) The 1954 White Paper entitled "Annual Review and Determination of Guarantees" stressed the fact that home agriculture should pay greater attention to "careful planning" and "wise management of resources."

(2) See, for example, JONES, W. E., "The Years Ahead," *Agriculture*, Vol. 70, No. 2, February, 1963; and earlier, LIVERSAGE, V., "The Approach to Farm Planning in Northern Ireland," *Agricultural Progress* Vol. XXXV, 1960.

(3) JONES, A., "The Educational and Advisory Approach to the Efficiency of the Individual Farm," *J. of Agricultural Economics*, Vol. XIII, No. 2, December, 1958.

(4) In a foreword to MINISTRY OF AGRICULTURE, FISHERIES AND FOOD. *The Farm as a Business*. H.M. Stationery Office, London, 1963.



At a time when so many resources are being devoted to research, teaching and advisory work in farm management, it seemed desirable to make some assessment of the potential for farm income improvements, at least on a narrow locational front.

## 2. Objectives and Methods

The main purpose of this study, therefore, is to examine the scope for improving net farm incomes through changes in farm organisation. At the outset, it was decided to confine the investigation to holdings of a certain size, situated in a particular geographical region.

Two possible methods would have been (i) to examine the experience of farms which had previously received management advice or (ii) to analyse the wide range in individual results found in previous farm surveys. These methods were rejected, however, because such farms would not necessarily be typical—even for a particular area. It was decided, therefore, to conduct the survey on a representative sample of farms which may or may not have used management advice or have participated in previous economic studies.

The Nottinghamshire Sand Land area was selected as being suitable for such a survey for three main reasons. First, because of the inherent poverty of the soil, the area is particularly limited in the choice of enterprises. Thus if the incomes of Sand Land farmers could be raised, there might be even greater possibilities in better land districts. This could widen the applicability of results beyond this particular area. Second, soil type is uniform over the Sand Land area relative to other parts of the East Midlands Province, and it was desirable to obtain a sample of holdings reasonably similar in terms of their physical resources.<sup>(5)</sup> Lastly, because this area has always tended to be a problem area, it has been the subject of two previous studies by the Department of Agricultural Economics of Nottingham University, the last being conducted in 1947. It was considered that the time was ripe for a re-appraisal of the economics of sand land farming and this secondary objective was married to that already stated.

Beginning with a description of present conditions in the Sand Land area, this study proceeds to a review of earlier studies of the agricultural economy of the area. Post-war changes are examined with the help of agricultural statistics and the Farm Management Survey. The results obtained from the 1962-63 survey of sand land farms are then used to indicate the scope for profitable improvement in farm organisation. Certain data were also collected on social and psychological aspects of the individual co-operating farmers and their families. This information was useful for a full discussion of the economic results and of their significance for advisory work. Although some aspects of this study are of a purely regional nature, it is suggested that the more significant conclusions could usefully be considered in a wider geographical context.

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<sup>(5)</sup> For the same reason of obtaining a uniform group of farms, holdings employing systems of overhead irrigation were excluded.

## CHAPTER II

### THE NOTTINGHAMSHIRE SAND LAND AREA

#### 1. Location

The Nottinghamshire Sand Land Area comprises about 28 per cent of the total area of the county,<sup>(1)</sup> being mainly situated in the north and west. It consists of an eight mile wide band of Bunter Sandstone extending from Bawtry in the north to Papplewick, from which parish a narrow strip protrudes southwards to Beeston in the south-west. The area is bounded approximately on the east by the main Nottingham-Bawtry road (A.614) and on the west by a line drawn from Harworth through Blyth, Worksop and Mansfield to Nottingham.<sup>(2)</sup>

#### 2. Urbanisation

The interior of the area is largely rural except for the extreme south which includes part of the County Borough of Nottingham. In fact much of the city is built on Bunter Sandstone, Nottingham Castle standing on an elevated outcrop of this rock formation facing the river Trent. On the eastern and western fringes of the area (particularly the latter), however, much urban development has occurred, the chief towns being East Retford, Worksop, Mansfield, Sutton-in-Ashfield, Kirkby-in-Ashfield and Hucknall. Coal is mined extensively on the western fringe and there are a number of newer pits in the east also. The colliery villages and towns stand in sharp contrast to the picturesque parks and woodlands near which they are often located. The proximity of urban and agricultural districts within the Sand Land area has its effects on both, but the rapid expansion of towns such as Mansfield has inevitably led to a gradual loss of farmland for building.

#### 3. Natural Features

In terms of landscape the Nottinghamshire Sand Land area lacks the spectacular and little of the land surface is sufficiently hilly to restrict farming. Altitudes vary from less than 100 feet above sea level in the north to 600 feet around Mansfield. Surface drainage is restricted to five main streams which flow away from the western and higher land, towards the north-east, eventually to meet the river Trent at West Stockwith on the county boundary. There is a significant dearth of surface water in the southern half of the area.

The surface rock formation is wholly composed of Bunter Sandstone which is up to 600 feet thick, this stratum resting upon impervious Permian Marl.

The main features of the soils of the area are light texture and low retentiveness of water, lime, plant nutrients and humus. On the credit side for the farmer are its responsiveness to warmth and ease of working.

(1) ROBINSON, H. G., "Features of Nottinghamshire Agriculture." *Journal of the Royal Agricultural Society of England*, Vol. 88, page 3, 1927. This states the area of Nottinghamshire Sand Land covers 153,600 acres.

(2) See Fig. 1, page 12, for sketch map.

Though local variations do occur, the area is reasonably uniform in terms of soil quality. The main, and slight exception to this is the district north of Worksop where soils are finer and porosity is not quite so marked.

In some areas of this country (e.g. North Shropshire) the agricultural handicap of a soil with low moisture-holding capacity is mitigated by substantial rainfall. In Nottinghamshire, however, this is not the case. The Sand Land area, which tends to be of low relief, lies within the rain shadow of the Derbyshire uplands. Average annual rainfall is around 25 inches, though this varies a little according to altitude. Adequate precipitation in the early growth period (April and May and occasionally in June) is vital for high yields of roots and cereals, but these three months usually constitute the driest quarter of the year. It has been estimated<sup>(3)</sup> that at Worksop, moisture deficits cause reduced yields of hay (and probably of cereals) in 5 or 6 years out of 10 and in the case of sugar beet, in 3 to 4 years out of 10.

Temperatures in the area are very uniform between different places, though there is the relatively wide range of 23°F between the January and July means.<sup>(4)</sup> Late frosts are an occasional hazard of farming in this area which is also subject to mists and fogs in autumn and winter. The area is particularly vulnerable to high winds in spring which tend to dry out the topsoil and offset the beneficial effects of precipitation. "Blowing" is also an occasional hazard, whereby the surface particles of dry sand land in exposed places are easily picked up by wind and carried to the first major obstruction, be it a building or hedge. The eroding effect is not often of consequence but young root seedlings are especially susceptible to being cut off by the movement of sand particles a fraction of an inch above soil level.

To sum up the natural conditions which impinge on sand land agriculture, it can be said that farmers are handicapped by "hungry," pervious soils with frequent dry and windy springs, but the easily-worked soil and reasonable warmth are aids to crop and livestock production.

### CHAPTER III

#### THE HISTORY OF SAND LAND AGRICULTURE

Agriculture and forestry have vied for position in this area since very early times, but since the vast fellings of Sherwood Forest in the 16th century agriculture has slowly come to dominate the scene. Prior to the middle of the 18th century, however, farming was primitively carried on at a subsistence level. The development of a commercial agriculture dates from the introduction of the turnip around 1760 and the final enclosure movement in the late 18th century. From this period onwards, rotational farming was practised and much waste land was brought into cultivation. Investment in buildings, roads and fences was substantial

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<sup>(3)</sup> MINISTRY OF AGRICULTURE, FISHERIES AND FOOD. *Agriculture of Sand Lands*. 1954. Bulletin No. 163. H.M. Stationery Office, London.

<sup>(4)</sup> 38°F and 61°F respectively.

in the mid-19th century, much of the capital coming from the profits of coal mining. Over the last 100 years sand land farming has kept in step with other areas in the application of the findings of agricultural science.

Economically, however, the agriculture of this area has suffered a very stormy passage with depressions and boom periods alternating. The unfavourable natural conditions of soil and climate render the sand land farmer particularly susceptible to the agricultural price situation. Because of low yields and narrow profit margins a price decline renders the area "marginal" more quickly than more favoured regions. Periods of inflation have led to intensification and technical advancement of sand land farming, whereas depressions have produced the symptoms of a fast declining agriculture.

Following the Napoleonic Wars a short-lived but severe depression caused some of the newly cultivated sand land to revert to scrub. This gave way to the gradual improvement caused by this country's industrialisation and farming again became profitable. Favourable conditions lasted for about 80 years up to the late 19th century when low agricultural prices again hit the area causing a widespread neglect of good husbandry practices. The first World War produced a temporary alleviation of these conditions when the demand for home-produced food soared. However, the most severe depression of all time, in the 1930's soon rocked the foundations of sand land farming for the third time in a little over a century. The old rotation of cereals, fodder roots and short leys with sheep was frequently neglected, and in 1935 the Economics Department of the Midland Agricultural College set out to investigate the effects of low prices.

The report of the 1935 survey<sup>(1)</sup> makes dismal reading with the conclusion that, under the prevailing economic conditions, much of the area was marginal and some of it was sub-marginal. Makings<sup>(2)</sup> continued his interest in the area in 1936 to 1938 when farming remained at a low ebb. Although the advent of government price support for cereals and the Land Fertility Scheme (which provided grants for lime and basic slag) increased the viability of sand land farming, not until the outbreak of the second World War did any measure of prosperity reach the area. The sand land farmer had the difficult task of operating a system which was compatible with both economic circumstances external to the farm and with his available resources of land, capital and labour. Often the nature of the land and the experience of the operator dictated a system which was inappropriate to the price situation, e.g. sheep and barley production. Dairying would have been a profitable alternative to many more farms if the area had not been subject to the uncertainty of severe droughts with a consequent falling off in forage production. The scope for improving farm systems in the 1930's was much more restricted than at the present day when modern technology renders farm systems more flexible. The

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(1) MAKINGS, S. M., *Farming Forest Sand, in the Sherwood Forest area of Nottinghamshire*. 1938. Survey Study No. 4. Midland Agricultural College, Department of Agricultural Economics, Sutton Bonington (now incorporated in the University of Nottingham).

(2) MAKINGS, S. M., *The Economics of Poor Land Arable Farming*. E. Arnold & Co. Ltd., London, 1944.

low output of sand land farms together with their unspecialised production aggravated the situation, and Makings also criticised the system of tenure for its slow adaptation to the slump conditions.

The outbreak of World War II probably benefited sand land agriculture even more than that of most other areas and profits rose steeply in the early 1940's. Data analysed by Mejer<sup>(3)</sup> indicate that the improved crop prices (relative to livestock), crop acreage subsidies and the incentive to plough up caused a sudden swing towards arable production. Mechanisation expanded rapidly and, despite more intensive cropping, yields generally increased. It should be noted that farm incomes, even in the war years, continued to fluctuate widely showing the effect of different seasons on an area of basically poor land. Towards the end of the war there was some evidence that profits were slowly declining and it seemed that the period of prosperity was drawing to a close. All farmers remembered the Great Depression of the thirties and Mejer was concerned at this downward trend at the end of, and immediately after, the war. Many people feared that prices would slump as they had done soon after the 1914-18 War. However, the world food shortage and the implementation of guaranteed agricultural prices, together with continued technical advance, ensured the overall profitability of sand land farming in the 1950's.

## CHAPTER IV

### POST-WAR SAND LAND FARMING

Mejer's work, published in 1949, is the most recent study dealing specifically with the economics of agriculture in the Nottinghamshire Sand Land area.

In this chapter factual information is given for the period since 1947 so as to provide some continuity with the two earlier studies by Makings and Mejer respectively.

Use has been made of parish statistics<sup>(1)</sup> in order to trace the changes which have occurred in sand land agriculture since the second World War. Because the perimeter of the Sand Land area does not coincide with parish boundaries, those parishes<sup>(2)</sup> were selected which had 75 per cent or more of their land within the area. These parish figures were totalled and used to represent the whole area for every third year in the period 1947 to 1962.

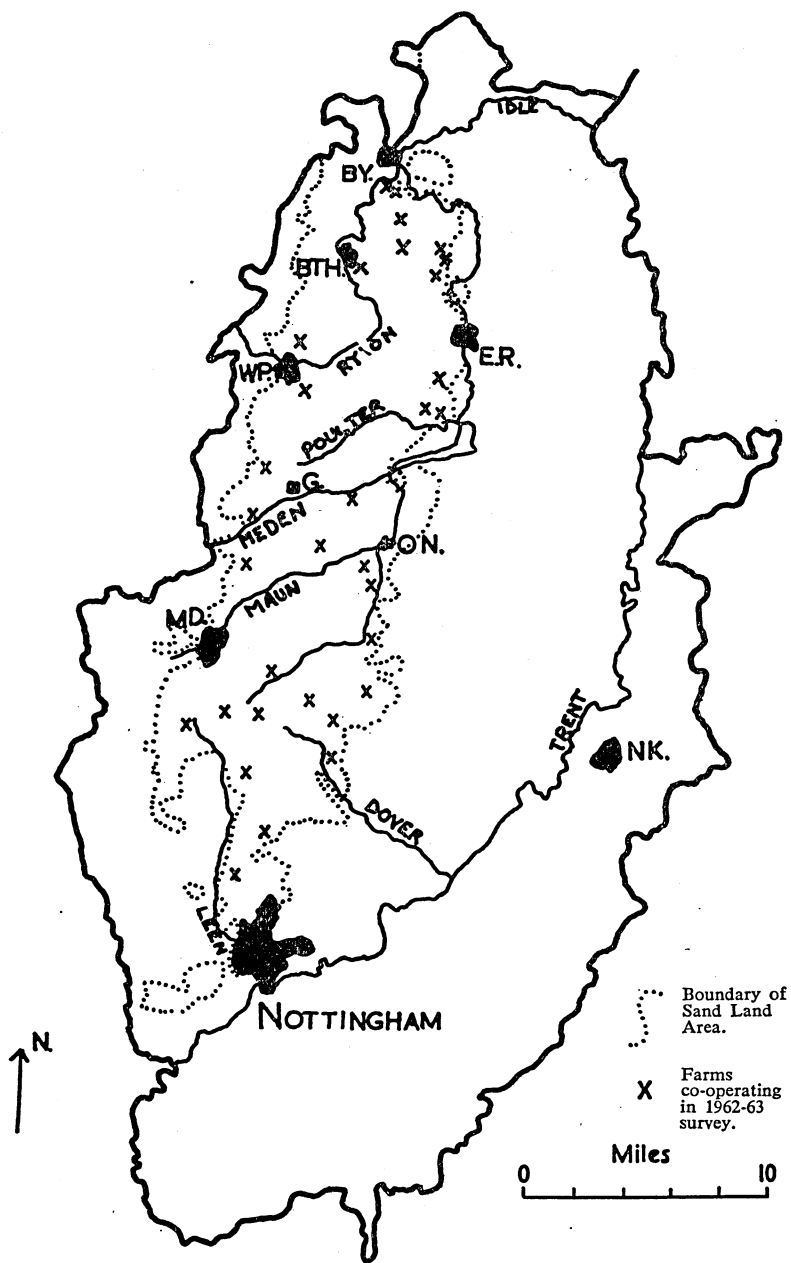
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(3) MEJER, E., *Sand Land Farming: A study of the impact of war-time conditions on the Nottinghamshire Sand Area*. 1949. University of Nottingham School of Agriculture, Department of Agricultural Economics, Sutton Bonington.

(1) The author is indebted to the Ministry of Agriculture, Fisheries and Food for making June returns available for the relevant years and parishes.

(2) The parishes used were: Harworth, Styrrup, Scrooby, Blyth, Hodsock, Ranskill, Torworth, Barnby Moor, Babworth, Elkesley, Carburton, Norton, Perlethorpe-cum-Budby, Warsop, Edwinstowe, Ollerton, Clipstone, Rufford, Lindhurst, Blidworth, Farnsfield, Haywood Oaks, Newstead, Calverton, Papplewick and Bestwood Park.

FIGURE 1  
 SKETCH MAP OF NOTTINGHAMSHIRE SHOWING THE SAND  
 LAND AREA



The changing pattern of cropping is shown in Figure 2 where the major crops and crop groups are expressed as a percentage of total crops and grass acreage.

Under favourable price conditions during this 15 years period, cereal growing gradually attained more importance. All this increase came from the barley crop, which nearly trebled in area in proportion to the total crops and grass acreage. A large expansion occurred in more recent years at the expense of oats, which tend to be less profitable. Wheat declined slightly in importance and mixed corn and rye virtually disappeared.

Owing to high labour costs there has been a decrease in the acreage of fodder roots and kale, etc.

Potatoes are always regarded as speculative when grown on sand land due to fluctuating yields and the widespread occurrence of scab with resulting low prices. The reduction in their acreage was particularly evident after 1950, but the spread of irrigation after the dry summer of 1959 slowed down the decline. Sugar beet is nowadays an important cash crop in the area and often provides a highly profitable "break" between cereals. The beet acreage gradually rose after 1947, frequently replacing swedes and mangolds. But for the acreage quotas imposed by the British Sugar Corporation, this crop would no doubt have expanded faster and further in recent years.

Most of the "other crops and fallow" shown in Figure 2 consist of fruit and vegetables, of which the acreage has changed very little since the War. It is likely, however, that farm scale vegetable production in the north of the area has replaced much of the former production from small holdings around Mansfield and Nottingham.

Grassland acreage has remained remarkably steady, though some permanent grass was replaced by leys in the early post-war years. Also during this time much rough grazing (not shown in Figure 2) was ploughed up. This has continued at a decelerating rate over the 15 years until rough grazing in 1962 amounted to only 1.1 per cent of crops and grass acreage.

Whilst grassland has remained steady, the density of grazing livestock has increased, as shown in Table 1. Both cattle and sheep were intensified after 1953. Dairying, which has never been a traditional sand land enterprise, has recently shown signs of expansion — possibly under the stimulus of grassland irrigation.

**DENSITY OF GRAZING LIVESTOCK 1947 to 1962**  
**NOTTINGHAMSHIRE SAND LAND PARISHES**  
Numbers per 100 acres crops and grass

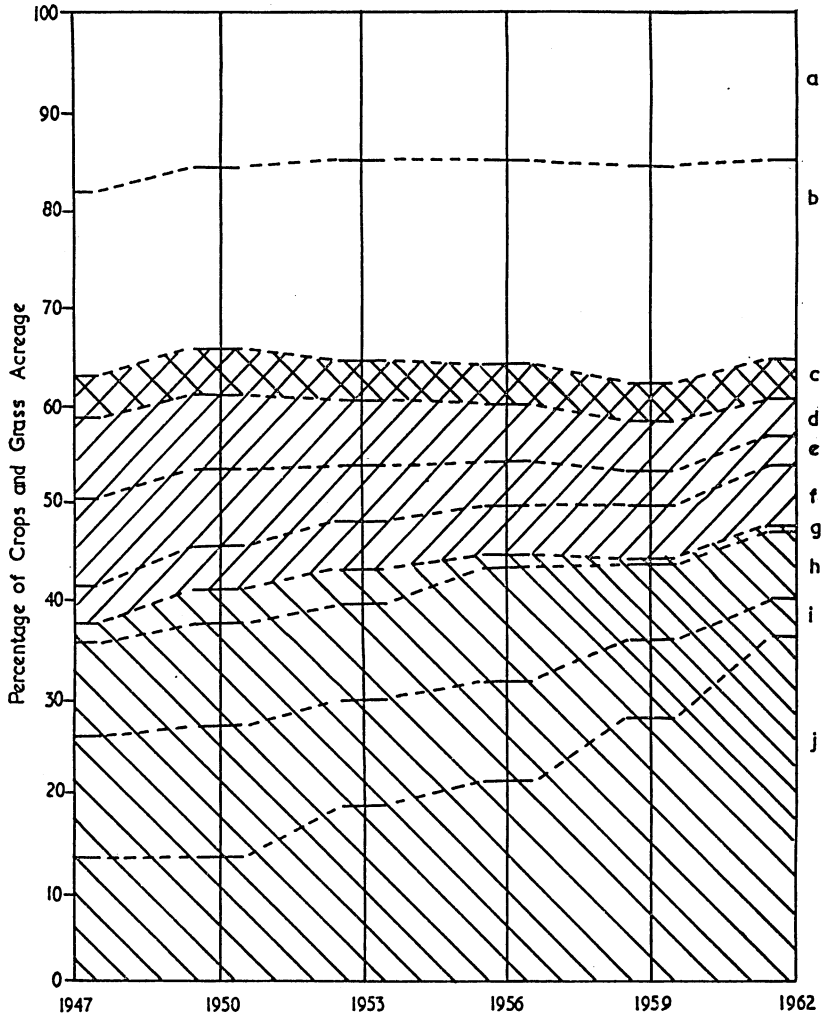
TABLE 1

	1947	1950	1953	1956	1959	1962
Dairy Cows and Heifers in milk	not available		3.4	3.1	3.2	4.0
Total Cattle	16.1	16.6	16.4	17.8	17.3	19.2
Breeding Ewes	8.9	9.6	8.7	12.3	13.5	13.8
Total Sheep	30.7	28.6	28.2	33.1	39.6	38.0



FIGURE 2

CHANGING PATTERN OF LAND USE, 1947 to 1962,  
NOTTINGHAMSHIRE SAND LAND PARISHES



- a. Permanent grass
- b. Leys
- c. Other crops and fallow
- d. Fodder "roots"
- e. Potatoes

- f. Sugar beet
- g. Mixed corn and rye
- h. Wheat
- i. Oats
- j. Barley

Some interest in irrigation was shown as early as 1955 but more widespread adoption did not get under way until 1959 when the drought of that year gave impetus to its expansion. No accurate data are yet available on the number of irrigation plants in the area, but these are likely to be nearly 100, which may cover as much as 15,000 acres. Further expansion of irrigation is limited not so much by the proximity of surface water sources as by the volume of water available at peak periods and by the cost of reservoirs for storage.

During the Second World War pig and poultry production were forcibly cut back by feeding stuffs rationing. After 1947, however, these livestock numbers increased rapidly, as shown in Table 2. The population of laying hens quadrupled and further increases seem likely. Broiler production, which is centred particularly in two sand land parishes, has grown enormously. Pig numbers in 1962 were five times greater than in the immediate post-war years, but there appears to have been some levelling off more recently. Pigs and laying poultry often form an integral part of the farm system, consuming home grown barley, providing farmyard manure and using surplus labour.

**NUMBERS OF PIGS AND POULTRY 1947 to 1962  
NOTTINGHAMSHIRE SAND LAND PARISHES**

TABLE 2 Thousands

	1947	1950	1953	1956	1959	1962
Breeding sows and gilts	.44	.76	1.38	1.71	1.93	1.98
Total pigs	2.9	5.0	9.4	12.0	14.3	13.4
Fowls, 6 months old and over	26	50	53	61	73	103

Table 3 clearly shows the downward trend in the number of full-time agricultural workers over the 15 years period. The overall reduction of about two per cent per annum was, however, faster in the earlier years as farms became more mechanised after the War.

**FULL-TIME AGRICULTURAL WORKERS, 1947 to 1962 IN  
NOTTINGHAMSHIRE SAND LAND PARISHES AND  
NOTTINGHAMSHIRE (whole county)**

TABLE 3 Numbers per 100 acres of crops and grass

Year	Nottinghamshire Sand Land Parishes				Nottinghamshire			
	Boys under 18	Men 18 and over	Women and girls	Total full-time labour	Boys under 18	Men 18 and over	Women and girls	Total full-time labour
1947 <sup>1</sup>	0.32	1.49	0.23	2.04	0.22	1.51	0.14	1.87
1950	0.21	1.55	0.14	1.90	0.19	1.67	0.13	1.99
1953	0.20	1.42	0.09	1.71	0.17	1.60	0.12	1.89
1956	0.13	1.29	0.13	1.55	0.13	1.35	0.11	1.59
1959	0.22	1.24	0.12	1.58	0.17	1.30	0.10	1.57
1962	0.17	1.17	0.08	1.42	0.15	1.17	0.08	1.40

<sup>1</sup> Excluding Prisoners of War, numbering 0.57 per 100 acres crops and grass in the Sand Land Parishes and 0.53 in Nottinghamshire in 1947.

Part-time workers have always been of importance in the area, most of that labour being seasonal in nature. There is some evidence that part-time female labour has increased in importance — though this is not shown in Table 3.

Whilst the total area under crops and grass (excluding rough grazing) has undergone some change since 1947, no significant change in holding size occurred until quite recent years. After the War some War Department land was returned to agricultural use and a considerable area of rough grazing was improved. But after about 1950 there was a steady drain on agricultural land through urbanisation. Average farm size was stable in the early years, but has increased more recently. (Table 4).

**PROPORTION OF CROPS AND GRASS ACREAGE IN VARIOUS  
SIZE GROUPS 1947, 1953 and 1962  
NOTTINGHAMSHIRE SAND LAND PARISHES**

TABLE 4

	1947	1953	1962
	%	%	%
Acreage in holdings of less than 100 acres	13.4	13.9	12.4
Acreage in holdings of 100 and under 300 acres	40.4	39.4	32.9
Acreage in holdings of 300 acres or more	46.2	46.7	54.7

*Note on method of estimation:*

For each year the average size of farm in each Ministry size group under 300 acres has been calculated for the whole of Nottinghamshire, by dividing the total acreage of the group by the number of holdings comprising it. This average was then multiplied by the actual number of sand land farms in each group of the survey to give total acreage in each group. This gave the total area in the survey holdings of under 300 acres. The area in larger holdings was estimated by difference from the grand total.

The effect of post-war changes in sand land farming has doubtless tended to raise absolute farm incomes. Using the Farm Management Survey to portray financial changes, Figure 3 shows that for eight farms which were in the Nottinghamshire "Sand" group throughout the period, both gross output and net farm income have risen steeply.<sup>(3)</sup>

The large fluctuation in net income is mainly associated with climatic factors, particularly summer rainfall. Table 5 uses five year averages for the identical sample to eliminate short-term fluctuations.

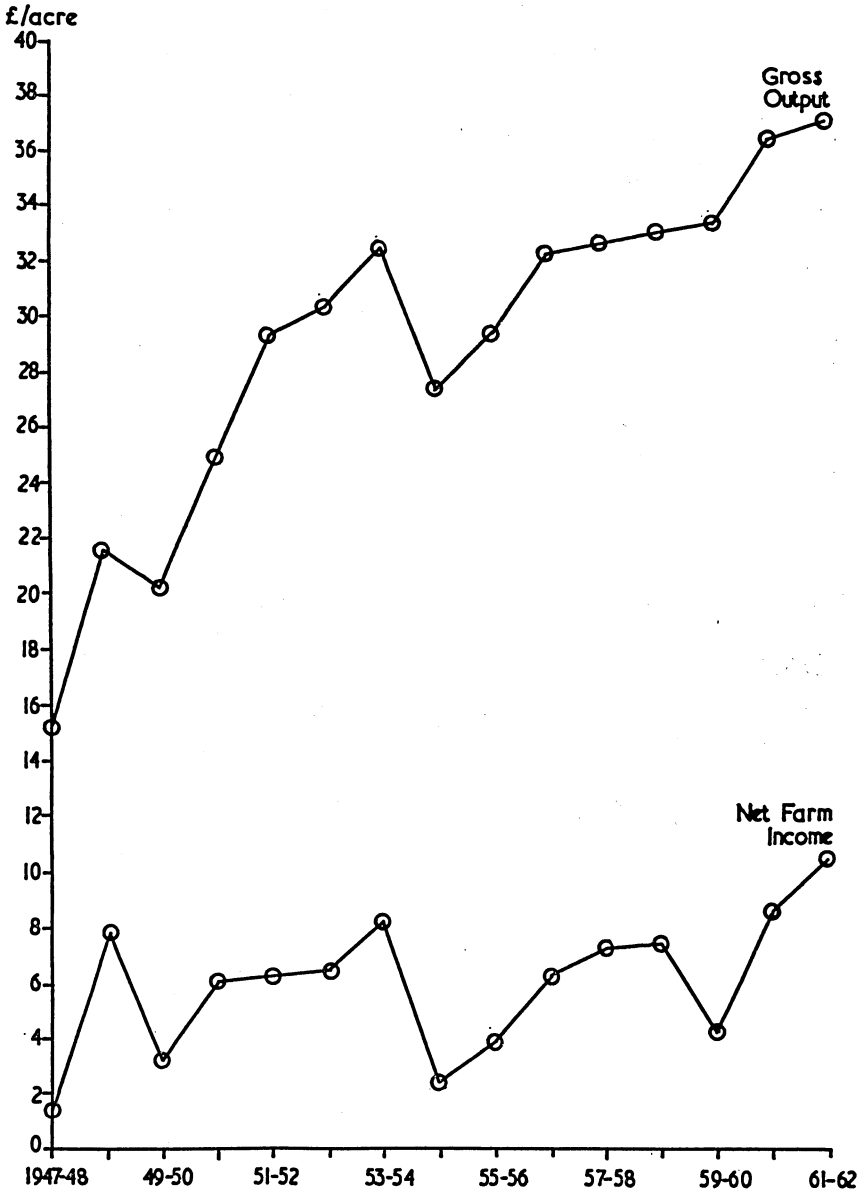
Gross outputs advanced most rapidly after 1947 and more recently the rise has been less marked, due to the general price decline. On the other hand the more noticeable improvement in incomes has occurred in later years largely due to the incidence of only one poor year (1959), after which there was a rapid recovery.

The symptoms of a declining sand land agriculture during the latter years of the War receded during this 15 years period. Post-war expansion was rapid and remunerative and today profits from sand land farming are

<sup>(3)</sup> Data obtained from a larger but varying sample of farms from the same F.M.S. type group gave very similar indications.

FIGURE 3

TRENDS IN GROSS OUTPUT AND NET FARM INCOME FOR AVERAGE  
OF EIGHT SAND LAND FARMS, 1947-48 to 1961-62



**MEAN NET FARM INCOMES AND GROSS OUTPUTS FOR  
IDENTICAL SAMPLE OF EIGHT SAND LAND FARMS<sup>1</sup>**

TABLE 5

£ per acre

	1947-48 to 1951-52, average	1952-53 to 1956-57, average	1957-58 to 1961-62, average
Gross Output	22.23	30.30	34.42
Net Farm Income	4.53	5.42	7.52

<sup>1</sup> The figures are weighted for different farm sizes.

at levels not far below those of other, more favoured, regions. It must be noted, however, that these profits depend not only upon high guaranteed cereal prices (particularly barley) but still fluctuate considerably because of the susceptibility of sand land crops to climatic conditions.

Compared with the rest of Nottinghamshire, the Sand Land area is today more devoted to the production of cash crops and sheep. On the heavier land grassland and cattle (especially dairy cattle) are of greater importance. Unreliable grassland production is a handicap experienced by all non-irrigating sand land farmers, who consequently tend to understock their pastures. Stocking rates are relatively poor and this has further tended to encourage arable cropping which is now the mainstay of the area.

Pigs are of more significance on sand land farms than on other farms in Nottinghamshire and laying poultry are relatively as numerous as in the rest of the county.

Agricultural labour is employed as intensively per acre in the area as in the whole county, but sand land farms tend to be considerably larger. The importance of the estate system in the area is a factor which has helped to keep farm size fairly high—a distinct asset in a poor land area—and in recent years it has generally been estate policy to produce larger farms.

The historical and present-day features of sand land agriculture presented above provide the background against which the 1962-63 survey was carried out. This survey, based on a particular group of sand land farms, concentrated on certain management aspects regarding economic performance and the scope and means for improving that performance.

## CHAPTER V

### METHODS USED IN THE 1962-63 SURVEY

#### 1. Derivation of the Sample

At the outset it was decided to restrict the survey to a representative sample of holdings of 150-350 acres which were composed mainly of sand land and where irrigation was not practised. This size range was selected because such holdings would be large enough to employ at least one worker (besides the farmer and his wife) but too small to justify

the use of two combine harvesters. Also, from a cursory glance at parish address lists it appeared that a sufficient number of farms would come within this range to present a reasonable picture of results being obtained from this type and size of holding.

Parish address lists were used to compile a register of all farms falling into the size group situated in those parishes known to contain Bunter Sandstone. The resulting list of 176 farms was then discussed with each District Agricultural Officer of the National Agricultural Advisory Service responsible for the parishes concerned. Such discussion saved considerable visiting time as farms which did not comply exactly with the requirements of the sample were discarded at this early stage.

Each officer was asked to reject those farms which definitely :

- (i) contained one quarter or more of their acreage in land heavier than sand,
  - (ii) were practising irrigation,
  - (iii) were part of a joint holding, the combined acreage of which exceeded 350
- or (iv) were at that time (Spring 1962) of less than 150 acres despite the indications of the register, having recently lost land.

The advisory officers' knowledge of farms in their districts was assumed to be correct, but where any doubt occurred about the eligibility of a particular case, the address was retained.

The original list was thus reduced to 87 farms contained within 42 parishes. It was decided to obtain a sample of about 30 farms for inclusion in the survey, this being no more than a manageable number for one person to consider in detail and yet sufficient to give a reasonable picture of the population.

Of the 87 farms which were thought to be eligible, 64 were selected for visiting over a four week period. This selection was approximately at random since nothing was known about any of the farms except information concerning size, irrigation and nature of the land. No formal procedure for selection was used but a conscious attempt was made to obtain an even geographical distribution over the Sand Land area.<sup>(1)</sup>

Each farmer was initially contacted by a letter which explained the aims of the survey and a visit was made soon afterwards. Farms for visiting were chosen (a few days in advance) for convenience to each day's route. When about 30 eligible farmers had agreed to participate in the survey, no further visits were made. At this point a total of 64 farms had been contacted. Twenty-three of the visited farms were found to be ineligible after obtaining further information, most commonly because the holdings contained an insufficient proportion of sand land. Thirty-three eligible farms initially agreed to co-operate in the survey, one refused at the second visit, leaving a final sample of 32. In total, 9 eligible farmers did not wish to co-operate chiefly because of a lack of

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<sup>(1)</sup> Before embarking on farm visits the author discussed sand land farming at length with numerous agriculturalists well-acquainted with the area. In attempting to gain a favourable response from farmers, some publicity was given locally at the outset. Several N.F.U. meetings were informed of the project and a description of its aims was included in a local newspaper.

interest in such studies or a reluctance to allow their financial accounts to be examined by an outsider. Two farmers considered themselves too old to participate and another was shortly leaving the farm.

The characteristics of the farmers who declined were unknown, save a completely subjective estimation that they were older than the average age in the final sample surveyed.

Out of 41 eligible farms visited, 32 completed the survey, constituting a 78 per cent response. Table 6 summarises the derivation of the sample.

#### HOW THE SAMPLE WAS OBTAINED

TABLE 6

	Number of farms
Farms in Nottinghamshire Sand Land parishes in 150-300 acres group	176
Farms in the above said to consist of Sand Land and not to be using irrigation	87
Visited during survey	64
of which: found to be ineligible	23
found to be eligible	41
Declined to participate	9
Completed the survey	32

## 2. The Gross Margin Technique

Extensive use was made of gross margin data in both the analysis and planning stages of this investigation. This system, which has received much publicity in recent years, seeks to provide a measure of efficiency of each individual enterprise; to indicate how the various enterprises on a farm compare with each other; and to provide data for replanning. The crux of the method is to divide all farm costs into fixed and variable items on the basis of whether or not they would vary for the planning changes considered. In this survey, costs were classified on a similar basis for all farms, variable costs being those which would change as a result of only *small* changes in size or balance of enterprises. Since nearly all variable costs are specific to particular enterprises, each crop and live-stock group is charged with its relevant variable costs and credited with its financial output, the difference being its gross margin. The sum of all gross margins constitutes the fund from which the overall fixed costs of the farm are met, leaving a profit or loss. The definition of a cost as "fixed" only means that it will remain unaltered with small changes in enterprise composition. Such costs are often capable of considerable adjustment in replanning since a fairly long time period is being considered at this stage.

Alternative methods of farm business analysis, such as cost accounting and comparative analysis of efficiency factors, were rejected on the grounds of unsuitability to the study. The former would have been almost impossible to obtain and even then would have been of doubtful value as a planning tool, whilst the latter is useful only for diagnosis of managerial deficiencies since it rarely provides suitable data for replanning.



The widespread adoption of gross margins by researchers and advisers alike has marked a major step forward in farm management, but it should be added that differences occur in the use of this technique. Thus some economists prefer to classify costs on the basis of specificity to particular enterprises rather than on fixity, though this tends to detract from the usefulness of gross margins in planning. Further, there are several methods of obtaining the required information for the calculation of gross margins. These vary from accurate on-farm recording to "off the cuff" estimation of costs and output for the previous year. The method adopted here is closely tied to the financial account, backed up by any other records available and the farmer's own knowledge of his business. Eligibility for the survey did not depend on the keeping of gross margin records, since as representative a sample of holdings as possible was required. The good response from farmers was largely due to the fact that they were only required to produce three years financial accounts and to discuss their farm businesses in considerable detail.

### 3. Farm Business Analyses<sup>(2)</sup>

During the first visit to each farm at which co-operation in the investigation was sought, much physical data was obtained in order to arrive at a general picture of the farm. Details were obtained of acreage, cropping, livestock, labour, machinery and buildings, and descriptions of rotations, techniques and yield levels were recorded. At the second visit more precise information was collected, especially of a financial nature, which would enable a full gross margin analysis to be carried out. In each case three years' accounts were scrutinised, except where the farmer had been in business for less than that period.<sup>(3)</sup> The most recent year for which profit and loss accounts were available was taken as the base year and the analysis was initially made on this, the two earlier years being used in the process of "normalisation" (see footnote 7, page 23). In most cases the base year was 1961-62, but 1960-61 was sometimes used since this was the most recent year for which complete accounts were available. The cropping and livestock numbers relating to the base year were noted from a perusal of copies of June returns, notebooks and maps.

A standard procedure was used for adjusting the account for analysis purposes, based on that suggested by the Ministry of Agriculture,<sup>(4)</sup> and using Farm Management Survey conventions. These preliminary adjustments were as follows:—

- (i) Labour costs adjusted to exclude farmer and wife but to include other unpaid family labour.
- (ii) Rental value inserted for owner-occupiers.
- (iii) Where the costs of capital improvements were included in current expenditure, these were removed but were allowed for by increasing the annual rent or rental value.

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<sup>(2)</sup> Additional details of conventions used are included in Appendix A.

<sup>(3)</sup> There were only two such cases and these were not rejected as two years' figures were available.

<sup>(4)</sup> In the *Farm as a Business*, M.A.F.F., 1958.

- (iv) Interest and mortgage payments excluded.
- (v) Allowances made for private occupation of farmhouse.
- (vi) Private share of car expenses, electricity charges and the costs of solid fuel, etc., allowed for.
- (vii) Realistic estimates of the sale value of produce consumed in the farmhouse were made and added to "other income."
- (viii) Non-farm sales (e.g. timber) excluded.
- (ix) Accountants' estimates of "uncertain" sales (such as eggs from a small poultry flock) were adjusted to give a more realistic figure, where necessary.
- (x) Other adjustments made to individual abnormalities.

The next stage was to break down those items of valuation, expense or income which were not detailed. For instance the costs of feeding stuffs, seeds and fertilisers or the sales of various classes of livestock were often aggregated into one item. The extra detail was obtained either from the farmer's own cash book or invoices, or direct from the accountant.<sup>(5)</sup>

Gross outputs were next calculated. For livestock this was a simple matter, but for cash crops which were partly fed to stock (chiefly barley and oats and occasionally potatoes) an estimate was required. Some reliance was placed on the farmer's memory but, knowing the prices obtained, final estimates of crop output were checked back to yield levels.

Variable cost items<sup>(6)</sup> were extracted from the account, care being taken to allow for valuation of stock on hand and to include only those crop costs appertaining to the cropping year in question (usually 1961 harvest). The allocation of variable costs was usually made by questioning the farmer and checking his answers against the total figures for each item included in the account. For crops this was usually a question of obtaining physical input (e.g. "x" cwts. per acre of fertiliser "y") and converting these to financial terms. If large differences occurred between farmers' estimates and actual payments made, the former were scaled up or down over all crops. The relatively minor items of fuel and twine were allocated with the help of standard data and from payments made—where these could be ascertained. Resort was frequently made to invoices to calculate purchased compound foods fed to different livestock. "Straights" and homegrown cereals were more difficult to split. A combination of farmer's knowledge and standard food requirements was employed, together with a calculation of actual food fed in total. The technique was adopted of apportioning food costs to the smaller livestock enterprises first, and sometimes a residual was charged to the largest

(5) Accountants were always found ready to assist; they usually had the required information and were often interested in the exercise.

(6) Falling into the "variable costs" category were: seeds and plants, fertilisers, lime, sprays, twine, fuel, casual labour, contract work and haulage, P.M.B. levy, sack hire, feeding stuffs, vet. and drugs, A.I. fees and breed society charges. The remaining costs were classified as "fixed" and were grouped thus: rent and rates; regular labour; repairs, vehicle licences, etc. (landlord's repairs excluded by definition); depreciation; services (electricity, water, etc.); professional charges (charges for accountant, bank, valuer, N.F.U.); office expenses (telephone, stationery, etc.); miscellaneous.

enterprises. This was always checked with standard figures, bearing in mind the range in levels of feeding. In many cases the problem of food allocation was eased by the existence of only one large livestock enterprise or by the exclusive use of compound foods, the amount of which could easily be found. The allocation of forage crops (excluding grazing) and other livestock variable costs was rarely difficult. Use was made of average livestock units in the allocation of grazing.

The final stage of analysis was that of normalisation.<sup>(7)</sup> Up to this point all calculation had been based on one year—the most recent for which accounts were available. Ideally one would repeat the exercise for each of the earlier years, but in practice this is impossible where the farmer's memory is used. Detailed analysis is extremely difficult for more than one or two years back as retrospective assessment soon becomes clouded. But, by using the concrete information contained in all three years' accounts, it was possible to pinpoint some of the abnormalities of the most recent year. Livestock outputs were calculated for each class for each year and all crop sales were checked for differences between years. In some cases these differences were fully explained by changes in numbers of stock and acres of crops between years. In such instances the last year's figures were accepted. But where fluctuations in yield or prices due to season or disease were evident, some adjustment was necessary. Farmers were asked to estimate average crop yields and, to a degree, this could be checked. If yield estimations (either average or for the base year) were optimistic for sugar beet or wheat (such cash crops being easily checked) the other crop yields were scaled down in proportion. Some odd output items, such as contract work or ploughing grants, were frequently in need of averaging to give a normal picture.

On the costs side, the variable items were rarely adjusted since there was little variation which could not be explained by changes in the size or in the method of conducting the enterprise. Fixed costs, however, did sometimes vary inexplicably. Rent increases were not averaged—but the base year figure was always accepted as being the best reflection of future level. The costs of repairs and depreciation frequently required averaging due to spasmodic increases caused by irregular major overhauls or by the purchase of large new items of equipment. The cost of regular labour was adjusted only in a few cases where an employee was temporarily taken on or laid off in the base year.

Overall, the normalisation procedure caused few adjustments to variable costs or livestock outputs, though crop outputs and machinery expenses were commonly altered.

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(7) Normalisation is a method of averaging which has the virtue of ironing out spasmodic variations in costs and outputs, but at the same time taking more account of the current situation than by simple averages. By referring to several years' figures, abnormalities in the most recent year are identified. These abnormalities are not adjusted, however, unless they are not likely to continue in future. If they have been caused by chance, or seasonal effects, or by some other temporary influence an average figure is taken. But should they be a permanent feature of the farm economy, the most recent figure is used. Alternatively, a system of averaging may be adopted giving more weight to recent years, if an increasing or decreasing trend is obvious. Though this method is fairly subjective, it does allow for the dynamic nature of inputs and outputs since long-term trends are not eliminated.

Needless to say, the above analysis involved considerable time—on average three hours actually spent on the farm after which the accounts were borrowed for several days of office work. The fact that all the work was performed by the author gave some uniformity to subjective assessment, where this was required. Each co-operator then received his individual gross margin analysis, normalised, but based on the cropping and stocking of the base year.<sup>(8)</sup>

#### 4. Farm Business Plans<sup>(9)</sup>

At the third visit to each co-operating farmer any permanent changes to costs<sup>(10)</sup> which had occurred since the base year were noted and used in the farm plan. Changes to size of farm were ignored, however, and plans were based on the acreage in the base year.

The first step was to examine the gross margins and fixed costs to determine what "slack" could be taken up within the *existing* farm system. Obvious shortcomings in the techniques of existing enterprises (as shown up by low gross margins) were corrected "on paper" and the new levels of profitability estimated. Similarly, it was occasionally possible to reduce excessive fixed costs, if, for instance, over-mechanisation was clearly a cause. Great care was taken to avoid over-estimation of such possible improvements and usually it was safer to accept past performance as it stood, unless really striking faults were observed. On several farms in this survey, little improvement to enterprises was budgeted for. Occasionally low fertiliser rates were stepped up or modern crop varieties introduced but, over the whole sample, technical efficiency was reasonably good.

Existing and feasible enterprises were next listed together with their expected future profitability and upper size limits.<sup>(11)</sup> These restrictions to expansion were decided from a careful assessment of the limiting factors of suitable land, production quotas, regular labour and existing buildings, though it was realised that these were sometimes capable of modification. Some guidance on the capital position was derived from a discussion with the farmer and a perusal of the balance sheet. It was found that capital restricted very few of the farm plans, partly because further investment was unnecessary and partly because there was access to more capital if required. Seasonal labour demands were observed, where necessary, by reference to standard data<sup>(12)</sup> and past labour

(8) At the third visit it was ascertained if the cropping and stocking in the base year was abnormal in any way. A normalised distribution of crops and stock was then calculated (with the corresponding financial results) before proceeding to the planning stage.

(9) Additional details of the conventions used are included in Appendix A.

(10) E.g. rent increases, new machinery (additional to replacements) or wage increases due to age.

(11) The gross margin levels of new enterprises were calculated individually from a combination of the enterprise data included in all analyses and from the performance level of the particular farmer in similar enterprises.

(12) Use was made of THEOPHILUS, T. W. D., *Farm Planning Handbook*, University of Nottingham, Department of Agricultural Economics, March, 1962, and *The Farm as a Business*, M.A.F.F. 1958.

efficiency. After numerous discussions with crop husbandry experts it was decided to put a limit on cereal growing of 75 per cent of all arable land unless more than this proportion had been grown successfully in the recent past.

The finally selected farm plan was extremely dependent on the limits to enterprise expansion of the kinds discussed above and, as Giles<sup>(13)</sup> has aptly stated, their accurate determination "is in many respects the crux of successful farm planning."

The proficient farm manager is often the one who successfully operates a system which is not hamstrung by the usual restrictions. The ability to see beyond conventional horizons is one of his attributes.

Farmers' preferences were not taken into account as this was primarily an academic exercise to determine the theoretical scope for improvement.

The aim of replanning was to calculate the net farm income obtainable from the adoption of a plan which, though not strictly the optimum as defined by linear programming, was as near to that optimum as could be reached by the simpler but more flexible method here described. A comparison was then available between recent organisation (virtually present organisation in most cases) and that suggested for the near future, after allowing sufficient time for the plan to materialise. Plans were formulated which would enable their continuous operation. Because of the extreme difficulty of projection, no changes in the prices of inputs or products were assumed apart from the likely changes in barley deficiency payments, guaranteed wheat prices and ploughing grants.<sup>(14)</sup> The disadvantage of not allowing for any future "cost-price squeeze" was partly alleviated by the fact that most farmers would be likely to continue increasing their productivity through technical and economic progress. It may be admitted that overall price declines could offset the benefits of planned improvements but farmers would still be in a more favourable position than under their unimproved organisation which would also have suffered from the lower prices.

At the outset of the reorganisation, all enterprises were equally considered for inclusion, but those with the highest gross margins per acre were initially selected. Unless the present costs of labour and mechanisation were unjustifiably high, plans were at first based on the existing level of fixed costs. The scope for reducing these costs, however, was carefully examined during the planning procedure and sometimes their reduction turned the selection of enterprises along a new course. In some cases insufficient labour was available to permit the unrestricted inclusion of enterprises giving high margins per acre of land, and labour require-

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(13) GILES, A. K., *Gross Margins and the future of Account Analysis*. Miscellaneous Studies, No. 23, June, 1962. University of Reading, Department of Agricultural Economics, Reading.

(14) These were lowered at the 1963 Price Review. The effect on gross output of the increase in guaranteed milk price proved too difficult to calculate and a constant price was assumed. The increased floor price for potatoes was not likely to affect farmers' receipts from that crop.

ments were always checked before final settlement of the improved plans. The complementarity of certain enterprises was a necessary consideration (e.g. fodder crops and livestock, wheat-for-straw and potatoes). Yield levels of expanded enterprises were scaled down to allow for lower marginal productivity with the increased size. Selected crops were built into feasible rotations which could be operated on the type of land available. The system of livestock production used in the various plans sometimes involved a change from the existing organisation (e.g. a switch from fattening store cattle to single-suckled beef). Pigs and Poultry were only introduced or expanded if there was a sufficiency of labour available after organisation of land-use enterprises.

In summary it may be stated that selection of crops and livestock and their various systems depended principally on their gross margins per acre within the bounds of labour requirements and other resources of the farm.

This planning method was more empirical and subjective than either of the two available alternatives, linear programming or programme planning (in the formal sense<sup>(15)</sup>) and was less rigid in the selection process.

Linear programming was not used because the analysis data lacked meticulous precision, plans were required which could be derived by advisory officers and computer facilities were not readily available. The method used was more akin to programme planning though less rigid, as many permutations and possibilities were considered in each case—some of these would have been difficult with a less flexible approach. For instance, with some of the restrictions some feasible "bending" could be taken into account during the selection process instead of having to construct several plans from start to finish.

To some extent the unusually limited choice of enterprises in the sand land area facilitated farm planning, particularly in the selection of arable crops. The main problems lay in deciding on the most efficient utilisation of essential grassland.

The final farm plans and inherent changes cannot be stated to be the optima for the farms concerned. They are basically improvements which are believed to approximate closely to the optima. Furthermore *they are each within the scope of the individual farm and farmer*. The use of a standard form and technique for the collection of data from all farms, coupled with the fact that, at all stages of this investigation, work at the farm level was performed by the author alone, gave considerable consistency in both analysis and planning. At the same time the adaptability of this technique enabled each farm to be considered as an individual unit with its own peculiar set of input-output characteristics and its own level and flexibility of restrictions.

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(15) As demonstrated by Clarke, G. B. and Simpson, J. G., "A Theoretical Approach to the Profit Maximisation Problems in Farm Management." *Journal of Agricultural Economics*, Vol. XI, No. 4, January, 1956.

## CHAPTER VI

### THE ECONOMIC ASPECTS OF SURVEY FARMS UNDER EXISTING ORGANISATION

#### 1. The Survey Farms

The location of the 32 farms selected for analysis and planning is indicated on the map Figure 1, page 12. They are scattered over the whole of the predetermined area with the exception of the Dukeries where there is a predominance of woodland and large estates. The quality of sand land tended to be slightly higher in the north where a rather wide variety of crops was grown. The sample constituted a fairly uniform group in terms of physical resources but organisation and performance varied greatly as will be shown later.

The distribution of farm size is shown in Table 7, the range being 150 to 315 acres with a mean of 235 acres.

**DISTRIBUTION OF FARM SIZE IN SAND LAND SAMPLE**  
TABLE 7

Size group	Number of farms	Acreage	Per cent of total acreage
150—199 $\frac{1}{4}$	8	1,387 $\frac{1}{2}$	18.4
200—249 $\frac{1}{4}$	11	2,443 $\frac{1}{4}$	32.5
250—299 $\frac{1}{4}$	11	3,062 $\frac{1}{4}$	40.7
300—350	2	628	8.4
All groups	32	7,521 $\frac{1}{2}$	100.0

Only seven farms were completely owner-occupied, 15 were wholly rented, and the remaining 10 farmers both owned and rented land. Eight farmers occupied more than one holding and a further nine owned or rented land separate from the main farm, with distances of up to 12 miles between different blocks of land. Such layouts, although sometimes complicating management, did not appear to present any insoluble problems. The organisation of divided holdings was greatly assisted by good road transport, modern machinery and the fact that these farms concentrated on arable crops.

The quality of farm buildings was variable, though most were at least adequate even if they were often not ideally suited to the needs of modern farming. There was a distinct tendency for the poorer steadings to be associated with tenanted farms, often on low rentals.

Farms were usually well-mechanised and machinery expenses accounted for a considerable share of fixed costs. The degree of mechanisation was partly dependent on the farming system adopted, but also on the outlook of the farmer concerned and on the profits he was making. The number of regular employees was generally low and varied between farms because of such factors as farmer's own activity, mechanisation, farm system and the availability of casual workers.

Lack of capital appeared to be limiting progress in only a minority of cases, even though outside sources of non-farm capital (available to a few farmers) were disregarded for the purpose of this study.



The farmers themselves were the most important and probably the most variable factors in the production process. Management was divided on a quarter of the holdings where son(s) or wife had material effects on decisions. Occasionally, in cases of "syndicate management," each member of the family was responsible for a particular aspect of the farm organisation. On all farms, however, it was possible to define one person as "the farmer"—the final decision maker (or entrepreneur). Their ages, activities and farming aims (as influenced by education and experience) were noticeably different and these appeared to have a large effect on managerial decisions and so on economic performance.

Hence, despite similarities in location, soil type and lack of irrigation, it is not surprising that because of other variable factors a diversity of farming systems existed within the sample of 32 holdings. It is difficult to classify these systems, but for the sake of description, approximate groupings can be made :

- (i) The most traditional types of farm were those carrying sheep and/or beef cattle which consumed fodder roots during winter and which were lightly stocked on leys or permanent grass in summer. At least half the area of such farms was in forage crops, cash roots not being important though cereals were grown, with a fair proportion of oats for feeding.
- (ii) The above pattern was modified on others by the expansion of more profitable cash crops. Sugar beet and occasionally potatoes thus replaced fodder roots, and cereals acreage was enlarged with a concentration on barley. The grazing livestock were intensified by grassland manuring, concentrate feeding and by the earlier finishing of fatstock. Such changes were undoubtedly more compatible with modern economic conditions than the traditional approach which was based on the Norfolk four course rotation.
- (iii) On a small number intensive cereal growing was carried on with few or no other crops being grown. Grazing livestock were therefore absent.
- (iv) Milk production constituted a major enterprise on a minority of farms and, in these cases, a fairly large proportion of grassland was being maintained to support the dairy herd.

Pigs and poultry were found to be superimposed on all the above farming types but there was some tendency for the larger intensive livestock enterprises to be associated with farms growing a large proportion of cereals.

Thus over the whole sample a general gradation of system occurred, within which certain distinct types could be discerned. Each farm was different in some respects from any other and merited individual attention.

## 2. Cropping and Stocking

Using the method outlined in Chapter V, a normalised pattern of crops and stock was drawn up for each farm. Table 8 sets out the cropping per 100 acres of crops and grass for the complete sample. The figures most commonly relate to the years 1959 to 1962.

## NORMALISED CROPPING FOR TOTAL AREA OF 32 SURVEY FARMS

TABLE 8

	Acreage per 100 acres crops and grass
Wheat	5.6
Barley	29.6
Oats	8.5
Rye	0.6
<b>Total Cereals</b>	<b>44.3</b>
Potatoes	0.9
Sugar beet	6.3
Vegetables	0.4
<b>Cash roots, vegetables and fruit</b>	<b>7.6</b>
Mangolds	0.9
Turnips and swedes	1.1
Kale, rape, etc.	2.5
Other non-grass forage crops	0.4
<b>Total non-grass forage crops</b>	<b>4.9</b>
Ley for: Silage	1.6
Hay	14.4
Grazing	14.0
<b>Total ley</b>	<b>30.0</b>
Permanent grass: Silage	0.1
Hay	0.5
Grazing	12.2
<b>Total permanent grass</b>	<b>12.8</b>
Bare fallow	0.4
<b>Total</b>	<b>100.0</b>
of which: total grassland	42.8
total forage crops	47.7

Land was about equally divided between cash and forage crops, the only important cash crop apart from cereals being sugar beet.

Livestock obviously played an important part in the economy of these farms and Table 9 indicates the normal distribution of certain classes of livestock per 100 acres crops and grass. During the survey it was often impossible to collect complete information on livestock numbers. Though the numbers of breeding stock and laying hens were accurately known, store and fatstock were much more difficult to ascertain. Table 9 includes only those classes for which precise figures were available.

The sample, on average, carried about 8 beef or dairy cows and 17 breeding ewes per 100 acres of crops and grass, apart from the comple-

**NORMALISED DENSITIES OF CERTAIN LIVESTOCK CLASSES FOR  
TOTAL AREA OF 32 SURVEY FARMS**

TABLE 9

	Per 100 acres crops and grass
Cows and heifers in milk (for dairying)	5.4
Cows and heifers in milk (for beef)	2.8
Breeding ewes	16.9
Breeding sows and gilts	1.8
Fowls, 6 months old and over	105

ment of followers and progeny. To all these cattle and sheep 48 per cent of total land was devoted.

Compared with the whole sand land area (which includes farms outside the 150-350 acreage grouping) these farms contained a greater proportion of grassland (especially ley) with more cattle and sheep and less cash crops. Pigs and poultry were of much less significance to the survey farmers.

Under existing price conditions and considering the limitations of sand land grass production it might well be postulated that profits were being limited by the allocation of only half of the land to cash crop production. Several factors contributed to this situation—tradition, cautiousness, personal preferences and the fact that *some* farmers were able to use grass and forage crops efficiently and profitably. The many divergent patterns of production discussed in this section gave rise to great variation in financial results.

### 3. Overall Financial Results

The effects of size differences between farms on financial results were eliminated by expressing most of the results on a "per acre" basis, Table 10 indicates the distribution of normalised net farm incomes per acre over the sample of 32 holdings. The wide range in net farm income is evident, though results tended to cluster around the unweighted mean<sup>(1)</sup> of £7.2 per acre. The average normalised gross output per acre was £37.1.<sup>(2)</sup>

The array of net farm incomes achieved by the survey farms is shown in Figure 4A. In an attempt to discover some of the particular features which accompany financial success (as measured by normalised net farm income per acre) the remaining histograms in Figures 4B to 4G express other factors of the economies of these farms, the farms being ranked from left to right in the same order as Figure 4A. Thus, Figure 4B indicates that gross outputs per acre tended to rise in the same direc-

<sup>(1)</sup> Except where otherwise stated, the survey results give equal weight to each farm. Only where the sample is treated as a complete group are the results weighted by farm acreage.

<sup>(2)</sup> It is interesting to note that these average figures for net farm income and gross output are closely similar to results obtained by the 13 Farm Management Survey farms in the "Sand" group in 1959-61.

**DISTRIBUTION OF NET FARM INCOMES AND GROSS OUTPUTS  
UNDER EXISTING ORGANISATIONS**

TABLE 10 £ per acre

Net farm income groups	Number of farms	Gross output groups	Number of farms
-6.0 to 0	2	10.0 to 20.0	3
0.1 " 6.0	12	20.1 " 30.0	6
6.1 " 12.0	14	30.1 " 40.0	10
12.1 " 18.0	2	40.1 " 50.0	7
18.1 " 24.0	2	50.1 " 60.0	5
		60.1 " 70.0	1
All farms	32	All farms	32

tion as net farm incomes, though this relationship did not invariably hold true. In order to eliminate abnormalities and to indicate trends, the results for each group of eight farms were averaged and are shown in Table 11.

**MEAN FINANCIAL RESULTS FOR EACH "PROFIT GROUP"**

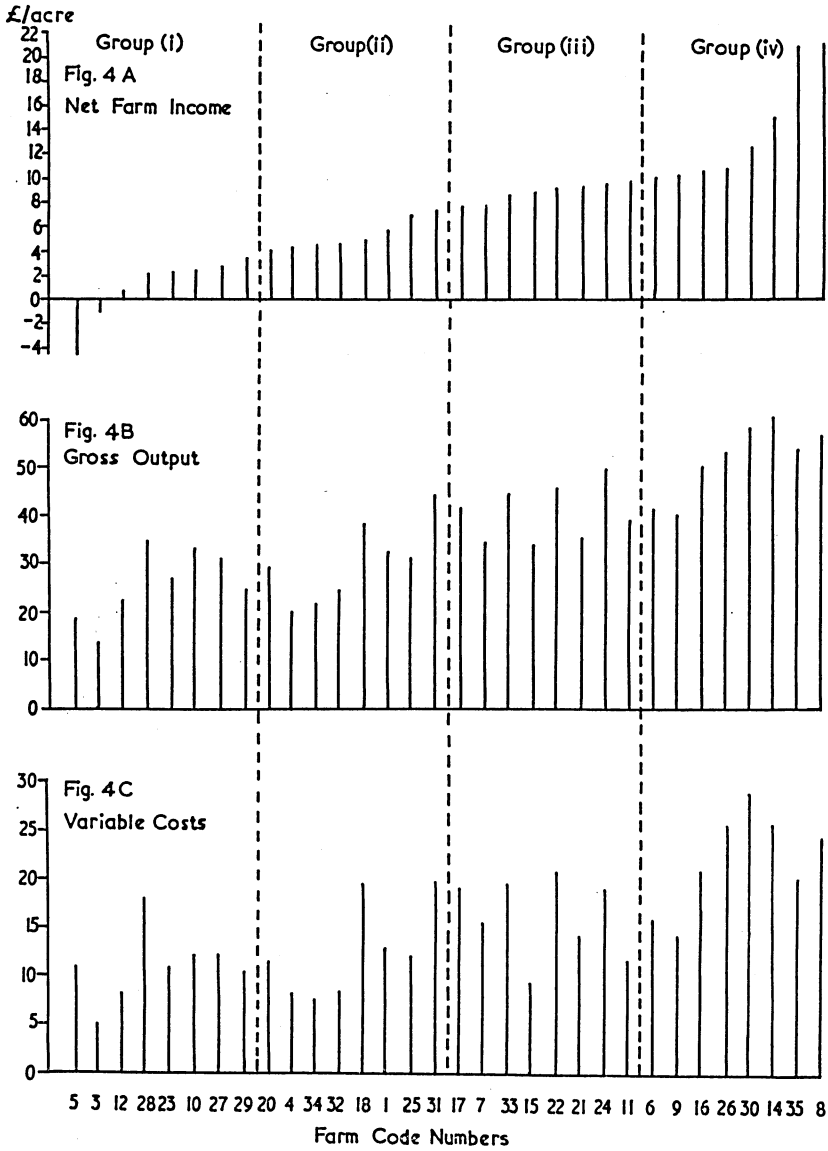
TABLE 11 £ per acre

Factor	Figure	" PROFIT GROUP "			
		(i)	(ii)	(iii)	(iv)
Net farm income	4A	0.95	5.22	8.91	13.93
Gross output	4B	25.4	30.4	40.7	51.9
Variable costs	4C	11.1	12.6	16.3	21.8
Gross margin	4D	13.7	17.0	23.4	29.0
Fixed costs	4E	13.4	12.6	15.6	16.2
Total costs	4F	24.5	25.2	31.8	38.0
Management and investment income	4G	(-).044	3.66	7.31	11.69

High net incomes per acre were associated with greater intensities of production, whether intensity is measured in terms of gross output or total costs. Gross output per acre in group (i) was only about half that achieved in group (iv)—a similar relationship occurring for both variable costs and gross margins per acre. Fixed costs were also greater on the more profitable farms, though differences were not so marked because fixed inputs are less affected by the degree of intensity than are variable costs or gross outputs. At least two farms in group (i) were left with poor net incomes because their high fixed costs were not matched by high gross outputs. Excessive fixed costs (chiefly regular labour and machinery) appear to be one factor which caused low profits on a small number of farms. Nevertheless on most farms which incurred above average fixed costs these would seem to have been justified since the farms tended to fall into the more profitable groups—that is, these items of fixed costs were efficiently utilised to produce gross outputs and margins which were also above average. The level of total costs was highest in the more profitable groups. Management and investment incomes approximately followed the pattern of net incomes.

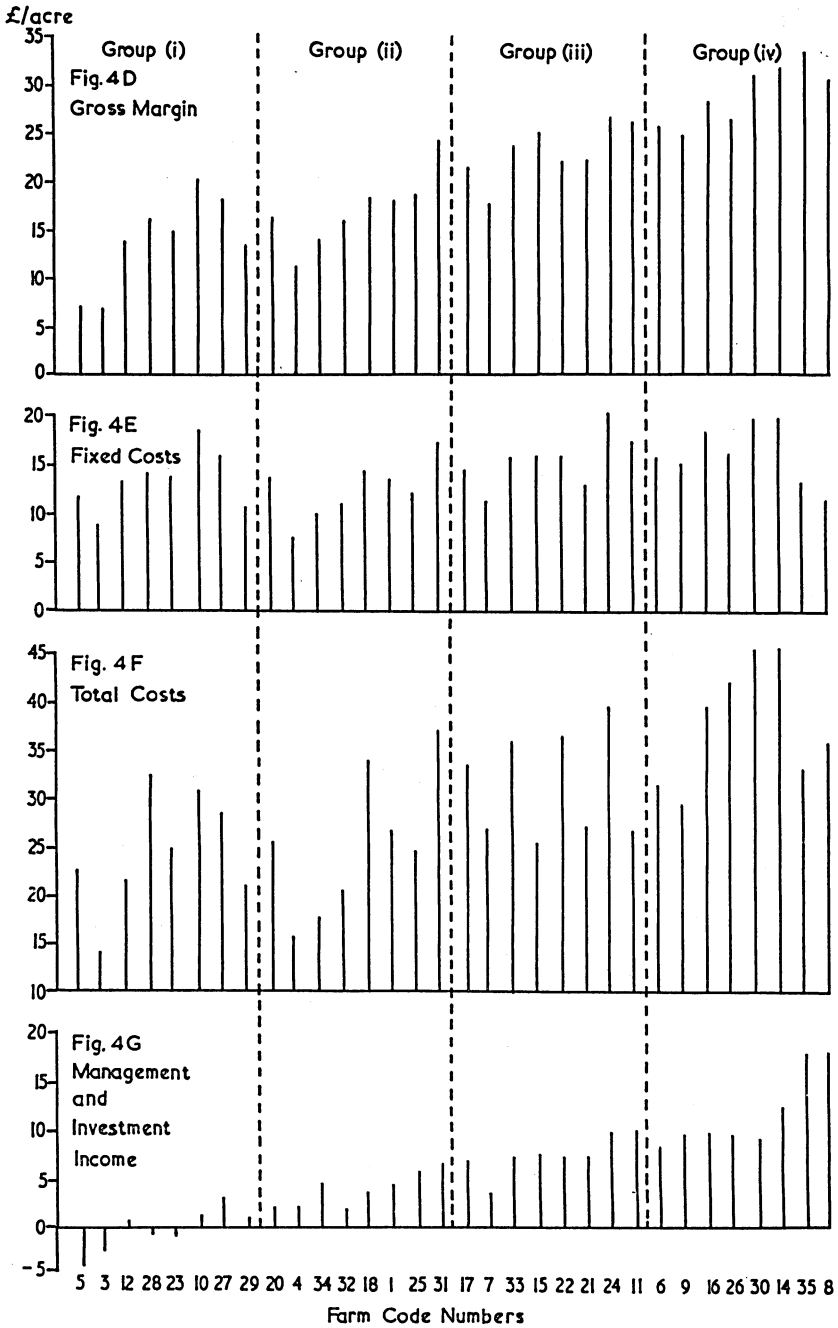
FIGURES 4A—4C

FINANCIAL RESULTS ARRAYED IN "PROFIT GROUPS"



FIGURES 4D — 4G

FINANCIAL RESULTS ARRAYED IN "PROFIT GROUPS"



The relationship between net farm incomes and gross outputs and costs indicates that intensification was conducive to profitable production. The average figures for each "profit group" in Table 12 indicate how the *composition* of gross output tended to affect net farm income. The percentage contributions from the two main crop groups and four main livestock enterprises are shown.<sup>(3)</sup>

**PERCENTAGE CONTRIBUTIONS TO GROSS OUTPUT FOR  
FOUR "PROFIT GROUPS"**

TABLE 12

Per cent

Enterprise	" PROFIT GROUP "			
	(i)	(ii)	(iii)	(iv)
Cereals	25.4	25.7	25.6	24.7
Cash roots and vegetables	11.2	16.4	18.9	15.1
Cattle (beef and dairy)	43.7	36.1	25.2	26.8
Sheep	4.4	9.4	5.5	4.1
Pigs	4.5	5.9	13.8	17.5
Poultry (laying and table birds)	7.4	3.7	8.4	9.7
Other income <sup>1</sup>	3.4	2.8	2.6	2.1
	100.0	100.0	100.0	100.0

<sup>1</sup> Includes such items as ploughing grant, contract work, and produce consumed in the farmhouse.

In all "profit groups," the share of gross output derived from cereals was similar, and the differences between groups in the contributions from cash roots and vegetables were not conclusive. On the other hand, cattle, which constituted by far the most important livestock class, carried much more weight in groups (i) and (ii). This fact points to the unsatisfactory nature of many sand land cattle enterprises which are dependent on grassland. Sheep production, also, showed a tendency to be of more significance amongst the lower "profit groups." Intensive livestock production, and especially pigs, commanded a much greater share of output in the two highest profit groups. On the more profitable farms gross output per acre tended to be boosted by these non-land-using enterprises. If intensive livestock are disregarded by considering only land use, there is a definite propensity for low profits to be associated with large proportions of land devoted to livestock enterprises. This is illustrated in Table 13, individual proportions of land in cash crops varying from 0 to 100 per cent. Whereas the group (i) farms averaged only 40 per cent. of land in these crops, group (iv) farms had 65 per cent. Table 13 also indicates that differences in net farm income per acre were not consistently associated with differences in farm size. Because of the acreage limits of the sample and because actual farm sizes were fairly high (by national standards) this result is to be expected.

<sup>(3)</sup> Since gross output does not include crops fed to livestock or used for seed, the contribution from cereals does not indicate their true importance in the farm economy because a considerable proportion of the grain produced was used on the farm.



Within the 150—350 acreage range the smaller farms apparently made little effort to counteract their handicap of small acreage by intensification.

#### LAND USE AND FARM SIZE FOR FOUR "PROFIT GROUPS"

TABLE 13

	" PROFIT GROUPS "			
	(i)	(ii)	(iii)	(iv)
Per cent of land in cash crops	39.8	47.6	57.6	64.9
Farm size	233	253	236	218

The overall picture therefore emerges that net farm income per acre was the result of numerous factors, the most important of which were the degree of intensity (in terms of inputs and outputs per acre), the proportion of land devoted to cash crops and the importance of pigs and poultry. Individually, however, some farms showed a divergence from this general pattern. Thus, three highly successful dairy farms existed where a large proportion of the land was devoted to forage crops and profits were exceptionally high. On the other hand three other dairy farms yielded poor results because of the extensive nature of their cattle enterprises.

However, it was usually the case that low cost - low output farms with a considerable proportion of land devoted to unprofitable cattle and sheep enterprises occupied the weakest economic position.

#### 4. Fixed Costs

Table 14 shows the unweighted average levels of the various items of fixed costs on a " per acre " basis. Rents are extremely low in relation to rents currently being negotiated on arable farms generally even bearing in mind the poor quality of land. Large increases often occur with changes of tenancy. Although regular labour accounts for as much as 45 per cent. of total fixed costs, the absolute figure of £6.6 per acre is low for mixed farms of this size. On average 2.8 workers were

#### FIXED COSTS

TABLE 14

Item	£ per acre	Per cent of total fixed costs
Rent and rates	2.13	14.7
Regular labour	6.56	45.3
Repairs, vehicle licences, etc.	2.16	14.9
Depreciation	2.59	17.9
Services	0.30	2.1
Professional charges	0.39	2.7
Office expenses	0.13	0.9
Miscellaneous	0.22	1.5
Total	14.48	100.0

employed per farm and 1.19 workers per 100 acres crops and grass which denotes a fairly efficient standard of labour organisation for a gross output of £371 per 100 acres. To some extent this is achieved because of easily worked soils, the prevalence of cereal growing and the use of casual labour for intensive root crops. If the farmer's own contributions are included (on average, about two thirds full-time), there were 1.47 workers per 100 acres and the labour cost per acre becomes £8.23. Total fixed costs then amount to £16.15 per acre.

Mechanisation costs, in total, amounted to about 33 per cent. of fixed costs, but again these were not excessive at £4.75 per acre.

The other minor items were not capable of much manipulation since they tended to be fixed, even in the long term.

It should be added that, in spite of the above general comments on labour and mechanisation, individual cases existed where some economies in fixed costs could be effected. The planning stage included a close examination of these fixed costs, and a reduction was planned where there were obvious inefficiencies capable of modification.

## CHAPTER VII

### GROSS MARGINS WITH EXISTING ENTERPRISES

In addition to providing data on the performances of individual farms, the survey results also furnished useful information on the gross margins yielded by the various enterprises practised on farms within the sample.

These will now be considered individually.

#### 1. Cereals

Largely because of the lack of profitable alternatives, cereals constituted the major group of crops in this sample, accounting for a little under half the total acreage. Most farms were well-mechanised for corn production; 30 of the 31 cereal growers used combines for harvesting, 10 had corn drying facilities and eight had bulk grain stores. Forty-one per cent of all grain produced was retained on the farms, the bulk of this being oats and barley for feeding to livestock.<sup>(1)</sup> The margins realised from cereal growing were normally attractive and compared well with other enterprises. Output was augmented to a considerable extent by deficiency payments which amounted to about 37 per cent of the value of total grain produced. The distribution of deficiency payments for oats and barley on the basis of acreage rather than production is to the advantage of sand land farmers whose yields are generally below the national average.

Table 15 shows the mean results obtained from cereals, including figures for the more important items of variable cost.

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<sup>(1)</sup> For wheat, the proportion of grain retained on the farm was 1.9 per cent, for barley 38.6 per cent, oats 81.8 per cent and rye 2.8 per cent.

CEREALS—AVERAGE RESULTS

TABLE 15

	Wheat	Barley	Oats
No. of farms	19	31	30
Acreage per farm <sup>1</sup>	22.2 (±10.3)	71.8 (±44.2)	21.2 (±14.0)
Yield (cwts/acre)	21.1 (± 3.3)	23.1 (± 3.2)	20.6 (± 3.5)
	- - - - - £ per acre - - - - -		
Output	28.6 (± 4.4)	31.2 (± 3.3)	27.8 (± 3.5)
Total variable costs	9.1 (± 1.8)	7.6 (± 1.4)	7.9 (± 1.5)
Gross margin	19.5 (± 4.1)	23.6 (± 3.3)	19.9 (± 3.3)
Seed	2.8 (± 0.5)	2.2 (± 0.4)	2.5 (± 0.5)
Fertilisers	3.1 (± 1.0)	2.7 (± 0.8)	2.6 (± 0.8)

<sup>1</sup> This refers to those farms on which each crop was grown.

N.B. Figures in brackets shown beside average values in this and subsequent tables in this chapter are standard deviations which indicate the extent to which individual farm values are dispersed around the averages.

The results from wheat growing are not strictly comparable with those for oats and barley since this crop was usually grown on the better land and was commonly sown after ley. Large annual fluctuations in wheat yields were often experienced and frequently it was less profitable than barley.

The popularity of barley seemed fully justified as the margins were generally higher and more reliable than for wheat. This crop is highly suited to sand land conditions, because of its drought resistance, its adaptability to mechanisation and suitability for feeding to stock. Most crops were grown for feeding barley and modern high-yielding varieties which respond to liberal nitrogen application were always used. Occasionally, however, samples of Proctor (by far the commonest variety) were disposed of for malting. In accord with national trends, these farmers had gradually expanded barley acreage in recent years. The feasibility of continuous barley cropping is a subject especially relevant to sand land farmers and the success of one such farm in the survey gave evidence to its financial attraction. On this particular farm, net income was high, partly because no land was devoted to the less profitable forage crops and partly because of the low fixed costs associated with continuous barley growing. Thanks to the liberal use of fertilisers and the effectiveness of modern herbicides, barley yields on this farm tended to increase.<sup>(2)</sup>

Further limited evidence on the effect on barley yields of intensive corn growing may be gleaned from this survey by a comparison between 11 farms where more than 50 per cent of land was in cereals (including barley in each case) and the remaining 20 farms which grew barley. The "intensive cereal growers" averaged 22.7 cwts. of barley per acre, against 23.3 for the other farms where between 27 and 49 per cent of land was cropped with cereals. The yield difference is negligible and,

<sup>(2)</sup> A further treatment of this case study is given in DAW, M. E., "Continuous Barley Cropping." *Farm Management Notes No. 29*. University of Nottingham, Department of Agricultural Economics, Sutton Bonington. Spring 1963.

furthermore, the first group included one farm with an exceptionally low yield which was due to management and soil type. If this farm is excluded, the remaining 10 farms averaged 24.0 cwts. per acre.

It seems that in this area at least, the loss of organic matter with successive cereal crops, the dangers of fungal diseases and eelworm infestation are not the menaces which agriculturists used to anticipate.

In view of the reduction in the East Midlands oat acreage in recent years, it is somewhat surprising that as many as 30 farms normally grew oats, though the average acreage grown was not great. Mean yields and gross margins were fairly similar to those for wheat and the chief reason for the inclusion of this crop was that oats were thought to be required for feeding on the farm. During the survey, considerable illogical opposition was met with regard to the replacement of oats with barley for feeding to stock.

Rye merits only passing reference, it being an obsolescent crop in this area. Yields and prices are low and render it an uneconomic crop to grow unless the straw is saleable at high prices to industry.

Though cereals in general were profitable on these farms, there appeared to be some scope for altering the balance of cereals towards barley, to an even greater extent than had occurred in recent years. Also, fertiliser levels were sometimes low with an obvious sacrifice of yield, and occasionally newer varieties were recommendable. Gross margins were almost directly related to physical yields. Compared with other crops and livestock, cereals have low capital requirements and the ratio of output to variable costs is particularly high.

## 2. Cash roots

Sugar beet was widely grown and the results in Table 16 indicate its high profitability compared with cereals. Because the crop makes substantial demands on the fixed costs of labour and machinery, small acreages may not be justified. Fertiliser applications were usually generous and husbandry techniques provided good crops even if they were not

### CASH ROOTS—AVERAGE RESULTS

TABLE 16

	Sugar beet	Potatoes
No. of farms	25	11
Acreage per farm	19.0 ( $\pm 11.6$ )	6.4 ( $\pm 5.6$ )
Yield (tons/acre)	11.6 ( $\pm 1.2$ )	6.8 ( $\pm 1.4$ )
- - - - - £ per acre - - - - -		
Output	71.1 ( $\pm 7.2$ )	88.1 ( $\pm 25.0$ )
Total variable costs	31.3 ( $\pm 5.7$ )	47.3 ( $\pm 9.6$ )
Gross margin	39.9 ( $\pm 8.2$ )	40.8 ( $\pm 19.5$ )
Seed	—	17.8 ( $\pm 6.0$ )
Fertilisers	10.8 ( $\pm 2.6$ )	10.7 ( $\pm 3.7$ )
Casual labour	6.4 <sup>1</sup> ( $\pm 4.5$ )	11.8 ( $\pm 4.0$ )
Contract work and haulage	8.1 ( $\pm 3.8$ )	—

<sup>1</sup> The average includes two farms which employ no casual labour.

always economic. Only one farm had a normalised yield of below 10 tons per acre and it was noticeable that even on farms where other crop yields were poor, sugar beet crops performed well. Though yields fluctuated considerably from year to year, the variation between farms was less marked than for other crops.

Economical use of labour was the most important factor in minimising costs. Mechanical thinning was surprisingly uncommon (three farms in 1961) and even precision drills were used on only eight farms in 1961. Over the following two years, however, the number of both these implements more than doubled. Only a minority of farmers lifted sugar beet by hand and there was widespread satisfaction with mechanical lifters. For a farmer with the necessary machinery (either owned or readily available on contract) it was normally desirable to expand sugar beet production to the limit of his regular labour force or to the available quota. This was not always realised by the farmers concerned.

It has already been indicated that potato acreage has steadily declined on non-irrigated sand land farms over the past few years. Only three farmers in this sample grew more than 10 acres of potatoes, these being concentrated on the small areas of stronger land. Most farmers had become dissatisfied with the crop, in view of fluctuating yields and the prevalence of diseased samples which were difficult to market. They had often allowed their production quotas to decline to one or two acres or even to nil.

Nevertheless, the 11 farms on which potatoes were still regularly grown produced satisfactory gross margin results as shown in Table 16. The mean gross margin per acre was very similar to that for sugar beet, though it should be added that potato growing presented more problems and crops were usually grown on land superior to that used for sugar beet. Seed was the major item of variable cost and casual labour was also high. Potatoes were always harvested with spinners or elevator-diggers together with casual labour. Only maincrop varieties were grown and two farmers marketed their crops either direct to consumers or to retailers. Retail or wholesale margins were not, however, included in the results.

Vegetable growing is worthy of brief mention at this point since one farmer made a speciality of producing a range of brassicas, kidney beans and peas, selling the produce direct to retailers. This was a profitable sector of the farm since little casual labour was required. The pattern of vegetable growing developed over the years was such that it fitted in with the regular labour force, and production rarely exceeded marketable quantities. In addition, two other farmers grew vegetables on a very small scale to satisfy available market outlets. Although the gross margins per acre from these intensive crops were high they cannot be widely recommended because of a lack of specialised knowledge and limited markets. Furthermore, if vegetables are expanded far, extra regular labour may become necessary, offsetting the high margins.

### **3. Fodder crops**

A variety of brassicas, mangolds and rye were grown for feeding and, in this survey, were charged at variable cost of production to the relevant livestock enterprises. A summary of these variable costs is given

in Table 17 together with certain specific items. Mangolds incurred the greatest costs on account of high fertiliser rates and the use of casual labour for spring work. The advantages of all these crops lay in the fact that they provided (like all root crops) a rotational "break" from cereals and they gave a high output of fodder per acre. On the other hand, labour requirements were fairly high (except for kale), often at periods when sugar beet would be strongly competitive for labour, and all had some degree of susceptibility to frost damage. The fodder was either grazed (with cattle or sheep) or carted off to be fed in the steading or soiled on pasture. On most farms some fodder roots were justified and husbandry practices appeared to be good.

### FODDER CROPS

TABLE 17

	Kale, cabbage and rape	Turnips, swedes and swedes with kale	Mangolds
Number of farms	21	13	21
Acreage per farm	8.8 (± 4.5)	6.5 (± 5.9)	3.0 (± 1.6)
- - - - - £ per acre - - - - -			
Total variable costs: Mean	9.3 (± 2.6)	9.3 (± 3.1)	19.1 (± 5.6)
of which: fertilisers	5.1 (± 1.6)	5.0 (± 2.5)	9.6 (± 3.1)
casual labour (mangolds only)	—	—	3.5 <sup>1</sup> (± 3.7)

<sup>1</sup> Eight farms used no casual labour for mangolds.

Grazing rye has recently been introduced to the area to provide an early bite and, as such, is especially applicable to dairy farms. However, it was grown on only two farms in the sample.

#### 4. Grassland

Thirty per cent of all grassland on these farms was permanent, practically all this being kept for grazing. About half of all grazing was made up of permanent grass. Permanent pastures were of variable quality and existed for several reasons such as the occurrence of very poor land, convenience to the steading, and occasionally because of a liability to flooding. It must be added, however, that some such pastures were retained for no particular reason other than tradition. Production was often low, though some heavily manured permanent grass was able to support stocking rates such as would normally be expected from well-managed leys. All leys tended to be managed better than the permanent grass, but uneven growth and susceptibility to weather conditions were recurrent problems with all grassland.

Table 18 sets out the variable costs of producing hay, silage and grazing. Silage was uncommon chiefly because labour requirements clashed with spring work in sugar beet crops. It should be added that mechanical thinning of beet crops substantially eases pressure for labour

at this time. Fertiliser applications were heaviest on grass for silage, and this fact accounted for its higher variable costs. Variations in costs between farms were the result of different levels of manuring, length of leys (and hence seed cost) and contract work (chiefly baling).

### GRASSLAND

TABLE 18

	Hay	Silage	Grazing
Number of farms	31	7	31
Acreage per farm	36.0 ( $\pm 19.8$ )	18.5 ( $\pm 17.4$ )	63.6 ( $\pm 28.7$ )
	- - - - - £ per acre - - - - -		
Total variable costs: Mean	4.7 ( $\pm 1.3$ )	5.2 ( $\pm 1.2$ )	2.7 ( $\pm 1.2$ )
of which: seeds	1.7 ( $\pm 0.6$ )	1.6 ( $\pm 0.7$ )	0.8 ( $\pm 0.5$ )
fertilisers	1.7 ( $\pm 0.8$ )	2.8 ( $\pm 1.0$ )	1.5 ( $\pm 1.0$ )

Livestock enterprises were extremely diverse within the sample and the following is an attempt to compare the various types of production.

#### 5. Cattle

Grazing livestock were an important part of all farm systems, except in two cases, the mean result being shown in Table 19 together with that for sheep (see section 6 below).

### CATTLE AND SHEEP—MEAN RESULTS

TABLE 19

	Dairying <sup>1</sup>	Beef, mainly breeding	Beef, mainly fattening	Sheep
No. of farms	13	11	7	20 <sup>2</sup>
No. of breeding stock per farm	31.8 ( $\pm 11.5$ )	18.3 ( $\pm 3.5$ )	—	67 ( $\pm 34.9$ )
Acreage devoted to enterprises	119.3 ( $\pm 43.0$ )	79.5 ( $\pm 13.8$ )	48.3 ( $\pm 34.4$ )	40.2 ( $\pm 16.9$ )
	- - - - - £ per acre - - - - -			
Gross output	39.4 ( $\pm 19.5$ )	23.2 ( $\pm 9.4$ )	31.8 ( $\pm 16.8$ )	19.2 ( $\pm 7.0$ )
Total variable costs	22.1	14.9	21.8	8.9
Gross margin	17.3 ( $\pm 10.6$ )	8.3 ( $\pm 5.8$ )	10.0 ( $\pm 3.8$ )	10.3 ( $\pm 4.9$ )

<sup>1</sup> In the analysis it proved impossible to separate the costs and returns for milking herds from those for rearing heifers or producing beef. These results, therefore, are for whole cattle enterprises where these *included* dairy cows.

<sup>2</sup> The results refer only to the 19 farms with breeding flocks; one farm which fattened purchased lambs only has been omitted.

In terms of gross margins, dairying was, on average, the most profitable means of utilising forage acres. However, dairy herds make greater demands on fixed costs (especially labour) than do beef and sheep and a

comparison of gross margins cannot be taken at its face value. Thus some dairy herds justified their continuance in view of their heavy demands on labour and management. It is interesting to note that the 13 dairy enterprises appeared to be either moderate to poor, or very successful. Only three farms fell into the latter category, their gross margins ranging from £32.4 to £39.1 per acre. Gross margins for the other 10 varied from £6.7 to £18.4 per acre. The features of the three successful herds were: fairly large size (average of 40 cows); high stocking rates (average of one cow per 2.2 acres devoted to whole cattle enterprise) resulting from good grassland management and from somewhat better land; and generally a greater adoption of modern techniques (e.g. two had parlours, one a bulk milk tank and all three recorded). The most important factor resulting in low margins per acre on the less profitable farms was the low stocking rate. Also, some farmers adopted uneconomic replacement policies where all calves were reared, necessitating the allocation of large proportions of land to the relatively unprofitable venture of rearing heifers. On four dairy farms a small part of the cattle output was derived from beef production which tended to pull down the gross margins from the total cattle enterprise.

Beef was produced under a variety of systems which yielded a wide range of financial success. The popularity of beef breeding herds appears to have increased in recent years, and some farmers were finishing cattle intensively at 15 months by liberally feeding concentrates. There is no doubt that these enterprises were more profitable than the more traditional fattening at 2 to 2½ years which was still being practised by some. Four farms could be identified on which breeding with intensive finishing was being practised, their unweighted average gross margin per acre being £12.9 against £5.1 for the five breeding herds where older, fat cattle were sold.

Store fattening tended to be more intensive in land use since root crops were used to a greater extent than with breeding. Consequently gross outputs and gross margins per acre were, *on average*, higher than for breeding herds. There appeared to be considerable scope for improving beef enterprises; sometimes the system did not suit the farm (e.g. summer fattening stores on poor grassland) and frequently stocking rates were capable of being increased by improved grassland management, particularly manuring. Earlier and faster finishing would often have lifted financial results on to a higher plane.

## 6. Sheep

Systems of sheep production were more uniform than those for beef; the end product was fat lamb in all cases and all except one farm with sheep carried a flock of breeding ewes. The main differences between flocks were in lambing dates, time of sale of finished animals and the importance of fattening autumn purchased store lambs. The traditional sand land enterprise of winter fattening is still commonplace, though root crops are probably of less importance than formerly. Nine farmers in this sample regularly purchased store lambs between September and December for finishing, first on sugar beet tops followed by other root crops and hay. This practice was intensive and margins per acre were usually good, though very dependent on market prices (especially pur-



chased prices).<sup>(3)</sup> In the analysis, it was not possible to divide breeding from fattening enterprises, but gross margins were, on average, higher in flocks where store lambs were also purchased for fattening. Fat lambs from the earlier lambing flocks were sold off the grass but few managed to sell all their home-bred lambs before autumn. Under existing price conditions most preferred to market heavy lambs which were sold as late as March in some cases.

No cases of creep grazing were recorded, presumably because the system was liable to break down in a dry summer. Under more favourable price incentives for early, lightweight lambs, December and January lambing would have much to offer the sand land farmer who can rely on early spring grass when later production is more uncertain.

The financial results in Table 19 confirm that sheep production has a proper place on many modern sand land farms. Gross margin per acre tends to be slightly greater than that for beef production. In addition, requirements of labour and capital are low, no housing is required and sheep efficiently consume by-products. The average stocking rate of only 1.7 ewes per acre used (grass and forage crops) is well below East Midlands standards and low grazing intensity often accounted for poor results. However, these flocks often fitted unobtrusively into an arable farming system and were in many cases the most profitable method of using any grassland necessary for reasons of rotation or layout.

## 7. Pigs and Poultry

Only four farms did not include either a pig or poultry enterprise. This widespread occurrence of intensive livestock was typical of the area as a whole. Twenty farms had poultry and 19 had pigs whilst 11 had both. The size of these enterprises varied from a small flock of "backyard" hens or a handful of fattening pigs to large units which were an integral part of the farming system. In only nine cases did these enterprises account for more than 25 per cent of the farm's total gross output and usually they could only be considered as subsidiary to other sections of these farms.

Egg production was the mainstay of poultry keeping, though table birds (broilers, cockerels and turkeys) were fattened on three farms, these being profitable ventures which compared well with laying stock on the same farms. Eggs were produced on 19 farms under diverse conditions, and Table 20 indicates that these enterprises were, on average, unprofitable when compared with other livestock and crops. Low gross outputs (a reflection of egg yield and price) were the main cause and this was in turn influenced by system, breed and quality of management. There was a strong tendency for the larger poultry flocks to be more successful through more frequent adoption of batteries, hybrid birds and home milling and mixing, and a better standard of general management. Several of the smaller "sideline" units were run on antiquated lines receiving little of the farmer's attention and none of his interest. Although they were often retained for non-economic reasons many of them could profitably have been eliminated.

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<sup>(3)</sup> A feeder's margin of £3 per lamb was usual.

PIGS AND POULTRY—MEAN RESULTS

TABLE 20

	Breeding sows, selling weaners or young stores	Breeding sows and fattening to bacon or pork	Weaners or young stores purchased and fattened to bacon or pork	Laying hens <sup>1</sup>
Number of farms	7	6	6	19
Size of unit per farm	7.2 (± 4.0) sows	15.8 (±10.4) sows	187 (± 262) fat pigs per year	426 (± 504) layers
	<i>£ per sow</i>	<i>£ per sow</i>	<i>£ per fat pig</i>	<i>£ per layer</i>
Gross output	87.1	197.0	8.41	2.07
Total variable costs	72.1	143.6	6.48	1.94
Gross margin	15.0 (±11.8)	53.4 (±21.5)	1.93 (± 0.7)	0.13 (±0.48)
Gross margin as percentage of gross output	17.2	27.1	22.9	6.3

<sup>1</sup> The financial results include costs of rearing replacements as well as of egg production.

Pig enterprises were generally making worthwhile contributions to the income of these farms but there were noticeable differences between the three broad systems practised. A comparison of these is made in Table 20 by expressing gross margins as a percentage of gross outputs. The six farms which carried breeding stock and sold weaners not only yielded the poorest gross margins from pigs (relative to gross output) but the variation between farms was greatest. This was largely due to the risk element, not only of breeding, but of selling weaners in the open market. The same applies, to a lesser degree, to the group which purchased store pigs for fattening where wide divergence between farms occurred. The six farmers who both bred and fattened tended to be the largest producers, four of whom made a speciality of pig production. Their performances were more even and exceeded those of the other two groups partly because of better management but also due to economies from the integration of breeding and fattening.

On average, the pig enterprises were obviously operating more successfully than were the poultry units. One quarter of all laying flocks failed to achieve positive gross margins, against no such cases for pigs. Furthermore, poultry gross margins as a percentage of their gross outputs were considerably below the figure for pigs. Generally it was the small laying flocks which were unjustifiable but the larger flocks did compare well with the average pig results.

### 8. Summary

When all these enterprise data are compared with East Midlands "standards",<sup>(4)</sup> it is conspicuous that the average sand land results for both crops and livestock are below the expected averages for the whole

(4) As given in: THEOPHILUS, T. W. D., *Farm Planning Handbook*, op. cit.

province. Such is to be anticipated because of the local limitations described in Chapter II. Differences are particularly apparent in the case of wheat, sugar beet, potatoes, beef, breeding sheep, laying poultry and pigs. Deficiencies do not lie in excessive costs (except with breeding pigs) but usually in low outputs (or yields). Total gross margins (as affected by individual enterprise margins and the balance of enterprises) therefore tend to be lower than East Midlands levels. On the credit side, however, these farms did appear to have rather lower fixed costs for their size and organisation, as shown in Chapter VI.

## CHAPTER VIII

### THE SCOPE FOR INCREASING NET INCOMES ON THE SURVEY FARMS

The grouped results discussed in the previous chapter and the wide range in performance between farms made it appear likely that there was scope for profitable reorganisation on some of these farms.

During the replanning stage of this investigation (as detailed in Chapter V) certain steps were taken which are important to any interpretation of results.

Farm size was kept constant and management was assumed to be in the hands of the same men as at the time of the survey.<sup>(1)</sup> Since the aim was to formulate plans for 1963 conditions, the sugar beet and potato quotas appertaining to that year were taken as the upper limits to expansion of these crops. In practice this meant that rather more sugar beet could be grown than in the base year, but potato acreage quotas were similar.

For the reasons outlined in Chapter V, the only price changes taken into account were reductions in guaranteed prices for wheat and barley and the lower ploughing grant announced at the 1963 Annual Review. Nevertheless changes in certain cost items had sometimes occurred since the base year quite apart from alterations in prices, e.g. rent increases and unavoidable increases in wage bills due to juvenile workers becoming adult. These were taken into account during planning.

The deliberate disregard of farmers' personal preferences on the question of choice of enterprises (unless these were logically based on limitations of the farm or farmer) distinguishes this from a purely advisory approach. Some of the improvements outlined below came outside what farmers would prefer to do, but in the judgment of the writer, were within their capabilities.

It was possible to plan for an improved net farm income and management and investment income for every farm in the sample. This was achieved by various means, the most important of which consisted of

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<sup>(1)</sup> In reality, farm size had increased in eight cases and decreased in five. One farmer had died since the base year but the normalised results had been expressed as if his son had been manager (i.e. the son's manual labour was not charged in calculating net farm income). The son was in control in 1963 and the plan was designed for him.

altering the balance of enterprises, some change in the number and/or scale of enterprises being incorporated into all farm plans. Technical modifications were also planned for some individual enterprises where there was obvious scope for profitable improvement. As a result of these two types of adjustment fixed costs were occasionally modified, principally through changes to regular labour or machinery expenses. Before discussing the overall effects on financial results, each main type of planning adjustment is now considered separately.

### 1. Alterations to the balance of enterprises

On all farms most of the planned additions to net incomes came from the expansion of profitable enterprises at the expense of less profitable ones and, to a less extent, through the introduction of new enterprises. The overall effect of such changes on the distribution of crops and livestock is shown in Table 21.

The cropping pattern has swung markedly towards cash crops and away from forage crops. The general changes are in accord with the gross margin derived for the various methods of land use. Thus barley and sugar beet acreage has been extended with a consequent reduction in other cereals, grassland and fodder roots. Total cereals have been expanded by approximately one third and forage crops reduced by that amount. The greatest proportionate decrease in forage acreage is from fodder roots and kale. Silage is also substantially less because of the labour clash with increased sugar beet acreages. Of the grass crops, grazing has been reduced proportionately less than hay or silage since there was more scope for improving the stock-carrying capacity of grazing compared with grass for conservation.

For each farm a definite cropping rotation was devised to suit the particular conditions of soil type, layout, livestock requirements, cash root quotas, etc. In some cases it was necessary to use two rotations for different parts of the same holding where these conditions differed. Certain cultural restrictions were imposed from a husbandry point of view; root crops were never planned to appear in the rotation more than once in three years, and 75 per cent was the highest proportion of arable land in cereals unless this had been successfully exceeded in the past. Approximately one third of the present permanent grassland was ploughed and incorporated into the arable rotation. One and two year leys were frequently built into the plans and leys were never longer than four years. No fewer than 30 different<sup>(2)</sup> rotations were employed, their full cycle covering from one to eight years.

Cattle appear to be of less importance in the "planned"<sup>(3)</sup> organisations, this being solely due to the diminished numbers of dairy cows. A slight increase in the population of breeding ewes is shown. The "present"<sup>(3)</sup> performance of pig enterprises was found to be generally satisfactory and the number of breeding sows was stepped up. *Profitable*

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(2) This is regarding all three cereals as one crop.

(3) The words "planned" and "present" are used here and in the following pages to describe the data relating to the farm plans and the normalised data obtained during the farm business analyses respectively.

**PRESENT AND PLANNED CROPPING AND STOCKING**

**TABLE 21**

Crop	Per cent of total acreage		Per cent
	Present Distribution	Planned Distribution	Change of Planned from Present Distribution
Wheat	5.6	0.7	- 87.5
Barley	29.6	53.6	+ 81.1
Oats	8.5	3.8	- 55.3
Rye	0.6	—	-100.0
<b>TOTAL CEREALS</b>	<b>44.3</b>	<b>58.1</b>	<b>+ 31.2</b>
Potatoes	0.9	0.9	—
Sugar beet	6.3	8.8	+ 39.7
Vegetables	0.4	0.3	- 25.0
<b>TOTAL CASH ROOTS AND VEGETABLES</b>	<b>7.6</b>	<b>10.0</b>	<b>+ 31.6</b>
Mangolds	0.9	0.7	- 22.2
Turnips and swedes	1.1	0.4	- 63.6
Kale, Rape, etc.	2.5	1.2	- 51.9
Other non-grass forage crops	0.4	0.1	- 75.0
<b>TOTAL NON-GRASS FORAGE CROPS</b>	<b>4.9</b>	<b>2.4</b>	<b>- 51.0</b>
Ley: Silage	1.6	0.9	- 43.7
Hay	14.4	9.4	- 34.7
Grazing	14.0	10.8	- 22.9
<b>TOTAL LEY</b>	<b>30.0</b>	<b>21.1</b>	<b>- 29.4</b>
Permanent Grass: Silage	0.1	—	-100.0
Hay	0.5	0.2	- 60.0
Grazing	12.2	8.2	- 32.8
<b>TOTAL PERMANENT GRASS</b>	<b>12.8</b>	<b>8.4</b>	<b>- 34.4</b>
Bare Fallow	0.4	—	-100.0
<b>TOTAL</b>	<b>100.0</b>	<b>100.0</b>	<b>—</b>
of which: total grassland	42.7	29.5	- 30.9
total forage crops	47.7	31.9	- 33.1
<i>Livestock Class</i>	<i>Numbers per 100 acres</i>		
Dairy cows and heifers in milk	5.4	3.2	- 40.7
Beef breeding cows, and beef heifers in milk	2.8	2.8	—
Breeding ewes	16.9	17.6	+ 4.1
Breeding sows and gilts	1.8	3.2	+ 77.8
Laying hens	105	127	+ 21.0

flocks of laying poultry were also enlarged with a consequent rise in total numbers despite the elimination of a greater number of smaller, unprofitable flocks.

Notwithstanding the overall changes, adjustments to individual farms were by no means uniform. Dairy cow numbers were increased on five farms and three of these necessitated extra grassland and other

forage crops at the expense of cereal growing. The extra land required for the other two expanded dairy herds was obtained by eliminating competing sheep enterprises and by reducing home-reared dairy replacements. Sheep were dropped, in fact, from six farms in all and introduced to one other. In one case only, a Rowett-type beef enterprise was brought in to absorb surplus labour and buildings, use being made of an available contract for purchased calves and sale of fatstock. Two present breeding pig enterprises were omitted from the plans and 10 cases involved an elimination of laying poultry.

Many of the farm plans involved the adoption of more specialised systems and there was a general reduction in the number of enterprises carried. The occurrence of most crop and livestock categories was decreased in the plans, this being particularly marked in the cases of wheat, silage, dairy cattle and poultry. Barley was the only crop which showed a net increase in the number of farms on which it was grown.

At least one enterprise was eliminated from 29 holdings, and seven farm plans allowed for the introduction of at least one new crop or livestock group. However, only two of the plans included a net addition to the number of enterprises, whilst in 24 cases the number was decreased. Some adjustment to the size of an existing crop or livestock enterprise was made on every farm.

Table 22 shows that on farms where herds of dairy and beef cows, breeding sows, and flocks of breeding ewes and laying hens were included in the plans, their average number was considerably greater than before reorganisation. At the same time smaller units were eliminated. The effect is especially pronounced with pigs, poultry and sheep but there was only a negligible change for beef cows. The average acreage of cash crops has increased, except for wheat and oats which were often replaced by barley. Average forage crop acreages have generally declined, except in the case of silage where an increase was necessary for feeding to expanded dairy herds.

The above trends towards specialisation have resulted from a replacement and/or expansion of some existing enterprises. Several of the survey farms were found to be too diversified and the rejection of weaker enterprises was often very desirable. This was particularly so where the latter competed with the more profitable enterprises of the farm for land, labour and capital. Simplification, coupled with expansion of remaining enterprises, would sometimes enable the farm to reap some economies of scale. For example, further mechanisation of cereals and sugar beet was possible when these crops were expanded to an economic size. Many other advantages of simplification and specialisation may be cited and have been dealt with elsewhere.<sup>(4)</sup>

The results of this survey give some limited evidence to support the contention that much scope exists for the further simplification of British farms.

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<sup>(4)</sup> For example in DAW, M. E. "Are our Farming Systems too Complicated?" *Farm Management Notes No. 28*. University of Nottingham, Department of Agricultural Economics, Sutton Bonington. Autumn 1962.

## CHANGES IN THE SIZE OF ENTERPRISES

TABLE 22

	Average acreage per farm growing each crop		
	Present	Planned	Change
	----- acres -----		
Wheat	22.2	11.2	- 11.0
Barley	71.8	125.8	+ 54.0
Oats	21.2	13.2	- 8.0
Rye	15.3	—	—
Cereals	107.4	136.6	+ 29.2
Sugar Beet	19.0	26.4	+ 7.4
Potatoes	6.4	9.6	+ 3.2
Vegetables	11.2	12.9	+ 1.7
Mangolds	3.0	3.1	+ 0.1
Turnips and swedes	6.5	3.3	- 3.2
Kale, rape, etc.	8.8	4.5	- 4.3
Rye with kale	9.1	5.0	- 4.1
Silage	18.5	22.7	+ 4.2
Hay	36.0	24.2	- 11.8
Grazing	63.6	47.6	- 16.0
	Average number of stock per farm with each class		
	Present	Planned	Change
<i>Livestock Group:</i>			
Cattle with dairy herd	31.8 dairy cows	40.7 dairy cows	+ 8.9
Beef cattle	18.3 beef cows	18.9 beef cows	+ 0.6
Sheep	66.6 ewes	120.0 ewes	+ 53.4
Pigs	12.3 sows	20.3 sows	+ 8.0
Poultry	426 layers	1061 layers	+ 635

### 2. Changes to Individual Enterprises

Some types of technical change to the organisation of an enterprise was budgeted for on the majority of farms. In some cases an improvement in gross margin was allowed for, but on other farms a drop in margin was necessary to make allowances for the diminishing returns from an expanded enterprise. A straight comparison of mean gross margins between present and planned results on all the survey farms shows a general improvement in nearly all crops and livestock after replanning. To some extent this is due to the fact that the weaker enterprises tended to be eliminated in planning. This factor is eliminated by restricting the comparison to those farms which contained each enterprise in both present and planned organisations. Table 23 presents such a comparison.

In the case of cereals, fertiliser rates were often stepped up either to improve yields on a similar acreage or to maintain yields on an increased acreage. The average fertiliser expenditure per acre on cereals was increased by roughly 20 per cent and occasionally higher yielding varieties were introduced. Higher yields were allowed for in some cases

**COMPARISON OF PRESENT AND PLANNED CASH CROP  
RESULTS FOR IDENTICAL SAMPLE**

TABLE 23

Enterprise	No. of farms having this enterprise in both present and planned results	Mean Gross Margins (£ per acre)		Mean Yields (per acre)	
		Present	Planned	Present	Planned
Wheat	5	23.8	24.8	25.4 cwts.	25.4 cwts.
Barley	31	23.6	21.8	23.1 cwts.	22.8 cwts.
Oats	21	19.7	19.3	20.0 cwts.	20.0 cwts.
Sugar beet	25	39.9	38.6	11.6 tons	11.7 tons
Potatoes	7	48.6	42.8	7.5 tons	7.3 tons

but in others a reduced yield was assumed (especially of barley) because of an expanded acreage. The net effect was that present and planned mean yields were closely similar. Barley gross margins were reduced because of higher costs of fertiliser and lower deficiency payments but oats were only affected by the higher fertiliser levels. The mean gross margin derived from wheat was slightly higher in the plans because of the elimination of contract combining on two farms where the purchase of combines was allowed for.

The slight fall in sugar beet gross margins was again due to the small expansion of this crop, the additional acreage requiring increased quantities of casual labour despite an extension of mechanical thinning and hand spraying. Machine harvesting of beet was introduced on some farms. Increased use of casual labour also largely explains the fall in the mean gross margin obtained from potatoes. In one case this was caused by a reduction in the regular labour force and in another by an expansion of acreage.

Vegetable growing was almost unaffected by replanning.

Variable costs of kale and fodder root crops were generally slightly greater in the plans because of marginally higher costs of fertiliser, lime or casual labour. Grass forage crops, however, often underwent considerable rises in their variable cost of production. Extra fertilisers and greater seed costs (from the introduction or shortening of leys) were often necessary to increase stocking rates or to fit in with new rotations. This was particularly marked in the case of grazing where there was most room for improvement.

Table 24 compares present and planned livestock enterprises within an identical sample of farms. Only beef fattening has shown no improvement over the present gross margin level, in spite of an increase in gross output. The slightly reduced margin per acre for this enterprise was principally the result of shifts in both season and stage of fattening on two holdings.<sup>(5)</sup>

Gross margins from dairying were improved principally by limiting the number of calves reared to the minimum required for replacement purposes.

<sup>(5)</sup> Although these two enterprises yielded lower margins than before they fitted better the new overall farm system.



**COMPARISON OF PRESENT WITH PLANNED LIVESTOCK  
RESULTS FOR IDENTICAL SAMPLE**

TABLE 24

Enterprise	No. of farms having this enterprise in both present and planned results	Mean Gross Outputs (£)		Mean Gross Margins (£)	
		Present	Planned	Present	Planned
		- - - - per acre - - - -			
Cattle with a Dairy Herd	6	49.2	51.7	24.0	26.3
Beef, mainly breeding	6	23.9	27.9	10.0	12.5
Beef, mainly fattening	5	32.7	37.7	11.9	11.4
Sheep, mainly breeding	10	19.8	21.9	11.0	11.7
		- - - - per sow - - - -			
Pigs, breeding only	4	78.8	77.1	21.5	23.3
Pigs, breeding and fattening	5	226.2	237.6	62.5	64.3
		- - - - per fattened pig - - - -			
Pigs, fattening only	6	8.2	8.2	1.8	1.9
		- - - - per layer - - - -			
Laying poultry	9	2.37	2.42	0.49	0.54

By means of an intensification of fattening on a number of farms, the performance of beef breeding herds was raised. Stocking rates were also improved through better grassland management.

Sheep breeding flocks were slightly more profitable in the plans, because of higher rates of stocking (rising on average to 2.0 ewes per acre), less ewe hoggs being carried and (in one case) a change of breed. Operating against these improvements was the smaller number of lambs purchased for winter fattening because of a reduced acreage of fodder roots. Planned sheep enterprises tended to be solely breeding or winter lamb-fattening.

The average margins from all pig enterprises were improved by economising on food costs through a reduction in wastage and by feeding home grown cereals.

By altering the system of two poultry flocks to batteries and by a swing to hybrid birds in a third flock, average gross margins from egg production were raised by 10 per cent over the present results.

In short, a technical change to at least one cropping enterprise was incorporated into 24 farm plans and to at least one livestock enterprise in 18 cases. Many of these changes were necessary because of shifts in the balance of enterprises but some would have been made even if the existing enterprise combination had been retained.

### 3. Changes to Fixed Costs

This apparently self-contradictory heading covers all planned adjustments to those items defined as "fixed" at the outset of the study—see page 22, footnote<sup>(6)</sup>. Many of these items were only fixed in the short term and, in fact, were amenable to change during planning, but the classification was retained as it was the most satisfactory for the majority of cases.

There was only a negligible change in the total level of fixed costs between the average present and planned results shown in Table 25. The composition of these costs, however, underwent some alteration, in particular a swing from manual labour towards mechanisation. To some extent, the reduction of £0.54 per acre in regular labour and the rise of £0.40 per acre in fixed machinery costs arose from substitution of one for the other. But these two changes were also the result of the adoption of different farm systems in the plans. The trend to arable crop production often necessitated extra machinery as well as the fuller use of existing equipment. The adoption of new mechanised methods was often a part of technical improvements, e.g. mechanical lifting of sugar beet for speedy and efficient harvesting.

#### AVERAGE PRESENT AND PLANNED FIXED COSTS

TABLE 25

Item	£ per acre		Per cent change Planned from Present Fixed Costs	Planned Fixed Costs as per cent of Total
	Present	Planned		
Rent and rates	2.13	2.23	+ 4.7	15.4
Regular labour	6.56	6.02	- 8.2	41.7
Repairs, vehicle licences, etc.	2.16	2.26	+ 4.6	15.6
Depreciation	2.59	2.89	+ 11.6	20.0
Services	0.30	0.30	—	2.1
Professional charges	0.39	0.40	+ 2.6	2.8
Office expenses	0.13	0.13	—	0.9
Miscellaneous	0.22	0.21	- 4.8	1.5
Total	14.48	14.44	- 0.3	100.0

Regular labour was reduced on 12 farms—in two cases by two men, in seven by one man and in three cases part-time workers were dropped. Most commonly (five farms) reductions in labour were associated with the replacement of dairy herds by beef cattle or sheep. Decreases in fodder root acreage and in sizes of cattle enterprises, together with mechanisation, also enabled smaller labour forces to cope with planned organisations. On each of three farms one youth was brought in to assist with the more intensive production entailed by the new farm plans. The net decrease of nine man-years on these 32 farms constituted a 10 per cent loss in employed man power, leaving 1.07 regular workers per 100 acres of crops and grass or 1.35 if the farmer's own labour is included.

The average rent increase of £0.1 per acre was caused by actual or imputed rises since the base year—occasionally being due to building improvements. In only one case was the rent increase above the 1963 level, because the farm plan, in which sheep were expanded, necessitated improvements to fencing.

The last four items in Table 25 were kept relatively constant since they were each of an inflexible, "overhead" nature. In total they accounted for only 7.3 per cent of all fixed costs—virtually the same proportion as in the present results.

The actual reduction in average fixed costs of £0.04 per acre had *in itself* relatively little effect on net incomes. But in individual cases,

the adjustment of certain fixed items (especially labour and machinery expenses) often made possible (and reflected) the reorganisation of enterprise combinations and of the techniques employed.

#### 4. The Overall Planned Results

The distribution of planned net incomes and gross outputs per acre shown in Table 26 is at higher levels than were found in the present results. The wide range in net incomes has been considerably narrowed by replanning, which suggests that low income farms were improved to a greater extent than more profitable farms.

#### DISTRIBUTION OF PLANNED NET FARM INCOMES AND GROSS OUTPUTS<sup>1</sup>

TABLE 26 £ per acre

Net farm income groups	Number of farms	Gross output groups	Number of farms
-6.0 to 0	—	10.0 to 20.0	—
0.1 „ 6.0	5	20.1 „ 30.0	8
6.1 „ 12.0	18	30.1 „ 40.0	9
12.1 „ 18.0	5	40.1 „ 50.0	6
18.1 „ 24.0	4	50.1 „ 60.0	3
		60.1 „ 70.0	4
		70.1 „ 80.0	—
		80.1 „ 90.0	2
All farms	32	All farms	32

<sup>1</sup> The same break points are used as in Table 10 for present results in order to highlight the upward trend in both incomes and outputs.

On average, gross output has increased by £6.3 per acre, but in achieving this, total costs would expand by only £2.6 per acre (Table 27).

#### CHANGES IN MEAN FINANCIAL RESULTS<sup>1</sup>

TABLE 27

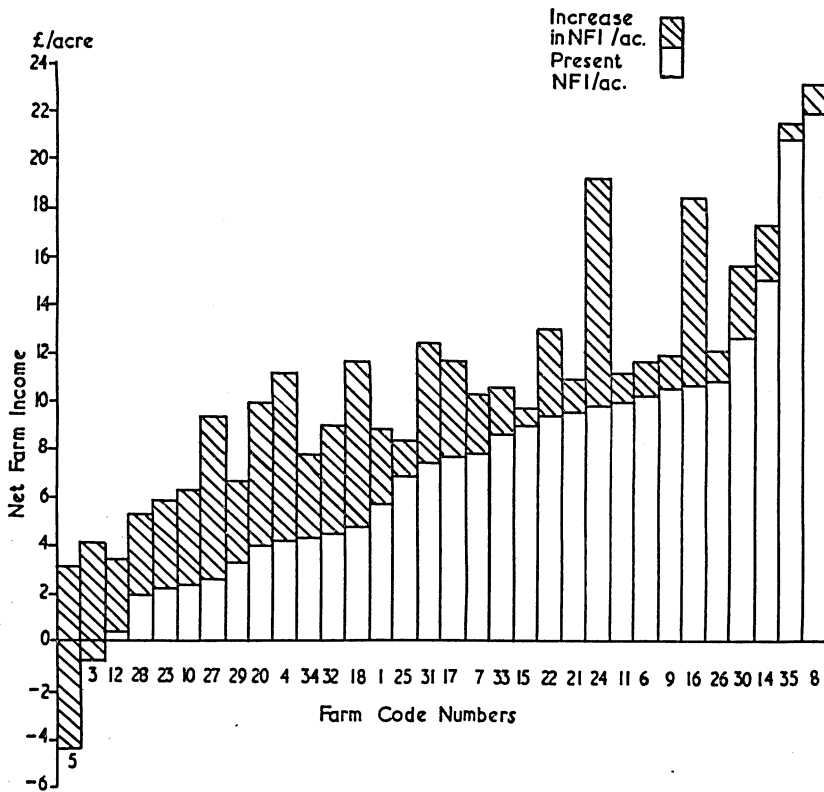
	Present £ per acre	Planned £ per acre	% Change from Present
Gross output	37.1	43.4	+ 17.0
Other income (included in gross output)	0.9	0.5	- 44.5
Variable costs	15.4	18.1	+ 17.5
Gross margin	20.8	24.8	+ 19.2
Fixed costs	14.5	14.4	- 0.7
Total costs	29.9	32.5	+ 8.7
Net farm income	7.2	10.9	+ 51.4
Management and investment income <sup>2</sup>	5.6	9.2	+ 64.3

<sup>1</sup> Changes in total financial results are as follows:—

Gross Output ... ..	£273,897 — £316,750 (+ 15.6 per cent)
Gross Margin ... ..	£153,304 — £182,507 (+ 19.0 per cent)
Other Income ... ..	£6,908 — £3,992 (- 42.0 per cent)
Fixed Costs ... ..	£107,536 — £107,054 (- 0.4 per cent)

<sup>2</sup> Farmers' labour was identical in present and planned organisations. The apparent slight increases (from 1.6 to 1.7) in the planned figures is due to rounding.

FIGURE 5  
INDIVIDUAL PRESENT AND PLANNED NET FARM INCOMES  
PER ACRE



Hence there is a rise in gross margin which is reflected in the increase in net farm income.<sup>(6)</sup> Because net income is a residual sum between two larger aggregates (i.e. gross output and total costs), the proportional rise in planned net income of 51 per cent is much greater than for changes in inputs or outputs.

It can be seen from Figure 5 that income improvement was by no means constant over the whole sample of farms. Generally speaking, greater increases in net income were made on the farms which were less profitable under the "present" organisation. This did not, however, bring all cases up to a common level, and the higher income farms under present conditions tended to occupy a similar position after replanning. This is further borne out in Table 28 where the present and planned net incomes and mean increases are calculated for each of the four "profit groups" of farms, as used in Chapter VI (see page 31). The

(6) This is partly offset by the fall in "other income" which is mainly due to losses of ploughing grant.

figures suggest that low income farms were operating further away from their optimum organisations than those with higher incomes where there was less scope for improvement. Although it may well be argued that farms in the lower "profit groups" may always remain so relative to other groups, there is obviously considerable scope for improving their position. Furthermore, this scope is greater in absolute, and particularly in proportionate, terms than for the more profitable farms.

**CHANGES IN NET FARM INCOMES FOR FOUR "PROFIT GROUPS"**

TABLE 28

£ per acre

(Present " Profit Group ")	(i)	(ii)	(iii)	(iv)
Present Net Farm Income	1.0	5.2	8.9	13.9
Planned Net Farm Income	5.5	9.9	12.0	16.4
Change in Net Farm Income	4.5	4.7	3.1	2.5
Per cent Change in Net Farm Income	450	90	35	18

Table 29 is presented to show what type of overall financial changes are associated with different levels of income improvement. Farms were arrayed in order of increases in net income and each "profit increase group" represents a group of eight holdings. Farms with the largest rises in net farm income per acre, i.e. those in group (a), increased output substantially with a consequent increase in gross margins. In order to achieve this boost to output some slight additions to the fixed resources of the farms (labour and machinery) appear to be necessary. Outputs were increased in the other three groups also, though by considerably less. The correlation between increases in gross output and net income indicates that the size of income improvement was generally dependent on the amount of the rise of output.

**MEAN FINANCIAL RESULTS AND CHANGES RELATED TO "PROFIT INCREASE GROUP"**

TABLE 29

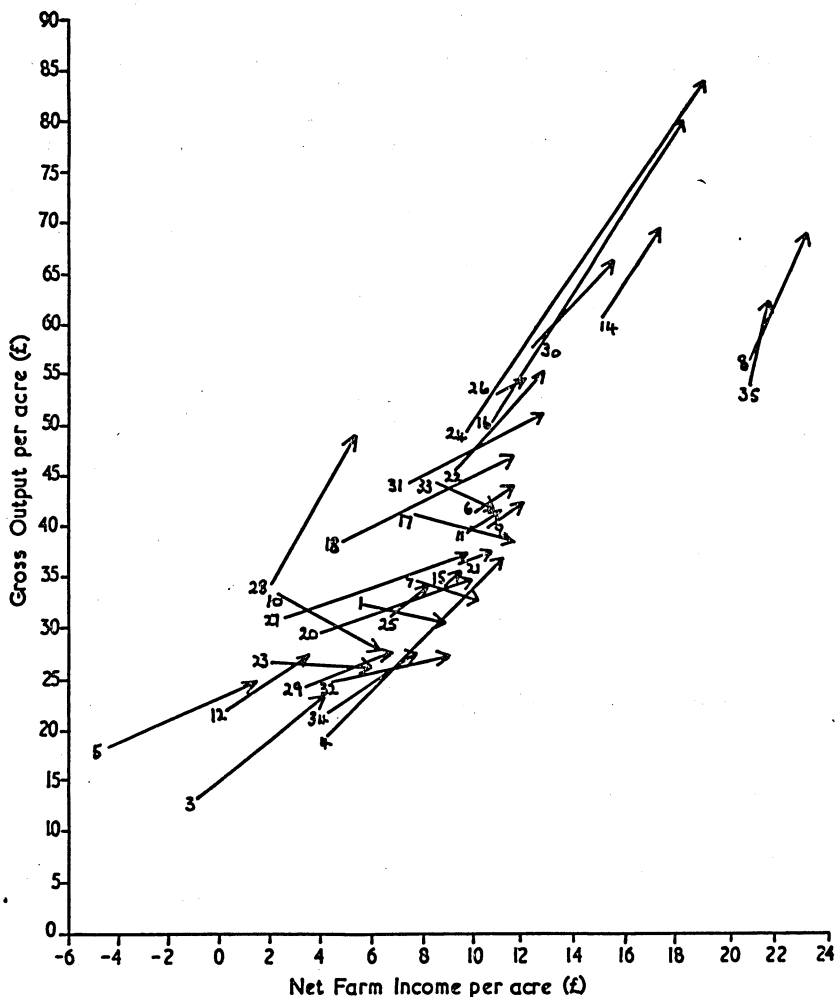
" Profit Increase Group "	(a)	(b)	(c)	(d)
Present Net Farm Income	4.9	3.9	9.3	10.9
Planned Net Farm Income	11.8	7.9	12.0	12.1
Change in Net Farm Income	+ 6.9	+ 4.0	+ 2.7	+ 1.2
Present Gross Output	35.2	30.2	41.7	41.3
Planned Gross Output	49.6	34.5	45.4	44.2
Change in Gross Output	+ 14.4	+ 4.3	+ 3.7	+ 2.9
Present Gross Margin	19.0	16.4	22.5	25.2
Planned Gross Margin	27.3	19.6	25.6	26.8
Change in Gross Margin	+ 8.3	+ 3.2	+ 3.1	+ 1.6
Present Fixed Costs	15.0	13.5	14.5	14.9
Planned Fixed Costs	16.1	12.1	14.5	15.2
Change in Fixed Costs	+ 1.1	- 1.4	0	+ 0.3

<sup>1</sup> Note that "other income" is excluded from the table, hence gross margin less fixed costs does not equal net farm income.

FIGURE 6

**GROSS OUTPUT PER ACRE AND NET FARM INCOME PER ACRE IN PRESENT AND PLANNED RESULTS**

(The lines connect present and planned positions for individual farms. Arrowhead=planned position).



In the majority of individual farm plans gross output was, in fact, increased but the six holdings which were exceptional in this respect are identifiable from Figure 6. In this graph the relationship between net income and gross output for each farm has been plotted for present and planned results, the two points then being joined by a line. Downward sloping lines indicate that the farm plans involved falls in gross output.

In four out of these six cases dairy herds were dropped with a consequent decrease in regular labour. In another the fall in output was caused by the replacement of a beef enterprise by sheep and an expansion of cereal growing with the saving of one worker. In the sixth case an unprofitable 800 birds laying flock was eliminated and the resources of labour were devoted to more remunerative arable crops. Of these six holdings where planned output was reduced, total gross margin was, nevertheless, increased in five. On one farm, however, even gross margin was slightly reduced but the substantial fall in fixed costs (i.e. of £5.0 per acre) resulted in an above-average rise in net income.

The gross outputs of certain farms in Figure 6 have risen sharply under the reorganisation and, of the six farms where this rise was more than £10 per acre, four involved substantial expansions of intensive live-stock enterprises, especially pigs. On the other two farms net incomes were improved by diverting particularly large acreages away from weak cattle enterprises to arable production, thus greatly raising output.

Both present and planned results in Figure 6 are contained within a fairly narrow band, again demonstrating that net incomes (present and planned) were related to gross outputs. The general shape of the whole graph shows a steepening in the upper ranges of outputs and net incomes, though this applies more to planned than to present results. The lines joining both points are generally steeper for farms with higher incomes and outputs. This is indicative of an effect of "diminishing returns" which applies to net income improvement. For a given increase in gross output the increase in net income is likely to be greater on less profitable farms than on those already achieving high net incomes. Mean gross output increased by £5.4 per acre for the 16 farms with the lowest present net incomes per acre, whilst net income increased by £4.6 per acre. Similar figures for the most profitable (present) 16 farms were a £7.2 rise in output for a rise of only £2.8 in net income. To some extent this is explained by the type of improvement made. On the weaker farms improvements mainly took the form of technical adjustment and changes in cropping, particularly from grass to arable at the expense of cattle and sheep. These usually have the effect of raising net incomes substantially without much change in gross output. On the more profitable farms, however, technical efficiency is high and land use is nearer the optimum. Improvements are often then achieved only by increasing pigs and poultry to boost output. But substantial additions to cost, especially for feeding stuffs, must be incurred to achieve this and net income may only rise by a moderate amount. The slopes of lines in Figure 7 are therefore steepest where the improvements have included an expansion or introduction of these enterprises.

## 5. Implications of Expanded Output

The overall increase in output planned for this sample of farms may well be contrary to the interests of the industry as a whole at a time when the market for many commodities tends to be fully supplied. In Table 30 this planned increase in output is broken down to show those commodities which were most expanded.

## CHANGES IN OUTPUT, TOTAL FOR 32 SURVEY FARMS

TABLE 30

	Present	Planned	Per cent increase from present
	£000	£000	
Total Gross Output	274	317	15.6
Gross output from crops	113	152	34.9
Gross output from livestock	154	161	4.2
Gross output from pigs	31	51	67.2
Gross output from poultry	23	28	19.8
	tons	tons	
Total cereals sold	2,185	3,382	54.8
Total barley sold	1,593	3,239	103.3
Sugar beet sold	5,508	7,684	39.5

Although the gross output from all livestock would be increased by only four per cent, poultry would be increased substantially, and pigs even more so. For the individual farmers concerned it was wise to expand pigs and poultry, despite the national tendency towards an over supply of eggs and pig meat, because even at relatively low prices margins were satisfactory.

The large planned rise in gross output from cash crops is derived from the change in acreage of barley and sugar beet, as shown in Table 21. Sugar beet production is controlled through acreage quotas, and excessive production leading to a downward pressure on prices is much less likely to occur than with other crops.

In the case of barley, the national trend has been one of considerable expansion in recent years. Guaranteed prices were reduced at the 1963 Annual Review to discourage overproduction. But the moves towards more intensive feeding of livestock have resulted in an absorption of much of the increased production. On these farms, however, only 17 per cent of the extra barley which would be produced under the planned organisations would be consumed on the farms, and then generally in substitution for other home grown grain, so that the planned consumption of the total cereals was in fact unchanged. Hence, 1,646 tons of extra barley would have to be marketed and, in the plans, marginal sales were usually assumed to be made at a lower price than at present,<sup>(7)</sup> particularly where the extra grain could not be stored on the farm. Sales of other cereals would be reduced and the resulting increase in sales of all grains would amount to 1,197 tons.

Even if barley tends to be overproduced with a consequent reduction in returns, a simple comparison of gross margins for grazing livestock with those for barley (as shown in Tables 15 and 19) suggests that barley could still be an economic proposition on many farms if the reduction did not exceed 10s. 0d. per cwt.<sup>(8)</sup>

<sup>(7)</sup> Commonly at £1 per ton lower.

<sup>(8)</sup> Present returns averaged 27s. 0d. per cwt. including deficiency payments.



The fact that these farms rely to a considerable extent on cereal deficiency payments may be considered to be a weak factor in their long-term economic position. The present results indicate that 9.7 per cent of total gross output of all enterprises was derived from this source, and that cereal deficiency payments accounted for 50.5 per cent of total net farm income. But the results of this survey also indicate that even while expanding cereal acreage by 31 per cent, the group as a whole would become rather *less* dependent on cereal deficiency payments for the maintenance of farm incomes than at present.<sup>(9)</sup>

This total cereals deficiency payments would amount to only 40.2 per cent of total net income and 10.0 per cent of gross output under the planned organisations.

The position of the individual farmer in discussions of overproduction and price support at the national level is, however, clear. There is little point in his reducing output of those heavily supported commodities which are produced in excess of national requirements unless there are obvious indications of imminent substantial falls in returns. This is especially so in the case of arable production which is relatively flexible and capable of radical change within fairly short time periods. The introduction or expansion of enterprises involving heavy capital investment in fixed equipment (e.g. dairying) may well require a more careful assessment of long-term price tendencies. This highlights the nagging problem of overproduction in the near perfectly competitive British agricultural market.

The fact that farm management advice often points to increased output as the principal means of increasing net farm income may only serve to aggravate the vital national problem of supply control, which is not necessarily solved by product price reduction. The long term solution is much more likely to be found in the structural reform of agricultural production—a subject outside the scope of this survey.

## 6. Recent Changes on Sample Farms

From data on cropping and stocking for 1963, obtained at the final farm visit, it was observed that some farmers had already made some changes to their organisations. Sometimes these were in the direction indicated by the farm plans, and the total figures for all farms showed a general movement towards the overall planned data. With

(9) Under present organisation		
Cereals acreage	... ..	= 3,330½
Cereals deficiency payments	... ..	= £26,591
Total Net Farm Income	... ..	= £52,676
Cereals deficiency payments as % of Total N.F.I.		= 50.5%
Under planned organisation		
Cereals acreage	... ..	= 4,372½
Cereals deficiency payments	... ..	= £31,926
Total Net Farm Income	... ..	= £79,445
Cereals deficiency payments as % of Total N.F.I.		= 40.2%

To a limited extent the slightly lower rates of deficiency payments for wheat and barley assumed in the plans accounts for the fact that deficiency payments amount to a smaller proportion of planned net income. But even if these rates are standardised at the level used to express present results, cereal deficiency payments still only account for 43.1 per cent of planned net income.

crops, such movement was slight, probably because farmers were cautious about reducing grassland. Changes in livestock were rather more marked, especially in the case of pigs and poultry. But there was an increase in the number of farm workers per 100 acres which is contrary to changes suggested by replanning.

Comparatively few farms had moved very close to the planned systems. The effect of the advice offered during this survey may not be discernible for some little time, partly because of the natural limitations to sudden change in farming and partly because of some of the characteristics of the farmers themselves which are dealt with in Chapter IX.

## CHAPTER IX

### SOME HUMAN ASPECTS OF FARM MANAGEMENT

In earlier chapters it has been shown that, within the sample of 32 farms, extremely wide variation existed in financial results and further that there was considerable scope for improvement in those results. It is not unreasonable to suppose that these two findings are applicable in some degree to many other areas in this country. The reasons why incomes differ so greatly between farms and why they are often capable of amelioration are questions of prime importance, particularly for advisory agencies, in all types of agriculture. It is the purpose of this chapter to discuss some of the human aspects of farm management, relating these to each other and to the financial results, in an attempt to discover some of the underlying reasons both for the variable results and for the scope for improvement.

#### 1. The Variation in Financial Results

The profitability of these farms has already been shown to be influenced by various economic and technical factors e.g. enterprise combination and fertiliser usage. To a large extent these explain the wide variation in performance but such factors cannot be the basic cause of inter-farm differences since they are in turn under the direct influence of the manager. The underlying reason for differences in techniques and economic efficiency must be sought in the farmer himself and his managerial ability—his capacity to utilise available resources to satisfy his aims.

Other factors which could influence results, such as climate, soil type, market conditions and (broadly speaking) available land and capital, were broadly similar between the survey farms, and we must, therefore, conclude that managerial ability was of overriding importance.

Although no attempt was made to measure this abstract concept, some information was collected<sup>(1)</sup> on the background and experience of

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<sup>(1)</sup> One farmer was omitted from this section of the study because he had decided to leave farming. This leaves a sample of 31 except in discussing relationships between financial results and other factors from which a further two farms were dropped. In those cases the achievements related more to the fathers of the persons interviewed, one of whom had died and the other was infirm.

each farmer and his family which have been elsewhere shown<sup>(2)</sup> to affect economic performance. In addition, an attempt was made to score the mental ability of each farmer, since this doubtless forms an important element of managerial ability. Lastly, the use made by farmers of various sources of agricultural information was assessed.<sup>(3)</sup>

**(a) Social Characteristics**

The social picture of the whole sample is one of fairly mixed characteristics. Farmers of all age groups were included, though their average age of 54 years was greater than the national average for farmers which in 1951 was estimated to be 48 years.<sup>(4)</sup> Their past experience varied in length but was deeply rooted in agriculture and most were sons of farmers or farm workers. Their formal education had not been extensive. Their wives tended to be higher in educational status than themselves, and as a group were much more varied in their social origins.

Since all these characteristics doubtless had some effect on managerial ability, the lack of uniformity within the sample makes the variation in financial results less surprising than at first appears. Age probably exerts the greatest effect on results and its relationship to them is discussed later.

**(b) Mental ability and the use of information sources**

These two factors were thought to be influenced by the above social characteristics. It was also supposed that they would directly affect financial success.

The assessment of mental ability, using a rating schedule, was made only after all fieldwork connected with the survey had been completed so as to give the longest possible time for assessment. This did have the disadvantage however, that each farmer's financial performance had been ascertained beforehand, though a conscious effort was made to exclude such bias as this might introduce. It was considered that, since all the ratings were made by the same person (i.e. the author, who had become well acquainted with all 31 farmers) at the same time, the exercise would produce a realistic relative assessment. Use of this method was, in effect, a means of rationalising subjective judgement. The technique had been successfully used in two Scandinavian studies<sup>(5)</sup> and their actual schedule was only slightly modified for this study.

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(2) For instance by WESTERMARCK, N. in "The Human Factor and Success in Farming." *Acta Agricultural Scandinavica* Vol. 1, 1951.

(3) This has been shown to be an important factor in management. For example in *A Study of Managerial Processes of Midwestern Farmers*. Iowa State University Press, 1961.

(4) Calculated from the numbers of farmers (excluding farm managers) given by age groups in England and Wales at the 1951 Population Census. GENERAL REGISTER OFFICE: *Census 1951: England and Wales, Occupation Tables*. H.M.S.O. 1956.

(5) WESTERMARCK, N. "Management and success in Farming: Part III. Influence of Individual Advisory Services." *Acta Agriculture Scandinavica*. Vol. 10. No. 4. 1960; and PUOHIT, B. D. "The Economic Implications of Human ability on Finnish Bookkeeping Farms" (Published dissertation, *Acta Agralia Fennica*. Vol. 101. No. 2. Helsinki. 1963).

The test items used in the rating scale were related to general human aptitudes not necessarily connected with agriculture, but most of them would contribute to managerial ability.<sup>(6)</sup> In identifying relationships between mental ability and other factors, the sample was split into two groups, respectively above and below the median rating. This grouping minimises any possible errors in the subjective assessment of individual farmers since only small rating errors near the median could affect a farmer's classification.

During the interviews, farmers were asked to indicate, from a list which sources of agricultural information they had used during the past two years. These were grouped into mass media ("mass" sources<sup>(7)</sup>), participation in group activities ("group" sources<sup>(8)</sup>) and personal contact with "advisers" ("personal" sources<sup>(9)</sup>).

It is of interest to note that all farmers regularly took a national farming periodical of a general nature and 17 took at least one specialist journal in addition. Farmers tended to be much more regular viewers of farming programmes on television than they were listeners to similar radio programmes.

Most were regular visitors to markets and agricultural shows but only a minority regularly attended demonstrations, meetings and discussion groups.

Table 31 summarises the use made by farmers of "personal" sources of information. Commercial sources of advice were used more regularly than were the N.A.A.S. district officers and both of these agents were usually concerned with technical problems on the farm. Only three farmers had ever received any management advice concerned either with the whole farm or with one particular enterprise. All came into contact with some adviser but there were wide differences between farmers.

### (c) Financial Results

Present gross output per acre and net farm income per acre were used as measures of economic performance. These figures were taken straight from data contained in Chapter VI.

### (d) Inter-relationships between factors

Figure 7 is a diagrammatic representation of the results obtained from an analysis of the relationships occurring between age, mental ability, use of information sources and the financial performances. The

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(6) The 10 aptitudes used were as follows: power of comprehension; ability to think quickly and logically; memory; attentiveness; self respect; will power; initiative; reliability; mental work pace and attitude towards mistakes made.

(7) "Mass" sources included the farming press, local newspapers with an agricultural bias and farming programmes on radio and television.

(8) "Group" sources: attendance at markets, agricultural shows, demonstration meetings and discussion groups.

(9) "Personal" sources: personal contacts with technical representatives of the National Agricultural Advisory Service, Agricultural Land Service, British Sugar Corporation, Milk Marketing Board or commercial farms.

USE OF "PERSONAL" SOURCES OF INFORMATION

TABLE 31

No. of farmers to whom applicable

	Regular contact	Occasional contact	No contact	Total
N.A.A.S. district officer	8	10	13	31
Commercial technical representative	16	5	10	31
	Contact			
N.A.A.S. specialist adviser	8		23	31
A.L.S. officer	13		18	31
B.S.C. fieldsman	25		1	26
M.M.B. consulting officer	2		9	11
Government sponsored advisers <sup>1</sup>	23		8	31
"Institutional" advisers <sup>2</sup>	30		1	31

<sup>1</sup> Viz those from N.A.A.S. or A.L.S.

<sup>2</sup> Viz those from N.A.A.S., A.L.S., B.S.C. or M.M.B.

Figure does not depict the whole complex of factors affecting performance since many more could be included (e.g. business acumen), but some of the more relevant and more easily measured factors are shown.

Using numerical ratings for mental ability and for use of information sources,<sup>(10)</sup> the sample was divided at the median into "high" and "low" groups for each individual factor. Factors were then related in pairs using a 2 x 2 division and tested for significance by the Chi-square calculation. Directional relationships were accepted if  $p < 0.30$  but significance was accepted only where  $p < 0.05$ . Three different levels of significance were used to indicate the closeness of relationships and, in Figure 7 these are shown by different types of line. The Figure is presented to illustrate the closeness of relationships between factors and whether they were positive or negative.

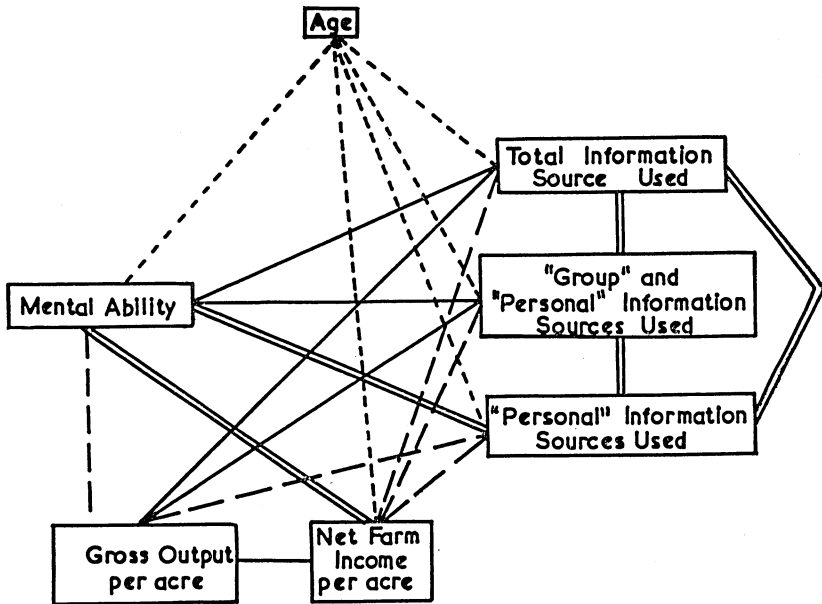
Farmers' net incomes appear to be closely associated with their age: the older the farmer the lower his net farm income tends to be. To some extent this is explained by the fact that the older farmers, on average, made less use of all sources of information and tended to be rated lower on mental ability. Furthermore, from conversation with some of the older farmers, it was obvious that they laid less stress on maximising profit than did some younger farmers. Often they would put items such as tidiness of the farm or appearance of livestock before economic considerations.

Mental ability was strongly related to the use of information sources (particularly "personal" sources), both of which, in turn, directly affected gross outputs and net incomes. All three measures of information sources were very closely related, i.e. a farmer tended to use each group of sources to about the same extent. Regular readers or viewers were also frequent participants in groups and sought personal advice.

<sup>(10)</sup> The use made of information sources was qualified by attaching weights to the various applicable sources depending on regularity of contact.

FIGURE 7

DIAGRAM OF INTERRELATIONSHIPS



Levels of significance

-----  $p < 0.30$       ———  $p < 0.01$   
 - - -  $p < 0.05$       = = =  $p < 0.001$

The relationships with age are in a negative direction.  
 Other relationships are all positive.

The strong correlation between gross output and net income shown in the Figure has already been reported in Chapter VI.

This brief analysis of some human factors suggests that they accounted for much of the diversity in net income described in Chapter VI.

## 2. The Scope for Income Improvement

To answer the question of why so many farmers were operating below economic potential is a more complex problem. In the first instance this was due to lack of knowledge about the economics of their farm business, particularly with regard to the relative profitability of the different enterprises. It has already been mentioned that only 10 per cent of farmers had received advice about management and although some had shrewd ideas about the economics of some enterprises, others were surprised by the analysed results for their holdings. Table 32 indicates that those farms where there was greatest scope for raising absolute net income per acre were operated by farmers who tended to use total information sources least, and vice versa. The relationship is significant at  $p < 0.20$ .

SCOPE FOR IMPROVEMENT RELATED TO USE OF INFORMATION SOURCES

TABLE 32

	Use of Total Information Sources		
	High	Low	No. of farmers
<i>Absolute Increase in Net Farm Income per acre by replanning.</i>			
High	5	9	14
Low	10	5	15
No. of farmers	15	14	29

The second most important reason why farms were operated below their potential level of profitability was due to the farmers' own preferences. Sometimes the plans formulated clashed with farmers' desires, especially when plans included elimination or substantial adjustment of grazing stock. On other occasions farmers frankly admitted that they were not interested in maximising income since they were already earning sufficient to fulfil their needs. Furthermore, there is no doubt that the high level of tax which would have to be paid on extra income was a disincentive to improvement for some farmers.

Thirdly, a minority of co-operators were sceptical whether the improvements were really feasible. They had misgivings about some of the changes made in plans. This was most apparent where grassland was reduced and cereals expanded, particularly if such farmers had a traditional outlook. Occasionally farmers feared the risk of reducing the number of enterprises even where such simplification presented obvious advantages in terms of profit and ease of management.

## 3. Implications for advisory work

The data on use of "personal" sources of information suggest that farmers using any of the various advisory services frequently use more than one. All farmers who regularly consulted their N.A.A.S. district officers were also among the regular users of commercial sources for

advice although, in fact, they accounted for only half of the latter group. If the numerical ratings for information sources are applied to various sub-divisions of "personal" sources and the sample is then divided at the median into high and low groups, the figures in Table 33 result. The majority of farmers who were rated high in terms of their use of commercial advisers also came into the high group for use of government-sponsored and "institutional" sources of information. The corollary was also true and these relationships refute any suggestion that these suppliers of advice are mutually exclusive to a group of farmers, although they may be so for particular individuals. In fact, the evidence provided by this analysis indicates that some farmers have a propensity to seek information, whatever the source, whilst others make little use of any of the available sources.<sup>(11)</sup>

### RELATIONSHIPS BETWEEN USE OF GROUPS OF ADVISORY SOURCES<sup>1</sup>

TABLE 33

		Use of commercial sources of advice		Number of farmers
		High	Low	
Use of government-sponsored sources of advice	High	10	2	12
	Low	6	13	19
	Number of farmers	16	15	31
Use of institutional sources of advice	High	11	1	12
	Low	5	14	19
	Number of farmers	16	15	31

<sup>1</sup> The relationship between commercial sources and government sources is significant at  $p < 0.02$  and that between commercial and "institutional" sources significant at  $p < 0.01$ .

The survey results indicated that those farmers who made most use of "advisers" (i.e. "personal" sources of information) on average attained significantly higher financial results. Such farmers were of higher mental ability and they also tended to be younger. Their use of advisory services had undoubtedly been an asset in making above-average profits. They appeared to seek agricultural information, whatever the source, and in the opinion of the author this type of farmer is most likely to benefit from the application of advice. It may well be that such farmers could make even more use of information supplied through all channels if this was made available. There seems to be a good case

<sup>(11)</sup> This is in agreement with the findings of JONES, GWYN. E. "Sources of Information and Advice available to United Kingdom Farmers: Description and Appraisal." *Sociologia Ruralis*, Vol. 3, No. 1, 1963.



for the advisory services to intensify their efforts with these farmers, since they may well be "leaders" (in the sociological sense) who will exert a progressive influence on neighbours. This is not to suggest that older farmers who have, in the past, made relatively little use of information sources should be neglected. If sought out by advisers, they would, in many cases, benefit from such contact, although they may never attain the results of the "information-seekers." This is in agreement with the results discussed in Chapter VIII where the replanning of weaker farms did not bring them up to the level of the planned results of the more profitable (present) farms. The very fact that 12 farmers who had no recent contact with the N.A.A.S. participated fully in this searching investigation suggests that many farmers who do not actively seek advice might nevertheless respond to its being offered. This is particularly so in the field of farm management where the N.A.A.S. is the major dispenser of such advice. Technical information is available to farmers from several sources (including "mass," "group" and "personal" sources) but management problems, which are usually of an individual nature, can often be dealt with by N.A.A.S. officers. There is obviously much useful work to be done in this field, and although some of the human factors enumerated above may make it difficult to establish the initial contact, this problem should not be insuperable.

## CHAPTER X

### SUMMARY AND CONCLUSIONS

This study was undertaken with the dual aim of investigating the economics of sand land farming (without irrigation) in Nottinghamshire and of evaluating the scope for profitable improvements in the management of sand land farms. Whilst some of the conclusions to be drawn apply only to the geographical area under review, others have wider implications.

#### 1. Sand Land Farming in Nottinghamshire

The commercial agriculture of this area has been particularly vulnerable to the external price situation because of the inflexibility imposed by natural factors, notably soil type and rainfall. During each of the three periods of depression experienced since the early 19th century, marginal farms were observed to predominate in the area. Such a situation has not recurred since the 1930's. Technical advancement has been rapid since the second World War and favourable prices, particularly for arable crops, have encouraged the upward trend in the average level of sand land farming incomes. Fluctuating incomes and a heavy reliance on cereal deficiency payments constitute the major local problems today, together with the limited choice of profitable enterprises.

From the present investigation of a representative sample of 32 medium-sized sand land farms it has been shown that normalised net incomes averaged £7.2 per acre, but a quarter of the farms were operating

at below £4 per acre. Low incomes were strongly associated with the low intensities of production attained by some of the systems adopted. Cash crops were considerably more remunerative than grassland utilised by sheep and especially by beef cattle, and a large proportion of farmers devoted an excessive amount of land to grass and other forage crops. Cereals (particularly barley), sugar beet and potatoes (on the better land) yielded high gross margins and their expansion was widely recommendable where it was feasible. Some of the dairy enterprises were found to be economically unjustified but a minority, of larger size and under good management, were highly profitable. Pigs and the larger poultry enterprises generally contributed usefully to net incomes and, by boosting gross output, they tended to compensate for the low natural productivity of the land. For all enterprises the average levels of gross margins were below standard figures for the whole East Midlands Province, but so also were levels of fixed costs (especially rent and regular labour).

In all financial results, however, the wide variation from farm to farm was particularly striking. The range would be narrowed, in some measure, if the proposed plans for each of the survey farms to improve net incomes, were to be achieved.

The results from replanning suggested that net incomes would rise, on average, by 51% by the adoption of the proposed farm plans.<sup>(1)</sup> Most of the improvements of individual holdings came from adjustments to the combination of enterprises i.e. changes of system. Technical changes and reductions in fixed costs were of less importance because there was less room for this type of adjustment. The chief exceptions to this were the improvements budgeted for in grassland management, resulting in higher rates of stocking, and the reductions in regular labour employed. The main shortcomings in most farm organisations lay in the balance of enterprises. Weak enterprises were sometimes eliminated with a consequent specialisation and concentration upon those crops and classes of livestock best suited to the farm and farmer. The average sizes of cash cropping and livestock enterprises were generally increased, through the elimination of small units and the expansion of enterprises which were already relatively large. There was little scope for the profitable introduction of new enterprises.

Although no account was taken of farmers' own preferences, each farm plan received individual attention so as to take account of differences in available resources, the managerial ability of the farmer and other circumstances, and no two plans were identical. The largest improvements were made on low income farms, but the trend for the whole sample was that of intensification with consequent increases in output.

The overall effects of planned changes would be increases in barley, sugar beet, sheep, pigs and poultry with decreases in other cereals, all forage crops and cattle. These changes, coupled with increased mechanisation, would permit some reduction in regular labour. From visits made

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(1) Since input prices were kept constant in the plans, net incomes would probably rise by slightly less than this amount because of increases in costs, such as labour, occurring since the base period. It is possible, however, that technical advances, e.g. new varieties, with increased productivity, would offset some of these cost increases.

to survey farms in July 1963 it was evident that some farmers had already moved in the direction suggested by their plans, particularly in the case of changes in livestock numbers.

The above results are probably applicable to most non-irrigated holdings of this size and above situated in the Nottinghamshire Sand Land area, which can therefore be stated to be potentially well above a state of economic marginality under present day circumstances. Nevertheless, considerable scope exists for improving sand land farm incomes through the further expansion of cash crops. Such a trend has been operating since the second World War but the movement has been too slow and has not yet gone far enough on most farms for the attainment of their full economic potential. Statistics indicate that during the past 15 years sand land farmers have been unwilling to make further reductions in grassland acreage, which has remained steady. It is this inertia which prevents farmers from maximising incomes, since the majority of sand land enterprises based on grass are uneconomic when compared with alternatives, because of the low rates of stocking. Furthermore, there is today little technical justification for keeping a large grass acreage on this type of land in order to maintain arable crop yields. If this inertia can be overcome, arable expansion will probably accelerate in future, mostly from increases in cereals (especially barley), which with modern rotational practices can be grown much more intensively than formerly. Even if returns from cereals decline in future, due to continued expansion of total market supplies, cereal growing will still compare favourably with alternatives on sand land farms unless livestock prices rise substantially. Pigs, poultry and sugar beet appear likely to expand slowly whilst dairying and potatoes (without irrigation) will decline in importance.

Although under present conditions the general profitability of sand land farming is reasonably satisfactory, farmers need to continue improving organisation and management to consolidate their position. An overall decline in product prices in the future could alter the whole picture, as it has done in at least one period within the memory of present day farmers.

## **2. Wider Interpretation of Survey Results**

In this survey, planned net incomes were, on average, about one half greater than those earned under existing organisations. Individual increases exceeded 10 per cent in 30 out of 32 cases. Since the area is one of severely limited choice of enterprises, one might perhaps suppose that sand land farms would be nearer optimum organisation than would farms in better land districts where the range of choice is greater. Other factors no doubt have to be taken into account, such as age of co-operating farmers or the fact that better farmers tend to move to better land, but at least there is no reason to suppose that the scale of improvements possible in this sample was abnormal in relation to many other lowland areas.

The inference is, therefore, that much useful advisory work remains to be done in the field of farm management, particularly where profit maximisation is the chief farming aim. In practice, some farmers are

motivated by other aspirations e.g. breeding of top-class pedigree stock or increasing leisure time for the pursuit of non-farming interests, but management advice may well be adapted to help in the attainment of these other goals. Such farmers may also benefit financially from the advice, irrespective of the fact that for them the limit of acceptable income may be lower than for others. Even where farmers' preferences operate against the maximisation of profit, it will not be out of place for the adviser to demonstrate what income is being foregone by adhering to these personal preferences.

This study has indicated that the type of farmer who has greatest scope for income improvement is the one least likely to seek advice. He tends to be older, he is probably less alert and he makes relatively little use of all sources of information. His farming system is frequently out of step with present day economic and technical circumstances and his profit is therefore low. He is unlikely to make the needed changes on his own initiative. Many such farmers, however, would respond to personal discussions of their farm businesses if approached by advisory officers able to win their confidence. They will also be influenced, in some degree, by those leading farmers whose profits are high and who actively use all information sources. Advice should be given liberally to these leading farmers since the benefits will gradually extend further to others. To what extent the advisory resources of this country can match the apparent need is uncertain, but there probably is, at present, a shortage of trained personnel. "Group" methods of dispensing advice (especially through small discussion groups) are known to be effective and they have the advantage of being economical in manpower. But it is unlikely that they will ever be a complete substitute for individual farm visits. Obviously, therefore, the less time advisory officers spend in performing routine calculations the more effective will be the service given. In recent years, agricultural advisory work has been increasingly directed towards the problems of farm management and away from questions of technique and this study confirms that the present-day need is for economic as well as technical advice. The development of gross margin analysis has facilitated farm planning and the method outlined in this study is thought to be widely acceptable as an advisory tool and is, in fact, being regularly used. Linear programming is unlikely to be used extensively for individual holdings in the near future partly because of a lack of computer facilities and partly because few farmers would be able to supply sufficiently accurate data to warrant the use of such a precise technique. Furthermore, few British farms will require mathematically "perfect" solutions until their organisation more nearly approaches the optimum.

These comments are not intended in any way to deny the utility of linear programming as an efficient data-handling tool, particularly in view of the numerous complex restrictions and relationships to be considered in modern farm business planning.

The survey results have confirmed that it is essential, where possible, to use past performance as a basis for planning. The wide variation in gross margins achieved means that the use of standard data could lead to inappropriate farm plans in individual cases. Furthermore, this individuality of farms and farmers is a strong argument against the use of

farm models. Even in the limited geographical area on which this study has been based, there were wide divergences between farms in both existing and planned organisations and financial results. Farm models may serve the purpose of enabling advisers rationally to consider some of the problems which will be met in a given area but their application to individual holdings (even in a modified form as with "management objectives"<sup>(2)</sup>) could be misleading. All forms of farm planning are still handicapped to some extent by the dearth of experimental data on input/output relationships and on marginal returns to increased scale of production (e.g. cereal growing). Advisers all too frequently have to depend on a combination of intuition and experience in the field.

Under the influence of the continuing "cost-price squeeze" and a general realisation of the scope for improvement, it seems likely that more and more farmers will seek management advice. The implementation of such advice will generally improve low income farms most and high income farms least (i.e. an effect of "diminishing returns" operates with regard to income improvement) but in all groups the tendency will be to raise output under the existing price situation. (See Figure 6).

### 3. Suggestions for further research in this field

It would be of considerable value for a similar research project to be conducted in a widely differing geographical area where soil type was superior to Nottinghamshire Sand Land. By employing similar conventions and methods, it would be possible to examine the extent to which the findings of the present study were more widely applicable, especially those appertaining to the reasons for the variation in normalised results and to the scope for profitable improvements. For the same reasons, an investigation of farms in a smaller size group would also be of use. Adjustment studies of this type, which attempt to measure the "slack" which could be taken up by farmers, have been neglected in this country, possibly because of the lack of uniformity of farms and farm systems when compared with, say, the United States. Although it is more difficult to draw consistent conclusions for all farms in heterogeneous groups, this does not detract from the usefulness of such work.

Similarly, few studies have been carried out which systematically evaluate the effectiveness of management advisory work. Yet the validity of the advice given and of the manner of giving it can only be judged by results.

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<sup>(2)</sup> As described by BARNARD, C. S. "Farm Models, Management Objectives and the Bounded Planning Environment" July, 1963. A paper given to The Agricultural Economics Society.

## APPENDIX A

### Conventions and Procedures Used in Individual Farm Business Analyses and Plans<sup>(1)</sup>

(i) Rental values inserted for owner-occupiers were £2 per acre in the south of the area and £2 10s. per acre in the north.

(ii) Private share of farmhouse rent, charged as follows:

Rates assumed to be 20/- per £1 of rateable value,

Rates doubled and £15 12s. subtracted for each farm-worker's cottage;

Three-quarters of remaining figure charged out of "rent" and "rates" item for private share of farmhouse (Farm Management Survey convention).

Accountant's allowance eliminated.

(iii) Private share of car expenses allowed for as follows:

Three items of expense reduced (for private allowance) thus:

	Fuel	Repairs	Depreciation
1st Car	£15	£5	$\frac{1}{4}$ of car depreciation plus £20.
2nd Car	£50	£20	$\frac{1}{4}$ of car depreciation plus £70.

Accountant's allowance eliminated.

Lorries, pick-ups and vans charged wholly to farm (F.M.S. convention).

(iv) Private use of electricity. Where unknown taken at £25 per annum. (F.M.S. convention).

(v) Telephone. No private share normally allowed for.

(vi) Solid fuel. Where not used on farm, removed from account. Where used on farm (e.g. dairy boilers) amount estimated.

(vii) Schedule A assessments excluded. (F.M.S. convention).

(viii) Tithe redemption annuity costs excluded (F.M.S. convention).

(ix) Cereals not credited for straw sold or used on the farm, but charged for baling. Livestock not charged for straw used, nor crops charged for applications of farmyard manure.

(x) Sugar beet tops not credited with production of tops and no charge made to livestock consuming tops or to subsequent crops.

(xi) "Losses on sales of equipment" added to depreciation costs and such "profits" subtracted from depreciation (F.M.S. convention).

(xii) Increases or decreases in tenantry omitted unless appreciable (over £100) when they are omitted after adjustments to the relevant cost items (e.g. fuel and machinery repairs).

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<sup>(1)</sup> The details included supplement those given in Chapter III.

- (xiii) Cereal deficiency payments allowed as follows:—  
Oats at £7 15s. per acre (same in planned results).  
Barley at £8 5s. per acre (£7 3s. in planned results).  
Both these cereals sold at usual market price.  
Wheat at £1 7s. per cwt. sold (£1 6s. 6d. in planned results).  
Rye at £1 1s. 7d. per cwt. sold.
- (xiv) Cost of transporting own sugar beet estimated at 2d. per ton per mile of return journey. Fuel, depreciation and repairs reduced accordingly. (Based on half the cost of a contractor.)
- (xv) Apportioning the variable costs (and acreage) of grass between hay or silage and "aftermath" grazing. Under normal circumstances two thirds of costs charged to hay and one third to aftermath. For silage, half and half. This convention was, however, flexible, depending on circumstances.
- (xvi) Costs of fuel, sprays and twine. Where unknown, standard figures employed.
- (xvii) Fixed costs grouped into eight items shown in Chapter IV.
- (xviii) Depreciation rates used by accountants were adopted, i.e. pre-tax rates (farmers taxed on  $\frac{5}{4}$  of these rates and amounts).
- (xix) Estimation of farmer's and wife's labour for the purpose of calculating management and investment incomes as follows: Farmer asked what proportion of a full-time man's work their joint contributions would annually amount to. £600 was allowed for full-time, and less or more than full-time was charged in proportion.
- (xx) Unpaid sons were charged (for full-time 20 year olds and over) at £600 per annum (F.M.S. convention). The labour of sons who were under 20 years old was charged to the farm in proportion to standard wage rates. Where sons were paid below this rate, their labour cost was increased for the purpose of analysis and planning.

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