University of Cambridge School of Agriculture

FARM ECONOMICS BRANCH

Mimeographed Report No. 61
(issued March, 1965)

SUGAR BEET PRODUCTION
in the Eastern Counties

An economic study of the 1961 and 1962 sugar beet crop

by

B. G. JACKSON

A. J. PLAISTER

Price 3s. post free

ACKNOWLEDGEMENTS

The writers wish to express their thanks to the farmers who co-operated in the survey, for providing them with the information on which this report is based. Thanks are also due to those farmers who supplied information on the depreciation of sugar beet harvesters.

The writers are grateful to other members of the department for their help, in particular P. W. H. Weightman (now at Cornell University) for permission to use his work-study data on beet harvesting. The section on the opportunity cost of beet harvesters, in Chapter 5, is based on a paper by B. M. Camm (now at Farm Planning & Computer Services Ltd.) but the writers of course accept responsibility for the text as presented here.

The data was tabulated very efficiently by Miss J. M. Lowe.

SUGAR BEET PRODUCTION

Mimeo Report No. 61

Addendum

Table 5.1, p. 19

Own harvester		
Opportunities lost	144	0s.

Erratum

Table 3.2, p. 11

Total production costs	68	8s.
Net profit	21	2s.

SUGAR BEET PRODUCTION IN THE EASTERN COUNTIES

AN ECONOMIC STUDY OF THE 1961 AND 1962 CROP RESULTS

CONTENTS

LIST OF TABLES

CHAPTER I INTRODUCTION

This report presents the results of a survey of the sugar beet crop in the Eastern Counties,[1] for the harvest years 1961 and 1962. In recent years just over a quarter of a million acres have been grown annually in the region and following the increase in the national quota acreage this figure has risen to more than 275,000 acres in 1964. The profitability of the crop is therefore of particular interest at the present time. In addition to the usual information on costs and returns per acre, this report also includes discussion of some topics of current interest. For example, a work study investigation carried out at the same time as the survey, demonstrated the substantial savings in harvesting labour obtainable with a tanker harvester (Chapter 4, section (d)). Average labour efficiency at harvesting rose by about one fifth in the two years covered by the survey, although this rise could not be ascribed to increased use of tankers (Chapter 4, section (a)). Chapter 5 includes a discussion of the possible advantages of employing a contractor to harvest the crop (sections (b) and (c)) and a summary of the tax allowances which can be claimed on a harvester (section (d)).

The present report also incorporates some changes in the presentation of results, aimed at making them more suitable for comparison with other farms. For example, Chapter 2 includes figures for margins over materials costs, and "standardised" gross margins, as well as the actual gross margins, which depend on farm practice. Figures for average labour requirements (Chapter 4) are based on the number of farms carrying out the operation, not necessarily all those in the survey, and only the typical operations are included in the annual totals.

The Survey Sample

In the two years covered by this report the crop was generally satisfactory, although the severe weather at the beginning of 1963 prevented some of the 1962 harvest being lifted. Of the farms in the survey, those in west Norfolk suffered particularly badly, losing 12 percent of their crop. Factories had to close earlier than usual, and when the thaw came in March (1963) the beet still in the ground had deteriorated so far that there was no point in harvesting it.[2]

1 Comprising the counties of Bedford, Cambridge, Essex, Hertford, Holland (Lincs.), Huntingdon, the Isle of Ely, Norfolk, the Soke of Peterborough, and Suffolk.

2 Further information on weather and growing conditions is given in Appendix A.

The survey covered one beet field on 65 farms in 1961, and 60 of these farms in 1962. The sample comprised farms in five different areas, representing different types of soil. The districts were south Cambridgeshire, west Norfolk, north Essex and West Suffolk, the Isle of Ely, and Holland. Differences between districts were not always very marked, and in a number of tables the only distinction drawn is between fen and upland farms.[1] However, figures for each district separately are also given in Appendix B.

Some basic information about the survey sample and the practices adopted, is given in Table 1.1. It is evident that F. Y. M. application was not typical, and was particularly uncommon in the Fens. Hand chopping-out and singling was typical, but machine harvesting was usual except on the west Norfolk farms. The number using cleaner-loaders doubled even in the two years surveyed.

Further information on the seed and fertiliser used, and the type of labour, is given in the Appendix (Tables B1 and B2). Rubbed seed was used by 77 percent of the farms in 1962, compared with only 69 percent in 1961. Contract work was mainly confined to spreading kainit, and hauling the beet to the factory. Casual labour was usually called on only for chopping-out and singling (in the remainder of the report these two operations are usually referred to collectively as "thinning").

1 The fen districts are defined as Holland and the Isle of Ely.

Table 1.1 The Survey Sample

	South Cambridge		West Norfolk		North Essex & West Suffolk		Isle of Ely		Holland		All Districts	
	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962
No. of farms (fields)	10	10	12	11	21	19	12	11	10	9	65	60
Av. size of fields costed - acres	17.0	26.8	21.7	21.9	13.6	19.7	19.8	16.3	11 0	8.4	16.3	19.0
No. Applying F. Y. M.	6	3	3	5	5	6	-	1	1	-	15	15
% Total	60.0	30.0	25.0	45.4	23.8	31.6	-	9.1	10.0	-	23	25
Drilling: Precision	8	7	3	3	10	13	4	3	4	5	29	31
Placement	-	-	3	2	-	-	1	1	-	-	4	3
Ordinary	2	3	6	6	11	6	7	7	6	4	32	26
Thinning etc.:												
No. using hand only	6	7	10	11	21	18	10	10	10	9	57	55
" " D.R.T.* only	1	1	-	-	-	-	-	-	-	-	1	1
" " hand & D.R.T.	3	2	2	-	-	1	2	1	-	-	7	4
Harvesting:												
No. using harvester	10	10	4	4	13	14	12	11	10	9	49	48
" " hand harvesting only	-	-	8	7	8	4	-	-	-	-	16	11
Loading for factory:												
No. using cleaner loader	2	3	3	4	1	5	-	1	-	-	6	13
" " other	8	7	9	7	20	13	12	10	10	9	59	46
Percentage of acreage of costed fields lifted	100	100	100	88	100	96	100	95	100	99	100	95

* Down the row thinner

CHAPTER 2 YIELDS, RETURNS AND GROSS MARGINS

The yield per acre is one of the principal factors affecting the profitability of the sugar beet crop. The important consideration is the yield of sugar per acre, rather than the weight of roots Indeed a heavy crop with a low sugar percentage has the disadvantage of costing more, to lift and haul to the factory. In the two years surveyed, yields of sugar on the farms costed were reasonably satisfactory. Although yields of roots were in many cases rather lower in 1962, generally higher sugar percentages helped to maintain the yield of sugar. Yields and sugar percentages in each district and for the sample as a whole, are shown in Table 2.1. As usual, the highest yields were obtained on the silt soils of Holland, followed by the Ely black fens. For comparison, the average yield for England was 14.1 tons in 1961, and 12.7 tons in 1962.

Table 2.1 Yields, tare, and sugar content

	South Cambridge		West Norfolk		North Essex & West Suffolk		Isle of Ely		Holland		All Districts	
	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962
Average yield of sugar (cwts per acre)	40.3	40.8	45 8	36.3	41.7	39.2	49.2	50.3	54.6	51.3	45.7	42.9
Average yield of clean beet (tons per acre)	13.7	13.1	14.3	11.3	13.6	13.0	16.8	16.5	17.8	16.7	15.0	13.9
Average sugar percentage	14.8	15.5	16.0	16.1	15.3	15.1	14.6	15.2	15.3	15.4	15.2	15.4
Average dirt tare (lbs. per cwt.)	11.8	13.6	13 4	14.8	15.1	14.9	11 3	12.6	15.8	16.3	13.7	14.5
Percentage of costed acreage lifted	100	100	100	88	100	96	100	95	100	99	100	95

Range in yields of clean beet per acre (no. of farms)

	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962
20 tons and over	-	-	-	-	-	-	1	2	3	-	4	2
15.0 - 19.9 tons	5	2	5	1	8	6	10	4	6	8	34	21
10.0 - 14.9 tons	4	7	7	8	9	11	-	5	1	1	21	32
5.0 - 9.9 tons	1	1	-	2	4	1	1	-	-	-	6	4
Below 5 tons	-	-	-	-	-	1*	-	-	-	-	-	1

* no yield

(a) Returns

The gross return per acre from sugar beet corresponds closely but not exactly to the weight of sugar per acre.[1] The average cash receipts per acre as found in the survey are shown in Table 2.2. These figures do not include any allowance for the value of tops, because of the difficulty of estimating such an allowance. Although beet tops may be considered useful for their manurial or feeding value, it is unlikely that these considerations will affect a farmer's decision to grow the crop. Therefore in the present report little emphasis is placed on their value. However, for reference and for comparison with other reports, the value of tops, estimated according to conventional methods, are included in Table 2.2.

1 In the two years considered here, the guaranteed price was 128s. per ton of clean beet, at 16.5 per cent sugar, with a bonus or penalty of 7s.6d. per ton for each one per cent sugar above or below 16.5. There is also an industry levy of $4\frac{1}{2}$d. per ton of clean beet, for research and education.

Table 2.2 Average gross margin per acre

	Upland		Fen		All Districts	
	1961	1962	1961	1962	1961	1962
Direct Costs	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Seed	1 10	1 13	1 12	2 1	1 10	1 16
Fertiliser*	10 8	10 10	8 11	9 16	9 13	10 4
Sprays	1 8	14	2 2	14	1 15	14
Contract (exc. haulage)	1 6	1 6	2 12	1 2	1 13	1 3
Casual labour	3 16	3 14	3 16	5 0	3 19	4 4
Haulage	9 6	8 8	7 7	6 15	8 6	7 13
Total	27 14	26 5	26 0	25 8	26 16	25 14
GROSS MARGIN	55 18	50 13	75 17	73 10	62 14	59 0
Cash receipts	83 12	76 18	101 17	98 18	89 10	84 14
Credit for tops	5 2	3 8	3 19	3 6	4 11	3 7

Range in gross margin per acre (no. of farms)

£90 & over	2	1	4	4	6	5
£70 - 89	7	7	13	8	20	15
£50 - 69	18	16	4	5	22	21
£30 - 49	12	11	-	2	12	13
Less than £30	4	5+	1	1	5	6

* excludes F.Y.M.

+ one farm had no harvest

(b) Gross margins

There are various methods of assessing the "profitability" of particular farm enterprises. One of the more useful is to calculate the "gross margin" obtained. This is defined as the difference between gross output and the direct costs incurred by that enterprise. It therefore represents the contribution made by the enterprise towards recovering the common costs of the farm.[1] The gross margin has the advantage that it does not attempt to allocate common costs to individual enterprises, irrespective of the opportunity costs involved. However carefully such an allocation is made, the usefulness of the results for farm management purposes is unlikely to repay the effort involved in the calculation.

The average gross margins from sugar beet as found in the present survey, are shown in Table 2.2. Differences were principally between fen and non-fen, but the corresponding figures for individual districts are shown in Appendix B (Table B.3).

(c) Margin over materials costs, and standardised gross margin

Some of the variation between districts, shown in Table 2.2, is caused by differences in farm location and system. For example, on an individual farm contract work and casual labour are both direct costs, which must reduce the gross margin from sugar beet. On the other hand the use of such services should enable the farmer to manage his farm with a smaller regular labour force and less machinery, thereby reducing the fixed costs of the farm. Another source of variation in direct costs is the distance from the farm to the nearest factory. Thus although the inclusion of contract work and casual labour as direct costs is realistic for an individual farm, it tends to confuse comparisons between farms, by combining together farms using different systems. In particular, the costs shown for contract work and casual labour are the average over all farms, even though some did not make use of these services. Thus the figures are too low for farms using these services, but too high for farms not using them.

To assist comparison between the results from this survey, and other farms, Table 2.3 shows the average margin over materials costs, and a standardised gross margin, based on the assumption that casual labour was used for thinning, and a contractor for haulage to the factory. The spray costs under the heading 'materials' refer to insecticides and are the average for those farms which actually sprayed.[2] Contract spraying has been included at two-thirds of the actual cost, to cover only the materials used. Similarly, the costs shown for casual labour and contract haulage are the averages for those farms which employed them. The haulage cost is of course dependent on the yield of dirty beet, and the distance from the factory. For this reason, the cost per ton-mile is included in Table 2.4, which shows some representative costs for the three operations most likely to be undertaken by casual labour or contractors (i.e. be chargeable as direct costs of the beet crop). These are spreading kainit, hand thinning and contract haulage.

[1] This procedure differs slightly from that used to show average labour requirements, in Chapter 4. There, the labour requirements for operations not typical are bracketed and are not included in the totals.

[2] The direct costs of a crop are here defined as seed, fertiliser, sprays, casual labour and contract work. Conversely the common costs are rent, regular labour, machinery costs, and general overheads For machinery specific to one enterprise (e.g. a sugar beet harvester) there is a good case for charging its whole cost to the particular enterprise, but since the cost does not vary in direct proportion to the acreage, it is different in principle from the direct costs listed above.

It is reasonable to expect that the cost per acre for thinning should be lower when a precision drill has been used, by comparison with an ordinary drill. (Differences in these labour requirements are discussed in Chapter 4). In fact, the average rate paid to casuals in 1962 for thinning was higher on those farms using a precision drill. For both types of drill, however, the range of piece work rates for casuals was substantial, as shown in Table 2.4. Piece work rates for regular workers also varied considerably. Although the rates paid will depend on local labour conditions, it should be realised that if the same rate is paid for thinning, irrespective of the type of drill, hourly earnings will be substantially higher after a precision drill.

Table 2.3 Average margins over materials costs, and standardised gross margins, per acre

District / Cost	South Cambridge		West Norfolk		North Essex & West Suffolk		Isle of Ely		Holland		All Districts	
	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962
Materials	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Seed	1 11	1 12	1 12	1 13	1 7	1 14	1 6	2 2	1 17	2 0	1 10	1 16
Fertilisers*	10 11	9 14	11 1	11 2	9 13	10 13	7 10	9 6	9 12	9 19	9 13	10 4
Spray materials	1 17	2 13	1 15	1 7	2 8	1 10	2 12	1 0	1 17	1 7	2 4	1 9
Total	13 19	13 19	14 8	14 2	13 8	13 17	11 8	12 8	13 6	13 6	13 7	13 9
MARGIN OVER MATERIALS COST	65 2	65 10	75 2	56 6	68 4	67 1	85 18	85 16	93 2	86 6	76 3	71 5
Casual labour (thinning)	11 8	10 10	9 2	9 4	10 10	11 15	9 13	11 6	9 18	11 14	10 2	10 18
Contract Haulage	9 19	8 7	8 16	7 3	8 7	8 3	9 10	10 11	11 3	10 7	9 11	8 18
STANDARDISED GROSS MARGIN	43 15	46 13	57 4	39 19	49 7	47 3	66 15	63 19	72 1	64 5	56 10	51 9
Cash receipts	79 1	79 9	90 0	70 8	81 12	80 18	97 6	98 4	106 8	99 12	89 10	84 14

* excludes F.Y.M.

Table 2.4

Representative piece-work and contract rates (based on 1962 figures)

Spreading kainit	10s. per acre (for 6 cwts. per acre)	
Thinning:	Ranges in piece work rates (per acre)	
	Casuals	Regulars
Ordinary drill	£9.6s. to £12.10s.	£9.0s. to £13.18s.
Precision drill	£10.18s. to £15.0s.	£9.0s. to £13.8s.
Contract transport to factory (lorry & driver)	8d. per mile from farm to factory, per ton dirty beet. For hire of cleaner-loader (where available) add at least 1s. per ton dirty beet.	

CHAPTER 3 PRODUCTION COSTS

In addition to the direct costs mentioned in Chapter 2, the sugar beet crop makes substantial claims on regular labour and on machinery. The actual amounts will depend on the system followed, for example, the amount of casual labour employed. An estimate of the proportion of the total regular labour bill chargeable to the sugar beet can be made by charging for labour time according to the appropriate hourly wage rate. Similar estimates can be made for machinery and implements, using hourly or per acre rates. Other common costs such as rent and overheads can also be allocated, for example on an acreage basis. In this way it is possible to arrive at a figure for the total cost of growing sugar beet. However, such a figure is unlikely to be of much help in deciding whether to expand or contract the beet acreage, because it does not take account of the fact that much of the cost of regular labour and farm machinery is a fixed item. For example, if the beet yield is low, and harvesting requires less labour than usual, this saving is apparent rather than real, since the men must be paid anyway. Thus the average production costs shown in Table 3.1 should be interpreted with care. Similar figures for individual districts are shown in the Appendix (Table B.4).

The average costs given in Table 3.1 include any work done by contractors, under the appropriate heading, and there is no separate item for contract work. Harvester depreciation has been charged at 10 percent per annum for new machines and 20 percent for second-hand machines. Further details of the costing method are given in Appendix C.

(a) Net Profit

Net profit is the difference between cash receipts and total production costs. This is summarised in Table 3.2, for all districts. Corresponding figures for individual districts are shown in Appendix B, Table B.4. There was a good deal of variation between districts and between years. For example, the average net profit for the survey farms in the Isle of Ely was four times that for west Norfolk. Most of this variation can be attributed to yield differences.

(b) Factor Costs

Costs of production classified according to the factors of production used, are shown in Table 3.3 for all districts together. Similar figures for individual districts are listed in the Appendix (Table B.6). Factor costs are also shown in greater detail in the standard presentation of results (Appendix D), although there is no breakdown into districts.

Table 3.1 Average production costs per acre

	All Districts	
	1961	1962
	£ s.	£ s.
Stubble cultivations	8	11
F. Y. M.	1 6	1 16
Applying F. Y. M.	1 5	1 5
Ploughing	1 18	1 15
Seedbed cultivations	1 15	1 7
Fertilizer	9 13	10 4
Applying fertilizer	16	17
Seed	1 10	1 16
Drilling	18	19
Thinning	9 17	10 7
Tractor-hoeing (inc. D. R. T.)	2 17	2 16
Other post-drilling cultivations	4	4
Hand weeding	7	4
Spraying	2 11	1 1
Irrigation	1	3
Total pre-harvest costs	35 6	35 5
Harvesting	13 10	11 11
Transport	8 6	7 13
Rent (inc. drainage rate)	4 16	4 19
General overheads	8 0	8 0
Cash costs	69 18	67 8
Add residues b/f	2 0	1 17
Deduct residues c/f	3 10	3 19
TOTAL COSTS	68 8	65 6

Table 3.2 Average net profit per acre

	All Districts	
	1961	1962
	£ s.	£ s.
Total production costs	68 18	65 6
NET PROFIT	20 12	19 8
Cash receipts	89 10	84 4
Credit for tops	4 11	3 7

Table 3.3 Average Factor Costs per acre

	All Districts	
	1961	1962
	£ s.	£ s.
Seed	1 10	1 16
Manual labour	22 8	21 9
Tractor power	6 10	5 17
Machinery	7 15	7 8
Contract	6 6	5 5
Net manurial cost	9 7	9 18
Spray materials	1 16	14
Rent (inc. drainage rate)	4 16	4 19
Overheads	8 0	8 0
Total	68 8	65 6

CHAPTER 4 LABOUR REQUIREMENTS

The sugar beet crop makes considerable demands on labour, particularly in the spring and autumn, and these seasonal labour peaks play an important part in the economics of the crop. From information collected on the survey it was possible to calculate the average labour (and tractor) requirements for different operations, and the seasonal distribution. The average labour requirements for the usual sequence of operations are shown in Table 4.1.[1] The averages shown, correspond to the usual practice in the two areas.[2] Figures for operations not typical are bracketed and are not included in the totals. The averages are based on the number of farms carrying out the particular operation, not necessarily all those in the district. Contract operations are excluded from the Table, as information on the time taken is not usually available. For this reason the total number of farms shown as carrying out a particular operation may be less than the total number surveyed in each year.

Table 4.1 shows that the average total labour requirements were higher on fen than on upland farms With generally higher yields in the fens, it could be expected that harvesting labour would be higher than on the upland farms. In fact, the pre-harvest totals are also higher on the fen farms. Considering differences between years, it is noticeable that whereas there is little change in the pre-harvest totals, the harvest totals are substantially lower in 1962 than in 1961. This aspect is discussed below.

(a) Labour efficiency in harvesting

The lower average labour requirements for harvesting in 1962 might be explained by the slightly lower yields in that year. If this is the case, the man-hours per ton of dirty beet harvested should remain fairly constant.[3] In fact, in all districts the average man-hours required per ton of beet were substantially lower in 1962 than in 1961, implying that labour productivity had risen. Measuring productivity as tons of dirty beet harvested per man-hour, increases varied from 13 per cent in the Isle of Ely to 24 per cent in south Cambridge, and Holland. The average for all districts was 20 per cent. Some of the reasons for this marked productivity increase are discussed below.

(b) Seasonal labour peaks

The main labour requirements of the sugar beet crop are for thinning in the spring and harvesting in the autumn. These seasonal labour peaks are shown diagrammatically in Figure 4.1, over the period of 17 months during which cultivations and harvesting operations may be carried out. This diagram is based on the timing of operations as found on the survey farms in the two years considered. Variations occur from farm to farm and from year to year, depending on the weather and other factors, but the distribution shown gives a general indication of seasonal requirements. The amount of labour needed is influenced by the work methods used, and some differences are indicated in the diagram; for example, hand labour for thinning should be appreciably less if a precision drill is used. Labour requirements for hand-harvesting are not shown, but there is a comparison between the survey average for mechanical harvesting, and the amount likely to be needed if a tanker harvester is used. These aspects are further discussed in the remainder of the chapter.

(c) Reducing the spring labour peak

High seasonal labour requirements may be met by employing casual labour, or by maintaining the regular labour force at a rather higher level than would otherwise be necessary. In either case there is good reason to reduce labour peaks, provided the cost of so doing does not exceed the saving on labour.

The spring labour peak for chopping-out and singling can be drastically reduced by the use of a down-the-row thinner, but only a few of the survey farms used mechanical thinning. The evidence from these few indicated that yields of sugar were not significantly affected. Even where thinning is entirely by hand, labour time can be saved by using a precision drill (together with rubbed seed).

1 Tractor hours per acre are shown in Appendix B, Table B.7.
2 "Usual" means half or more of the farms.
3 The yield of dirty beet can be calculated from the yield of clean beet, and tare, as follows:

$$\text{Yield of dirty beet} = \frac{112 \times \text{yield of clean beet}}{112 - \text{dirt tare}}$$

FIGURE 4.1 SEASONAL LABOUR REQUIREMENTS FOR SUGAR BEET

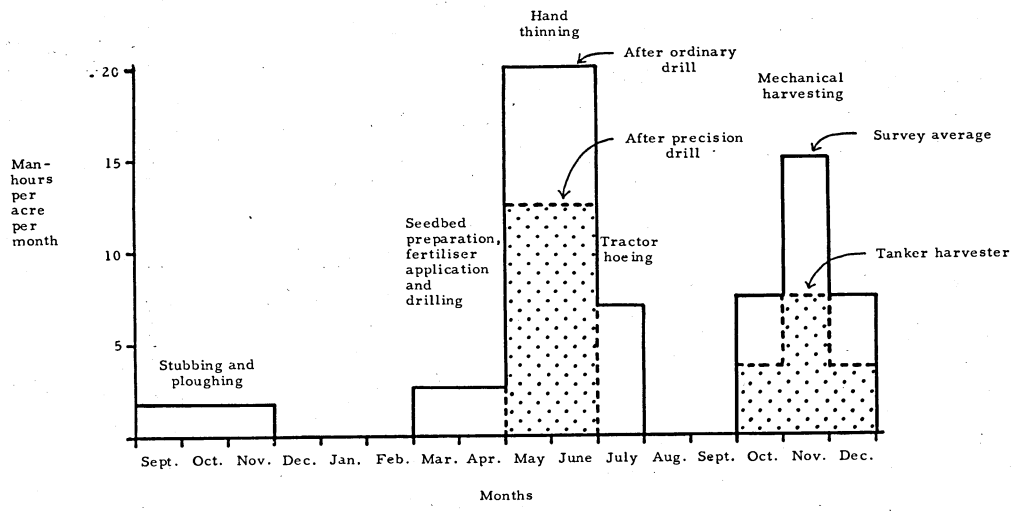


Table 4.1 Average Labour Requirements

Man hours per acre

Operation	Upland		Fen		All Districts			
	1961	1962	1961	1962	1961		1962	
					No. of farms	Hours	No. of farms	Hours
Stubbling	1.6	1.6	(2.3)	(2.7)	25	(1.7)	31	1.6
Applying F.Y.M.	(8.4)	(9.3)	(8.0)	(9.8)	15	(9.0)	15	8.7
Applying salt/kainit	(0.9)	(0.9)	(0.5)	(0.4)	8	(0.9)	8	0.7
Ploughing	2.7	2.2	3.3	3.2	58	2.9	58	2.9
Seedbed cultivations	2.5	2.1	3.4	2.1	65	2.8	60	2.1
Applying fertilisers	1.4	1.2	1.4	1.2	64	1.4	60	1.3
Drilling	1.5	1.5	1.7	2.0	56	1.5	52	1.5
Chop-out, singling etc.	36.7	35.1	36.2	41.5	64	36.4	59	37.6
Tractor hoeing	6.4	6.7	7.8	7.3	65	6.8	58	6.8
Other cultivations	0.5	0.5	1.0	0.8	39	0.7	38	0.6
Hand hoeing	(3.5)	(1.6)	(5.6)	(6.6)	20	(5.8)	13	(3.6)
Spraying	0.6	(0.5)	0.8	0.6	53	0.7	30	0.5
Irrigation	(2.8)	(1.6)	(-)	(-)	1	(2.8)	2	(1.6)
Pre-harvest total	53.9	50.9	55.6	56.6	x	53.2	x	56.5
Hand harvesting	(27.8)	(25.7)	(-)	(-)	15	(27.8)	12	(23.8)
Machine harvesting	10.6	7.1	12.0	8.2	44	10.2	40	7.1
Hand & machine harvesting	(37.8)	(15.9)	(-)	(19.1)	2	(37.8)	5	(17.0)
Carting off field	11.8	9.8	12.3	10.5	61	12.3	58	10.5
Loading for factory	4.0	3.2	7.0	4.6	54	4.9	49	3.8
Transporting to factory or railhead (own lorry)	9.0	5.4	5.7	4.9	32	7.6	29	(5.0)
Harvest total	35.4	25.5	37.0	28.2	x	37.2	x	21.4
Total	89.3	76.4	92.6	84.8	x	90.4	x	21.4
Average yield of dirty beet (tons per acre)	15.8	14.4	19.8	19.1	x	17.2	x	16.0

According to the survey results, the use of a precision drill can reduce the hand-work hours per acre from about 43 to 34, mainly by removing the need for seconding. In fact, there is reason to believe that this reduction of 9 man-hours per acre is less than could be expected if workers were more accustomed to thinning after a precision drill

A few farmers used a down- the-row thinner, followed by hand-trimming. These results indicated that handwork could be reduced to about 15 man-hours per acre. Adding 2 man-hours for mechanical thinning (i.e. twice) and 3 for tractor-hoeing (i.e. three times), gives a total of 20 man-hours per acre for all thinning and weeding. This compares with a total of about 40 hours per acre for thinning by hand only, followed by tractor hoeing.

Reductions in the labour needed for sugar beet may be advantageous even if there is no saving in the money paid out. Improved timeliness of operations can benefit the beet and other crops also. Nevertheless, if the labour cost cannot be reduced as well as the labour hours, there is less incentive to improve efficiency, particularly since there will be some additional machinery costs. In theory, the piece work rate per acre can be reduced as the rate of work increases, to maintain hourly earnings the same. In practice, it may be difficult to reduce the piece work rate in this way. For instance, many farmers in the survey who were using a precision drill, were paying similar rates per acre for thinning as those using an ordinary drill. It does not necessarily follow that the rates could not have been reduced, but for example where regular labour is accustomed to earning an annual "bonus" from beet thinning, there may be resistance to the fall in income. Piece work rates for casuals will depend on the local labour situation, but it seems reasonable that there should be some differential between the rates, according to the type of drill used.

The additional machinery costs represented by a precision drill or a down-the-row thinner are not likely to be very substantial, less than £2 per acre.

(d) Reducing the autumn labour peak

Beet harvesting by machine is now the normal practice in most districts in the eastern counties. The only exception in the present survey was west Norfolk. Here the light soils permit the use of "squeezer" type lifters, and handwork is faster than on heavier soils. For this reason, there is less incentive to introduce harvesters. Furthermore, the figures of man-hours per acre for harvesting in this district are unlikely to be applicable to other districts. For most farmers, therefore, a comparison between labour requirements with hand and with machine harvesting is largely of academic interest. What is more relevant is an analysis of the reasons for differences in labour requirements on farms using harvesters. Some of the variation found in the survey can be ascribed to differences in soil type, weather conditions at harvest, the distance for carting, whether family or paid labour was involved, and the system of harvesting. A work study investigation of sugar beet harvesting, carried out during the period of the survey, provides detailed information for an analysis of this last factor. [1]

1 The investigation was carried out by P. W. H. Weightman as part of a study of the optimum size for East Anglian arable farms.

The lowest labour requirement, measured as man-hours per ton of dirty beet harvested, was achieved by a one-man system using a tanker harvester with an elevator. When full the harvester is driven to the heap with its load of about 30 cwt. and the beet elevated direct from the tank to form the heap. This method is only suitable where the distance from field to heap is short, and for this reason the comparison of systems is confined to those appropriate for a short haul. These are two-man and three-man systems, using an ordinary harvester. The two-man system employs one man on the harvester and one carting, using a tipping trailer. The beet is elevated into the trailer as it keeps pace with the harvester, and harvesting stops while the full trailer is taken to the heap and unloaded. The three-man system has two men carting and thus enables the harvester to work more or less continuously. The results of the investigation shown in Table 4.2 refer to these three systems.

It is evident from the Table that in terms of man-hours per ton, the one-man system is about three times as efficient as the others. Moreover, it also appears faster, measured as acres harvested per day.

Even with a longer haul it is likely that a tanker harvester will be most efficient in labour-use, because one man carting will probably be sufficient to keep the harvester working continuously. The tanker is of course substantially more expensive than an ordinary machine, but on the other hand fewer tractors and trailers are required, and it may also be possible to reduce the regular labour force. Thus the extra annual depreciation on the harvester is likely to be matched by savings in other directions.

Table 4.2 Comparison of sugar beet harvesting systems

	System		
	1-man	2-man	3-man
Type of harvester	Tanker with elevator	Ordinary	Ordinary
No. of tractors	1	2	3
No. of trailers	0	1	2
Average man-hours per ton dirty beet	0.27	0.79	0.87
Assuming yield of 16 tons dirty beet per acre			
Average man-hours needed per acre	4.3	12.7	13.9
Average acres harvested per 8-hour day	1.9	1.3	1.7

CHAPTER 5 SUGAR BEET HARVESTERS

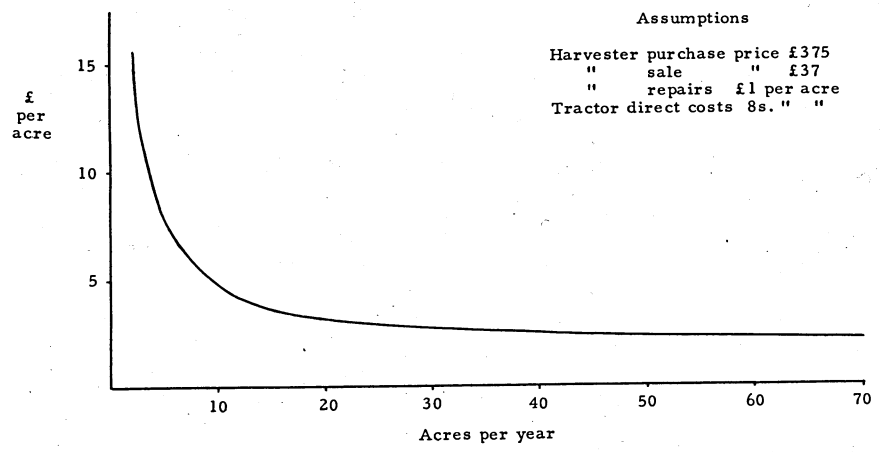
For some purposes it is sufficient to regard the cost of farm machinery as a single total, chargeable to the farm as a whole. However, in the case of machines used only for one enterprise, it is realistic to charge their entire cost to the particular enterprise. Thus the beet crop should bear the whole cost of the harvester, but this will not vary exactly in proportion to the acreage. Much depreciation, for example, will occur even if the machine is little used, and the larger the beet acreage the lower is this cost per acre.

(a) Harvester costs

The main costs incurred by owning and using a beet harvester are depreciation and repairs. For comparison with a contractor's charge, it is also appropriate to add fuel and repairs for the tractor pulling the harvester. A charge for labour is better omitted, as the harvester operator is usually one of the regular farm labour force.

A special investigation of the depreciation of beet harvesters was made, taking into account the difference between purchase and resale price, the number of harvests, and the total acreage harvested. It was found that although the amount of use contributed to the fall in value, the main influence on depreciation was the age of the machine. Thus the depreciation cost per acre falls as the annual acreage increases. On the other hand, harvester repairs are closely linked to the amount of use, and the survey indicated that a charge of £1 per acre is realistic. Tractor fuel and repairs can be expected to total 2s. per hour, or 8s. per acre if the harvester works at the rate of $\frac{1}{4}$ acre per hour. Thus there is a constant charge of £1.8s. per acre to be added to the harvester depreciation. Combining all these costs, the curve in Figure 5.1 shows how the cost per acre varies with the acreage of beet. If the contractor's charge is £9 per acre, it appears that it will pay a farmer with more than 4 acres to harvest his own beet.

FIGURE 5.1 COST PER ACRE IN MECHANICAL SUGAR BEET HARVESTING



(b) Opportunity cost

In addition to the straight comparison of harvesting costs described above, it is also important to consider whether any opportunities are lost to the farmer if he harvests his own beet. During this period of the year farm labour is usually fully occupied, and by using his own machine and regular labour a farmer may (for example) have to reduce the acreage of winter wheat drilled, or delay ploughing land intended for spring cereals. Either of these courses is likely to reduce income from cereals, and such losses represent an opportunity cost of harvesting one's own beet.

As an example consider the case of a farmer with 30 acres of sugar beet. At a harvesting rate of nearly 2 acres per day the tractor driver will be needed for about 16 days. Had this man been free he could during the first 8 days, have prepared the ground for and drilled 16 acres of winter wheat (i.e. 2 acres per day). In the remaining time he could have brought forward the ploughing for spring crops by 32 acres (4 acres per day).

As winter wheat usually gives a higher gross margin per acre than spring barley, the farmer will lose the difference between these margins, on 16 acres. If the difference is £8 per acre, the loss will be £128. This represents the opportunity cost of the labour used in harvesting the sugar beet, for the first eight days (referred to above). The second eight days could have been used to bring forward the ploughing, and if the value of this shown in the increased yield of the following crop is 10s. per acre, 32 acres will be worth £16. This is the opportunity cost for the second eight days. (Bringing forward the ploughing is also likely to reduce the number of cultivations needed to prepare the spring seed bed).

It is now necessary to compare these costs with the contractor's charge, which will be taken as £9 per acre of beet. Thus the opportunity costs must also be expressed per acre of beet. During the first 8 days the choice is between harvesting 15 acres beet or drilling 16 acres wheat. The opportunity cost for this period is £128 or £8.10s. per acre of beet This in itself is nearly as high as contractor's charge, (quite apart from the direct costs of operating one's own machine), and it is therefore likely to be profitable to contract at least this acreage. Considering the second 8 days the choice is between harvesting 15 acres beet or ploughing 32 acres for spring barley. Here the opportunity cost is only £16, or about £1.1s. per acre of beet. The cost per acre of a farmer's own machine on 15 acres is estimated at £3.11s. per acre (from Figure 5.1), giving a total cost of £4.12s. per acre, well below the contract charge. The costs incurred under each of these three alternative plans are set out in Table 5.1. It can be seen that in this example the best solution is to employ the contractor to harvest 15 acres, so that 16 acres winter wheat can be drilled. The remaining 15 acres are raised with the farmer's own machine and regular labour, foregoing the chance to bring forward the ploughing. In this way the loss of the most valuable opportunity is avoided and the advantage of owning one's own machine is gained.

It must be emphasised that this result depends on the figures assumed, in particular the relative rates of work (acres per day) in beet harvesting and wheat sowing, the difference in gross margins between wheat and barley and the charge for contract harvesting.

Table 5.1 Comparison of beet harvesting costs I

Own Harvester	£	Contractor	£	Own Harvester and Contractor	£
30 acres at £2.13s./ac.	79.10s.	30 acres at £9/ac.	270	15 acres contract at £9/ac.	135
Opportunities lost:-				15 acres own harvester at £3.11s./ac.	53.5s.
				Opportunities lost:	16
TOTAL	223.10s.	TOTAL	270	TOTAL	204.5s.
Cost per sugar beet acre					
£7.9s		£9.0s.		£6.16s.	

(c) Opportunity cost of capital

In addition to the opportunity costs referred to above, there will also be an opportunity cost of the capital invested in a sugar beet harvester. For example, grain storage is a similar kind of investment from which many farmers would gain. £375 would enable a farmer to extend an existing bin system by about 60 tons, which by displacing the variable costs attributable to sack storage of wheat, could bring in another £90 per annum in gross margin. Deducting half this sum for depreciation and maintenance costs of the new equipment, leaves £45 as the net return from the investment. On £375 this is 12 per cent, per annum, probably the lowest acceptable return from an uncertain investment of this type. Even if there is no investment opportunity of this kind, the capital can always be invested outside agriculture. Thus the opportunity cost of capital never falls to zero.

Including an opportunity cost of capital at £45, does not change the relative merits of the three harvesting plans referred to above, but the contractor's charge becomes more competitive with the other alternatives. This is shown in Table 5.2

Table 5.2 Comparison of beet harvesting costs II

(including opportunity cost of capital)

Own Harvester	£	Contractor	£	Own Harvester and Contractor	£
30 acres at £2.13s./ac.	79.10s.	30 acres at £9/ac.	270	15 acres contract at £9/ac.	135
Opportunities lost:				15 acres own harvester at £3.11s./ac.	53.5s.
Labour	144			Opportunities lost:	
Capital	45			Labour	16
				Capital	45
TOTAL	268.10s.	TOTAL	270	TOTAL	249.5s.
		Cost per sugar beet acre			
£8.19s.		£9.0s.		£8.6s.	

(d) Tax allowances

Another factor influencing the cost of a beet harvester is the tax allowances on capital expenditure. The impact of these allowances will depend on the individual farmer's circumstances, particularly his marginal rate of tax. Nevertheless their effect is sufficiently important to justify a brief discussion.

Tax allowances for capital expenditure specify the amounts which can be charged as the annual depreciation cost, for the equipment in question. Since the annual depreciation charge forms part of the farm trading account, it reduces the farm profit and the tax payable. At present there are four types of allowance:

(a) Investment allowance. This is a once-for-all allowance of 30%, applicable to capital expenditure on new equipment. It is not taken into account in computing other capital allowances.

(b) Initial allowance. This also is once-for-all, but at the rate of 10% (except for second-hand equipment, when it is 30%, with no investment allowance).

(c) Annual allowance. This is the rate at which the equipment may be written off each year. In the case of beet harvesters it is 25%. The written-down capital value of the machine at any time is determined by the initial and annual allowances together.

(d) Balancing allowance (or charge). If the equipment is later sold the difference between the purchase and sale prices is the actual "net cost". If the

net cost found in practice is greater than the total of initial and annual allowances over the same period, a balancing allowance can be claimed to bring the total allowances up to the net cost. Conversely the net cost may be less than the allowances, in which case a balancing charge is made, to equalise the two figures.

Capital allowances (and charges) apply to a tax year, but are normally computed by reference to a "basis period". The latter is the accounting year preceding the tax year. Thus initial and investment allowances refer to new capital expenditure during the basis period, while annual allowances apply to the equipment in use at the end of the basis period. Balancing allowances and charges are calculated on disposals during the basis period. An example will help to clarify these points.

Example:

A farmer buys a new sugar beet harvester on 1st October 1963, costing £375. His accounts are made up on 31st December each year, and therefore the accounting year ending 31st December 1963 is the basis period for calculating allowances for the 1964-65 tax year. As the machine in question is new it qualifies for an investment allowance of 30% and an initial allowance of 10%. As already mentioned, the investment allowance does not enter into the calculation of written-down value. Table 5.3 summarises the allowances for two years.

If tax is paid at a marginal rate of 6/5[1] in the pound, the total capital allowance for 1964-65 will reduce the tax paid by £80, or more than a fifth of the capital cost of the harvester. In the 1965-66 year, when capital allowances are only £60.19s., the tax relief drops sharply to £20.

It should be noted, however, that the tax relief represented by the initial and annual allowances is no different in principle from that obtainable on any other legitimate cost. In other words, these two allowances only specify the rates at which a particular capital expenditure can be written off. As trading profits are taxed, but losses are not compensated, the farmer's interest is to avoid large fluctuations in profit from one year to another. It would be convenient for this purpose if the depreciation rates could be varied by the farmer to help reduce fluctuations in profits, but for obvious reasons the Inland Revenue does not allow this. The investment allowance, on the other hand, not being included in the calculation of written-down value, is a free gift to the farmer who buys a new machine, and the higher his marginal rate of tax, the larger the benefit. As the investment allowance can only be claimed on new machines, for the first year, it provides an incentive to keep replacing machinery.

Initial and annual depreciation allowances are directly comparable with contractors charges, in the sense that both are expenses allowable for tax. However, the investment allowance lowers the real cost of owning a harvester, and therefore increases its competitiveness with contract harvesting.

[1] 8/3 adjusted for two-ninths earned income relief

Table 5.3 Example of capital allowances on a beet harvester

1964-65	Cost in basis period			£375
	Initial allowance (10% of £375)	£37.10s.		
	Annual allowance (25% of £375)	£93.15s.		
			£131. 5s.	£131. 5s.
	Investment allowance (30% of £375)		£112.10s.	
	Total capital allowances for 1964-65		£243.15s.	
	Written-down value			£243.15s.
1965-66	Annual allowance (25% of £243.15s.)	£60.19s.		£60.19s.
	Total capital allowances for 1965-66		£60.19s.	
	Written-down value			£182.16s.

Note: the fact that the total capital allowances for 1964-65 equal the written-down value at the end of that tax year, follows from the particular combination of percentage rates applicable to harvesters. i.e. the initial and annual allowances total 35% of the initial cost, so that the written-down value is 65%. Adding the 30% investment allowance brings the total allowances to 65% also.

CHAPTER 6

Summary

1. The survey covered one field of sugar beet on each of 65 farms in 1961, and on 60 of these in 1962. Both years were reasonably satisfactory for the beet crop, and yields of clean beet averaged 15.0 tons per acre in 1961 and 13.9 tons in 1962. The lower acreage yield in 1962 can be attributed mainly to the cold weather, which started at the end of December 1962, and prevented some of the beet being harvested.
2. The more important financial results were as follows:-

	1961	1962
Average per acre:	£ s.	£ s.
Gross margin	62 14	59 0
Margin over materials cost (seed, fertilizers, sprays)	76 8	71 18
Cash receipts	89 10	84 14
Production costs	68 8	65 6
Net profit	20 12	19 8

3. Labour requirements up to harvest were fairly uniform in both years, averaging 53.2 and 56.5 man-hours per acre. However, labour for mechanical harvesting was lower in 1962, averaging 21.4 man-hours per acre compared with 37.2 in 1961. Only part of the fall was caused by lower yields.
4. An analysis of sugar beet harvester depreciation was used in assessing the cost per acre of mechanical harvesting, for different acreages This varied from nearly £16 per acre with 2 acres of beet, to £2.10s. per acre, with 80 acres.

APPENDIX A

Notes on the 1961 and 1962 seasons

In the Eastern Counties, preparatory cultivations for the 1961 crop were hindered by the wet autumn of 1960, but drier weather in the following February enabled seedbed preparations to go forward, particularly on the lighter soils. Reasonable tilths were eventually obtained, except on heavy land, and most drilling was completed during April. Germination was generally good, but there was a good deal of damage by hares, and some patchiness developed owing to dry conditions in June. Aphids were widespread, and spraying to check virus yellows was general. The crop grew well during the summer. Harvesting commenced during September, continued through October and November in generally good conditions, and was almost completed in December. Yields for the 1961 survey farms averaged 15.0 tons clean beet per acre, compared with an average for England as a whole of 14.1 tons,* and a corresponding 5-year average of 13.1 tons*.

The favourable weather also enabled autumn cultivations to go ahead, and the work was well advanced by the new year. Progress was slower in January (1962) but at the end of the month ploughing was possible on lighter soils. By March generally good seed beds had been formed. Drilling was almost completed by the end of April, except on heavy soils, but with rather cool weather, germination was slow. However, plants were mainly satisfactory although some damage from birds and insects, on first emergence, was reported. Growth was slow during May and June, owing to the rather cool, dry conditions. Substantial rain in July benefited the crop, but there were an unusually large number of bolters. Harvesting commenced in September on the lighter soils, and continued through changeable weather in October and November. Less favourable conditions in early December slowed up lifting. Most of the crop was out of the ground when temperatures fell sharply at the end of December. Heavy snow then hindered the rest of the lifting, and some fields had to be abandoned. 5 per cent. of the costed acreage was left in the ground, and there was also damage to lifted roots in unprotected clamps. Many of the farms in the survey lost some of their crop owing to the severe weather, particularly those in west Norfolk. Factories became so short of beet that the usual system of permits for deliveries was stopped, but even so the factories were forced to close earlier than usual. When the thaw came in March, the beet still in the ground had deteriorated so far that there was no point in harvesting it. The average yield fell to 13.9 tons clean beet per acre, and the average for England was also lower, at 12.7 tons.*

* British Sugar Corporation data, based on tonnage of roots delivered to factories, and total quota acreages.

Appendix B

Table B.1 Seed and Fertiliser

Seed	Natural		Rubbed		Monogerm		Total	
	1961	1962	1961	1962	1961	1962	1961	1962
No. of fields	20	11	45	46	-	2	65	60
Av. rate (lbs. p. acre)	13.1	12.3	5.7	5.7	-	3.7	-	-
Variety:								
Sh. Kleine E	14	10	36	29	-	2	50	41
Hilleshog E. & N.	1	1	4	5	-	-	5	6
Bush E.	2	-	2	3	-	-	4	3
Other	3	1	3	9	-	-	6	10
Av. distance between seeds when using precision drill (in.)							1.83	1.87

Fertiliser	Compound		Salt and/ or Kainit		Top dressing		
	1961	1962	1961	1962	1961	1962	
No. of fields	64	60	29	30	13	10	
Av. rate (cwts. p. acre) where applied	9.1	9.1	5.2	5.3	2.1	2.1	

Table B.2 Type of Labour

No. of farms

	Contract		Casual		Own		Casual & Own		Total	
Operation	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962
Salt &/or Kainit	17	22	-	-	12	9	-	-	29	31
Ploughing	8	2	-	-	57	58	-	-	65	60
Drilling	9	10	-	-	56	50	-	-	65	60
Chop out, single & 1st trim	-	-	15	14	36	33	12	12	63	59
Seconding & 2nd trim	-	-	15	15	38	35	10	5	63	55
Tractor hoe	-	2	-	-	65	58	-	-	65	60
Hand weed	-	-	1	2	19	10	-	-	20	12
Spraying	7	5	-	-	51	28	-	-	58	33
Harvesting:										
Harvester	4	3	-	1	44	43	1	1	49	48
Hand - knock & top	-	-	3	1	7	8	6	2	16	11
Cart off field	-	-	-	-	63	57	2	2	65	59
Load for factory	8	9	-	-	57	50	-	-	65	59
Transport to factory	32	30	-	-	33	29	-	-	65	59

Notes: (a) The figures in the final column may not add to the total number of farms in each year, because of variations in farm practice.
(b) One field in 1962 had no harvest.

Table B.3 Average gross margin per acre

	South Cambridge		West Norfolk		North Essex & West Suffolk		Isle of Ely		Holland		All Districts	
	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962
Direct costs	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Seed	1 11	1 12	1 12	1 13	1 7	1 14	1 6	2 2	1 17	2 0	1 10	1 16
Fertiliser*	10 11	9 14	11 1	11 2	9 13	10 13	7 10	9 6	9 12	9 19	9 13	10 4
Sprays	1 5	16	13	16	2 6	11	2 12	15	1 12	13	1 15	14
Contract work (exc. haulage)	1 4	1 10	1 15	1 9	18	18	2 1	8	3 2	1 16	1 13	1 3
Casual labour	2 5	2 4	5 0	5 6	4 2	3 12	4 16	6 7	2 15	3 13	3 19	4 4
Haulage	12 2	11 15	8 6	6 7	7 11	7 4	7 3	6 16	7 11	6 13	8 6	7 13
Total direct costs	28 18	27 11	28 7	26 13	25 17	24 12	25 8	25 14	26 9	24 14	26 16	25 14
GROSS MARGIN	50 6	51 18	61 13	43 15	55 15	56 6	71 18	72 10	79 19	74 18	62 14	59 0
Cash receipts	79 4	79 9	90 0	70 8	81 12	80 18	97 6	98 4	106 8	99 12	89 10	84 14
Credit for tops	4 15	3 1	5 13	3 15	4 19	3 9	3 17	3 6	4 0	3 6	4 11	3 7

Range in gross margin per acre (no. of farms)

£90 and over	-	-	-	-	2	1	2	3	2	1	6	5
£70 - £89	-	1	3	1	4	5	7	3	6	5	20	15
£50 - £69	4	6	7	2	7	8	2	3	2	2	22	21
£30 - £49	5	2	2	6	5	3	-	1	-	1	12	13
Less than £30	1	1	-	2	3	2+	1	1	-	-	5	6

* Excludes F.Y.M.

+ one farm had no harvest

Table B.4 Average Production Costs per acre

District	South Cambridge		West Norfolk		North Essex & West Suffolk		Isle of Ely		Holland		All Districts	
	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Stubble cultivations	15	13	12	14	4	9	7	15	4	4	8	11
F.Y.M.	3 17	1 11	15	2 11	1 6	2 10	-	1 7	18	-	1 6	1 16
Applying F.Y.M.	4 12	2 3	12	1 8	1 1	1 14	-	13	9	-	1 5	1 5
Ploughing	1 11	1 8	1 15	1 18	1 13	1 14	2 2	1 12	2 13	2 5	1 18	1 15
Seedbed cultivations	1 11	1 9	1 9	1 8	1 12	1 14	2 4	1 9	2 2	1 7	1 15	1 7
Fertilizer	10 11	9 14	11 1	11 2	9 13	10 13	7 10	9 6	9 12	9 19	9 13	10 4
Applying fertilizer	18	18	1 3	1 3	15	17	12	15	13	12	16	17
Seed	1 11	1 12	1 12	1 13	1 7	1 14	1 6	2 2	1 17	2 0	1 10	1 16
Drilling	18	18	18	19	16	17	17	16	1 1	1 7	18	19
Thinning	9 4	8 19	8 19	9 4	10 12	11 5	8 16	10 4	11 5	11 12	9 17	10 7
Tractor hoeing (inc. DRT)	2 18	2 18	2 19	3 0	2 7	2 9	3 4	2 19	3 3	3 3	2 17	2 16
Other post-drilling cultivations	2	1	3	3	4	5	7	4	5	6	4	4
Hand weeding	2	1	2	1	6	1	1 2	18	5	-	7	4
Spraying	1 16	19	1 16	1 6	2 19	19	3 8	1 5	2 8	19	2 11	1 1
Irrigation	8	12	-	-	-	2	-	-	-	-	1	3
Total cultivations, seed, manures, and sprays	40 14	33 16	33 16	36 10	34 15	36 13	31 15	34 5	36 15	33 14	35 6	35 5
Harvesting	10 12	9 13	14 5	11 15	15 5	12 12	12 3	10 6	14 2	12 15	13 10	11 11
Transport	12 2	11 15	8 6	6 7	7 11	7 4	7 3	6 16	7 11	6 13	8 6	7 13
Rent (inc. drainage rate)	3 0	3 0	3 0	3 9	3 6	3 9	7 18	8 5	8 1	7 19	4 16	4 19
General overheads	8 0	8 0	8 0	8 0	8 0	8 0	8 0	8 0	8 0	8 0	8 0	8 0
Cash costs	74 8	66 4	67 7	66 1	68 17	67 18	66 19	67 12	74 9	69 1	69 18	67 8
Add residues b/f	1 5	2 7	1 4	17	1 16	1 10	2 18	1 19	3 5	3 5	2 -	1 17
Deduct residues c/f	6 16	4 5	3 4	4 10	3 8	4 12	1 18	3 6	3 7	2 7	3 10	3 19
TOTAL COSTS	68 17	64 6	65 7	62 8	67 5	64 16	67 19	66 5	74 7	69 19	68 8	65 6

Table B.5 Average Net Profit per acre

District	South Cambridge		West Norfolk		North Essex & West Suffolk		Isle of Ely		Holland		All Districts	
	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Total production cost	68 17	64 6	65 7	62 8	67 5	64 16	67 19	66 5	74 7	69 19	67 14	65 6
NET PROFIT	10 17	15 3	24 13	8 0	14 7	16 2	29 7	31 19	32 1	29 13	21 16	19 8
Cash receipts	79 4	79 9	90 0	70 8	81 12	80 18	97 6	98 4	106 8	99 12	89 10	84 14
Credit for tops	4 15	3 1	5 13	3 15	4 19	3 9	3 17	3 6	4 0	3 6	4 11	3 7

Range in cash receipts per acre (no. of farms)

	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962
£110 & over	-	-	3	-	3	-	2	3	4	3	12	6
90 - 109	1	2	3	1	4	8	9	4	5	4	22	19
70 - 89	8	6	4	4	8	8	-	3	1	1	21	22
50 - 69	1	1	2	5	4	2	-	1	-	1	7	10
30 - 49	-	1	-	1	2	-	1	-	-	-	3	2
Under £30	-	-	-	-	-	1*	-	-	-	-	-	1

* no harvest

Table B.6 Average Factor Costs per acre

District	South Cambridge		West Norfolk		North Essex & West Suffolk		Isle of Ely		Holland		All Districts	
	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Seed	1 11	1 12	1 12	1 13	1 7	1 14	1 6	2 2	1 17	2 0	1 10	1 16
Manual labour	21 5	18 11	22 17	21 14	24 0	23 0	20 2	20 14	22 16	21 19	22 8	21 9
Tractor power	7 2	6 1	6 9	5 17	6 12	5 14	6 14	6 4	6 1	5 13	6 10	5 17
Machinery	12 14	11 4	6 3	6 5	6 19	6 11	7 12	7 13	6 16	6 0	7 15	7 8
Contract	5 4	5 15	6 14	4 14	6 1	5 15	5 5	3 6	8 14	6 18	6 6	5 5
Net manurial value	8 17	9 7	9 16	10 0	9 7	10 1	8 10	9 6	10 8	10 17	9 7	9 18
Spray materials	1 4	16	13	16	2 6	12	2 12	15	1 12	13	1 16	14
Rent (inc. drainage rate)	3 0	3 0	3 0	3 9	3 6	3 9	7 18	8 5	8 1	7 19	4 16	4 19
Overheads	8 0	8 0	8 0	8 0	8 0	8 0	8 0	8 0	8 0	8 0	8 0	8 0
Total	68 17	64 6	65 4	62 8	67 18	64 16	67 19	66 5	74 5	69 19	68 8	65 6

Table B.7 Average Tractor Requirements

Tractor hours per acre

	All Districts			
	1961		1962	
	No. of farms	Hours	No. of farms	Hours
Stubbling	25	(1.7)	31	1.6
Applying F. Y. M.	15	(3.3)	15	(6.9)
Applying salt/kainit	8	(0.9)	8	(0.7)
Ploughing	58	2.9	58	2.9
Seedbed cultivations	65	2.8	60	2.1
Applying fertilisers	64	1.0	60	1.0
Drilling	56	1.0	52	1.0
Tractor hoeing	65	4.6	58	4.3
Other cultivations	39	0.7	38	0.6
Spraying	53	0.7	30	0.5
Pre-harvest total	x	13.7	x	14.0
Hand harvesting	15	(2.2)	12	(2.0)
Machine harvesting	44	6.0	40	5.0
Hand and machine harvesting	2	(4.7)	5	(5.7)
Carting off field	61	10.4	58	8.1
Loading for factory	54	0.7	49	0.9
Transporting to factory (own lorry)	32	7.6	29	(5.0)
Harvest total	x	24.7	x	14.0
Total	x	38.4	x	28.0

Note: Figures for operations not typical are bracketed and are not included in the totals.

APPENDIX C

Costing Details

(applicable to the production and factor cost figures in Chapter 3)

Labour was costed at the actual rates paid, with allowances made for employers' insurance contributions, paid holidays, perquisites etc. The weekly minimum wage for men was £8.9s. until 25th February 1962, when it rose 6s. to £8.15s. On 26th November it rose again to £9.3s. Higher rates than these were commonly paid and piece-work earnings were considerably greater. The farmer's own labour and that of his family were charged at slightly above the minimum rates.

Tractors

Between 4s. and 5s. an hour was charged for wheeled tractors, according to the type and size. Crawler tractors were similarly costed at from 7s. to 11s. per hour. Farmers' lorries for carting beet to the factory were costed individually on each farm.

Machinery

Standard rates were charged for each implement. Sugar beet harvesters, spinners and lifters were costed separately on each farm. Depreciation was charged at the annual rate of 10 per cent. on new machines, and 20 per cent on second-hand machines.

Seed, fertiliser, and spray materials were charged at cost (net of subsidy in the case of fertilisers).

Farm yard manure was charged at 15s. per ton.

Manurial residues

Half the total farmyard manure cost, including application, was carried forward to subsequent crops. Residues from farmyard manure applied in the three years previous to the costed year were brought forward to the current crop at 7s.6d., 4s.0d. and 2s.0d. Fertiliser residues were brought or carried forward as follows (1 year only): compounds: $\frac{1}{4}$, straight phosphatic and potassic fertilisers: $\frac{1}{3}$. The cost of lime was spread over 8 years. Crop residues were included at standard rates according to the particular crop (including bare fallow).

Overheads

A rounded estimate of £8 an acre was charged to cover those general farm costs which are particularly difficult to allocate to any one enterprise. These include labour-time lost owing to bad weather or mechanical breakdown, labour employed on general maintenance such as hedging and ditching, and such miscellaneous items as telephone bills and use of the farm car.

Value of tops

Tops ploughed in or folded were valued at 5s. per ton, and tops carted off for feeding to stock at £1 per ton (25s. less 20 per cent. wastage).

Appendix D Standard Presentation of Results

The 1961 figures in this Appendix are based on one record (field) from each of 65 farms, the recorded fields totalling 1060 acres of beet.
For 1962 the figures are based on one record (field) from each of 60 farms, covering 1140 acres beet.

Table D.1 Summary of average costs per acre

	1961			1962		
	Hours			Hours		
	Men	Women & boys	£ s.	Men	Women & boys	£ s.
Labour	75.7	7.7	20 14	68.3	8.6	19 15
Power: Tractor	26.6		5 18	23.7		5 2
Horse	.3			.8		1
Machinery dep. & repair allowance			4 11			4 7
Contract services			1 8			18
Other fuel			1			1
Materials: Seed			1 10			1 16
Fertilisers & manures applied			12 19			14 2
Sundries (Spray materials)			1 16			14
Rent			4 7			4 10
Marketing costs (Transport)			8 6			7 13
Total direct costs			61 10			58 19
Plus share of general farm expenses			8 9			8 9
(including drainage rate)			69 19			67 8
Adjustment for residual manurial values			(-) 1 11			(-) 2 2
Gross cost of production at delivery point			68 8			65 6
Credit value of beet tops			4 14			3 8
Net cost of production at delivery point			63 14			61 18

Note: In this table transport is included as a separate item, thereby reducing the labour and power costs (by comparison with Table 3.3).

Table D.2 Yields, Costs, Returns and Margins

	1961		1962	
Yield of clean beet per acre	15.0		13.9	
	per acre	per ton	per acre	per ton
	£ s.	£ s.	£ s.	£ s.
Sales of clean beet	89 10	5 19	84 14	6 2
Net cost at delivery point	63 14	4 5	61 18	4 9
Margin	25 16	1 14	22 16	1 13

Printed by Metcalfe & Co. Ltd., Cambridge