Sugar beets

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SUGAR BEET IN THE SOUTH WEST

1959

by

MARGARET LOADMAN, B.Sc., (Hons.)

and

J. E. HARRISON, M.Sc.

Price Three Shillings and Sixpence

I, COURTENAY PARK,
NEWTON ABBOT,
DEVON.

THE 1959 SUGAR BEET CROP IN THE SOUTH WEST

An Economic Study on 48 Farms in

Cornwall, Devon and Dorset

CONTENTS

FOREWORD

During the past twenty years British farmers have been increasing their share of the home sugar market. This rose from 18% in the period 1934 to 1938 to 26% in 1959. The total sugar beet acreage has remained fairly constant during this period but yields of sugar beet roots per acre are at least twenty five per cent higher than those obtained in the years immediately prior to the war. The world market in sugar is complicated by various agreements, and imports to this country from the Commonwealth are fixed at a price well above the 'free' world price. This should not be forgotten when congratulating farmers for their willingness to produce increasing quantities of beet without receiving any subsidy. The price realised by the British Sugar Corporation for sugar equals that paid for imported raw sugar.

This report deals solely with the sugar beet crop in the South West but the national picture must nevertheless be borne in mind. There is little doubt that cane sugar producers could increase their production considerably and an expansion in sales might well result in a reduction in unit cost, which would have repercussions on the price paid for beet in this country.

The department gratefully acknowledges the co-operation of those farmers who supplied the information that forms the basis of this report, and also the assistance given by members of staff of the British Sugar Corporation, Southern Area. The field work was carried out by Miss M. Loadman, who was also responsible for the analysis of the data. The report was written jointly by Miss Loadman and J.E. Harrison.

S. T. MORRIS

Provincial Agricultural Economist

I. INTRODUCTION

Sugar beet is of little importance in the counties of Cornwall, Devon and Dorset, occupying less than 0·1% of the total acreage of crops and grass. Only in Cornwall is the sugar beet acreage greater now than it was ten years ago. The increase in this county may be a reflection of the difficulties experienced by Cornish farmers in marketing field horticultural crops, and sugar beet, with a guaranteed market and price, is quite an attractive crop. The reasons for the considerable reduction in the acreage grown in Devon and Dorset (minus 52% and 29% respectively) are not obvious but it may be associated with the increasing drift from the land in these two counties which is not happening to the same extent in Cornwall.

During the past decade, yields of beet in the South West have compared favourably with those obtained elsewhere in the country, with an upward trend being recorded. The same applies to sugar content so that inability to grow a reasonable crop has not been responsible for the fall in acreage in Devon and Dorset.

The 1959 Crop

Nationally, the yield of sugar beet at 5½ million tons (13·4 tons per acre) was the second highest ever obtained. The yield of sugar per acre for all areas was 45·3 cwt., the highest ever achieved, and the sugar content of 16·9% was the highest recorded since 1947-48 when yields of clean beet were far lower. Yields in the South West were somewhat lower than in the country as a whole, averaging 12·6 tons of clean beet per acre with a sugar content of 16·8% and yielding 42·3 cwt. of sugar per acre. For Cornwall and Devon the yield of sugar produced per acre was 47·7 cwt. per acre from a crop of 14·1 tons of clean beet. Only nine factory areas recorded average yields in excess of 14 tons per acre in 1959, and in the Southern Area as a whole yields averaged below 10·5 tons per acre.

II. THE SAMPLE

The survey relates to 383·3 acres of beet grown in the counties of Cornwall, Devon and Dorset. In Dorset four of the costed crops were situated on the chalk in the South Eastern part of the county, and two in the north near Sherborne. In Devon the crop is mainly grown in the arable district around Exeter with smaller areas in the north near Bideford, and in the South Hams near Kingsbridge. Most beet in Cornwall is grown in the far west, and in the coastal area between Newquay and Padstow. In both Devon and Cornwall the costed sample included growers from each of these areas. The sample was fairly representative of growers in the South West as far as size distribution is concerned, with a certain degree of under-representation of small acreage growers in Devon and, more particularly, in Dorset. Within the sample, average farm size varied considerably, but the relative importance of cereals to root crops on an acreage basis was similar in each county (see Appendix 1. Table (vi)). Most of the costed beet was grown on dairy farms, with milk the most important individual item of output.

After reviewing the return obtained from sugar beet in 1959, the various factors affecting profit are discussed in some detail. The data are available for only one year, but since 20% of the crop grown in the South West was included in the costed sample, the data obtained should have some pertinence to the conditions prevailing in 1959. Yields both of clean beet and sugar on the costed farms were very close to the county yields, and for the South West as a whole were within 1.6% in yields of clean beet and 2·4% in sugar percentage.

Tables showing details of the contracted acreages, the yields during the past decade and the distribution of total inputs will be found in Appendix 1. Tables (i) - (x).

III. RETURNS AND PROFITS.

The average profit per acre obtained from the 48 costed crops was £15·5, with a yield of 12¾ tons of clean beet. Individual profits ranged from a surplus of £78·5 to a deficit of £29·0. Farms on the chalk in Dorset averaged £10 per acre profit, those in West Cornwall earned £16 per acre and those in Devon £19 per acre. Although most growers would possibly consider the contribution of the beet crop to total income in this manner, this is not necessarily valid when individual enterprises are compared. When considering alternative enterprises only variable costs need be estimated since fixed costs will be the same whatever enterprises take the place of sugar beet. Variable costs are those which would not be incurred if sugar beet were not grown, i.e. seed, manure, spray, fuel, marketing charges and harvester depreciation and repairs. Apart from casual labour and overtime, labour is assumed to be a fixed cost but this will not of course be true in the long term. The difference between gross output and variable costs is the gross profit, from which fixed costs have to be met and a profit obtained. The following table shows that the gross profit obtainable from sugar beet is only likely to be exceeded by horticultural crops. These figures for crops other than sugar beet represent results for three recent years and mask considerable yearly variations.

Table 1. Gross Profit per Acre

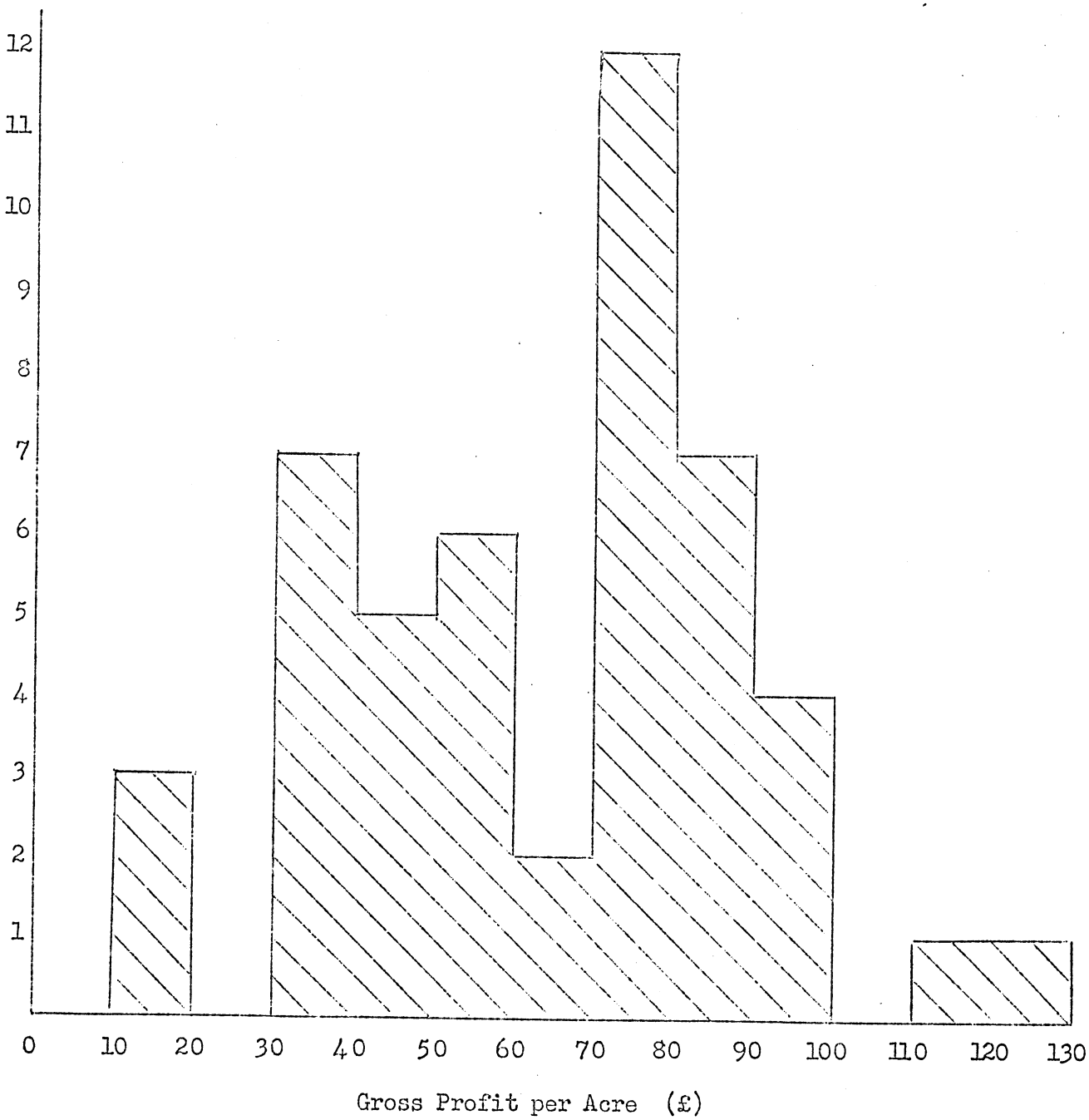
	£
Sugar Beet - hand harvested	78·6
Sugar Beet - mechanically harvested	56·7
Potatoes - main crop	37·0
Potatoes - earlies	50·0
Wheat	23·0
Barley	20·0
Broccoli	80·0
Spring Cabbage	164·0

The weight of clean beet received at the factory from mechanically harvested crops was some 3 tons per acre less than from hand harvested crops and this difference largely accounts for the higher gross profit obtained from the latter. In terms of profits alone, early potatoes would be a better crop than sugar beet since the land would be available for another crop from mid-summer onwards, but despite this advantage, the acreage of early potatoes grown in each of the three South

Figure 1

Sugar Beet in South West 1959

Distribution of Gross Profit Per Acre



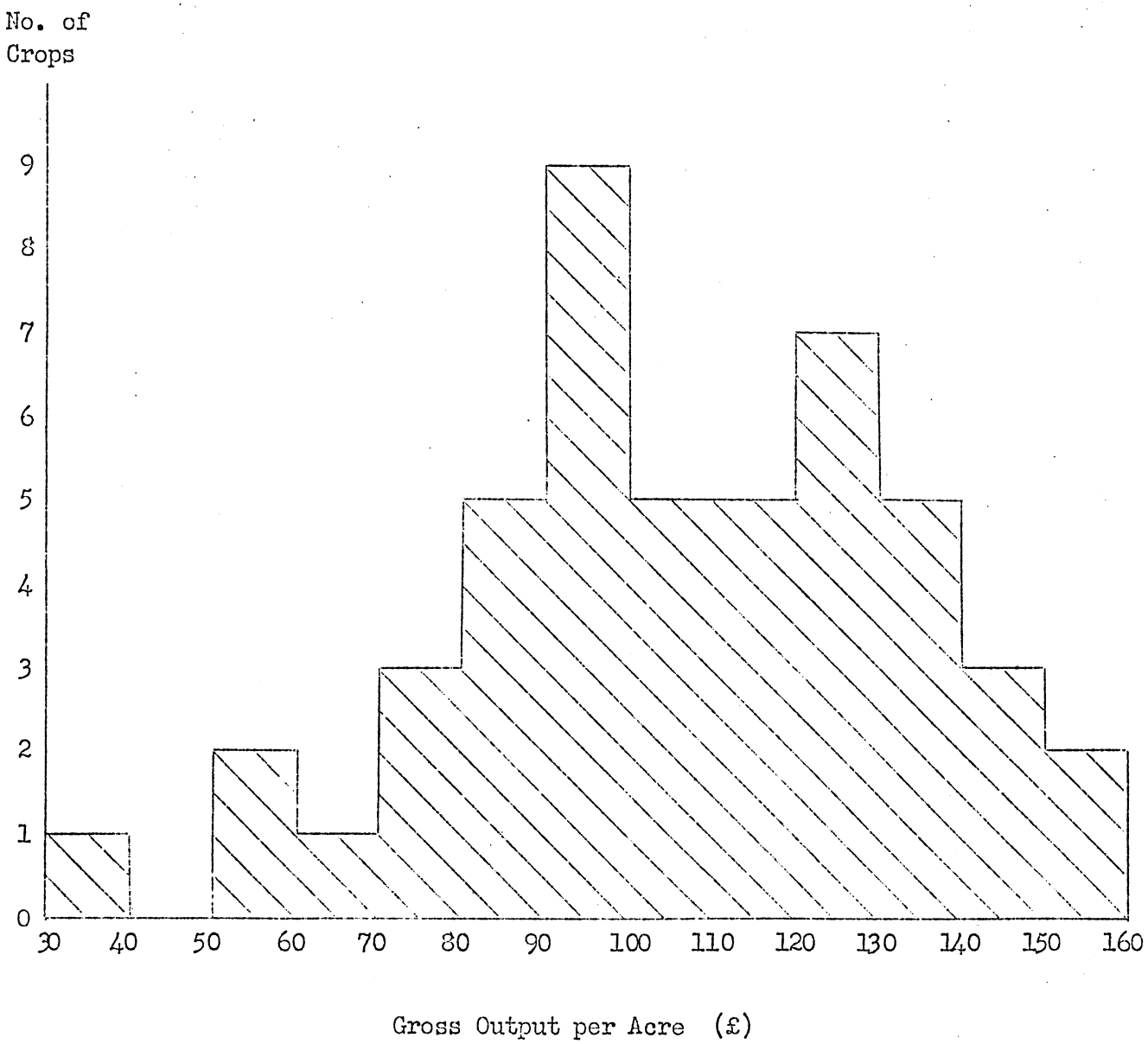
Western Counties has fallen by more than 50% during the past decade. It would also seem advantageous to replace sugar beet with broccoli or spring cabbage despite current problems of marketing. The fact that most dairy herds in Cornwall are being increased in size may account for the willingness to switch from horticultural crops to beet which has no labour requirement in late winter when the demands of the dairy cow are rather heavy. The peak labour requirement for beet arises in the months of May - June and October - November, whereas for broccoli it falls in the period January - March, and for spring cabbage from March to May.

On the sample farms, yields of clean beet varied from 5.5 tons to 20.8 tons per acre. In Dorset the crop averaged only 9 tons per acre compared with 14.4 tons in Devon and 15.6 tons in Cornwall. The percentage of sugar obtained varied slightly from county to county, being 16.1% in Dorset, 16.3% in Cornwall and 16.8% in Devon. The price received for sugar beet depends upon the weight of clean beet delivered and the sugar percentage obtained. Growers are paid a basic price of £6. 10. 6d. per ton with a sugar percentage of 16.5, with a variation of 9d. for every 0.1% change in the sugar percentage. Growers in Dorset had an output of sugar worth only £57 per acre whereas those in Devon had £95 and in Cornwall £101 to cover costs and to provide a profit margin. Although, as will be shown later, the cost of moving beet from the field to the factory varies proportionately with yield, most other costs are fixed irrespective of yield and the yield of 9 tons per acre obtained in Dorset gave growers little opportunity to obtain a satisfactory profit. There was little difference in the average yields of beet and sugar percentage on the sample farms and the overall results for the individual counties, as shown in Appendix 1. Table (xii).

Apart from the price received for sugar sent to the factories, growers also have a considerable weight of tops available for feeding or for ploughing in, and are able to purchase sugar beet pulp at a concessionary price. Most growers place considerable importance on the value of tops but little on the reduced price of pulp. In this survey, tops, with a feeding value akin to kale, have been valued at 25/- per ton consumed, but this may well be an underestimate of their true value. According to work carried out by the National Agricultural Advisory Service recently in South Devon the average crop of kale grown on dairy farms yields only about 14 tons of consumable green matter. The weight of sugar beet tops relative to root weight varies according to weather conditions and in 1959 the British Sugar Corporation estimated that in the South West the weight of tops was about 90% of rootweight. Assuming a 20% wastage, the average weight of tops used for feeding was approximately 9 tons per acre providing more than half the yield of an average crop of kale. Since tops can be fed to all classes of grazing livestock their

Figure 2 Sugar Beet in the South West 1959

Distribution of Gross Output Per Acre



value on a livestock farm is evident.

Many costed growers did not take up their quotas of dried sugar beet pulp available at a reduced price. This quota provides them with 1½ cwt. of pulp for every ton of clean beet sent to the factory, with a price reduction of £2 per ton. Nutritional experts recommend the use of pulp for dairy cows and young stock, but since the price at which it may be purchased has been comparable to feed grains many farmers have lost interest in using it, and compounders now take a far larger percentage of the total production than they did 10 - 12 years ago. Sugar beet pulp may be used to replace oats on a 1 lb. - 1 lb. basis and to the grower of beet the prices of both are more or less the same.

IV. PROFITABILITY FACTORS

1. Yields and Margins

Most surveys of the sugar beet crop in this country have revealed a close connection between yield of beet and the final profit. The following table shows that this was the case in 1959 in the South West.

Table 2. Relationship between Margin, Yield and Inputs per Acre.

Margin	Over £30	£0 - £30	Deficit
Total inputs	£86.1	£74.2	£77.7
Total inputs less marketing charges	£67.5	£61.3	£67.2
Yield of clean beet	17.1 tons	12.4 tons	9.9 tons

Most of the variation in inputs in these three groups is due to the affect of yield on marketing charges. After eliminating these, the average cost of growing 17 tons of beet in one group and 10 tons in another, is almost identical. Therefore, any steps that can be taken to increase the yield of beet, as long as the sugar percentage is not reduced, are likely to increase the profit obtained. Some factors affecting yields, such as soil and weather conditions are outside the control of the farmer, whilst others such as row width, date of sowing and manurial application are within his control. Other factors such as methods of singling and harvesting, although having very positive effects on costs, have a more tenuous connection with yields.

2. "Break-even" yields

The yields of clean beet required in order to "break-even" or to provide a certain profit per acre depend upon:-

(a) the price received for the beet
(b) the marketing costs
(c) the cost of production.

In 1959 the guaranteed price of £6. 10s. 6d.* per ton was based on a payment of 7/6d per cent for a crop containing 16·5% sugar, plus

* During 1959 4d. per ton was deducted for the Research and Education Fund and for Growers Representatives.

an additional 6/9d. The price paid per ton varies from this figure by 7/6d. for each 1% change in the sugar content. The net effect of this price system is that growers with beet yielding less than 16·5% sugar do in fact receive more per ton of sugar than those with yields in excess of 16·5%. However, to obtain the same return per acre, growers of beet with a low sugar content need a greater yield per acre, and have to incur heavier transport charges.

In 1959, the average cost of producing an acre of sugar beet, excluding marketing charges, was £65·5 and a yield of 10·5 tons of beet with a 16% sugar content was necessary to meet this cost. If the value of tops was omitted, then the necessary yield would be 12·2 tons. The yields of beet required at different levels of sugar content in order to "break-even" and to provide a margin of £20 per acre are set out in Table 3.

Table 3. Yields and Sugar Content per Acre Required to "Break-even" and to show a Profit of £20*

Sugar Content	"Break-even" Yields			Yields for £20/acre Profit		
	14%	16%	18%	14%	16%	18%
	tons	tons	tons	tons	tons	tons
Value of tops ignored	14·2	12·2	10·7	18·6	16·0	14·0
Tops at feed value	11·9	10·5	9·4	15·5	13·7	12·2
Tops at manurial value	13·6	11·7	10·4	17·7	15·3	13·5

* This data is correct for prices prevailing in 1959. The guaranteed price was reduced by 2/6d. per ton in the 1960 Price Review. See Appendix 1 Table (xx).

In order to "break-even" or to obtain a margin of £20 per acre, the yield requirements of individual growers will, of course, vary from those shown in Table 3 to the extent that their costs are lower or higher than £65·5 per acre.

3. Manures and Fertilisers

The data in Appendix 1 Table (xiii) has been classified into yield groups and within these groups the plant nutrients available to the

beet crop are shown. No relationship could be found between the tonnage of clean beet or yield of sugar and fertiliser application.

Farmyard manure varies appreciably in its content of plant nutrients according to its source, and the values placed upon these in this report will no doubt have been underestimated in some cases and overestimated in others. One third of the nitrogen (total 9 lb. per ton), two thirds of the phosphate (total 4 lb. per ton) and three quarters of the potash (total 10 lb. per ton) in F.Y.M. were considered to be available to the crop in the year of application.

No F.Y.M. was applied to any of the costed beet acreage in Dorset, and as yields of clean beet in this county were exceptionally low for reasons other than the non-use of F.Y.M. (see Page 25) the Dorset farms have been eliminated from the following comparison.

In Devon and Cornwall the average dressing of farmyard manure was 14 tons per acre but this varied from 5 to 30 tons per acre on individual farms. The following data suggests that no additional yield was obtained by applying plant nutrients in the form of F.Y.M. when the overall availability of nutrients was satisfactory:-

Table 4

	Devon and Cornwall	
	Yield of clean beet per acre	No. of Farms
With F.Y.M.	14.2 tons	26
Without F.Y.M.	15.4 tons	16

In fact most growers using farmyard manure applied more artificial fertiliser than those not using farmyard manure as Table 5 shows, whereas the British Sugar Corporation advises a reduction of from 25% to 33% in these circumstances.

Table 5 indicates that both on farms applying F.Y.M. and those not applying F.Y.M. phosphate and potash applications were considerably greater than recommendations made by Cooke (1960) for soils of average fertility. However, when the level of available phosphate in the soil is low the recommended dressing of phosphatic fertiliser is doubled. The

Table 5. Plant Nutrients per Acre - not adjusted for Residual Manures

	lb. available		
	N	P_2O_5	K_2O
Without F.Y.M.			
Applied 1959	106	83	232
Recommended*	112	56	168
With F.Y.M.			
Applied 1959 - from artificials	98	106	213
- from F.Y.M. 14 tons/acre	48	63	118
Recommended* - from artificials	78	39	112
- from F.Y.M. 10 tons/acre	34	45	84

Table 6. Cost of Plant Nutrients.

	No. of Farms	Cost per Acre			
		Applied 1959		Recommended*	
		Artificials	F.Y.M.	Artificials	F.Y.M.
		£	£	£	£
Without F.Y.M.	26	8.1	-	6.4	-
With F.Y.M.	22	15.2	17.6	4.7	12.5

* G.W. Cooke. Fertilisers & Profitable Farming. Crosby Lockwood 1960.

heavy application of phosphate on the survey farms may, therefore, have been due to the low status of this element in the soil. This suggestion is supported by the fact that considerable quantities of phosphate are removed from the soil in the production of milk, which is pertinent since dairy herds were kept on the majority of the costed farms.

On farms where no F.Y.M. was used it is surprising to find less than the recommended amount of nitrogen being applied, since nitrogen has a greater effect on "top" weight than any of the other plant nutrients, and most beet growers placed considerable importance on the value of tops for livestock feeding.

In almost every case N, P_2O_5 and K_2O applications exceeded Cooke's recommendations, based on optimum requirements. It would be natural to expect that dressings greatly in excess of these recommendations would initially raise yields, albeit uneconomically, and that at a certain level increased dressings would actually depress yields. There is no evidence that either has occurred on any of the farms in the sample.

Suitable combinations of straight fertilisers, F.Y.M. and salt, together with the cost of these dressings to meet Cooke's recommendations for soils of average fertility are set out in Appendix 1 Table (xiv).

Although there is a wide range of compound fertilisers on the market at the present time, only one approaches the required ratio for sugar beet of 2N : 1P : 3K. Applying the total nutrient requirements in the form of this compound fertiliser, the cost per acre amounts to £7.13s.4d. This is reduced to £6. 8s.9d. if straight fertilisers are used, but the advantage of £1. 4s. 7d. in favour of the latter will be reduced by a small mixing charge.

By applying 3 cwt. of salt per acre, the need for K_2O is reduced by 0·8 cwt. per acre, but owing to heavy delivery charges on salt in the South West, which involves the grower in a charge of £5 per ton more than in the Midlands, the cost of applying 3 cwt. of salt per acre is 15s.0d. greater than the application of additional K_2O. Apart from this, salt has to be applied separately which further raises the cost of replacing K_2O. Since Kainit, which contains salt and potash, is now more freely available, there is little justification for using salt in the South West.

When F.Y.M. is used to supply some of the required nutrients, costs are considerably higher - amounting to £17.4s.9d. and £18.6s.0d. where salt is also applied. It must be emphasised, however, that the cost of F.Y.M. is determined by the value placed on the manure and the

method of application. In the estimated gross costs in Appendix 1 Table (xiv) F.Y.M. has been charged at £1 per ton and spreading at 5s.0d. per ton, this being the average cost for the sample.

4. Seed.

Sugar beet growers have the option of using either natural seed, a cluster of separate seeds, or rubbed and graded seed consisting of two or three individual seeds and generally sown with a precision drill. Seed growers have produced a monogerm seed but their efforts to secure a satisfactory germination rate have not so far met with complete success. Once this has been achieved, labour requirements for singling will obviously be much reduced.

The weight of seed used by growers sowing rubbed and graded seed varied considerably, from 4 to 12 lb. per acre. Natural seed is generally used at the rate 12-15 lb. per acre. There seems little advantage, therefore, in sowing 12 lb. of the more expensive rubbed and graded seed since given equal germination the number of plants emerging will be identical and no saving in singling time can be expected. The British Sugar Corporation recommends a seed rate of 6 lb. of rubbed and graded seed, raising this to 8 lb. for March drilling when germination is liable to be lower, and reducing it, on all but the lightest soils, to 4 lb. for late sowing. Several of the costed growers in Dorset used as little as 4 lb. of seed per acre, and since most beet in the county is grown on light loam soils this could be one reason for the low yields of beet obtained there.

Table 7 shows the yield of clean beet and the labour requirements for hand cleaning on farms in Devon and Cornwall using various types of seed. Those growers who used (a) mechanical thinners, (b) more than 10 lb. of rubbed and graded seed, or (c) a mixture of various types and weights of seed have been excluded. The advantage of using rubbed and graded seed at a low seeding rate per acre is shown in terms of both yield of beet and labour requirements for cleaning. The labour requirements for rubbed and graded seed sown at the high rates are exceptionally high. The weights of seed used by costed growers did not appear to be fixed by the date of sowing and most growers bought far more seed than they actually sowed.

Only two growers, both situated in Cornwall, used mechanical thinners in 1959. No hand cleaning (other than for headlands) was required in either case and only about 5 man hours and 3 tractor hours were required per acre to complete the singling and cleaning mechanically and

to perform all inter-row cultivations. These figures are very satisfactory compared with an average labour requirement of over 60 hours for singling and inter-row cultivations. On the other hand, the yield in one case was 14.7 tons of clean beet per acre, and in the other only 10.0 tons. Experiments carried out by the National Institute of

Table 7. Type of Seed, Yield of Beet and Labour Requirements for Cleaning.

Type of Seed	Natural	Rubbed and Graded Precision Drilled		
Seed rate/ acre (lb.)	10 - 15	4	5 - 6	7 - 10
Tons of clean beet/acre	13.5	16.4	15.8	15.2
No. of farms	11	6	12	6
No. of acres	38.5	57.0	60.0	45.3
Singling and hand cleaning (hours)	58.2	50.2	58.2	85.2

Agricultural Engineering suggest that the average loss of yield as a result of mechanical thinning might be about 2 tons per acre, worth about £11. In the case of the two farms considered here the reduction in cost amounted to slightly under £9 per acre but the effect upon the yield obtained is not of course known. The greatest advantage of a mechanical thinner is the reduction in man hours required during May and June which are two of the peak labour requirement months of the year for most farms. If plentiful skilled casual labour is available mechanical thinners would seem to provide little scope for economy or increasing profits under present conditions.

5. Row Width.

Of the 383 acres costed, 200 were grown in 20" - 21" drills, and the remainder split more or less equally between those on 22" - 24" drills and those grown on 17" - 19" drills. No significant variation in yields can be expected between 20" and 21" rows but some significant relationship might be expected to arise at wider extremes. The comparison has been made for crops grown in Devon and Cornwall only.

Table 8. Yield and Row Width

	Average Row Width	
	22·4"	18·3"
Number of farms	8	12
Yield of clean beet per acre	12·7 tons	17·2 tons
Hours per acre hand singling and cleaning	60	85
Margin per acre	£12.0	£33·8

The larger yield of 4½ tons per acre obtained from the higher density crop cannot be attributed to manurial applications which were actually considerably higher (30%) in the lower density crops, mainly as a result of a greater dependance on farmyard manure. The additional cost of singling and harvesting the high density crop is more than balanced by the value of the additional yield obtained. The difference in row width results in the total length of rows per acre in the high density crops being almost one mile longer which might be expected to add 22% to the time required for singling and hand cleaning. On the costed farms the extra time required amounted to over 40%, primarily for second cleaning, and the cost was about £4.15s.0d. After deducting the transport charge, and the cost of carting the additional beet from the field, the additional return obtained from the higher density crops would be at least £17 per acre.

6. Spraying.

The weather conditions prevailing during the 1959 growing season were similar to those experienced in 1939 and 1947 when serious damage was done to the beet crop by virus yellows, a disease spread by aphids. Nationally, more than 90% of the crop was sprayed with systemic insecticides to control the aphids and according to Dr. R. Hull, of Rothamsted, this was responsible for about one million tons of the 1959 yield of 5½ million tons. National spraying experiments were carried out at 15 widely separated centres during 1959 and in every case the sprayed acreage yielded more heavily than the unsprayed, averaging over 20% heavier yields.

In the South West, two thirds of the costed acreage was sprayed but yields of clean beet on this acreage were 21% lower than on the unsprayed acreage.

Manuring policy, row width, type of seed sown and methods of harvesting were similar in the two groups of costed farms and the

difference in yield cannot be attributed to these factors.

Table 9 Yield and Spraying

	Sprayed	Unsprayed
No. of farms	25	23
No. of acres	257	126
Yield of clean beet (tons/acre)	11.8	14.9

All the costed crops in Dorset were sprayed (144 acres). Yields of clean beet in this county were exceptionally low for reasons discussed elsewhere and this explains the disparity in the yields shown above. Yields of clean beet from sprayed and unsprayed crops in Devon and Cornwall were as follows:-

Sprayed	15.0 tons
Unsprayed	14.9 tons

These figures suggest that growers in the South West are not obtaining the same increases in yields that growers elsewhere obtain from spraying - why?

In 1959 the British Sugar Corporation issued spray warnings based on aphid counts, made by field staff, and weather conditions. It is possible that some growers were slow to respond to the warnings and sprayed after the aphids had spread to a large percentage of the plants in a field. In fact very few growers sprayed in May which, in 1959, was the month when aphids first appeared in quantity and many of the costed crops were sprayed in late June or early July by which time they were probably seriously affected by virus. The spray controls only the aphids and has no affect whatsoever on the plant already afflicted with virus yellows. Furthermore, some growers were not using the correct systemic insecticides, and this provides another reason for the lack of response to spraying. Spraying as a regular measure irrespective of the presence or otherwise of aphids is not recommended by the Corporation, because apart from the actual cost of the operation, indiscriminate spraying might kill off the predators and parasites of aphids.

The actual operation of spraying costs approximately 25s. 0d. per acre including spray (£2 contract) but excluding depreciation of the sprayer. In some seasons two sprayings may be recommended. At the

basic price (net of freight) an increase in yield of only 0.22 tons is required in order to cover the cost of spraying once. There is little doubt that had costed growers sprayed at the right time, the increased yields would have more than covered costs.

7. Date of Sowing.

In some years beet sown in March or early April yields far more heavily than beet sown later. In 1959 weather conditions in the South West were such that yields generally varied little for crops sown at different times up to the end of April. On the other hand beet drilled in May suffered from the dry early summer and yielded about 3 tons less than beet sown earlier. It was also noticed that the acreage sown in March yielded less than that sown during any other month but this was due primarily to the fact that most of this acreage was in Dorset.

Table 10. Yield and Date of Sowing

Date of sowing	Yield of clean beet per acre	Yield of sugar per acre
	tons	cwts.
March	9 (exc.Dorset 14.6)	28.7 (exc.Dorset 46.0)
1st 2 weeks April	16.1	53.1
Last 2 weeks April	14.6	47.9
May	11.4	36.5

In 1960 beet sown in early April seems likely to yield several tons per acre more than later sown beet due to very dry conditions in late April and May. In 1959 some growers who drilled early had to re-sow because heavy storms in April washed the small beet plants away where the ground was rather steep. It is not possible, therefore, to make any general recommendation for time of drilling that will be satisfactory to all growers but not later than April would appear to be the best guide.

8. Weather Conditions.

For maximum yields sugar beet required frequent rainfall

interspersed with regular sunshine or bright skies. The yield of sugar is directly related to the intensity of light received by the crop. The South West normally records a higher rainfall total during the period April to September than most other beet growing areas of the country and slightly less intensity of light than, for instance, the Eastern Counties. The growing season is, however, far longer than in most other parts of the country and certainly in Devon and Cornwall as distinct from Dorset growth continues well into November. This factor may provide yet another reason for consistently lower yields in Dorset. The period from May to October in 1959 was exceptionally dry and rainfall in the South West was much below average and in line with conditions elsewhere in the country.

Tables showing the inches of rainfall and hours of sunshine recorded at various centres in the Province will be found in Appendix 1 Tables (xv) and (xvi). No connection between hours of sunshine and yield of sugar can be discerned and in fact the lowest yield of sugar per acre coincides with the highest number of hours of sunshine. This was recorded at Dorchester. It is rather surprising to note that the sugar percentage for beet grown in the South West averaged 15·9%, a lower figure than that recorded for any of the Corporation factories. Even Cupar in Scotland recorded a higher sugar content despite a very much shorter growing season than in the South West.

Rainfall in the South West was up to average during the period from January to April and there is no reason for thinking that the soil reservoir in terms of inches per foot of available water was below field capacity at the beginning of the growing season. In all but the lightest soils there would probably be at least 3" of water available in the top 2 feet of the soil, which is the effective rooting depth of the sugar beet plant. The sugar beet crop uses approximately 1" of water every 10 days in April, May, June and August and 1" every 8 days in July. Thus from May to August the crop requires about 13" of water. Apart from the Newquay district of Cornwall,(where $6\frac{1}{2}$" fell in August alone), only 5" - 8" of rain fell during this period and in all areas there was more than a 50% deficiency in the critical month of July. Normally rainfall from September onwards is heavy enough to meet all the requirements of the crop but in 1959 there was a deficiency of at least $2\frac{1}{2}$" of rain throughout the South West during this month and as a result yields of beet were undoubtedly reduced. A further factor was the unusually high temperature experienced in 1959 and this undoubtedly raised the loss of water by evaporation above the normal level, further aggravating the water deficiency. In addition to the effects of water deficiency it is realised that if a plant receives too much water too early in life there is a tendency towards shallow rooting. This probably occurred in the very wet April of 1959 and thus the effect of the drought was accentuated.

9. Method of Harvesting.

In 1959, 63% of the acreage of beet grown in England and Wales was harvested by mechanical harvester, either partially or completely. Generally speaking growers appear to be satisfied with mechanical harvesting despite heavier dirt tares and the additional handling of the lifted beet which arises, due to harvesting the entire crop in periods of good weather and the consequent need for storing. In good conditions an acre of beet can be lifted mechanically in about 3 hours (though the average would be nearer 5 hours) whereas ploughing out, hand pulling and topping will require about 45 hours. During mechanical lifting some beet are missed by the harvester and consequently left in the ground. Even under good conditions the amount of beet lost in this way can be quite substantial. At the Yorkshire National Sugar Beet Harvesting Trials in 1959, under good conditions losses averaged 16 cwt. per acre, varying between 6 cwt. and 36 cwt. for different machines. When the depreciation of the harvester, and the additional cost of carting extra tare to the factory are taken into consideration it will be appreciated that the financial benefit of mechanical harvesting may be very small indeed. In view of this, how did the mechanically harvested crops in the South West compare with hand harvested crops in 1959? The costs of harvesting in Dorset differed considerably from those incurred in Devon and Cornwall due mainly to lower yields and are discussed separately.

(a) Harvesting in Devon and Cornwall.

The following data refers to the 42 costed farms in Devon and Cornwall on which more than half the beet acreage was harvested mechanically. With almost identical yields, margins were slightly higher for hand harvested crops.

Table 11. Yield of Beet and Margin per Acre - Hand and Mechanically Harvested Crops

Method of Harvesting	Hand	Mechanical
No. of farms	25	17
No. of acres	101.3	137.8
Yield of clean beet/acre (tons)	15.2	15.0
Margin/acre	£24.5	£22.8

Top and dirt tare was only slightly higher from mechanically harvested crops than from hand harvested crops and resulted in an increase of only 11s.0d.per acre for transport charges for similar yields of clean beet.

Table 12. Total Tare - Hand and Mechanically Harvested Crops (adjusted to normal yield of 15 tons/acre clean beet)

Devon and Cornwall

Method of Harvesting	Total tare to factory:-			
	as % of dirty beet	per ton clean beet	per acre	cost of tare transport per acre
	%	cwt.	cwt.	£ s d
Hand	11.5	2.6	39.0	1 15 11
Mechanical	14.4	3.4	51.0	2 6 11

The labour requirement for harvesting is not likely to vary appreciably with different yields but will increase pro rata for every additional ton carted from the field. In many instances it was not possible to separate with any accuracy the labour used for actual harvesting from the labour required for carting the crop from the field to the station. The following tables include, therefore, only those farms where the cost of carting the beet as opposed to lifting it could be ascertained.

Table 13. Harvesting Costs and Manual Labour Requirements - Per Acre (adjusted to normal yield of 15 tons/acre clean beet)

Devon and Cornwall

Method of Harvesting	No. of farms	Av. acres of S.B. grown	Man Hours	Harvester Depreciation	Labour and Power	Total Costs
				£ s	£ s	£ s
Hand	16	3.3	94	-	21 1	21 1
Mechanical (complete harvesters)	6	11.0	51	2 10	15 0	17 10

Table 14. Harvesting Costs Per Acre with Complete Harvester
(adjusted to normal yield of 15 tons/acre clean beet)

Devon and Cornwall

Harvester	Initial Cost of Harvester	Costed Acres Harvested	Harvester Depreciation	Labour and Power	Total Costs
	£	acres	£ s	£ s	£ s
1. Viking*	160	7.0	2 15	19 2	21 17
2. Fisher Humphries	200	14.5	1 13	13 6	14 19
3. Peter Standen Jnr.	350	10.0ø	1 9	19 16	21 5
4. Catchpole	375	12.0	3 15	14 13	18 8
5. John Salmon	445	8.3	6 9	9 4	15 13
6. Viking	450	14.0+	15	14 16	15 11
Wt. Av.	-	-	2 10	15 0	17 10

* Purchased second-hand
ø This harvester lifted a further 19 acres in 1959
\+ This harvester lifted a further 56 acres in 1959

None of these tables take into account any loss due to beet not harvested. It would appear that this is unlikely to have been less than 15 cwt. per acre, worth some four guineas after deduction of transport charges. This would more than make up for the apparent cost reduction of £3.11s.0d. per acre obtained by mechanically harvesting.

The total cost of harvesting at actual yields for all harvesters found on costed farms are given in Appendix 1 Table (xvii).

Although the data in Tables 13 and 14 refer to only six mechanical harvesters the total manual hours per acre required for harvesting and carting on these farms were not dissimilar to requirements on the remaining 11 farms and there is reason for believing that the comparisons made are reasonably valid for all mechanically harvested crops.

Data presented by Nix in a recent Cambridge report on growing sugar beet ≠ shows that the average cost of mechanical harvesting in the Eastern Counties in 1957 was £13.4 per acre. The following table suggests that in the South West this is a more expensive operation requiring an average of 21 more man hours per acre.

≠ Economics of Producing Sugar Beet 1957. J.S. Nix, Farm Economics Branch, School of Agriculture, University of Cambridge.

Table 15. Harvesting Costs per Acre with Complete Harvester.
(adjusted to normal yield of 15 tons/acre clean beet)

	No. of Machines	Man Hours	Dep'n and Repairs	Labour and Power	Total Costs
			£ s	£ s	£ s
Eastern Counties 1957	44	30	3 10	9 18	13 8
Devon and Cornwall 1959	6	51	2 10	15 0	17 10

Examination of individual records suggests that the bulk of the additional labour used in the South West was involved in re-topping roots dealt with inadequately by the harvester and in additional handling after lifting. In fact, the tractor and man hours required for carting and loading were higher in the case of the mechanically harvested crops, despite lower yields, than for the hand harvested crops. Prior to December the harvesting season was generally dry and dirt tare little higher for mechanically harvested crops than for crops lifted by hand. The additional handling time during the early part of the harvesting season cannot therefore be attributed to the necessity to cart large tonnages of dirt as well as beet from the field. In December, wet weather seriously hampered harvesting and much of the double handling recorded on costed crops would have been necessary to separate roots and soil, since few growers possessed cleaner-loaders, equipment introduced recently with the aim of reducing the dirt tare on mechanically harvested beet. It should be emphasised that very little casual labour was employed for either hand or mechanical harvesting, and reduction of labour requirements for harvesting would not necessarily result in any reduction in total wage bill to the farmer. On the other hand, the work is not particularly enjoyable and elimination of unpleasant tasks often results in an improvement in carrying out other operations.

One further point is worth noting in attempting to explain the difference between South West and Eastern Counties results shown in Table 15. Nearly all beet growers in the South West are milk producers and the tops are fed to dairy cows. On the costed farms only one grower ploughed his tops in, whereas in the Eastern Counties about 80% of the tops are ploughed under. Since dairy stock require moderately fresh tops, most would be wasted if several acres were lifted together. Therefore, dairy farmers tend to spread beet harvesting over an extended

period so that a continuous supply of tops is available and thereby increase the labour requirements and cost of harvesting. This, of course, applies to both hand and mechanically harvested crops. Man hours required in the Eastern Counties for hand harvesting a 15 ton crop were 75 in 1957 compared with 94 in the South West in 1959.

Harvesters have been adopted rather later in the South West than in other parts of the country and it is possible that as yet they are being operated less efficiently than those in other areas. Apart from the question of poor topping, already referred to, stoppages were quite common and these resulted in the carting gang being out of work for long periods of time. Some improvement in running efficiency can be anticipated in the future.

(b) Harvesting in Dorset.

Four of the six costed growers in Dorset lifted their crops with complete harvesters. Their costs, adjusted to a normal yield of 12 tons clean beet per acre, are given in the following table.

Table 16. Harvesting Costs with Complete Harvesters in Dorset - Per Acre (adjusted to normal yield of 12 tons/acre clean beet)

Harvester	Initial Cost of Harvester	Costed Acres Harvested	Harvester Dep'n	Labour and Power	Total Costs
	£	ac.	£ s	£ s	£ s
Catchpole	450	11.0	4 18	15 16	20 14
Peter Standen Dumper	450	37.0	1 9	24 0	25 9
Stoll	700	30.0*	2 7	11 16	14 3
Stoll	745	46.3	1 19	10 17	12 16
Wt. Av.	-	-	2 3	15 11	17 14

* This harvester lifted a further 6 acres in 1959

Too much should not be read into results obtained from only four farms in one season. However, the difference in cost of performing the same task with similar equipment is so considerable that further investigation seemed desirable. Although the distance from the station to individual farms varied from about ½ mile to 1½ miles this in isolation was not sufficient justification for the variation in costs. The operation of

harvesting in every instance extended well into December, and each machine had an area of beet to lift in wet conditions. The soils on all four farms were largely light or medium loams. In each case practically all the beet was dumped in heaps at the ends of rows and later carted to the station. Neither of the farmers recording low total costs per acre indulged in hand topping after the harvesters. Despite this, the total tare (tops and dirt) was lower for these two farms than for the other two where far more handling of lifted beet occurred.

The Peter Standen and one Stoll were being used for the third season, the other two for their second season, so lack of experience in using the equipment should not have accounted for the peculiar results.

In some cases weather undoubtedly affected harvesting costs, these increased as the weather deteriorated. This is shown in Table 17 by data relating to one of the high cost farms where the beet was harvested in three separate periods. The faster working rate of the harvester and reduced hand labour for handling beet in December when the weather had broken was due to the variation in yields between the three fields concerned. If the yield in the field harvested last had equalled

Table 17. Hours per Acre Required for Harvesting

Period of Harvesting	Manual		Tractor	Yield
	Harvester	Topping & Loading		
	hrs.	hrs.	hrs.	tons
29th Sept. - 20th Oct.	20	67	10	10·4
21st Oct. - 6th Dec.	22	68	11	14·2
7th Dec. - 11th Jan.	14	54	7	6·1

that of the second field manual labour requirements would have been 72 hours greater and thus far in excess of requirements in the drier period of the harvesting season. Total tare was very much heavier in the field harvested last, accounting for 16·5% of the weight sent to the factory compared with 9·3% for the other two fields.

Once the growing season has ended very little loss of sugar occurs if beet is lifted and clamped and only a very severe frost will affect the roots. This being so, growers using mechanical harvesters

would be well advised to consider lifting all their beet by early December and ensiling the tops to prevent waste. This should result in a saving in both man hours and in transport charges for carting soil to Kidderminster.

(c) Harvesters for Small Acreages.

During the period 1948-52 a number of small beet harvesting units were introduced to this country, in most instances from the Continent. At that time it appeared that the Roerslav, Mern, Dameco and Fordson harvesters would prove of considerable value to growers with up to about ten acres of beet. In 1950, in a very wet season, growers using these harvesters in the South East* were able to reduce manual labour requirements for harvesting by almost two-thirds, with a net reduction in cost of more than £2 per acre. Since the early 50's these harvesters appear to have fallen out of favour. Of the costed crop in 1959 in the South West only 14 acres on two farms were harvested by this type of equipment and on one farm total costs and labour requirements were higher than would probably have been the case with hand lifting. The farmer recording reasonably low costs had lifted all his beet by the end of November; in the other instance some beet was being lifted at the end of December and early January in deplorable conditions. There is no doubt whatsoever that if mechanical harvesters, either large or small are to be used effectively, then the autumn and early winter programme of work will have to be adjusted so as to allow harvesting to be completed at an earlier date than appears to be present practice in the South West.

Several small acreage growers used contractors to lift their beet at a charge ranging from £8.10s.0d. to £10.0s.0d. per acre. Labour requirements for carting and re-topping ranged from 10 to 30 hours per acre, resulting in an average cost per acre approximately mid-way between those shown in Table 13 for mechanical and hand harvesting.

10. Low Yields in Dorset.

The yields per acre of clean beet sent to the factory have been consistently lower in recent years in Dorset than in Devon and Cornwall. (see Appendix 1 Table (v)). Over the past decade they have been 1·3 tons lower than those in Devon, and 1·9 tons lower than in Cornwall. To some extent this is due no doubt to the longer growing season that most

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* Sugar Beet Costs 1950. Wye College (University of London)

growers, at any rate in West Cornwall, enjoy, when compared to growers in East Dorset. Some of the crop grown in Dorset is to be found on chalk farms with thinnish soils, which are no doubt less suitable for sugar beet than the loams of South Devon and West Cornwall. As far as cereals and potatoes are concerned, this last factor has been countered by Dorset farmers using far greater amounts of fertilisers than farmers in Devon and Cornwall and obtaining generally substantially higher yields, e.g.

Wheat 1958	Cornwall	17 cwt.
	Devon	20 cwt.
	Dorset	23 cwt.
Potatoes 1958	Cornwall	6.2 tons
	Devon	7.2 tons
	Dorset	8.4 tons

However, experience in 1959 and discussion with the Sugar Corporation fieldmen suggest that the difference in the growing season and the variation in soil types, are not the only reasons for low yields in Dorset.

The lower yields recorded in Dorset are particularly noticeable on farms using mechanical harvesters and it would appear that the standard of singling is very much lower in this county than elsewhere, leaving an irregular stand which is difficult to harvest mechanically. The recommended plant population is about 70 to the chain, or 30,000 to the acre. On the costed farms plant population was only about 45 to the chain or some 20,000 to the acre. Not only is the total yield automatically reduced by the reduction in plant numbers but so also is the efficiency of mechanical harvesting. A rough estimate of the weight of beet left in the ground, particularly when it was hard in October and

Table 18. Costed Sugar Beet Crops in Dorset*

Plant Population per Acre	Yield per Acre
18,000	8.9 tons
19,000	7.9 tons
19,100	10.1 tons
20,200	11.0 tons
25,000	12.6 tons

* These are five of the costed farms in Dorset. The sixth had a plant population of 26,000 per acre, but due to extreme acidity the crop was almost a complete failure on 7 out of 15 acres.

early November, was 30 cwt. to 2 tons per acre. This quanity added to the weight lost by reduced plant population would probably have raised yields to the level attained in Devon and Cornwall.

If the suggestion that low yields are due primarily to poor singling is correct, it is difficult to ascertain the reason for poor quality workmanship in a county where the reverse is more usually found. It is true that mechanisation has proceeded at a slower pace in the beet crop than is the case for most other enterprises found in Dorset, and the poor singling may be the result of labour expressing a distaste for this type of work. Most of the singling was carried out by regular farm labour and not by casual gangs, and very little of it was paid for by piece work. In the more important beet growing areas of the country singling is paid for mostly by piece work and this, bringing as it does the opportunity of earning substantially more per week than the basic farm wage, is not regarded with disfavour.

There is no doubt that growers in Dorset are aware of the seriousness of the present position and in 1960 a number have introduced mechanical thinners in an attempt to solve the problem. As is mentioned earlier (Page 14) mechanical thinning may result in a reduction in yield compared with efficient hand singling , and this being so, it is surprising that no attempt has been made to experiment with the transplanting of the beet crop. This has been carried out successfully in Bavaria and was reported upon by Rasmussen and Warley in 1956*. The seedlings raised in soil cubes were transplanted in open ground, an operation which the authors suggested could be carried out mechanically at a lower cost than present methods of drilling, singling and cleaning and with fewer manual labour hours required in the months of May and June. The mechanical equipment cost no more than a "down the row thinner" and the work could be described as reasonably pleasant. There was some reason for assuming that yields might well be increased by transplanting and the effect of adverse weather or pest and disease attack in the early stages of growth would be greatly reduced. Although this system has been followed for some years now by intensive horticultural holdings in this country, it has not so far been applied to general farm crops.

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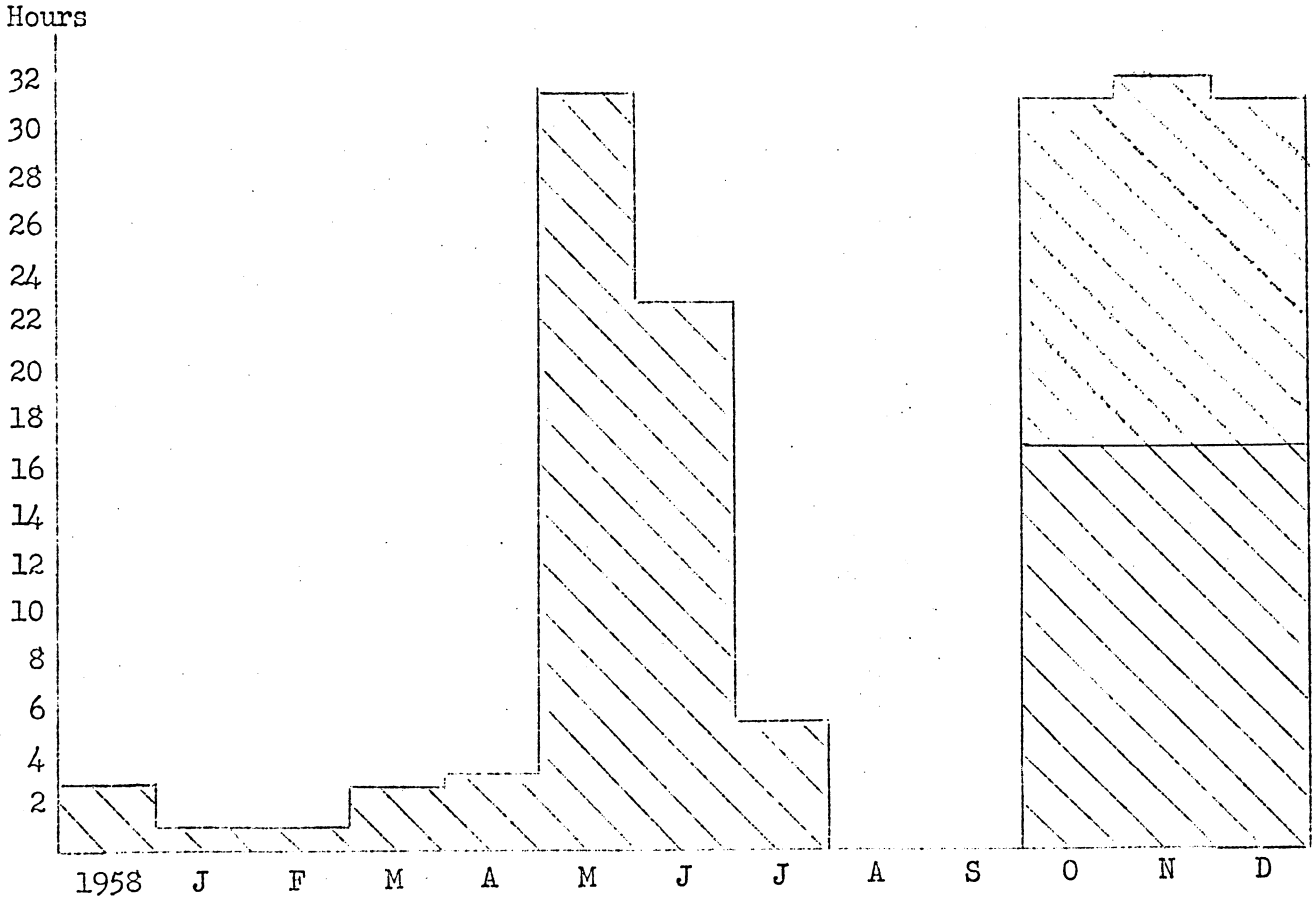
* University of Nottingham, Department of Agricultural Economics. Jan. 1956. "Transplanting of Farm Crops in Bavaria" Knud Rasmussen & T.K. Warley

V. SEASONAL AND OPERATIONAL LABOUR DISTRIBUTION

Table (xviii) in Appendix 1 shows the seasonal manual labour requirements for the beet crop in the South West. Farmers using contract labour have been excluded from this table. The following histogram sets out this information in diagramatic form.

Figure 3. Sugar Beet in the South West 1959.
Seasonal Labour Distribution (exc. farmyard manure)



Additional hours required for hand harvesting compared with mechanical harvesting with complete harvesters; for yield of 15 tons/acre clean beet.

The peak labour requirements fall in the months of May and June, and from October to December. Requirements in May and June can only be altered by mechanisation; requirements during October, November and December are only fixed in total and not for any individual month. The use of a complete mechanical harvester can reduce total manual labour requirements during these months by nearly 50%.

A further table in Appendix 1 Table (xix) shows the time required to carry out various operations. These are given for various field sizes and emphasize the general advantage enjoyed by large growers over small, namely the opportunity to perform a given task in a shorter time. Thus ploughing with a three furrow plough takes 2·9 hours per acre on fields of less than 4 acres in size, and only 1·6 hours per acre on fields larger than 12 acres in area. This is of some importance in Devon and Cornwall where the average field size is only 5 to 6 acres.

VI. FUTURE PROSPECTS FOR SUGAR BEET IN THE SOUTH WEST

For many years growers in the South have been asking for a factory to be established in the Southern Area so that transport costs could be reduced. In view of the world sugar position, and the fact that the Kidderminster factory can usually process all the beet grown in the Southern Area this is never likely to materialise. In any event, if a factory were to be established in, for instance, Hampshire, growers in Cornwall or Kent would not enjoy any reduction in transport costs. The present maximum charge for rail freight is 18s.5d. per ton and for road freight the charge is limited to 40 miles; above these rates transport is at present subsidised by the Corporation. This seems likely to continue indefinitely since farmers in the Kidderminster factory area are not apparently prepared to grow a large enough acreage of beet to maintain an annual throughput of about 220,000 tons. Probably growers in Shropshire would be prepared to grow a limited additional acreage of beet but apart from this area any additional acreage would have to be grown in the Eastern half of the county, where the transport costs would be similar to those for the Southern Area.

Enquiries made to British Railways suggest that the unsubsidised charge for handling beet from South Devon to Kidderminster would be about 33s.0d. per ton and from Cornwall over £2 per ton. If growers had to incur these charges in full the margin now being obtained would be practically eliminated, leaving a deficit in Cornwall, but some margin in Dorset where the distance to the factory is less. It may well be the case that the British Sugar Corporation, in view of the size of its trade, is able to obtain preferential rates for transport, and that the charges quoted above are higher than actually paid. If they are reasonably correct, then the cost of the subsidy paid by the Corporation for the transport of approximately one tenth of the throughput of the Kidderminster factory from Devon, Cornwall and Dorset is about £25,000. This amount is minute when compared with the turnover of the Corporation which is now running at the level of £36½ million per annum. Nevertheless, it is unlikely that the subsidy will be increased in the future, and there must be some possibility of it being reduced.

In view of this, it is interesting to note that an increasing number of growers in the South West are taking their beet by road to the factory. The cost of double handling the harvested beet has already been stressed and the possibility of loading beet directly into the vehicle which can take it to the factory offers scope for cost reduction. Road transport is cheaper than rail transport and has the obvious advantage of offering low rate return transport for beet pulp, either wet or dry. For

instance, the rail charge for pulp from Kidderminster to South Dorset is 69s.0d. per ton, by road only 30s.0d. per ton. Growers with their own transport, and most growers in Dorset have lorries, will no doubt be able to carry pulp at an even lower rate.

In considering the future of beet growing in the South West it seems reasonable to assume that transport costs will not vary appreciably, and to emphasise the probable growth in road transport to the factory unless British Railways reduces its present rates considerably. Most of the sugar beet grown in the South West is found on farms within two or three miles of railway stations and most of the farmers who gave up growing sugar beet in Dorset during the past ten years were situated further away from stations. It seems unlikely that this factor will be as important in the future.

Sugar beet is a high output crop and as the section on gross profits has shown, provides a substantially higher contribution per acre towards meeting fixed farm costs than most other enterprises, as long as yields of about 15 tons per acre can be obtained. The work involved in cleaning and harvesting is often unpleasant and the cleaning frequently clashes with other work. If mechanical methods of cleaning and harvesting can be improved, if not perfected, these objections will be less valid. Although the small grower could no doubt use contractors' services for cleaning, these will not be satisfactory for harvesting for he will be interested only in lifting small areas per day; permits will not be available to send all the beet away at one time, and tops will be of little value for feeding if all the beet is lifted at the same time. Unless tops were available for feeding most small growers would not be prepared to grow beet. At the National Harvesting Trials held in 1959 no machine suitable (in price) for small growers was included in the demonstration. This is unfortunate for the small farmer who, for various reasons, wishes to mechanise the operation of harvesting. He is faced with a fixed annual labour bill and cannot reduce total costs by using a harvester. His costs will, in fact, increase if depreciation is considered, but the harvester may enable him to continue beet growing. Even though total farm profit may be slightly lower, few alternative uses of the land are likely to yield as high a return.

Sugar beet is an eminently suitable crop for the large scale farmer, particularly on a non-dairy farm. With the conditions prevailing today in the potato marketing field an increasing interest in beet is likely to be shown by the large potato grower. Although in some years the return per acre from sugar beet will undoubtedly be lower than from

potatoes, the existence of a guaranteed market and a fixed price makes the crop a very attractive alternative.

Rather than falling further, therefore, the acreage of sugar beet grown in the South West in future is more likely to be extended, if the Corporation permits.

VII. SUMMARY

1. This report outlines the main aspects of sugar beet production in the South West during 1959.

2. Sugar beet occupies less than 0·1% of the total acreage of crops and grass in the South West.

3. During the last decade the sugar beet acreage has increased in Cornwall but decreased in Devon and Dorset.

4. Records were obtained from 48 farms - 23 in Cornwall (126·8 acres), 19 in Devon (112·2 acres) and 6 in Dorset (144·3 acres). The costed acreage represented 20% of the crop grown in these counties.

5. The average yield of clean beet per acre was 12·8 tons with a sugar content of 16·4%. Average yields in Cornwall, Devon and Dorset were 15·6, 14·4 and 9·0 tons per acre respectively. These compare with a national average of 13·4 tons per acre with a sugar content of 16·9%.

6. Net inputs averaged £67·5 and returns for clean beet £83·0. The average profit per acre was £15·5 but ranged from £78·5 to - £29·0.

7. The gross profit obtainable from sugar beet is only likely to be exceeded by broccoli or spring cabbage.

8. Yield of clean beet per acre was the greatest factor affecting profit.

9. Since most crops received generous applications of fertilisers, no relationship could be found between yield of clean beet and manures applied.

10. The average yield per acre of clean beet from crops grown in drills averaging 18·3" was 4·5 tons greater than for crops in 22·4" drills, the additional return obtained from the higher density crop being worth £17 per acre.

11. In the South West, mechanical harvesters, operated at the present level of efficiency provide little scope for any reduction in

costs over hand harvesting.

12. One of the main reasons for the poor yields of beet obtained in Dorset was the poor standard of singling and subsequent reduced plant population.

APPENDICES

APPENDIX 1

Table (i) Sugar Beet Acreages 1949 - 59

	1949	1951	1953	1955	1957	1959
	acres					
Cornwall	643	1082	1051	1048	834	923
Devon	1000	1135	816	612	588	484
Dorset	869	853	628	586	558	616
S.W. Province	2512	3070	2495	2246	1980	2023
% of England & Wales	.60	.74	.62	.55	.48	.48 *
	1949 = 100					
Cornwall	100	168	163	163	130	144
Devon	100	114	82	61	59	48
Dorset	100	98	72	67	64	71
S.W. Province	100	122	99	89	79	81
England & Wales	100	101	98	100	101	102 *

* Provisional

Table (ii) Relative Importance of Sugar Beet 1949 - 59

	1949	1951	1953	1955	1957	1959*
	Per cent of crops and grass					
Cornwall	·10	·17	·17	·17	·13	·15
Devon	·09	·10	·07	·05	·05	·04
Dorset	·20	·20	·14	·13	·13	·14
S.W. Province	·12	·14	·11	·10	·09	·09
England & Wales	1·69	1·70	1·65	1·68	1·70	1·71
	Per cent of total root crops					
Cornwall	1·77	3·97	4·61	5·32	5·32	5·70
Devon	1·58	2·08	1·57	1·37	1·58	1·35
Dorset	5·11	6·19	5·20	6·05	7·41	10·41
S.W. Province	2·15	3·22	2·87	3·03	3·28	3·48
England & Wales	21·19	24·30	24·47	27·39	29·94	31·11

* Provisional

Table (iii) Distribution of Growers and Sugar Beet Acreage between Different Acreage Size Groups - 1959

Sugar Beet Acreage (factory data)

Size Group	CORNWALL			DEVON			DORSET			SOUTH WEST PROVINCE		
	No. of growers	Total S.B. acreage	% S.B. acreage	No. of growers	Total S.B. acreage	% S.B. acreage	No. of growers	Total S.B. acreage	% S.B. acreage	No. of growers	Total S.B. acreage	% S.B. acreage
			%			%			%			%
Up to 5 acres	142	373	39	67	214	44	25	56	8	234	643	31
5·1 to 10 acres	43	293	31	20	138	28	5	35	5	68	466	22
10·1 to 30 acres	9	176	19	4	56	12	8	151	23	21	383	18
30 acres & over	2	105	11	2	78	16	8	427	64	12	610	29
Total	196	947	100	93	486	100	46	669	100	335	2102	100

Sugar Beet Acreage - 48 Survey Farms*

Size Group	CORNWALL			DEVON			DORSET			SOUTH WEST PROVINCE		
	No. of growers	Total S.B. acreage	% S.B. acreage	No. of growers	Total S.B. acreage	% S.B. acreage	No. of growers	Total S.B. acreage	% S.B. acreage	No. of growers	Total S.B. acreage	% S.B. acreage
			%			%			%			%
Up to 5 acres	14	42	28	9	28	22	-	-	-	23	70	15
5.1 to 10 acres	5	38	26	7	48	38	-	-	-	12	86	19
10.1 to 30 acres	4	67	46	3	51	40	2	30	17	9	148	33
30 acres & over	-	-	-	-	-	-	4	148	83	4	148	33
Total	23	147	100	19	127	100	6	178	100	48	452	100

* 69 acres on 5 farms not costed

Table (iv) Distribution of Growers and Sugar Beet Acreage Between Different Acreage Size Groups - Acreage on Survey Farms as Percentage of Total Acreage 1959

Size Group	CORNWALL		DEVON		DORSET		SOUTH WEST PROVINCE	
	No. of growers	Total S.B. acreage	No. of growers	Total S.B. acreage	No. of growers	Total S.B. acreage	No. of growers	Total S.B. acreage
	%	%	%	%	%	%	%	%
Up to 5 acres	10	11	13	13	-	-	10	11
5·1 to 10 acres	12	13	35	35	-	-	18	18
10·1 to 30 acres	44	38	75	91	25	20	43	39
30 acres & over	-	-	-	-	50	35	33	24
	12	16	20	26	13	27	14	22

Table (v) Average Yields of Sugar Beet and Sugar Content per Acre 1950 - 1959 (factory data)

	Cornwall		Devon		Dorset		S.W. Province	
	Yield	Sugar Content	Yield	Sugar Content	Yield	Sugar Content	Yield	Sugar Content
	tons	%	tons	%	tons	%	tons	%
1950	14.2	15.6	13.2	15.7	12.3	15.8	13.3	15.7
1951	11.5	15.8	10.8	16.9	9.5	15.6	10.7	16.1
1952	12.1	16.5	11.4	16.9	11.0	15.4	11.6	16.3
1953	12.5	15.6	14.2	16.1	12.0	15.9	12.9	15.8
1954	11.6	14.9	11.2	15.3	9.5	15.0	10.9	15.0
1955	11.7	16.6	11.3	17.3	10.7	16.5	11.3	16.8
1956	13.6	15.8	13.5	16.2	12.4	15.8	13.2	15.9
1957	14.9	16.3	12.9	16.1	12.3	16.0	13.6	16.2
1958	13.9	15.1	13.5	14.8	12.7	14.6	13.4	14.9
1959	14.5	17.1	13.2	16.7	9.2	16.4	12.6	16.8
10 year Average	13.0	15.9	12.4	16.2	11.1	15.7	12.3	15.9
Sample	15.6	16.3	14.4	16.8	9.0	16.1	12.8	16.4
Sample as % of 1959	107.6	95.3	109.1	100.6	97.8	98.2	101.6	97.6

Table (vi) Classification of Farms in the Sample

	Cornwall	Devon	Dorset
Average farm size - acres of crops and grass	120	226	888
Cereal acreage - per 100 acres of crops and grass	25	28	26
Root acreage - per 100 acres of crops and grass	14	11	12
Percentage of farms with highest gross output from:-			
Milk	48	52	83
Beef	4	16	-
Pigs	17	11	-
Cash crops	31	21	17

Table (vii) Average Inputs, Returns and Margins - Per Acre and Per Ton Clean Beet

(Bristol II Province 1959)

		Per Acre	Per Ton
INPUTS		£ s	£ s d
Labour:	manual	23 12	1 17 0
Power:	tractor	5 14	9 0
	horse	1	-
	machinery depn.& repair allow'ce	9 10	14 11
	contract services	4 2	6 5
	other fuel	1	-
Materials:	seed	1 12	2 6
	fertilisers & manures applied	17 12	1 7 7
	spray	15	1 3
Rent		2 19	4 8
Marketing charges		13 12	1 1 4
Total Direct Inputs		79 10	6 4 8
Share of general farm expenses		3 0	4 8
		82 10	6 9 4
Adjusted for residual manurial values		- 3 8	- 5 5
Total Inputs at Delivery Point		79 2	6 3 11
Credit Value of Tops		11 12	18 2
Net Inputs at Delivery Point		67 10	5 5 9
RETURNS - Clean Beet		83 0	6 10 0
MARGIN		15 10	1 4 3
Average Yield of Clean Beet per Acre		12 tons 15 cwt.	

Table (viii) A Comparison of Inputs for the Bristol II and Manchester Provinces

Primary Costs		Total Inputs			
		South West 1959		Manchester 1956	
		£	%	£	%
Labour:	manual	23·6	29·8	24·5	31·2
Power:	tractor	5·7	7·2	6·0	7·6
	horse	·1	·1	·1	·1
	machinery dep'n and repairs	9·5	12·0	8·4	10·7
	contract services	4·1	5·2	·9	1·1
Material:	seed	1·6	2·0	1·3	1·7
	artificials - net	9·1	11·5	20·2	25·7
	F.Y.M. - net	5·1	6·5		
	spray	·8	1·0	-	-
Rent		2·9	3·7	2·8	3·6
Marketing Costs		13·6	17·2	5·7	7·3
General Farm Expenses		3·0	3·8	8·6	11·0
TOTAL INPUTS		79·1	100·0	78·5	100·0

Table (ix) Distribution of Total Inputs and Cash Returns per Acre - by number of crops

(Bristol II Province 1959)

Total Inputs	Cash Returns				
	Over £120	£100-£120	£80-£100	Under £80	All Crops
Over £90	4	7	3	2	16(a)
£80 - £90	2	6	5	1	14(b)
£70 - £80	-	-	8	3	11(c)
Under £70	-	-	2	5	7
All Crops	6	13	18	11	48

(a) 13 farms applied F.Y.M.
(b) 10 farms applied F.Y.M.
(c) 4 farms applied F.Y.M.

Table (x) Inputs per Acre according to Acreage Size Group

(Bristol II Province 1959)

	Under 4 acres	4 - 7·9 acres	8 -11·9 acres	Over 12 acres	Average	
	£ s	£ s	£ s	£ s	£ s	%
F.Y.M.	8 1	8 10	3 0	3 7	5 2	6·4
Applying F.Y.M.	2 18	3 13	1 1	18	1 17	2·3
Artificial Fertilisers	10 6	11 2	10 0	10 16	10 13	13·5
Applying Art. Ferts.	8	10	6	11	9	·6
Manures & Manuring	21 13	23 15	14 7	15 12	18 1	22·8
Stubble Cultivations	3	3	3	8	5	·3
Ploughing	1 3	1 0	1 3	1 15	1 8	1·8
Seed-bed Cultivations	1 16	1 12	1 9	1 2	1 8	1·8
Seed	1 7	1 11	1 14	1 14	1 12	2·0
Drilling	17	17	11	9	12	·8
Inter-row Cultivations	1 9	1 6	1 8	1 15	1 11	1·9
Singling	8 14	7 19	7 16	7 13	7 18	10·0
Second Hoeing	1 11	2 17	2 19	1 5	2 0	2·5
Spray	8	12	13	1 1	15	·9
Spraying	6	3	4	9	6	·4
Cultivations, Seed, Spray and Hoeing	17 14	18 0	18 0	17 11	17 15	22·4
Mechanical Harvesting	4 8	9 10	13 12	13 13	11 10	14·5
Hand Harvesting	18 13	10 1	7 0	-	6 2	7·7
Marketing Costs	15 9	15 2	15 8	11 10	13 12	17·2
Rent	3 2	3 3	3 2	2 14	2 19	3·7
Machinery Dep'n & Repairs	10 13	9 7	9 5	9 9	9 11	12·1
Total Direct Inputs	91 12	88 18	80 14	70 9	79 10	100·4
Overheads	3 0	3 0	3 0	3 0	3 0	3·8
Residues brought forward+	2 3	3 16	1 11	1 4	2 1	+ 2·7
Residues carried forward-	6 16	7 2	4 9	4 12	5 9	- 6·9
TOTAL INPUTS	89 19	88 12	80 16	70 1	79 2	100·0
Sales of Clean Beet & Tops	118 13	103 6	109 11	78 10	94 12	-

Table (xi) Gross Profits per Acre - Sugar Beet (Sample Data)

(Bristol II Province 1959)

	Hand Harvesting	Mechanical Harvesting- own equipment
Variable Costs:-	£	£
Seed	1.6	1.6
Manures	10.6	10.6
Spray	.7	.8
Fuel	4.4	3.9
Marketing Costs	15.3	12.2
Harvester Dep'n and Repairs	-	2.2
Total	32.6	31.3
Gross Output:-		
Beet	96.1	76.1
Tops	13.0	10.3
Total	109.1	86.4
Plus Pulp Concession	2.1	1.6
GROSS PROFIT	78.6	56.7

Table (xii) Yields of Clean Beet and Sugar Contents

1959

	Cornwall	Devon	Dorset
No. of farms costed	23	19	6
No. of acres	126.8	112.2	144.3
Average yield of beet - tons/acre	15.6	14.4	9.0
Range in yield of beet- tons/acre	9.6 to 20.8	7.1 to 18.4	5.4 to 13.0
No. of farms:-			
Under 6 tons	-	-	1
6.1 to 10 tons	2	1	3
10.1 to 14 tons	6	8	2
14.1 to 18 tons	9	8	-
Over 18 tons	6	2	-
Average sugar content %	16.3	16.8	16.1

Table (xiii) Fertiliser Application at Various Yield Levels
(adjusted for residues)

(Bristol II Province 1959)

No. of farms	No. of acres	Acres per farm	Per Acre							
			Av. yield clean beet (tons)	lb. available			cwt.		Av. sugar %	Av. cwt. sugar
				N	P_2O_5	K_2O	$CaCO_3$	NaCl.		
8	41.3	5.2	19.3	106.5	113.4	177.0	8.7	1.7	16.2	62.6
7	48.0	6.9	17.6	196.2	83.6	259.2	4.7	-	15.9	55.9
6	43.5	7.3	15.6	232.9	259.0	353.1	5.3	1.3	15.2	47.6
7	37.0	5.3	13.9	145.4	91.8	149.5	5.1	1.2	16.5	46.2
7	37.3	5.3	12.4	134.4	88.8	144.1	4.3	.4	16.8	42.0
6	31.0	5.2	11.1	195.6	132.0	241.4	8.6	1.3	18.2	40.6
7	145.3	20.8	8.6	111.7	52.2	196.3	5.6	1.0	19.1	27.9
Aver-age	-	8.0	12.8	147.7	100.0	214.0	5.9	1.0	16.4	42.0

Table (xiv) Comparative Costs per Acre of Applying the Required Nutrients to Sugar Beet with Different Combinations of Manures & Fertilisers

		Optimum Nutrient Requirement*	Suggested Fertilisers and Manures	Costs (based on 1959 net prices for 6 ton lots)		
		lb.		£	s	d
Compound Fertiliser	N	112	7¼ cwt. Compound			
	P_2O_5	56	Fertiliser	7	13	4
	K_2O	168	(2N:1P:3K)			
				7	13	4
Straight Fertilisers	N	112	5 cwt. 20% S/A	2	16	3
	P_2O_5	56	1 cwt. 47% Supers	1	1	3
	K_2O	168	2½cwt. 60% M/P	2	11	3
				6	8	9
Straight Fertilisers	N	112	5 cwt. 20% S/A	2	16	3
	P_2O_5	56	1 cwt. 47% Supers	1	1	3
	K_2O	112	1⅔cwt. 60% M/P	1	14	0
plus Salt	Salt	3 cwt.	3 cwt. NaCl	1	12	3
				7	3	9
Straight Fertilisers	N	78	3½cwt. 20% S/A	1	19	6
	P_2O_5	49	1 cwt. 47% Supers	1	1	3
	K_2O	112	1⅔cwt. 60% M/P	1	14	0
plus F.Y.M.	N	33·6	)			
	P_2O_5	44·8	)10 tons F.Y.M.	12	10	0
	K_2O	84·0	)			
				17	4	9
Straight Fertilisers	N	78	3½cwt. 20% S/A	1	19	6
	P_2O_5	49	1 cwt. 47% Supers	1	1	3
	K_2O	78	1⅛cwt. 60% M/P	1	3	0
plus F.Y.M.	N	33·6	)			
	P_2O_5	44·8	)10 tons F.Y.M.	12	10	0
	K_2O	84·0	)			
plus Salt	Salt	3 cwt.	3 cwt. NaCl	1	12	3
				18	6	0

* based on recommendations by Cooke 1960
F.Y.M. @ 25s.0d. per ton - includes cost of spreading & dep'n on spreader

Table (xv) Yields of Sugar per Acre and Inches of Rainfall

1959

	Cornwall			Devon	Dorset
Centre where records are made	Penzance	Camborne	Newquay	Newton Abbot	Dorchester
No. of farms	9	3	11	19	6
Av. yield of sugar - cwt. per acre	55.1	42.0	46.8	48.5	29.0
	Inches of rainfall				
January - March	11.44	10.98	10.43	11.42	9.90
April	3.06	3.21	2.40	3.65	2.47
May	1.60	1.72	1.50	1.46	1.99
June	1.00	.83	.86	1.65	1.06
July	1.85	1.81	1.72	1.49	1.34
August	1.30	3.18	6.52	3.08	2.48
September	.11	.09	.40	.16	.12
October - December	24.43	22.93	23.17	21.04	17.82
TOTAL	44.79	44.75	47.00	43.95	37.18

Table (xvi) Yield of Sugar per Acre and Hours of Sunshine

1959

	Cornwall			Devon	Dorset
Centre where records are made	Penzance	Camborne	Newquay	Newton Abbot	Dorchester
No. of farms	9	3	11	19	6
Av. yield of sugar - cwt. per acre	55.1	42.0	46.8	48.5	29.0
	Hours of sunshine				
January - March	291.7	272.1	307.0	266.9	320.8
April - June	704.9	649.0	731.6	677.9	699.9
July - September	782.2	688.1	751.1	772.6	775.0
October - December	271.0	216.8	232.1	248.4	288.2
TOTAL	2049.8	1826.0	2021.8	1965.8	2083.9

Table (xvii) Harvesting Costs per Acre for all Harvesters - at actual yields

(Bristol II Province 1959)

Harvester	Initial Cost of Harvester	Costed Acres Harvested	Per Acre			
			Yield of clean beet	Harvester Dep'n	Labour & Power	Total Costs
	£	acres	tons	£ s	£ s	£ s
1.Stoll	745	46.3	7.7	1 19	8 12	10 11
2.Stoll	700	30.0(a)	10.0	2 7	10 2	12 9
3.Catchpole	475	10.0(b)	14.7	17	10 5	11 2
4.Peter Standen Dumper	450	37.0	9.6	1 9	21 4	22 13
5.Catchpole	450	11.0	5.4	4 18	9 17	14 15
6.Viking	450	14.0(c)	19.3	15	17 12	18 7
7.John Salmon	445	8.3	17.7	6 9	11 18	18 7
8.Peter Standen	400	8.0(d)	12.5	1 12	10 12	12 4
9.Catchpole	375	12.0	15.2	3 15	14 12	18 7
10.Peter Standen Jnr.	350	10.0(e)	11.4	1 9	16 2	17 11
11.Fisher Humphries	200	14.5	17.4	1 13	15 0	16 13
12.Viking	160	7.0	17.3	2 15	21 4	23 19
13.Teagle	150	10.0	10.0	1 16	32 4	34 0
14.Mern	140	4.0	12.9	4 12	11 12	16 4

(a) This Harvester lifted a further 6 acres in 1959
(b) " " " " 55 " "
(c) " " " " 56 " "
(d) " " " " 22 " "
(e) " " " " 19 " "

Table (xviii) Seasonal Manual Labour Distribution - Hours per Acre (exc. F.Y.M.)
(adjusted for normal yield of 15 tons/acre clean beet)

(Bristol II Province 1959)

Month	Mechanical and Hand Harvesting	
	hours	
Prior to January	2.7	
January	.8	
February	.8	
March	2.6	
April	3.5	
May	31.6	
June	22.5	
July	5.4	
August	-	
Total Preharvest	69.9	
	Mechanical Harvesting	Hand Harvesting
	hours	hours
September	-	-
October	17.0	31.0
November	17.0	32.0
December	17.0	31.0
Total Harvest	51.0	94.0
TOTAL	120.9	163.9

Table (xix) Manual Labour Distribution - Hours per Acre

(Bristol II Province 1959)

Operation	Field Size - Acres				
	Under 4.0	4.0 - 7.9	8.0 -11.9	Over 12.0	Average
Preharvest					
Stubble cultivations	.8	1.3	.6	.5	.6
Ploughing - 3 furrow	2.9	2.5	2.4	1.6	2.0
Rotovating	3.0	1.4	1.5	1.4	1.5
Cultivating	.6	.9	.5	.5	.6
Dragging	.6	.4	.3	1.2	.4
Discing	.7	.5	.5	.5	.5
Harrowing	.5	.3	.5	.5	.5
Harrowing & cultivating	2.2	1.3	-	.6	1.2
Rolling	.6	.4	.5	.5	.5
Discing & rolling	1.1	-	.5	.3	.5
Dragging & rolling	.5	1.1	-	.4	.6
Spreading artificials	1.0	1.2	.6	1.1	1.0
Spreading salt	.6	.8	.6	.5	.6
Drilling & harrowing in	1.7	1.7	.8	1.1	1.5
Precision drilling	2.6	1.5	1.8	1.1	1.4
Spraying	.7	.5	1.0	.4	.5
Inter-row cultivating:					
one man	1.8	-	.9	.7	1.4
two men	2.4	2.0	5.1	2.5	2.8
Mechanical thinning	-	-	3.2	-	3.2
Singling	45.8	42.1	52.3	38.0	42.6
Second hoeing	18.7	28.8	30.2	12.3	21.2
Top dressing	.5	.5	-	.7	.6
Harvest (adjusted for normal yield of 15 tons/acre clean beet)					
Hand harvesting	-	-	-	-	94*
Mechanical harvesting	-	-	-	-	51*

* excluding Dorset

Table (xx) Yields and Sugar Content per Acre Required to "Break-even" and to show a Profit of £20

(Bristol II Province 1960)

Sugar Content	"Break-even" Yields			Yields for £20/acre Profit		
	14%	16%	18%	14%	16%	18%
	tons	tons	tons	tons	tons	tons
Value of tops ignored	14.6	12.5	11.0	19.1	16.4	14.3
Tops at feed value	12.2	10.7	9.5	15.9	14.0	12.4
Tops at manurial value	13.9	12.0	10.6	18.2	15.7	13.8

The guaranteed price for sugar beet was reduced by 2/6d. to 128/- per ton (16.5% sugar content) in the February 1960 Price Review. The above table is based on the same assumptions made in constructing Table 3 but the value of beet produced has been reduced to the 1960 level.

APPENDIX 2

Standards Methods Used in Compilation of Costs

Manual Labour

	per hour
Adult Male	3/9d.
Adult Female	2/9d.
Youths	2/6d.
Male overtime	5/-

Other categories and piece work at appropriate rates.

Vehicles

Tractors -	Wheel types	4/-
	Crawlers	8/-
	Land Rover	6/-
	Lorry	1/- per mile or 6/- per hour

Horses

1/6d. per hour

Depreciation Charges

All specialised equipment was charged at 12% of initial cost.

Seed

All beet seed obtained from, and charged by the British Sugar Corporation was included in the costs whether all was used or not.

Manures

Artificials were charged at cost price on the farm less subsidy. One third of these costs were carried forward to the succeeding crop, and one third of the preceding years manure costs were brought forward to allow for unexhausted manures. Total charge for salt was debited to the sugar beet crop. Farmyard manure was charged at 25/- per ton including the cost of spreading.

Beet Tops

The weight of tops was calculated by the British Sugar Corporation to be 90% of the yield of clean beet in 1959. Tops ploughed in were credited at 5/- per ton,and tops fed at 25/- per ton, based on an effective consumption of 80% of the total yield of tops.

Overheads

£3 per acre for general field overheads such as draining, fencing and hedging. A further charge of 6/- per tractor hour on mixed arable farms and 10/- per tractor hour on livestock farms has been made to cover the share of cost of car expenses, depreciation and repair of implements and other sundry overhead expenses.

Weighted averages have been used throughout the report except in Appendix 3 where simple averages were used.

APPENDIX 3

Standard Presentation of Results

(The figures in this Appendix are based on 48 records, on 383·3 acres, on 48 farms)

Table (i) Summary of Average Costs per Acre

(Bristol II Province 1959)

Item of Cost		Hours		£ s
		Men	Women & Boys	
Labour		138·3	8·4	27 5
Power:	Tractor	27·2		5 12
	Horse	·7		1
	Machinery Depreciation			9 15
	Contract Services			3 19
	Other Fuel			-
Materials:	Seed			1 11
	Fertiliser and Manures applied			20 8
	Sundries (Spray Materials)			12
Rent				3 3
Marketing Costs				14 19
	Total Direct Costs			87 5
	Plus Share of General Farm Expenses			3 0
				90 5
Adjustment for Residual Manurial Values				- 4 7
Gross Cost of Production at Delivery Point				85 18
Credit Value of Beet Tops				12 16
Net Cost of Production at Delivery Point				73 2

Table (ii) Yields, Costs, Returns and Margins

Yield of Clean Beet per Acre	14.2 tons	
	per acre	per ton
	£ s	£ s
Sales of Clean Beet	94 1	6 13
Net Cost at Delivery Point	73 2*	5 8*
Margin	+ 20 19*	+ 1 5*

* after allowing for the value of beet tops.

Table (iii) Summary of Average Quantities of Materials Used per Acre

Material			Overall Average per Acre
			lb.
Seed			7.6
	Acres Dressed Only		
Fertilisers and Manures	Acres	Cwt. per Acre	cwt.
F.Y.M.	114	266.0	128.0
Lime	-	-	-
Artificials:-			
Straights - Nitrogenous	89	2.8	.6
Potassic	167	4.9	1.4
Phosphatic	19	5.7	.5
Compounds	310	9.3	8.1
Salt	90	4.1	1.0