Sugarbeets - Cost of production

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SUGAR BEET COSTS AND RETURNS 1963

An Interim Report of a Two Year Survey
of Sugar Beet Growing in Yorkshire

by

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F O R E W O R D

This is an interim report on a two-year study of the economics of growing sugar beet on some Yorkshire farms and refers to the first year, 1963. It has been thought wise at this stage to confine the report to the presentation of costs and returns, and to refrain from attempting to interpret them until a second years costs become available.

The study was originally planned by Mr.I.G.Simpson. He was seconded from the University in order to undertake some work for the Sudan Government and will be absent for two or three years. The writing of the report has been undertaken by Mr.J.W.WOOD who has thus had the thankless task of building on another man's foundations. He has been assisted by the field workers, Messrs E.Dawson, L.W.Bolton and E.G.Hunt.

The University takes this opportunity to express its gratitude to the farmers who provided the information on which the report is based.

December 1964. W.HARWOOD LONG

C O N T E N T S

THE SAMPLE

The sample of farms for the 1963-64 survey of sugar beet costs and returns was drawn on the basis of sugar beet factory areas so that use could be made of any additional statistical information that was available for these localities.

Three factory areas were selected for study: two from the factory at Poppleton, York, namely Area 2 which incorporates the Vale of Pickering and Area 5 which is bounded roughly by Tadcaster, Wetherby, Great Ouseburn and York, and, adjoining the latter, Area 5 of the Selby factory. Area 2 of the Poppleton factory was further restricted to that area of the Vale of Pickering west of a line from Brompton to Sherburn and Area 5 of the Selby factory was also restricted by confining the sample to the predominant sandy soils.

The address lists[x] for these areas were stratified into size groups on the basis of contracted sugar beet acreage and a random selection was made within these strata. This was to enable the selection both of an adequate number of farms in each size group and a total sample that approximated the over-all distribution of sugar beet acreage. The former involved weighting the sample to the extent of incorporating a slightly more than proportional number of larger growers.

The distribution of sugar beet acreage among the seventy four farms which constituted the final sample is shown in Table 1.

[x] This sampling procedure could not have been adopted without the co-operation of the British Sugar Corporation Ltd. and this help is fully and gratefully acknowledged.

Table 1. Distribution of Sugar Beet Acreage, 1963.

	Acreage Range					
	Under 10	10-14½	15-19½	20-24½	25-29½	30 and over
Number of farms	20	24	6	8	9	7

The acreage classification was reduced to three groups, namely under 15 acres, 15-24½ acres and 25 and over, in order to provide a satisfactory number of farms in each group. The average acreage of sugar beet for these groups is shown below.

Table 2. Average size of Sugar Beet Acreage, 1963.

Size Group	Number of Farms	Average Sugar Beet Acreage	Total Acreage Costed
5-14½ acres	44	9.7	425.5
15-24½ "	14	19.5	273.5
25-40 "	16	29.7	470.5
All farms	74	15.8	1,169.5

The distribution of the sample between the three sample areas is shown in Table 3. The acreage of sugar beet on the sample farms in the districts of Selby and the Vale of Pickering is very similar in both overall average and distribution, while the sample farms for the York district had noticeably smaller sugar beet acreages in 1963.

Table 3. Distribution of Sugar Beet Acreage between Sample Districts, 1963.

	Vale of Pickering		York		Selby	
Size-Group	Number of Farms	Average Acreage	Number of Farms	Average Acreage	Number of Farms	Average Acreage
Acres						
5 - 14½	13	9.7	17	9.0	14	10.5
15 - 24½	5	18.4	4	20.8	5	19.7
25-40	6	31.3	4	27.0	6	29.2
All Farms	24	16.9	25	13.7	25	16.8

In fact, 68 per cent of the farms in the York district grew less than 15 acres, while the corresponding figures for Selby and the Vale of Pickering were 56 per cent and 54 per cent, respectively. Furthermore, these farms with less than 15 acres of sugar beet, besides being more numerous, also grew fewer acres on average in the York district than in either the Vale of Pickering or the Selby district. Thus the average sugar beet acreage for all farms in the latter areas was three acres higher than it was in the York district (Table 3).

THE COST PER ACRE IN 1963

1. Introduction The average net cost of growing sugar beet in 1963 on the seventy-four costed farms was £69.6s. per acre (Table 4). The two outstandingly important items contributing to that figure were the cost of manures and fertilisers (£21.1s) and the cost of labour (£20.10s), which together accounted for 60 per cent of the total net cost. Compared to these charges other costs may seem rather unimportant individually (indeed the allowance for general overheads was greater than all except haulage) but, of course, in total these other costs represented a larger expenditure than either labour or manures and fertilisers.

Sugar beet was also costed in 1960, when the average costs on farms growing more than 30 acres were compared with those on farms with less than 10 acres of sugar beet. ¤

Table 4. Sugar Beet Costs 1960 and 1963

	1960		1963
	Farms with less than 10 acres	Farms with more than 30 acres	All Farms
Average Acreage	6. 2.	39. 0.	15. 8.
Average costs per acre:	£. s.	£. s.	£. s.
Seed	1. 5.	1. 5.	1.16.
Sprays	0. 3.	0. 5.	1.16.
Manures & Fertilisers	20.16.	18.12.	21. 1.
Power)repairs and Machinery)depreciation	5. 5.	5. 2.	4. 5.
	3. 0.	4. 7.	4.15.
Contract Services	2.14.	0.19.	2.10.
Haulage	9.14.	8.13.	7. 2.
Labour	27.19.	23. 6.	20.10.
Rent	3. 8.	3.10.	4. 2.
Total Gross Cost (including Overheads + 10%)	81. 8.	72.10.	74.13.
Residual Manurial Value Adjustable	5. 3.	4. 5.	5. 7.
TOTAL NET COST	76. 5.	68. 5.	69. 6.

Average figures for both 1960 and 1963 are shown in Table 4. It is of interest to note that although the average sugar beet acreage for the 1963 sample was only 15.8, the basic cost structure of the whole sample was more similar to that found for farms growing more than double the sugar beet acreage in 1960 than to that for farms with less than 10 acres of beet. The largest absolute difference for individual items of expenditure was, rather surprisingly, a reduction in the total cost

¤ Farmers' Report No.152.

of labour of almost £3 per acre between 1960 and 1963. This reduction occurred in spite of an increase in wages equivalent to nearly 1s.0d. per hour; the average number of hours of all classes of labour employed per acre, in fact, was 23 per cent lower in 1963 than it was on the larger farms in 1960. The explanation may lie, in part, with the larger expenditure on sprays in 1963 if this reflected the increased use of pre-emergence band sprays which can effectively reduce the task of hoeing and singling. The main reason, however, is undoubtedly that harvesting conditions were considerably more favourable and hence less labour-consuming in 1963 than in 1960.

Haulage charges, as previously mentioned, represented the third largest item of expenditure. While the average cost of haulage in 1963 was lower than that found in 1960, the comparison is clearly invalid, since this is a cost which is dependent to a considerable extent on distance, and no attempt was made to match the samples for this characteristic. The higher cost of seed, however, is probably a reasonable reflection of the general increase in importance of rubbed and graded seed. For the entire sample of farms, 68 per cent of the total costed acreage was planted with rubbed and graded seed at an average rate of 7.0 lbs/ acre in 1960, while the corresponding proportion for the 1963 survey had risen to 87½ per cent of the acreage at an average rate of 5.2 lbs/acre.

The charge for manures and fertilisers was noticeably greater on the farms in the 1963 sample. Closer examination indicates that they spent nearly as much on inorganic fertiliser as did the large growers in 1960 but that F.Y.M. was of considerably greater importance, in fact, involving a per acre charge approaching that incurred by the smaller growers in 1960. This whole question is examined in more detail in section 2(c) of this chapter.

The average charge for tractor power was substantially lower in 1963 than in 1960 and this must be explained, in large part, by the much more favourable harvesting conditions in 1963. The higher charge for machinery in that year, largely indicates the contribution to quicker and easier harvesting made by greater mechanisation. The latter cannot be considered, realistically, without taking account also of contract work. The average charge (£2.10s.per acre) for all contract work in 1963 is almost three times as great as that incurred by the large growers in 1960, but this is very largely explained by the smaller acreage of the 1963 sample. The use of contractors' services is obviously closely associated with the size of enterprise.

Finally, and not particularly surprisingly, the average rent for the 1963 sample of farms was higher than that found in 1960; the difference being approximately twelve to fourteen shillings per acre. The net effect of the changes in each item of expenditure, as outlined above, was that the average total net cost of growing an acre of sugar beet on farms in the 1963 sample was, essentially, the same as that found on farms with much larger beet acreages in 1960.

2. COMPARISONS BETWEEN SIZE GROUPS

a) Introduction The 1963 sample of seventy four farms has been divided into three size groups, namely, those growing less than 15 acres of sugar beet, those growing 15 but less than 25 acres and finally those growing 25 or more acres of sugar beet. In fact the smallest costed acreage was 5 and the largest 40, so that the size groups become 5 - 14½, 15 - 24½ and 25 - 40 acres of sugar beet respectively. The sample was not purposely selected for a comparison of the effect of size on costs of production but, since this was done in 1959 and 1960[H], it was decided that 1963 results could be used

H See Farmers' Reports Nos. 146 and 152.

to re-examine the effects of size, even though say differences could not be expected to be so definite (in 1959 and 1960 the comparison had been between farms with less than 10 and those with more than 30 acres of sugar beet).

The following paragraphs, therefore, examine in detail the various items of expenditure and pay particular attention to differences which appear to be associated with the size of the enterprise.

Table 5. Sugar Beet Costs 1963 - by size of beet acreage

Per Acre

Size-group	5-14½ ac.	15-24½ ac.	25-40 ac.	5-40 ac.
No. of Farms	44	14	16	74
Total acreage costed	425½ ac.	273½ ac.	470½ ac.	1169½ ac.
Average acreage costed	9.7	19.5	29.7	15.8
	£.s.	£.s.	£.s.	£.s.
Seed	1.14.	1.19.	2. 0.	1.16.
Sprays	1.13.	1.11.	2. 8.	1.16.
Manures & Fertilisers	21.16.	18.11.	21. 5.	21. 1.
Power) depreciation and Machinery) repairs	4. 7.	4. 8.	3.19.	4. 5.
	4. 8.	5.17.	4.13.	4.15.
Contract services	3.10.	1. 2.	1. 0.	2.10.
Haulage	7. 7.	7. 1.	6.10.	7. 2.
Labour	21.11.	19.18.	18. 4.	20.10.
Rent	3.19.	4. 9.	4. 4.	4. 2.
Total Gross Cost (including Overheads 10%)	77. 4.	71. 5.	70.14.	74.13.
Residual Manurial Value Adjustment	5.12.	4.12.	5. 8.	5. 7.
Total Net Cost	71.12.	66.13.	65. 6.	69. 6.

b) Seeds and Sprays The average cost of seed per acre is shown in Table 5 for the three size groups as well as the entire sample. Most of the differences in cost arise from the varying proportion of farms using rubbed and graded rather than natural seed. Table 6 gives the proportions of farms using the former, by size group, together with the average rate of application for each type. The increasing use of rubbed and graded seed by larger growers is clearly discernible. The application rate also dropped consistently as the size of enterprise increased.

Table 6. The Use of Sugar Beet Seed, 1963.

Size Group	Number of Farms	Proportion Using R.&.G. seed	Average Application Rate ¤		Average Cost/ acre
			R.&.G.	Natural	
		%	lbs/acre	lbs/acre	£. s.
5 - 14½ ac:	44	77	5.6	10.6	1.14.
15 - 24½ ac:	14	86	4.9	10.0	1.19.
25 - 40 ac:	16	94	4.5	9.0	2. 0.
All Farms	74	82	5.2	10.2	1.16.

¤ These figures represent the averages only for those farms actually using the seed in question - no farm used both.

Spraying sugar beet can be done for a number of reasons and by a number of methods. The reasons are mainly three, namely to control persistent arable weeds well before sowing, to control weeds during the early stages of growth by pre-emergence spraying and to control insect pests. The methods may be either entirely by contract, by owned spraying equipment, or by a mixture of the two; the approach to insect control may be to spray only when an aphis attack is imminent, or to have a regular programme to afford the maximum protection. The information in Table 7 covers only the

costs of spray materials purchased by the farmer, any contract charge for application being included with contract work of all types.

The proportion of farms that used sprays in 1963 was approximately the same (80 per cent) for both groups with under 25 acres of beet. A higher proportion of farms in the largest group used sprays and also spent more per acre when they did so, largely because of a greater frequency of spraying. Evidently spraying has become common practice amongst sugar beet growers, but more so amongst the large growers than the small.

Table 7. The Use of Sprays on Sugar Beet, 1963.

Per Acre

Size-Group	Number of Farms	Proportion of farms using sprays	Average Cost on farms using sprays	Average Cost for all farms in the group.
		%	£. s.	£. s.
5-14½ ac:	44	82	1.17.	1.13.
15-24½ ac:	14	78	2. 0.	1.11.
25-40 ac:	16	94	2.12.	2. 8.
All Farms	74	84	2. 3.	1.16.

c) Manures and Fertilisers

i) Introduction The charges which come under this heading represented the biggest single expense (£21.1s/acre) in the average cost of growing sugar beet in 1963, as shown in Tables 4 and 5. "Straights" and compound inorganic fertilisers (£11.6s) accounted for more than half of this cost, which also included a substantial charge for farmyard manure. (£8.11s.) The balance was made up of relatively small charges for shoddy (10s.) and lime (15s.).

ii) Inorganic Table 8 indicates the usage of lime and inorganic fertilisers by all farms and the three size groups separately.

Lime was applied, in the current year, by only just over half of the sample of farms and this proportion was similar for all size-groups.

Table 8. Lime and Inorganic Fertiliser Usage, 1963.

Per Acre

Size-Group	No.of Farms	Cost of Lime		Cost of inorganic fertiliser
		£.s.	£.s. ¤	£.s.
5 - 14½ ac.	44	0.15.	(1.11)	11. 0.
15 - 24½ ac.	14	0.15.	(1. 6)	11.17.
25 - 40 ac.	16	0.14.	(1. 4)	11.12.
All Farms	74	0.15.	(1. 8)	11. 6.

¤ The figures in parenthesis represent the average charge on those farms where lime was actually applied.

The expenditure on fertilisers was also not very different for the three size-groups; the range was some 17s.0d. per acre, representing a variation of about 8 per cent. This is contrary to the findings of 1959 and especially 1960, when large growers were found to have spent over £2 (18 per cent) more per acre than small growers on such fertilisers. In 1963 the largest group, in fact, had an average expenditure on inorganics slightly lower than that found for the middle group. This is quite adequately explained by the greater reliance placed on F.Y.M. by the larger farms(Table 9).

iii) Organic Farmyard manure was applied to the sugar beet acreage on about three-quarters of the farms in the 1963 sample. The information on cost,¤ in Table 9, applies only to those farms on

¤ In arriving at the cost of F.Y.M. (see Table 9), the cost of labour and tractor hours (charged at 5s.1d. and 3s.8d. respectively) have been added to the value of the F.Y.M. itself, the latter being charged at a standard rate of 15s.0d. per ton.

which F.Y.M. was used.

Table 9. The Use of F.Y.M. on Sugar Beet, 1963.

Per Acre

Size-Groups	No. of Farms	Farms using FYM.	Rate of Application. ✠	Man & Tractor Hrs Labour	Tractor	Average Cost ✠
	No.	%	tons	hrs	hrs	£.s.
5-14½ acres	44	77	10.8.	10.3.	8.7.	12.10.
15-24½ acres	14	57	8.6.	7.5.	6.4.	9.11.
25-40 acres	16	94	9.4.	4.9.	4.8.	8.13.
All Farms	74	77	10.1.	8.5.	7.3.	11. 2.

✠ These figures represent the average only for those farms which actually applied F.Y.M.

✠✠ Three farms which applied F.Y.M. entirely by contract are not included.

Farms in the smallest size-group applied noticeably heavier dressings of F.Y.M, but even taking account of this, their use of labour in carting and spreading was considerably higher than that for larger farms. The group with the largest beet acreage had a particularly low usage of labour and tractor hours. This combination of lighter applications and quicker spreading rates meant that the cost of applying F.Y.M, on farms with more than 25 acres of beet, was almost £4 per acre lower than that found on farms with under 15 acres. While the corresponding average cost for the medium size-group fell between that for the other two groups, nevertheless, significantly fewer farms in the group used F.Y.M, and for those that did, the average tonnage applied was also lower than for both large and small growers.

Shoddy was also used by 5 farms to supplement F.Y.M. and a further 2 farms used shoddy but no F.Y.M. The cost per acre for shoddy on these 7 farms averaged £5.10s.

iv. Plant Nutrients The only convenient way of combining the many different compound and straight fertilisers and manures applied by farmers into a single measure of the net addition to the existing fertility of the soil, is to express each in terms of its content of plant nutrients. Only the major nutrients, viz. nitrogen, phosphate and potash, and sodium, to which sugar beet particularly responds, need be of concern here. Table 10 shows the average applications of nitrogen, phosphate and potash by all farms in the sample, as well as the three size groups. The size of sugar beet acreage appears to have little effect on the amount of plant nutrients provided - the slightly higher figure for the largest groups are certainly not significantly greater. The similarity of the total applications of plant nutrients is of some interest, for it occurred in spite of quite wide variation in the contribution from F.Y.M. The latter, for instance, accounted for from 9 - 15 per cent of the nitrogen applied and the corresponding figures for phosphates and potash were 15 - 24 per cent and 16 - 26 per cent respectively (these ranges were between the averages for the size groups and not individual farms). This variability, together with the very similar total plant nutrient supply, suggests that inorganic fertiliser applications were appropriately adjusted for F.Y.M. dressings.

Table 10. Plant Nutrients applied to Sugar Beet 1963

Size Group	No. of Farms	Inorganic only			Inorganic + FYM **		
		N	P	K	N	P	I
	No.	..... Units* per acre.....					
5-14½ ac.	44	135	103	176	160	136	238
15-24½ ac.	14	146	115	195	161	135	233
25-40 ac.	16	143	110	199	169	144	264
All Farms	74	139	107	184	162	138	242

* 1 unit = 1% of 1 cwt.(1.12 lbs); e.g. 1 cwt. of Sulphate of Ammonia (21% N) will provide 21 units of nitrogen.

** F.Y.M. has been assumed to provide the first crop with, on average, 30 units of nitrogen, 40 units of phosphate and 75 units of potash from each 10 tons.

Sodium can replace potassium, up to certain limits, in the metabolism of sugar beet. The advantages of its doing so are that the performance of the beet is improved and that sodium, in the form of common salt, is substantially cheaper than any available form of potassium. A 3 cwt. dressing of salt should mean an actual saving in costs of approximately 14s.0d. an acre, providing the application of potash were suitably reduced. In addition to this saving in costs, there should also be a beneficial effect on the yield of sugar.

Salt was applied to sugar beet by just over 40 per cent of the costed farms in 1963 compared to 28 per cent in 1960. There was very little difference in usage between farms with varying size of beet acreage. (see Table 11). It is noticeable from a comparison of the last two columns of Table 11 that there was little difference,

also, in the amount of potash applied, whether or not salt was used. In fact, the smallest acreage group showed the largest difference between farms using and not using salt, but the recommended reductions in potash applications are some three times as great as this 30 unit difference. It is, of course, possible that the soils of the sample farms justified such very high applications of sodium and potassium, but it is probably more reasonable to conclude that salt was, by and large, used as an extra, rather than an alternative, plant nutrient, so that the full benefit from the potential saving in cost was foregone.

Table 11. The Use of Salt on Sugar Beet, 1963.

Per Acre

	No. of Farms	Farms using Salt	Weight of Salt ¤	Units of potash on farms using salt	Units of potash on farms not using salt
	No.	%	cwts.	units	units
5 - 14½ ac.	44	41	4.2	159	187
15 - 24½ ac.	14	36	3.9	188	199
25-40 ac.	16	44	4.2	200	198
All Farms	74	41	4.1	174	192

¤ The figures in this column represent the averages only for those farms actually applying salt.

The general level of fertiliser usage, in 1963, was higher than that found in 1959 and 1960. Comparative figures for these years, from farms with over 30 acres of beet, are set out in Table 12.

Table 12. Average Quantities of Plant Nutrients applied in 1959, 1960 and 1963.

Year	No.of Farms	Average Acreage of sugar beet	Plant nutrients supplied by artificials and F.Y.M.		
			N	P	K
	No.	acres	..... units per acre.....		
1959	36	38.5	147	130	239
1960	36	39.0	148	127	244
1963	74	15.8	162	138	242

The use of higher levels of nitrogen in 1963 is particularly noticeable. The report on the 1959 costs commented on the extent to which fertilisers were applied in excess of recommended levels; the discrepancy was even greater in 1963. It may be of interest to record here that the average yields corresponding to the above figures for fertiliser applications were, in 1959, 1960 and 1963, 16.5, 17.5 and 12.7 tons respectively. Clearly, yield depends on other important factors in addition to that of fertiliser application.

d) Power and Machinery A summary of the power and machinery costs for farms in the 1963 sample is given in Table 13.

The tractor costs were arrived at by applying a standard charge, established from an accumulation of recent data, to the number of tractor hours used. This charge was comprised of 1s.8d. per hour for fuel, oil, grease and repairs and a further 2.0d. per hour to cover depreciation and miscellaneous costs. Thus, the lower tractor costs for farms with over 25 acres of beet reflect the fewer tractor hours used. In addition to tractor costs there was an overall cost of rather less than one shilling per acre for other fuel, used mainly for elevator motors.

Table 13. Power & Machinery Cost for Sugar Beet 1963.

Per Acre

Size-Group	POWER			MACHINERY			
	TRACTOR			REPAIRS		DEPRECIATION	
	Repairs fuel etc.	Deprn. and Misc.	Other fuel	General	Specific	General	Specific
	£.s.	£.s.	£.s.	£.s.	£.s.	£.s.	£.s.
5-14½ac.	1.19.	2.7.	0.1.	0.18.	0.10.	1.12.	1. 9.
15-24½ac.	1.19.	2.7.	0.1.	0.18.	0.14.	1. 8.	2.17.
25-40 ac.	1.16.	2.3.	0.1.	0.18.	0.18.	1. 7.	1.11.
All Farms	1.18.	2.6.	0.1.	0.18.	0.12.	1.10.	1.15.

General machinery repairs and depreciation were also charged at standard rates. The rate for the former being 17s.6d. per acre, while that for the latter was again based on the number of tractor hours used. The costs under the heading "specific machinery repairs and depreciation" are those incurred by specialised sugar beet equipment such as harvesters and precision drills. The proportion of farmers in each size group who used specialised machinery is given in Table 14, together with the associated repairs and depreciation charges. The latter are averages only for those farms possessing specialised equipment.

Farms growing more than 25 acres of beet all used some specialised sugar beet equipment, while the percentage of farms with smaller beet acreages, who used such equipment, fell as the acreage declined. Differences in depreciation charges probably reflect

Table 14. Sugar Beet Machinery Costs 1963

Per Acre

Size-Group	Farms	Farms with Special Machinery	Specialised Machinery*	
			Repairs	Depreciation
	No.	%	£.s.	£.s.
5-14½ acres	44	68	0.14.	2. 3.
15-24½ acres	14	93	0.15.	3. 1.
25-40 acres	16	100	0.18.	1.11.
All Farms	74	80	0.15.	2. 4.

* These figures represent average costs only for those farms using specialised equipment.

average age differences for machinery in the size groups (large growers with low depreciation charges also had relatively high repair bills), as much as the amount of such machinery, or the acreage over which it was spread.

e) Contract Services Contractors were employed by about half of the 74 costed farms for various operations other than the application of F.Y.M. or the haulage of beet to its delivery point. The average cost per acre of all contract services, on the 41 farms using them was £4.8s, which gave an overall average of £2.10s. for the entire sample.(see Table 15).

Table 15. Use of Contractors' Services on Sugar Beet 1963.

Per Acre

Size-Group	Farms	Farms using Contract services	CONTRACT CHARGES ¤	
			On All Farms	On farms using contractors
	No.	%	£.s.	£.s.
5-14½ acres	44	79	3.10.	5. 3.
15-24½ acres	14	43	1. 2.	2.14.
25-40 acres	16	31	1. 0.	3. 3.
All Farms	74	55	2.10.	4. 8.

¤ These cover all operations except applications of F.Y.M. and haulage of harvested beet.

As might have been expected, the size of beet acreage had a marked effect on the extent to which contractors were used. This is particularly noticeable for farms with under, as against those with over, 15 acres of beet. Of the latter, approximately one-third used contractors at an approximate cost of £3 per acre, while nearly 80 per cent of farms growing less than 15 acres used contractors at an average cost of over £5 per acre.

f) Haulage In the haulage of sugar beet from field to delivery point, the distance involved is clearly of paramount importance, but the costs of alternative methods can vary widely. The four possible methods are:(a), to employ a contractor, (b), to use his own non-specialised machinery, i.e. a tractor and trailer, (e), to provide specialised equipment such as a lorry, and finally, (d) to use some combination of these methods. The growers choice will, of course, be severely conditioned by such factors as the distance involved, the size of the enterprise, alternative uses for special equipment and the availability of labour and capital.

A contractor was hired for all beet haulage by precisely half the farms in the 1963 survey at an average cost of £8.14s. per acre. (Table 16). A further 30 per cent of the total sample delivered their beet entirely by their own equipment at an average per acre cost of £4.7s; almost exactly half the cost of contract delivery. The remaining 20 per cent of farms used contractors for only part of their beet deliveries.

Table 16. Cost of Haulage to Delivery Point 1963

Per Acre

Size-Group	Farms	Farms delivering beet by *		Cost of delivery by		Total Delivery Cost **
		Contract	Own Equip.	Contract	Own Equip.	
	No.	%	%	£.s.	£.s.	£.s.
5-14½ ac.	44	59	27	8.14.	3.18.	7. 7.
15-24½ ac.	14	36	43	8. 5.	5. 0.	7. 1.
25-40 ac.	16	38	25	9. 1.	4. 5.	6.10.
All Farms	74	50	30	8.14.	4. 7.	7. 2.

* These figures refer only to those farms delivering beet either entirely by contract, or else, entirely by their own equipment.

** These figures represent averages for all farms in the group.

The proportion of farms using both contractors and their own equipment rose with the size of the enterprise. Thus, only 14 per cent of farms growing less than 18 acres employed both methods, while the corresponding figures for farms with 15 - 24½ and over

25 acres of beet were 21 and 37 per cent respectively. This is probably a straight-forward effect of the scale of operations - the larger the task, the more likely is it that a contractor will be called upon to help out.

About one-quarter of both the large and small acreage groups were able to cope with the entire job with their own equipment and it is interesting to note that where the small acreage enterprise could manage in this manner, it incurred a lower cost than both the larger groups. The medium acreage group included a much higher proportion (over 40 per cent) of farms using only their own equipment, but the cost of this was also greater. On balance, the average total delivery cost per acre fell as acreage increased. The over-all average for all farms was £7.2s. per acre.

g) Labour Labour usage on sugar beet in 1963 was, as already mentioned, almost £3 per acre lower than that found in 1960, even though the latter applied to farms with more than double the average beet acreage of the 1963 sample. Once again size was found to influence the per acre labour costs. Thus, farms with less than 15 acres of beet had labour costs of about £1 per acre above the overall average, while the corresponding figure on farms with 15 - 25 acres of beet was some 12s.0d. below average. Finally, farms growing 25 or more acres had a total labour cost of over £2/acre below average (see Table 17). The labour costs per acre for the latter group being some 15 per cent below those for farms with less than 15 acres. There was also found to be an increasing dependence on casual labour as the size of beet acreage increased, but the increasing average cost of this was more than offset by larger reductions in the amount of regular labour used.

Table 17. Use of Labour on Sugar Beet, 1963.

Per Acre

Size-Group	Farms	Farms using Casual Labour	Cost of Casual Labour ¤		Cost of Regular Labour	Total Labour Costs
	No.	%	£.s.	£.s.	£.s.	£.s.
5-14½ac.	44	52	(7.10)	3.18.	17.12.	21.11.
15-24½ ac.	14	93	(6. 6)	5.17.	14. 0.	19.18.
25-40 ac.	16	88	(7. 9)	6.10.	11.15.	18. 5.
All Farms	74	68	(7. 4)	4.17.	15.13.	20.10.

¤ The figures in parenthesis represent the average cost of casual labour only for those farms actually employing it.

THE RETURNS FROM SUGAR BEET, 1963.

1. Introduction The year 1963 was not a good one for sugar beet. Yields were low, and in spite of a relatively high sugar content, returns per acre were for the most part disappointing.

Table 18. Sugar Beet Yields in Britain, 1959-1963.

	Yield of Clean Beet	Sugar Content	Yield of Sugar
	tons per acre	%	tons per acre
1959	13.38	16.90	2.26
1960	17.37	14.97	2.60
1961	14.48	15.44	2.24
1962	12.99	15.68	2.04
1963	12.86	16.67	2.14

The national yields for the last five years are given in Table 18 and show that yields of clean beet in 1963 were the lowest of that period, although sugar content was well above average. Thus, the yield of sugar, while higher than that of the previous season, was again well below those of 1959, 1960 and 1961. The guaranteed price arrangements also changed slightly during this period. There was a drop from 130s.6d. to 128s.0d. per ton of clean beet (16.5 per cent sugar content) between 1959 and 1960, while for 1963, the guarantee price was based on beet of 16.0 per cent sugar content and the price differential increased from 7s.6d. to 10s.0d. per ton for every 1 per cent above or below this level. Thus the high sugar content of 1963 meant that the higher quality premium was fully reflected in the prices per ton received.

Comparison with earlier cost studies in 1959 and 1960, both of which were years of high yields of sugar, shows the average return to be over £20 per acre lower in 1963 (Table 19). Since, as has already been pointed out, the average total cost in 1963 was very similar to that for large growers in 1960, this lower return inevitably means that profits from beet were also lower in 1963 by over £20 per acre.

Table 19. Returns from Sugar Beet 1959,1960 and 1963.

Year	Large Farms Only ¤ 1959	1960	All Farms 1963
Number of farms	36	36	74
Acreage of Beet costed per farm.	38.5	39.0	15.8
Yield of Clean Beet per acre.	16t.8c.	17t.10c.	12t.14c.
Value per ton	£6.11.	£5.15.	£6.7.
Value per acre	£107.3.	£101.7.	£80.17.
Net cost per acre	£58.0.	£68.5.	£69.6.
Margin ¤¤	£49.3.	£33.2.	£11.11.

¤ Figures are from a sample of farms growing over 30 acres of Beet (See Farmers' Report No.152)

¤¤ Value of beet tops are not included in this figure

2. Comparison between size-groups As was found in both 1959 and 1960, the farms with larger acreages had higher yields (Table 20).

The thirty farms growing fifteen or more acres of beet had an average yield of slightly over 13 tons per acre, while the corresponding figure for farms with less than 15 acres of beet was approximately 4 per cent lower at 12 tons 9 cwts. The average value of beet sales was correspondingly lower for the smallest size-group (the value per ton being essentially the same for all three groups) and this, together with higher costs, resulted in a net margin per acre of less than half that of the next size group. This substantial drop in the net margin illustrates

Table 20. Returns from Sugar Beet, by size of beet acreage, 1963.

	15-14½ acres	15-24½ acres	25-40 acres	All Farms
No.of Farms	44	14	16	74
Acreage costed per farm	9.7	19.5	29.7	15.8
Yield of clean beet	12t.9c.	13t.1c.	13t.0c.	12t.14c.
	£.s.	£.s.	£.s.	£.s.
Value per ton	6. 7.	6. 7.	6. 7.	6. 7.
Value per acre	79. 4.	83. 2.	83.10.	80.17.
Net cost per acre	71.12.	66.13.	65. 6.	69. 6.
NET MARGIN PER ACRE	7.12.	16. 9.	18. 4.	11.11.

well the susceptibility of such a figure to large variation - returns down by 4 per cent and net costs up by 7 per cent have meant a lowering of no less than 53 per cent in the margin between them.

The higher costs per acre for the smallest size-group have already been dealt with, but the reason for the lower returns is not obvious and deserves considerably more attention in the future.

3. The Contribution from Sugar Beet Tops The excellent feeding value of clean and properly wilted sugar beet tops is unquestioned and yet relatively little use is made of them. The reasons for this are various, but the main one is the increase in mechanical harvesting, which has made top saving an additional and time-consuming operation, and even when it is practised considerable soiling is not easily avoided. In addition, the actual feeding of saved tops frequently involves substantial amounts of labour, and experience of occasional fatalities from incorrect feeding is not uncommon. Nevertheless, sugar beet tops are clearly of potential value, for even when ploughed-in a succeeding corn crop will frequently bear witness to the exact location of the rows of discarded tops.

The problems involved in finding a method of evaluating the contribution of beet tops, which would apply quite satisfactorily on all farms, are almost certainly insurmountable. The alternative is to use, and to make quite explicit, a method which would be relevant on a large number of farms and yet allow individual adjustments to be made when interpreting the data. The method used in this present report has been to assess the manurial value of ploughed-in tops at a standard rate of fifty shillings an acre. Information on sheep and cattle numbers fed on tops has been expressed in money terms as follows: a sheep was deemed to eat one hundredweight of tops in a week while the figure used for cattle was three hundredweights; these quantities were charged at the rate of one shilling per hundredweight, while any difference between the total weight consumed and the total weight of tops (taken as equal to the weight of clean beet) was charged at a rate equivalent to that for ploughing-in. On this basis the over-all average value of sugar beet tops for the 1963 sample farms was £3.14s. per acre (Table 21).

Table 21. The Value of Tops and Total Margins for Sugar Beet 1963.

Per Acre

Size-Group	Number of Farms	Farms using tops for feed *	Computed Value of Tops **	Net Margin	Total Margin
	No.	%	£.s.	£.s.	£.s.
5-14½ ac.	44	55	3.19.	7.12.	11.11.
15-24½ ac.	14	64	3. 3.	16. 9.	19.12.
25-40 ac.	16	44	3. 4.	18. 4.	21. 8.
All Farms	74	54	3.14.	11.11.	15. 5.

* Not including farms where tops were grazed by neighbour's sheep, free of charge.

** See text for basis of computation

Table 21 also indicates the use made of sugar beet tops by the three size groups. Farms in the largest group that used tops for livestock feed were relatively fewer than in the other groups. However, those that did so made fuller use of them than did farms in the medium size group, where, although top feeding was most frequent, the average computed value was the lowest of the three groups. Farms in the smallest size group had the highest average computed value for tops, almost £4/acre, which was more than half the group's average net margin between costs and factory returns. At this sort of level the feeding value of tops clearly deserves considerably more attention from both farmers and economists alike.

SUMMARY AND CONCLUSIONS

The average net cost of growing sugar beet in 1963 was just under £70 per acre on a sample of seventy-four farms from the three Ridings of Yorkshire. This figure was shown to be similar to that found on very much larger acreages in 1960 (see Farmers' Report No.152). The cost of labour, in particular, was lower in 1963 largely because of more favourable harvesting conditions. Expenditure on manures and fertilisers was, however, slightly higher; the general level of plant nutrient application was again well above recommended levels.

Much of the analysis of the effect of size of acreage on costs bore out the findings of the earlier survey of 1959 and 1960, namely that the smaller grower makes greater use of contractors, uses less rubbed and graded seed, uses less specialised machinery and has higher labour costs. In contrast to the finding of the earlier survey, there was relatively little difference between large and small growers in the usage of manures and fertilisers. Common salt was, however, used on sugar beet by a substantially larger proportion of growers in 1963 than in 1960.

As far as returns from sugar beet are concerned, 1963 was a year of relatively low yields and only average sugar content. Hence factory returns per acre were some 20 per cent lower than those found for large growers in 1959 and 1960 (two years of exceptionally high yields). Growers of less than

15 acres of beet had lower yields than larger growers and this, coupled with higher costs, left a net margin of only £7.12s/acre compared with more than twice this figure for larger growers. For the sample as a whole, the average net margin was £11.11s. in 1963 . In addition to these returns, the contribution of sugar beet tops was calculated and averaged £3.14s. per acre.

Any firm conclusions must await the analysis of the second year's data, but 1963 results have, at least, been useful in providing information for a year when sugar beet was clearly not as profitable as it had been in the past. Indeed, the justification of the place of sugar beet, on some smaller farms in particular, may well come to rest rather more on what it offers in addition to the cash return, if its performance in 1963 were to become typical of the future.

GROSS MARGINS

Appendix A.

Some of the information given in the body of this report has been reorganised in this appendix for the benefit of those who wish to work in terms of gross margins. This has entailed dividing the various items of expenditure into either fixed or variable costs, since only the latter are used in deriving the gross margin. Some costs, which are strictly speaking variable in nature, have also been excluded, in keeping with the usage currently adopted by the National Agricultural Advisory Service. Thus the costs on fuel and tractor and machinery repairs have been disregarded, although clearly their magnitudes will tend to vary with the acreage of sugar beet grown.

Farmyard manure and lime have also been excluded from the list of variable costs, largely on the grounds that the total quantities applied to the sugar beet acreage are determined by the system of farming adopted as much as by the specific acreage of sugar beet in any one year. Nevertheless, where applications of inorganic fertilisers are substantially reduced because of heavy dressings of F.Y.M, it may be appropriate to make allowances for this in deriving the gross margin.

Table A1. The Gross Margin from Sugar Beet, by acreage, 1963.

Per Acre

Acreage Group	5-14½ acres		15-24½ acres		25-40 acres		All Farms	
	£.s.	£.s.	£.s.	£.s.	£.s.	£.s.	£.s.	£.s.
Factory returns		79.4.		83.2.		83.10.		80.17.
Variable costs								
Seeds	1.14.		1.19.		2. 0.		1.16.	
Sprays	1.13.		1.11.		2. 8.		1.16.	
Fertilisers ¤	11. 8.		12. 7.		12.10.		11.16.	
Contract services ¤¤	3.10.		1. 2.		1. 0.		2.10.	
Contract haulage	5.19.		3.16.		3.18.		5. 2.	
Casual labour	3.18.		5.17.		6.10.		4.17.	
Total Variable Costs		28.2.		26.12.		28. 6.		27.17.
GROSS MARGIN		£51.2.		£56.10.		£55. 4.		£53. 0.
Value of Beet Tops		3.19.		3. 3.		3. 4.		3.14.
TOTAL GROSS MARGIN		£55. 1.		£59.13.		£58. 8.		£56.14.

¤ Inorganic fertilisers plus shoddy

¤¤ For all operations other than applying F.Y.M. or hauling harvested beet.

Table A1 shows that the average gross margin for farms growing less than 15 acres was about £4 per acre lower than that for larger acreages. It is important to notice, however, that most of this difference arises from differences in cash returns rather than in variable costs. While the medium group had substantially the lowest variable costs, those of the largest acreage group were higher than those of both the smaller groups, largely because of a greater reliance on casual labour and a larger expenditure on sprays and also fertilisers.

Two items in the above list of variable costs present some difficulty in that they are not incurred by all growers. Firstly, casual labour, which can replace regular labour (normally regarded as a fixed cost) and, secondly, contract services, which represent an alternative to the use of the farmer's own machinery and labour, both of which are again outside the gross margin calculation. Hence, farms incurring such variable costs are likely to have a lower gross margin even though their total production cost may be no different to that on farms using only regular labour and their own machinery.

The variable costs of those farms who made use of contractors were, therefore, calculated separately and these are shown, together with those of the remaining farms, in Table A2. The effect of these variable costs on the gross margins is also shown.

It is noticeable that, of the farms growing less than 15 acres of beet, those that did not employ contractors had markedly lower (over £6/acre) variable costs than those that did so. The difference for larger acreages was only half as much.

In allowing for casual labour in the same manner, the variable costs on all farms employing such labour were calculated separately from farms relying entirely on regular labour(Table A3). Farms using only regular labour were too few in number, particularly among those with larger beet acreages, to permit a comparison between size groups.

Not surprisingly, the variable costs on farms using casual labour was substantially greater than that on farms not doing so. The difference, of over £7/acre, was about a quarter of the average total variable costs for all farms in the sample.

Table A 2 Gross Margins from Sugar Beet by farms employing, and farms NOT employing contractors, ¤ 1963.

Per Acre

Size-Group	Number of Farms	Cash Returns	Total Variable Costs	Gross Margin	Value of Tops	Total Gross Margin
	No.	£.s.	£.s.	£.s.	£.s.	£.s.
5-14½ acres						
Using contractors	31	79.4.	29.19.	49. 5.	3.19.	53. 4.
No contractors	13		23.13.	55.11.		59.10.
15 acres and over						
Using contractors	11	83.6.	29.17.	53. 9.	3. 4.	56.13.
No contractors	19		26. 4.	57. 2.		60. 6.
All sizes						
Using contractors	42	80.17.	29.18.	50.19.	3,14.	54.13.
No contractors	32		25. 3.	55.14.		59. 8.

¤ For any operation other than applying F.Y.M. and haulage of harvested beet.

Table A 3 Gross Margins from Sugar Beet by farms employing and farms NOT employing casual labour, 1963.

Per Acre

	Number of Farms	Cash Returns	Total Variable Costs	Gross Margin	Value of Tops	Total Gross Margin
	No.	£.s.	£.s.	£.s.	£.s.	£.s.
Farms employing casual labour	50	80.17.	30.14.	50. 3.	3.14.	53.17.
Farms not employing casual labour	24	80.17.	23. 1.	57.16.	3.14.	61.10.
All Farms	74	80.17.	27.17.	53. 0.	3.14.	56.14.

APPENDIX B.

NOTES ON COSTINGS METHODS

1. Regular labour Time spent on sugar beet by the regular farm staff was charged at standard hourly rates which included allowances for overtime, insurance, sickness and holidays. The rates used were as follows:-

	Before 18/11/63	From 18/11/63
	per hour	per hour
Men	5s. 1d.	5s. 5d.
Women	3s.10d.	4s. 0d.
Youths	3s. 6d.	3s. 9d.

2. Casual labour This was charged at the actual cost incurred. The charge was converted to hours worked, as required, by using the standard rate appropriate to the date.

3. Tractors The number of tractor hours employed on sugar beet were charged at the standard rates of 1s.8d. to cover fuel, oil, grease and repairs plus 2s.0d. to cover depreciation and miscellaneous tractor expenses.

4. Farm lorries A charge of 1s.4d. per mile travelled in hauling sugar beet was made to cover the running costs and depreciation of the lorry.

5. Machinery Repairs and Depreciation The cost of repairs and the depreciation charge were calculated individually for specialised machinery (harvesters, precision drills, loader/cleaners, and irrigation equipment). The depreciation charge, i.e. 10 per cent of the difference between initial cost and scrap value (assumed to be 5 per cent of initial cost), was adjusted proportionally for any acreage, such as contract work, in addition to the costed acreage. The depreciation charge for new machinery was increased to 20 per cent for the first year.

Repairs and depreciation for non-specialised machinery were charged at flat rates of 17s.6d. per acre for repairs and 1s.0d. per tractor hour for depreciation.

6. Share of General Farm Overheads This was allowed for by charging 10 per cent of total direct costs.

7. Farmyard Manure This was charged at a standard rate of 15s.0d. per ton plus the costs of labour and tractor hours involved in applying it.

8. Manurial Residues Adjustments for manurial residues, both brought forward from the previous crop and carried forward, were made on the following basis.

Organic manures:	One-third of total cost including application.
Inorganic compounds:	One-quarter of the cost of purchase.
Inorganic "straights":	Nitrogen, nil.
	Phosphate, one-third of cost of purchase.
	Potash, one-third of cost of purchase.
	Lime, depending on liming policy, the average annual cost was used.

Grass: £3/acre brought forward to sugar beet.

Fallow: nil

9. Credit for beet tops An allowance of £2.10s. was made for tops that were ploughed-in. The weight of tops fed (sheep were deemed to eat 1 cwt. per week and cattle 3 cwts) was credited at 1s.0d. per cwt. Any difference between the weight of tops fed and the total weight available (taken as equal to the yield of clean beet) was credited at a rate equivalent to that for ploughing-in.

APPENDIX C.

STANDARD TABLES

The following tables are included for the purpose of comparison with similar tables issued by other agricultural economics centres. The figures are based on 74 records covering a total of 1,169½ acres; the average costed acreage being 15.8 and the range from 5 to 40 acres.

Table C 1 SUMMARY OF AVERAGE COSTS PER ACRE

ITEM OF COST	Hours			£. s.
	Men	Youths	Females	
Regular Labour	54.2	2.9.	.1	14.11.
Casual & Gang Labour	18.1.	1.1.	6.0.	5.19.
Power - Tractor	23.1.			4. 5.
Machinery Depreciation				3. 5.
Repairs allowance				1.10.
Contract Services				2.10.
Other Fuel				1.
Materials				
Seed				1.16.
Fertilisers and Manures applied				21. 1.
Sundries				1.16.
Rent				4. 2.
Marketing costs				7. 2.
Total Direct Costs				67.18.
Plus share of General Farm expenses				6.15.
				74.13.
Adjustment for Residual Manurial Values				5. 7.
Gross cost of Production at Delivery Point				69. 6.
Credit Value of Beet Tops				3.14.
Net Cost of Production at Delivery Point				65.12.

Table C 2

YIELD, COSTS, RETURNS AND MARGINS

	ALL GROWERS	
Yield of Clean Beet Per Acre	12.t. 14.c.	
	Per Acre	Per Ton
	£.s.	£.s.
Sales of Clean Beet	80.17.	6.7.
Cost at Delivery Point	65.12.	5.3.
MARGIN	15. 5.	1.4.

Table C 3

SUMMARY OF AVERAGE QUANTITIES OF MATERIALS PER ACRE

Material	Area Applied Only		Overall Average Per Acre
	Acres	Amount per acre	lbs.
	-	lbs	
Seed - Natural	148	10.2	1.1
Rubbed	1021½	5.2	4.5
Fertilisers and Manures		cwts	cwts
F.Y.M.	735½	222	142
Lime	498	41	18
Artificials:Straights -			
Nitrogenous	170½	2.5	.3
Potassic	29	8.4	.2
Phosphatic	38	3.2	.1
Compounds	1169½	11.0	11.0

Table C 4

SUMMARY OF AVERAGE MANUAL AND TRACTOR LABOUR USED PER ACRE IN GROWING AND HARVESTING

Operation	Manual			Tractor
	Men	Women	Youths	
	Hrs.	Hrs.	Hrs.	Hrs.
Pre Harvest	53.6.	5.2.	3.3.	10.5.
Carting & Spreading F.Y.M.* & Lime	6.2.	-	-	5.4.
Harvesting	18.7.	.9	.7	12.6.
TOTAL	78.5.	6.1.	4.0.	28.5.

* Includes Shoddy