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Strawberries – Cost of production
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THE WEST OF SCOTLAND AGRICULTURAL COLLEGE

THE STRAWBERRY CROP, 1959 and 1960

OUTLAYS AND RETURNS ON SOME MARKET GARDENS IN SOUTH WEST SCOTLAND

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SUMMARY

Note: In this summary any number in brackets refers to an unweighted average, the preceding number then relating to a weighted average.

In 1959 and 1960, 25 growers of strawberries gave details about this crop. Between them they contributed to the agricultural census about a quarter (that is some 84 acres) of the acreage under strawberries in the Clyde Valley counties. They marketed 22.4(27.7) cwt of the fruit per gross inclusive acre a year (i.e. including headlands and young non-bearing plantings). In the same years official estimates for Scotland put the output of the crop at about 34.5 cwt a year. On the fruit-bearing areas, yields were 34.7(42.5) cwt a net acre (i.e. excluding the area of headlands and of young non-bearing plants). Between holdings and years, yields varied from 7.2 cwt to 115.6 cwt.

The average gross value of the fruit per gross inclusive acre was £201 (£260) a year; net of commission and transport, it averaged £183 (£239). This £183 compares with estimates for Scotland as a whole, in the same two years, of about £375.

The gross value of fruit per net acre was £312(£419) or 1s.7¼d (1s.9¼d) a lb and, between holdings and years, varied from £55 to £1350 and 1s.1d. (for a crop, most of which went for factory jam) to 2s.7¾d a lb (for a crop largely sold at the door, for dessert). Even if the 25% of the crops at the extremes of value are ignored the variation is still as wide as from £206 to £603 and from 1s.5½d to 2s. a lb.

Total expenditure, including the growers' labour, the estimated overheads and the years' share of the cost of establishing the plants, averaged £351(£398) a net acre a year. Between holdings and crops it varied from £196 to £928.

The Surplus of returns over costs averaged -£36 (+£25) a net acre and varied from -£476 to +£799. Averaged over the gross inclusive area the Surplus was -£23 (+£19).

Labour cost including the labour on the first year plants and including a charge for the growers' labour, was £120(£138) per gross inclusive acre and labour hours were 937(1034). The cost of labour ranged from £46 to £335. This same labour cost, per net acre, ranged from £83 to £592.

Outlays, excluding overheads, prior to harvesting cost £163(£169) a net acre or 10d(8½d) a lb.

Harvesting cost £89(£106) a net acre or 5.5(5.3) pence a lb. Its cost varied from £13 to £260 a net acre and from 1.7 pence to 19.7 pence a lb.

Marketing expenses, including containers, cost £60(£78) a net acre or 3.7(3.9) pence a lb, and varied from £8 to £318 and 0.9 pence to 7.9 pence.

The net value of the fruit prior to harvest averaged £163(£235) or 9.1(11.9) pence a lb, and varied from - £60 to £940 a net acre.

The 1960 crop exceeded the 1959 crop by about 7½ cwt and £83 a net acre on average (unweighted) of 19 holdings, and surplus was higher on average by about £31.

Official estimates for Scotland are that these two years had heavier yields than previous years. It follows that as a high proportion of 'losses' were made in 1959 and 1960, the decline in acreage in these counties is understandable. However, the crop is likely to continue since some labour has little alternative value (or opportunity cost), since overheads are not direct expenses, since these are largely family holdings, and since strawberries have a beneficial place in crop rotation. Its continuance would be assured if a comparable successor to Auchincruive Climax could be produced.

Details of costs and returns are given.

THE OBJECT OF THE STUDY

It was already clear, in 1958, that horticulturists in the College area would soon be under the pressure of rising costs and falling prices. Some were already under severe pressure. The area of strawberries in the Clyde counties had fallen by 42% in four years and by 64% since 1931; whilst the area in the rest of Scotland had risen, by 10% in the four years, though only by 3% since 1931.(a) A study of costs and returns might bring to light facts which would enable growers to improve their position as strawberry producers or to see clearly that this was a crop to be dropped. It might serve as an introduction to the economic problems of outdoor horticultural crops, both for the Economics Department of the College and for County Horticultural Advisers.

THE SCOPE AND METHOD OF THE STUDY

In the spring of 1959, 25 growers expressed willingness to record essential details about their strawberries. Seventeen were in, or very close to, the Clyde Valley, two were elsewhere in Lanarkshire, three in Renfrewshire, and three in coastal Ayrshire. All except one gave adequate information for the 1959 crop. The one preferred just to record his outlays on a new planting in that year. In 1960, five found it necessary to withdraw. Hence, this report is concerned with nineteen growers for two years' crops, five growers for the 1959 crop alone and one grower for the 1960 crop alone.

Between them the growers had about one-quarter of the strawberry area in the Clyde counties. Six had less than one acre, three between one and two acres, five between two and three acres, five between three and four acres, two between four and five acres, three between six and seven acres and one over eight acres.

Details of and some comments on the costing method are set out at pages 14-16.

ACKNOWLEDGMENTS

The College is grateful to the growers who provided information, and the writer himself is indebted not only to the growers for their kindness but also to the Department of Agriculture and Fisheries for Scotland for statistical information, Mr. Robert D. Reid of the Scottish Horticultural Research Institute and to his own colleagues, the County Horticultural Advisers, and members of the Horticultural Department for their general help.

COSTS OF ESTABLISHING A PLANTING OF STRAWBERRIES

Most of the records of planting referred to the spring planting of 1959 (14 records), four to the autumn planting of 1958, seven to the spring planting of 1958 and one to the spring planting of 1957. (One co-operator gave details in two years. The rest, just one year's records of establishing).

Previous 'crops' were as follows:-

Brassicae (chiefly cauli flower)	9 records
" followed by Ryegrass	1 "
Potatoes	9 "
" followed by Fallow	1 "

Wheat; Lettuce; Parsley; Chrysanthemums; and Strawberries followed by Fallow; 1 each.

Costs of establishing up to the August before their first full harvest year, averaged about £190 an acre. (Table I). The lowest cost was £118 an acre, the highest £434, and half the growers had total costs of establishing lying between £161 and £220 an acre. (Table II).

Table I sets out the average costs per acre.

(a) See L.V. McEwan (1959) Scottish Agricultural Economics X 41, 42.

TABLE I

COSTS OF ESTABLISHING STRAWBERRIES IN 1959

Weighted Averages per Net Acre

	£
Preparatory cultivations	18.37
Planting	14.48
Plants	41.31
F.Y.M. or compost	35.33
Fertilisers and lime	4.84
Total to this point	114.33
Summer work	46.30
Credit for fruit	(0.81)
Rent	5.94
Overheads	19.41
Total Cost	£185.17
Total labour cost	£77.6
Total labour hours	477
Number of runners provided	12,068

Notes (i) These averages cover
1 planting of Autumn, 1957
4 " " " 1958
7 " " Spring 1958
14 " " " 1959

(ii) The total net area planted was 25.5 acres

(iii) For the definition of 'net acre' see p.14

(iv) The number of runners is the number purchased plus the number lifted and prepared for planting.

(v) The charge for plants includes the cost of lifting the runners from the stock beds or rows.

In this table of weighted average costs, the large plots have a bigger influence than the small plots. When the small plots are allowed to have as large an influence as the large plots the average costs are higher in all respects except for farmyard manure.

Labour, the biggest single item, varied from £29 an acre to £252. The lowest was on a well mechanized lot of 2.3 acres and the highest on 0.09 acres that became very weedy. Labour hours averaged 477 an acre, half of the holdings'needs lying between 390 hours and 600.

Methods designed to reduce labour costs included paying a contractor to rototill the ground before planting. This was clearly less laborious than rotavating with a small hoe, which several growers did. The previous crop and its treatment was, of course, an important influence upon the need for labour. Planting machines were used experimentally by some growers. Some who planted by hand planted so that the young plants could be mechanically cross hoed, a plan that involved lower-than-average plant density, but contributed markedly to reduction of labour and freedom from weeds.

'Pre-emergence' spray was used before planting on one holding. The efficiency of the organization of the setting out and planting appears to vary considerably.

All except five growers applied either farmyard manure or compost before planting. Two of the five considered that farmyard manure applied to the preceding cauliflower crop would suffice: the other three were reluctant to spend their limited resources on farmyard manure.

TABLE II

COSTS OF ESTABLISHING THE PLANTINGS.

The distribution of the data

	No. of Records	Median	Lower Quartile	Upper Quartile	Lowest	Highest
		£	£	£	£	£
Per acre						
Preparatory cultivations	26	17.9	13	27	5.3	64
Planting	26	14.9	9	20	4.7	48
Plants, including lifting	26	42.0	32	51	25.6	83
F.Y.M.	20	36.6	25	47	17	79
Compost	1	15.0				
Fertilizers	12	11.8	4.6	15.8	1.8	20.1
Lime	2	1.0			0.8	1.2
Total to this point	26	120.9	95	133	66	171
Summer work	26	49.5	29	64	16	193
Total Cost	26	185.0	161	220	118	434
Total labour cost	26	83.3	57	113	29	252
Total labour hours	26	467	390	603	194	1275
Weight of F.Y.M., tons	20	30	24	40	12	57
" " fertilizers, cwt	12	7.6	4.3	9.0	1.4	12.0
No. of plants, '000	26	13.0	11.4	14.3	7.5	19.4

Note: The figures above have each been obtained by arranging the individual entries in order from lowest to highest, or least to greatest. The median is the value that has equal numbers of entries on its each side; it is the 'middle' value. The lower quartile has one quarter of the entries below it, three quarters above it; and the upper quartile has one quarter of the entries above it, three quarters below it. It follows that half the cases lie between the two quartiles.

The average price paid for runners was £5.1 a 1000, and varied from £4 to £7.5. Eleven growers out of the 25 bought runners, but only eight bought more than two-thirds of the runners they needed.

Planting Distances. Row widths varied from 18" to 38" where rows were equidistant: 30" was commonest, 36" half as common. On the three holdings where the arrangement was to have alternate narrow and wide rows, the width of a pair of rows varied from 48" to 54". The only wide bed met was of minor importance on the one holding. Planting distance varied between 12" and 18", nearly half the records showing 14" or 15" as the standard distance.

Normally, any fruit appearing in the first season was left to the birds; but in two cases a crop was harvested and the proceeds exceeded the costs of harvesting and marketing by £21 an acre in one case and £33 in the other. On a third nursery, part of the first year planting was intended to produce saleable runners; so a credit (of £33) is made for the proceeds less the cost of lifting and packing. On a fourth holding, where sale of runners was a major source of revenue, the record has been adjusted to exclude the effect of that side of the enterprise.

Table II gives further details about establishing the plantings.

THE FRUITING YEARS

(1) Expenditure, Output & Surplus

The 44 fruiting-year records cover 79.5 acres. Within agricultural statistics the years' fruiting areas would appear as 87¼ acres, including headlands etc., and with the addition of the first-year plantings would appear as 123.5 acres.

Saleable yield, which was, in some cases, much less than the yield that would have been saleable had the weather during harvest been dry, averaged 34.7 cwt and made, gross, £312 an acre a year, or 19.26 pence a lb. If this yield is to be made comparable with the official statistics of estimated average yield, it needs to be related to the gross inclusive area, including the first-year plantings. On this basis, the average yield was 22.4 cwt, or less than two-thirds of the yields reported for Scotland as a whole, namely 32.9 cwt and 36.2 cwt in 1959 and 1960 respectively.

Yields varied from 7.2 cwt to 115.6 cwt an acre and, on the 19 holdings reporting in both years, average yields an acre were about 7½ cwt more in 1960 than in 1959. So far as total sales were concerned, the marketed yield from the 19 holdings as a whole fell by 86 cwt (or 7.0%) and the weighted average yield per acre fell by 4.2%.

Table III sets out the weighted average costs and returns of the fruiting areas. Table IV summarizes the same data as Table III for the 44 records, but, in the first column, gives small areas as much importance as large areas. In the second column it shows the costs and returns per lb as they would have been for a crop of the given average weight at the given average cost per acre and sold for the same gross value per acre.

The weighted average inclusive cost was £351 an acre, and the corresponding average deficit was £36 an acre. Out of 44 records, 24 showed deficits, only 20 returning surpluses.

(2) Results related to the inclusive area

The tables give figures related to the areas occupied by the plants and intermediate "roads" and the cross paths. However, as already briefly mentioned above, headlands and hedges etc. add roughly 12% to these areas, and the yields costs and profits per acre of the fields themselves, including hedges were therefore about one-ninth less than those quoted. Moreover, since the planting year gives little or no revenue, the revenue per acre occupied by fruiting plants and young plants together is very considerably less than that indicated. Indeed, allowing for the necessary areas of young plantings and for headlands, hedges etc., the gross inclusive area used on these holdings in the production from an acre of fruiting plants, is 1.55 acres. Hence, except where there is a notable output from the young planting, the return per gross inclusive acre is only about 65% of the return per net acre.

Table V relates the output of fruit to the gross inclusive area. It shows that the yield, as already mentioned above averaged 22.4 cwt per gross inclusive acre, and was worth £201: similarly the labour used was 937 hours costing £120 and the loss after charging all labour used and overheads was £23.1 an acre. These are figures based, in effect, on treating the whole recorded area as one big field.

Table V also gives alternative unweighted results which, giving the smaller areas more influence, show that between growers, the average profit, after charging overheads amounting to £34 an acre, was about £19 an acre. Labour charges represented from £46 to £335 an acre, the median being £136 and half the records lying between £94 and £172.

TABLE III

COSTS AND RETURNS OF THE FRUITING AREAS, 1959 & 1960

	£ per acre per annum	Pence per lb.
Costs		
Fertilizers	6.00	0.37
F.Y.M.	0.33	0.02
Sprays & dusts	0.85	0.05
Straw	0.42	0.03
Cultivations	73.54	4.54
Total to this point	81.14	5.01
Harvesting	88.94	5.49
Share of establishing	76.17	4.71
Rent	5.31	0.33
Cloches	0.71	0.04
Overheads	38.75	2.39
Marketing	59.59	3.68
	£350.61	21.65
Returns		
Fruit, gross value	311.90	19.26
Credit re runners	2.84	0.18
	314.74	19.44
Deficit	35.87	2.22
Labour cost	£155.0	9.57d
Labour hours	1266 hours	
Marketed yield	34.70 cwt	
Net area (sum of 44 records)	79.5 acres	

Note These are weighted averages.

TABLE IV

COSTS AND RETURNS OF THE FRUITING AREAS, 1959 & 1960

	£ per acre per annum	Pence per lb.
Costs		
Cultivating and manuring	90.36	4.56
Harvesting	105.94	5.34
Share of establishing	72.33	3.65
Rent	5.72	0.29
Cloches	0.20	0.01
Overheads	45.42	2.29
Marketing	78.16	3.94
	398.14	20.09
Returns		
Fruit	419.41	21.16
Credit re Runners	4.13	0.21
	423.54	21.37
Surplus	25.42	1.28
Labour cost	£181.7	9.17d
Labour hours	1394 hours	0.29 hours
Yield	42.47 cwt	

Note The average area of fruiting strawberries per record is 1.8 acres. The per acre figures are unweighted averages of 44 records. The per lb. figures are obtained by applying Column (1) Yield to Column (1) Outlays & Returns.

TABLE V

RETURNS, TOTAL LABOUR AND SURPLUS, RELATED TO THE GROSS INCLUSIVE AREA

	Weighted average	Unweighted average
Per Gross Inclusive Acre.		
Gross Returns of Fruit	£201	£260
The same, net of commission and transport	£183	£239 (approx)
Yield of Fruit	22.4 cwt	27.7 cwt
Surplus	- £ 23.1	£ 19.4
Labour, including Establishing,		
Cost	£120	£138
Hours	937	1034

(3) Changes between 1959 & 1960

Because yield and quality of fruit varies with the age of the planting, and because the proportions of the first, second, third and fourth year plants changed considerably on the 19 holdings for which particulars were given in both years, little value can be gained from setting out, in detail, the average costs and returns in the two years separately. Instead, Table VI shows some of the changes that took place.

In general, giving small areas as much influence as large areas, 1960 was a better year than 1959 for these growers; for, though prices of fruit fell and cost per acre rose substantially, marketed yield rose and the gross value of fruit per acre increased by about £83. Hence Surplus rose by some £31 an acre. It is not surprising, in view of the very wet weather at or near the peak of fruiting in both years, that individual yields and surpluses varied widely. For instance, there were four increases of Surplus by over £270 an acre and two decreases of Surplus by over £300 an acre.

TABLE VI

CHANGES BETWEEN 1959 and 1960

19 holdings

	Increases		Decreases	
	No.	Average of these increases	No.	Average of these decreases
Net fruiting area	9	0.486 acres	7	0.778 acres
Yield per acre	8	41.7 cwt	11	17.2 cwt
Gross value of fruit, per acre	8	£440	11	£175
Cost of Cultivations, per acre	7	£ 40	12	£ 19
Cost prior to harvest, "	7	£ 58	12	£ 35
Harvesting, per acre	9	£ 83	10	£ 28
Total cost, "	10	£179	9	£ 88
Surplus, "	10	£214	9	£172
Harvesting, per lb	13	2.39 pence	6	3.57 pence
Price per lb:				
Commission sales	6	1.79 pence	8	4.71 pence
Processing sales	none	-	1	28%
Other sales	4	4.1 pence	12	3.2 pence
Whole crop	7	2.18 pence	11	2.94 pence

TABLE VII(a)

COSTS AND RETURNS: FRUITING AREAS, 1959 & 1960

The distribution of the data: 44 records

	No. of records	Median	Lower Quartile	Upper Quartile	Lowest	Highest
Costs: £ per acre						
Fertilizers	31	6.9	3.4	11.0	1.5	23.0
F.Y.M.	4	10.6	6.6	15.1	6.0	15.1
Sprays & dusts	12	1.6	0.9	3.8	0.7	16.5
Straw	3	10.4	-	-	7.6	17.4
Cultivations	44	68.2	42.0	98.4	13.1	308
Establishing, share of	44	64.5	47.6	82.7	27.0	218
Rent	44	5.3	3.8	7.0	2.2	10.8
Total before harvest	44	150	127	191	66	483
Harvesting	44	103	60	139	13	260
Marketing	44	68	42	103	8	318
Overheads	44	43.0	30.5	55.8	12.7	127
Total cost	44	369	293	492	196	928
Returns: £ per acre						
Fruit, gross value	44	326	206	603	55	1350
Credit in respect of runners	22	7.7	6.0	9.5	0.6	20.1
Total	44	331	207	605	55	1350
Surplus £ per acre	44	- 20	- 155	187	- 476	799

TABLE VII(b)

COSTS, YIELDS AND PRICES: FRUITING AREAS, 1959 & 1960

The distribution of the data: 44 records

	No. of records	Median	Lower Quartile	Upper Quartile	Lowest	Highest
Labour on fruiting areas:						
£ per acre	44	172	122	223	51	509
Hours per acre	44	1298	834	1733	283	3038
Inclusive cost of labour: £ per acre of fruit	44	202	144	259	83	592
Value of fruit 'on the plant', £ per acre of fruit	44	168	87	378	- 60	940
Net area of strawberries on the holding, 1959, acres	25	2.84	1.10	4.03	0.18	8.43
Marketed yield, ~~cost~~ per acre	44	37.6	24.0	52.6	7.2	115.6
Labour in harvesting, lbs per hour	44	5.0	3.6	7.0	1.7	20.7
Cost of harvesting, pence per lb	44	5.2	3.9	7.4	1.7	19.7
Cost of marketing, pence per lb	44	4.1	2.9	4.7	0.9	7.9
Cost of containers pence per lb	44	2.12	1.67	2.47	0.5	3.0
Price, pence per lb, for sales:						
On Commission	37	21.2	17.5	24.0	15.9	32.0
For Processing	8	11.9	9.9	12.9	8.2	15.0
Other	38	20.9	18.2	24.0	13.2	31.8
All sales	44	20.1	17.4	24.0	13.0	31.8

(4) The variability between holdings and years

While the foregoing section deals with changes on individual farms between 1959 and 1960, this section is concerned with variability within the whole group of 44 records. Details are given in Tables VII(a) & (b). For instance, costs ranged from £196 to £928 an acre, but half the records lay between £293 and £492. Marketing costs varied from under a penny a lb (where a factory collected most of the produce) to nearly 8d a lb (where all the fruit was marketed in 2-lb chips bought at a relatively high price, transport charges were higher than elsewhere and all the fruit bore brokers' charges). The general run of marketing costs lay between 2.9 pence a lb and 4.7 pence.

(5) The relation between the years 1959 & 1960 & other years

Enquiry of the several growers indicates that thirteen growers had heavier crops in 1961 than in 1960, six had lighter crops and one saw no change. Nine had higher average prices, two had lower prices and nine had unchanged prices. It is therefore likely that, had the records covered the three years 1959 to 1961 the general average yields and surplus would have been higher than in the two years that the records did cover.

Until the national estimates of average yields for 1961 are published, these estimates for 1961 cannot be related to those national figures. But, Table VIII shows that, if the yields in the Clyde counties changed in the same way as those in other counties, the two studied years had heavier crops of higher value per acre than in any of the previous ten years. However, the change in national average yields may be due, in part, to increasing areas in counties where heavier yields can be obtained than in the Clyde counties; so the national figures cannot indicate how these growers themselves are likely to have fared in the earlier years. Nor can an estimate of costs and returns relating to the Bed System about 1938[a] be used for direct comparison; for the writer of that estimate (a County Horticultural Adviser who was very closely in touch with the industry) was at pains to point out that his estimate assumed the absence of disease. However, since his estimates of 100 cwt in three fruiting years correspond to 25 cwt an acre a year over the whole cycle, compared with the weighted average yield of Table V, 22.4 cwt, - a yield covering several heavily infected areas - it can be fairly confidently assumed that the general level of yield has certainly not fallen since 1938. Rather has it risen notably.

TABLE VIII

THE SCOTTISH STRAWBERRY CROP

Year	Acres	Harvested yield cwt per acre	Estimated Output £ per acre
1937-39	1892	11.6	33
1949	1519	18.1	148
1950	1718	19.2	138
1951	1520	17.5	193
1952	1453	30.7	290
1953	1495	21.0	163
1954	1676	30.3	187
1955	1559	31.0	238
1956	1551	27.4	225
1957	1390	25.9	252
1958	1531	25.4	320
1959	1629	32.9	340
1960	1687	36.2	410
1961	1720	N.A.	N.A.

The Source of Columns 2 and 3 and of the Total Output from which Column 4 is calculated, is the Department of Agriculture & Fisheries for Scotland.

(a) Howells, Dudley V. (1939) Strawberry Culture: Miscellaneous Publications No. 12, Department of Agriculture for Scotland

It may be of interest to point out that Howell's estimate of profit over the cycle was £19.17s. an acre a year; the corresponding figure from 1959 and 1960 would be (after adding back overheads) £6.18s. on a weighted basis, or £53.18s. on an unweighted basis. Growers might well point to the change in money values since 1938, which would imply far greater spending power for the £19.17s; but, as already said, Howell assumed that his beds would be free from disease.

(6) Some aspects of the 44 crops

(a) Soil and Situation

Since the grower looks to a heavy yield and a good price for a satisfactory profit, it is to be expected that sales per acre are the most potent influence on Surplus. This study gives some measure of confirmation of this expectation. The general impression of the results is, too, that the biggest Surpluses are likely from plantings on kindly soils with beneficial aspect. Unfortunately an aspect that will secure quick drying of foliage during the ripening stage, may also be so open to bitter winds at the time of blossom-set that yield is nil. A 'late' situation is desirable if the objective is to have a substantial part of the fruit to market after the English crop has passed its peak.

(b) Variety of Strawberry

This study cannot throw light on the important matter of selection of variety. Lateness to avoid gluts was sought after. Many of the growers 'sighed for' the days of Auchincruive Climax, and several looked eagerly forward for another variety as good, for their circumstances, as Climax. In the 44 records, Talisman appeared alone 16 times, Rearguard alone twice, and others appeared in combination with Talisman as follows: Redgauntlet 13 times, Rearguard 6 times, Cambridge Vigour 5 times, Coronation and Surprise 4 times each, Royal Sovereign 3 times, an Auchincruive numbered variety twice, and Cambridge Rival and Perle du Prague once each.

(c) Freedom from Disease

Healthy stocks that can withstand at least some of the soil-borne infection are clearly very important. Reduction of yield was obvious in several mature stands where gaps and deterioration of plants had followed the attack of one or other pest or disease, and on two holdings plantings failed because of infection.

Botrytis appeared to be the most important scourge, for it happened that, for several of the growers, heavy rain and humid weather came in both seasons when the crop was at its best. Because virtually every berry has to be inspected to detect blemish once the disease has struck, the labour of picking and packing is greatly increased; and a great proportion of the crop may be quite unsaleable. Indeed, as in one case, the cost of harvesting may exceed the gross proceeds of the crop. No noticeable benefit was recorded from the few experimental dustings and sprayings that were employed to prevent or reduce the mould attacks. Suitable aspect, erectness of fruiting habit and freedom from weed helped to protect the crop.

(d) The fruiting life of a planting

Closely associated with freedom from disease is the length of fruiting life of the plantings. This largely determines the charge, to be borne by a year's crop, for establishing the plants.

The most common annual charge for a share of establishing was one-third of that cost, based on a three-year life. Details are as follows out of 50 calculations.

TABLE IX

ESTIMATED LIFE OF PLANTINGS

Average years' life assumed	No. of cases
0	2
1	1
2	11
3	28
3½	5
4	3
	50

Very few plots had passed their 3rd fruiting year, as is shown by Table X.

TABLE X

AGE OF STANDS

Fruiting year	% of plots by number
1st	38
2nd	30
3rd	23
4th	7
5th & 8th	2
	100

(e) Quality of Worker

Several growers, who had the services of skilled workers, whether of their own family or hired, could refer to low costs of harvesting and high quality of produce; but several others were faced with great difficulty in securing skilled and painstaking workers, who could pick both quickly and without damage to berry or plant. Some growers, who could normally rely on school children's help at harvest, found the crop needing to be pulled several days before the school holidays started.

(f) The Cost of Harvesting

The effect of disease on the cost of harvesting is referred to above. The rates of harvesting and the costs per lb quoted in Table VII(b) are derived by comparing the weight of fruit marketed with the time and cost of labour, including the time during which workers were waiting to proceed with the work. There was no picking on piece-work. Costs per lb sold were, of course, high where large proportions of blemished fruit had to be picked and discarded; they were also high where the only workers were irresponsible children. In a few cases, it was clear that casual wages alone were, on particular days, exceeding the value of the day's picking. The contrast between the harvesting rates quoted here and the picking rate (when only the actual time spent at the plants is often counted) is illustrated by the statement of one grower, whose harvesting rate was 9.9 lbs to the hour, that one of his staff picked 46 lbs in little over an hour, and that his pickers were all good. Costs per lb were relatively low, and picking rates high, where the crop was sound and near the dwelling and the pickers were members of the family with a long experience of picking. Opinion varied about the desirability of grading, and practice varied accordingly.

(g) Markets

Most of the growers sold through Glasgow brokers, some to English brokers and some direct to shops. Private customers took decreasing quantities, and most growers said that door sales had dwindled markedly. This fall in door sales deprived them of considerable price and cost advantages. Six growers sold to conservers in 1959, but not in 1960, and one grower supplied a large proportion of his crop to conservers in both seasons, as he had done (on contract) for many years. Indeed, factory demand for jamming berries, weak in 1959, became almost negligible in 1960. Sales for canning, small in 1959, were not met with in 1960. Bakers took good quality fruit in both years.

Market prices lacked the support which would have followed from the normal diversion of supplies direct from grower to factory under contract. This did, indeed, weaken market prices in the main period of the 1959 meason. In 1960, the crop ripened early and, reaching markets already supplied with English fruit, met disappointing prices. Average prices are shown in Table VII(b).

(h) Containers

Payments for containers, averaging 1.21 pence a lb, accounted for about one-third of the cost of marketing. About one-seventh of the total crop was collected, without charge, by processors using their own trays. For the rest, the purchases of containers ranged between slightly over 3d a lb for fruit in half-pound punnets to a little over 1½d a lb for fruit in 4 - lb chips. The most frequently met containers were 1 - lb punnets (costing a penny and two-thirds each); but 2 - lb chips (costing slightly over 2½d a lb of fruit) were used for the greater quantity of fruit. Any charge made by the broker for the trays on which the punnets are transported is included in Commission. Custom and the destination of the fruit seemed to determine which type of container should be used. Table XI gives some details.

TABLE XI

CONTAINERS USED: EXCLUDING TRAYS SUPPLIED BY PRESERVERS

	Number using (44 records)	% of weight of fruit
½ lb punnets	7	10
1 lb "	33	34
2 lb chips	29	39
4 lb "	23	17
Others (5 lb & 12 lb)	1 each	less than 1

(j) Cultivations

Mechanical cultivations of the fruiting areas were largely done by power-driven rotary and fixed-time hoes. Tractors drawing hoes were also used, sometimes the team involved being tractor driver and two men on foot behind the hoes. Hand cultivations included pulling of weeds and weeding with long hoe, short 'chisel', short hoe, or fork. The average cost of these cultivations amounted to 23% of the gross value of the fruit, and as much as 45% of the value of the fruit 'on the plant' (see p.16). Clearly, any reduction of the cost of cultivation, unaccompanied by increased weed population or by damage to the plants, could be of considerable benefit. Sodium chlorate was applied to the mature plantings after harvest on two holdings: this could reduce weediness and so reduce hand-hoeing. Planting so that machines could hoe in both directions also helped.

Scotland is unable to practise the one-crop system which, in England, takes the single year's crop before the plantings are a year old and so avoids the necessity for the very expensive weeding of established plantings. For lateness of season leads to difficulty in clearing the land for timely autumn planting, and the plant growth is seriously retarded by Scotland's short day-length in winter.

Defoliation after harvest was performed on some holdings, partly for cleanliness' sake and partly with a view to improved flowering in the following year.

(k) The Return to Labour

It may be contended that thecalculations made for this report, which lead to statements that in 24 out of the 44 records returns failed to cover expenses, are not entirely relevant. For it may have been somewhat unrealistic to charge full current rates of wages for family workers. Hence the following paragraph.

Much of the work on these strawberries was done by the growers and their families. Some was done by regular employees and much by casual workers, whether adult or juvenile. It was not possible to distinguish between regular staff and 'regular' casuals in all cases, and so it is impracticable to arrive at the labour income after payment of casuals. Table XII, however, shows that on average, the margin between gross value and all other costs than labour, overheads and rent, was only 8% more than was required to pay for all labour, including the work on the plantings.

TABLE XII

MARGIN AVAILABLE FOR LABOUR

	Weighted average pence per lb
Gross price	19.26
All other costs than labour, overheads and rent	6.85
Balance available for labour etc.	12.41
The same, % of labour	108%
The charge for Labour	11.49d

If this average experience were general, a continuance of the crop in these conditions would be unlikely. That the crop is grown is due to many better-than-average returns and to an expectation that seasons will be more profitable than these two seasons.

(l) Break-even yields

If, as in Table IV, harvesting costs 5.34 pence a lb, marketing costs 3.94 pence a lb and the selling price averages 21.16 pence a lb, the net value for fruit "on the plant' is 11.88 pence a lb, or £5.54 a cwt. At this price the yield required to cover average costs up to the point just prior to harvesting is 30 cwt a net acre. 27 out of 44 records achieved yields of this weight. For the general run of costs up to this point, the break-even yields are between 23 cwt and 34 cwt, yields which were achieved in 34 and 24 records respectively out of the 44.

While all growers hoped for better-than-average results, five crops left less than £60 an acre for all the outlay prior to harvest, and fifteen crops left less than £100, whereas the average cost (excluding overheads) up to that point was £169.

The average value, on an unweighted basis, of the fruit 'on the plant' was £235 an acre. Table VII(b) gives other details.

(m) The Competitive Position of the Crop

This department has no commercial data about other crops, alternative to strawberries, that might be compared with those produced, for strawberries, from this study. However, the trends in acreages suggest that other crops are, indeed, more attractive to growers in this district, a district that once marketed vast quantities of the fruit.

Three other factors merit attention here: the first, a technical one, that the crop offers a break from brassicas with their club root, a break that also offers the chance of being a real money-spinner. The second is the economic one that while most of the spring and summer cultivations and the harvesting occur when the work is crying for attention, in autumn and winter there are relatively few directions in which the labour can be used. Some of that labour is provided by regular employees whom it is highly desirable to retain for the next season's work and some is of the grower and his family. So the work of these folk may well have a very low 'opportunity cost'. The third is that overhead expenses are not direct expenses of the crop, and though they have to be borne by some crop they need not be counted in when deciding whether to continue the strawberry crop or drop it.

The various factors discussed in the foregoing pages, bearing on the question of the future of the crop in the Clyde Valley counties suggest that the local crop is likely to survive, though not to expand; if, however, a variety like Auchincruive Climax were produced, the acreage would expand somewhat.

DEFINITIONS & COSTING METHOD

Areas (i) The area covered by the rows of plants and the 'roads' between the rows of plants, together with the cross paths within the plots is called the Net Area. Unless the contrary is indicated 'acres' refer to net acres.
(ii) The Gross Inclusive Area includes an addition to cover headlands, hedgesides and field tracks beside the crop if the chief purpose is the service of the crop, and covers both the fruiting area and the related area of young plantings.

The Accounting Period

For fruiting plots, the records run from immediately after the one harvest until immediately after the next.

Correspondingly, the records for the young plantings run to the similar date. In effect the work on the young plantings covers (a) for autumn planting, nearly a year and (b) for spring planting, less than six months.

Rent

The annual rental value of each field was agreed with the grower. One year's rent for the gross area is charged against each mature crop. One year's rent is also charged against each new planting, a second year's rent being charged if a fallow preceded the planting.

Labour

Typical charges for unpaid labour are

Grower	4/5
Wife	3/-

Other workers' rates are those actually paid, including allowances, if appropriate, for insurance, holidays - with-pay and paid sick time.

COSTING METHOD (Contd)

Inclusive Cost of Labour

Covers labour on both fruiting areas and the appropriate share of the first year work.

Machines

The following are the usual charges, per hour:

Tractor	4/3
M.G. tractor	8/-
Rotohoe	4/5
Rotavator on tractor	4/-
Vibro-hoe	2/5

Farmyard Manure

In addition to the price actually paid for the farmyard manure, haulage to the field or midden is included.

Compost

In the one case where compost from glasshouses was used the charge consists wholly of the labour involved.

Residual Values of Manures

In the absence of a generally acceptable table of residuas for horticultural holdings, each year's application is charged wholly to the one year.

Overhead Expenses

A tentative estimate is made that on holdings such as these, the expenses not covered by direct labour, tractor and power cultivators, manures, plants, sprays, straw, containers, other marketing expenses, and rent are equal to about one-quarter of the direct labour cost. The business car and indirect labour accounts for quite a large proportion of this overhead cost.

Surplus is profit after charging all expenses, including grower's labour and overhead expenses. If the same calculation shows a 'loss' the term Deficit may be used. A change from a Deficit of £50 to a Surplus of £80 is called an Increase of Surplus by £130.

Yields

Except in one case, no record is made of fruit used in the grower's house or given to workers. The quantities so used were said to be very small.

Cost of Establishing the Plantings

Normally the charge against a fruiting year is simply the estimated cost in the year, or half-year, of planting divided by the number of years the plants were expected to crop. In the cases where a planting failed, the whole cost is charged against the next year's crop on the rest of the holding. Normally it has been assumed that all the plantings were established at the cost per acre of the lot or lots costed on the same holding, allowance being made for changes in wage rates.

The Charge for Homegrown Runners

The charge of £1.5 per thousand is arrived at on the basis of 150,000 runners per acre, a reduction of crop as a result of taking runners, and the slightly greater expense in working runner beds than ordinary first year plantings. The corresponding credit to the fruiting year of which the crop has been reduced because runners have been taken, compensates the year for this decrease.

Marketing

Normally growers speak about the price at which their produce leaves their possession (in the legal sense) rather than about the price at the 'farm-gate', to which most costing of agricultural products is directed in this country. For this reason brokers' commission and handling charges are included in Marketing. Other items included are the cost of containers, usually non-returnables, trays (owned or hired), transport (whether paid to a carrier or simply a share of the costs of running the grower's lorry, van or car), and, where the fruit was retailed or delivered to shops, the cost of labour in selling.

Value of fruit 'on the plant'

This is the gross value of fruit less the costs of harvesting and marketing. It corresponds to the value, to a merchant, of a potato crop ready to be lifted.