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Silage - Cost of production

THE WEST OF SCOTLAND AGRICULTURAL COLLEGE

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GRASS SILAGE COSTINGS, 1964 CROP

John Reid

178 Bothwell Street,
Glasgow, C.2.

Economics Department Report No. 102

1965

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*With the Compliments of the
College Economist and Staff*

West of Scotland Agricultural College,
178 Bothwell Street,
GLASGOW, C.2.

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FOREWORD

Agricultural Statistics published by the Department of Agriculture for Scotland show that production of Grass Silage has been increasing over recent years while production of turnips and swedes has been falling. The following table embracing the last six years from 1958 to 1963 is interesting.

Production of Grass Silage and Turnips and Swedes in Scotland

<u>Year</u>	<u>Grass Silage</u> <u>Estimated Production</u> '000 tons	<u>Turnips and Swedes</u> <u>Estimated Production</u> '000 tons
1958	504	4746
1959	579	4359
1960	742	4900
1961	864	4478
1962	980	4509
1963	1162	3841

Grass Silage production has more than doubled over those six years while there has been a decrease of 900,000 tons in the production of turnips and swedes.

The main purpose of this study was to obtain up-to-date figures on the cost of growing and securing the grass silage crop in this area. This report deals with the cost of production of grass silage during 1964, and cost records, obtained from 34 farms for the crop of 1964, are reviewed.

These 34 farms were situated in six counties of the College area. Thirteen of the farms were in Dumfriesshire, seven in Ayrshire, four each in Kirkcudbrightshire and Stirlingshire, five in Wigtownshire and one in Dunbartonshire. Twenty-four of the farms were mainly dairy farms; the other ten being upland stock-rearing farms.

GENERAL INFORMATION ON THE COSTINGS.

Some information on the sample of farms is summarised in the following table showing the range of farm sizes (arable acres only).

<u>Farm acres (Arable)</u>	<u>Under 100 acres</u>	<u>100-200 acres</u>	<u>200-300 acres</u>	<u>over 300 acres</u>
No. of cases:-				
Single cut crops	3 (23.5%) [±]	6 (15%)	7 (16.4%)	2 (3.3%)
Multiple cut crops	3 (25.8%)	6 (24.8%)	6 (27.8%)	1 (9.4%)

± The percentage figure in brackets is the average percentage of the arable acres of the farms, used for silage growing.

On some farms the silage crop was relatively of more importance than on others, the range of the percentage of acres set aside for silage growing varying from 3.3% to 61%.

The weather in 1964 was rather unsettled, it being a somewhat cold and dull year. Official statistics record that one of the features of the year's weather was the dry, mild beginning to 1964. It was the first really mild January since 1957, but from June onwards it was mostly colder than usual. There was also a lack of sunshine in the spring, the months of March, April and May being more cloudy than usual. Conditions on the whole were not favourable for maximum yields of silage; in general it was not a very satisfactory year for wilting the crop, although conditions varied greatly from farm to farm in the different counties.

The costing of grass silage crops presents problems not met with in costing cereal or root crops. The reason for this is the great variations which occur in the uses of the land from which the grass silage is harvested and the number of cuts taken. Estimates have to be made of the other uses made of the silage fields prior and subsequent to each cut of silage taken. There are therefore two types of costs involved (i) costs such as rent, basic manuring and reseeding costs, etc. which have to be shared between "all uses" of the silage fields and (ii) costs incurred directly for silage. The former are "joint" costs and the latter "direct" costs and the method of handling these "shared" and "direct" costs is described later in the section headed Costing Method and Charges.

Grateful acknowledgement is made of the help given by the co-operating farmers in keeping careful and detailed records. The work of the County Advisers and their Assistants in sampling the silage, and of the Chemistry Department at Auchincruive in providing the analyses is also very much appreciated. Thanks are also due to my colleagues Grace Picken and R.F. Munro who collected some of the costing information.

John Reid.

SOME PRELIMINARY EXPLANATIONS OF METHOD

Before explaining details of the costings some explanations will make these easier to understand.

The silage crop was cut under a great variety of circumstances. In some cases the whole, or a proportion of, the crop, came from fields which had been directly reseeded for this purpose, while in other cases the crop came partially from a first year's ley sown out under a cereal crop the previous year, and also, in many cases from previously established leys.

In the tables the reseeded and sow-out costs shown per acre are not the actual costs per acre reseeded or sown out. The starred figures at the top of the tables are given to clarify the position for typical crops. The top figure is the total silage acres costed, while the lower figure is the actual acreage reseeded or sown out. The cost per acre figure under 'the all field uses' section is arrived at by dividing the total cost of reseeded or sowing out the reseeded acres by the total silage acres costed.

Similarly in the case of dung work, as in many cases only a proportion of the silage acreage was dunged. It is to be noted that no charge was made for the manurial value of the dung applied, but only the cost of labour and power in applying it, including overheads.

The yields per acre of silage were calculated from the dimensions of the silage in the silos, after shrinkage had ceased; then allowing for wastage. The yields shown in the tables are the estimated usable tons of silage stored. The yields were estimated assuming that silage weighed from 35-50 lb. per cubic foot. The weight per cubic foot varied from farm to farm, as some crops were wilted and others not, while some crops were cut at the young leafy stage and others were at or near the hay stage. The estimated yields were arrived at in conjunction with the farmer after allowing for these factors of wastage, stage of cutting and depth of silage in the silo.

The position regarding these various estimations and cost items is elaborated further under Costing Method and Charges and also in the detailed narrative which follows.

GROUPING USED FOR COMPARISONS

The 34 Costings were first divided into two Groups, these being Single Cut Crops and Multiple Cut Crops.

These two Groups were next sub-divided into three Groups each, the Single Cut Crop groups being A, B, and C and the Multiple Cut groups being D, E, and F.

Single Cut Crops

Group A is Single Cut Crops where no Farmyard Manure was applied to any of the silage crop and so there is no dung-work charge in the costings.

Group B is Single Cut Crops where all or a portion of the Silage acres were dunged, and also where some or all of the fields carried a sow-out or reseeding charge for 1964.

Group C is Single Cut Crops taken from established leys and so bearing no sow-out or reseeding charge whatever. All costs in this group also bore a dungwork charge.

Multiple Cut Crops

Group D is Multiple Cut Crops where all or portion of the silage acres were dunged and also having a sow-out or reseeding charge.

Group E is Multiple Cut Crops where no dung was applied but where some or all of the silage acres were sown out or direct reseeded.

Group F is Multiple Cut Crops taken from established leys with no sow-out or reseeding charge and in this group of only three farms, only one of the farms applied dung and this to all of his silage crop.

In Table I the average figures were calculated by aggregating the "per acre" yield and cost figures for all 18 farms and dividing by 18 to obtain an unweighted "per acre" average for the 18 Single Cut Crops. The same method was used in Table 2 in obtaining the 16 Multiple Cut Crops' averages, i.e. all farms were given equal weight irrespective of the silage acres grown on each farm.

SUMMARY

The main results from the costing study are shown below.

The average cost including a share of overheads was around £3 per ton of usable silage.

With the records divided into two main Groups the average results were:-

	<u>Single Cut Crops</u>	<u>Multiple Cut Crops</u>	<u>All Crops</u>
Number of cost records	18	16	34
Total acreage costed	454	704½	1158½

Yields

Average yield per acre grown - tons	7.2	8.3	7.7
Average yield per acre cut-over - tons	7.2	5.1	6.1
Number of silage acres reseeded	107	194	301
Number of silage acres dunged	115	297½	412½

Figures below are in £'s and decimal parts of £'s

<u>Costs</u>	£	£	£
Costs per acre grown	21.0	27.4	24.0
Cost per acre cut-over	21.0	16.4	18.9
Cost per ton	2.9	3.3	3.1

Labour and Power

Total labour and tractor hours taken varied greatly depending on the number of silage acres reseeded and/or dunged, and no comparisons are given. However, all crops were harvested by forage harvester and the following table shows the man and tractor hours from cutting till final covering of the silage, all figures being expressed per cut-over acre and per ton of silage secured.

<u>Harvesting and Securing</u> <u>Average number of hours</u>	<u>Single</u> <u>Cut Crops</u> <u>Hours</u>		<u>Multiple</u> <u>Cut Crops</u> <u>Hours</u>		<u>All</u> <u>Crops</u> <u>Hours</u>	
	<u>Per Cut</u> <u>Over ac.</u>	<u>Per</u> <u>ton</u>	<u>Per Cut</u> <u>Over ac.</u>	<u>Per</u> <u>ton</u>	<u>Per Cut</u> <u>Over ac.</u>	<u>Per</u> <u>ton</u>
Man hours	9.2	1.3	7.8	1.6	8.5	1.4
Tractor Hours	9.0	1.2	6.7	1.4	7.9	1.25

Analyses and Wastage

Some farmers gave estimates of the wastage in their silage, and where there were approximate figures these were calculated and expressed as percentages in the following summary table, also showing analyses for the samples analysed.

SUMMARY TABLE

	<u>Single</u> <u>Cut Crops</u>		<u>Multiple</u> <u>Cut Crops</u>		<u>All</u> <u>Crops</u>	
Dry Matter (D.M.%)	\bar{x} (16) 20.1%		\bar{x} (13) 20.1%		\bar{x} (29) 20.1%	
Starch Equivalent %	\bar{x} (8) 8.9%		\bar{x} (7) 9.0%		\bar{x} (15) 9.0%	
Crude Protein as % of D.M.	\bar{x} (16) 12.2%		\bar{x} (13) 13.9%		\bar{x} (29) 12.6%	
Yield of D.M. per acre	\bar{x} (16) 1.51 tons		\bar{x} (13) 1.63 tons		\bar{x} (29) 1.57 tons	
Cost of Dry Matter, per ton	\bar{x} (16) £14.4		\bar{x} (13) £16.3		\bar{x} (29) £15.2	
Estimated Wastage as %	\bar{x} (12) 8.0%		\bar{x} (12) 4.5%		\bar{x} (24) 6.3%	

Note: \bar{x} The figures in brackets indicate the number of farms from which the average is derived.

COST STRUCTURE

The cost structure of growing a grass silage crop could be shown by the natural stages of the work, but owing to the great variety of circumstances under which the grass crop is grown and utilised, this method was not adopted in this instance. A division was made into Variable and Fixed Costs.

The first step was to divide the costs into fixed and variable costs and since in this survey the largest acreage of grass silage was cut from established leys, it was decided that grass seed costs should be regarded as fixed costs, leaving the variable or direct costs of grass silage under the three headings of Fertilisers, Sundry Materials, and Contract Work and Casual Labour. The following Table extracted from the main Appendix Tables on the last two pages of this report show the Variable Costs of silage separately for the two main groups of Single Cut and Multiple Cut Crops.

<u>Variable (Direct) Costs per acre</u>	<u>Single Cut Crops</u>	<u>Multiple Cut Crops</u>	<u>All Crops</u>
	£	£	£
Fertilisers (specifically for silage)	3.6	5.2	4.4
Sundry Materials (for fields and silos)	0.3	0.1	0.2
Contract Work and Casual Labour	<u>0.1</u>	<u>0.3</u>	<u>0.2</u>
Total Variable Costs	<u>4.0</u>	<u>5.6</u>	<u>4.8</u>

It is to be noted that in the above table the cost figures for fertilisers applies only to those considered specifically applied to increase the yield of grass for silage. Costs of basic applications of slow acting fertilisers such as lime or slag were deducted, and these costs appear in the main Appendix Tables under the 'All field uses' section of costs. Also the description sundry materials includes such items as weed sprays applied to the grass silage fields, additives or preservatives added to the grass in the silo, and also short life covering materials such as polythene sheeting for the final securing of the silage.

Expressing and calculating these figures per ton of silage the variable costs per ton are as in the following table.

<u>Variable (Direct) Costs per ton</u>	<u>Single Cut Crops</u>	<u>Multiple Cut Crops</u>	<u>All Crops</u>
	£	£	£
Fertilisers (specifically for silage)	0.50	0.62	0.57
Sundry Materials (for fields and silos)	0.04	0.01	0.025
Contract Work and Casual Labour	<u>0.02</u>	<u>0.04</u>	<u>0.03</u>
Total Variable Costs per ton	<u>0.56</u>	<u>0.67</u>	<u>0.625</u>

From the above tables it will be noted that the variable costs of growing grass silage are not high, and indeed it is a crop where even on small farms very little casual labour is employed. The main Contract Work is usually for manure spreading or weed spraying of the silage fields. The term 'manure' here refers to both dung and artificial fertilisers.

There will be circumstances on some farms where it is the practice to direct reseed certain fields with special grass silage mixtures, when it will be necessary to regard the cost of the grass seeds as a variable cost of the grass silage crop. In such cases this may add another £3 to £6 per acre to the total variable costs, depending on the type of seed mixture used. However, even with this extra cost the grass silage crop is one which has a low variable cost per acre compared to many other crops such as roots, which usually require higher fertiliser applications and make a greater demand on labour.

GENERAL COMMENTS

Average figures for the groups and the figures from two typical costings are given in the Appendix Tables. For simplicity and ease of making comparisons however the costs of various stages have been analysed separately, and it is hoped the following may be useful in supplementing the figures given in the Appendix Tables.

Direct Reseeding and Sow-Out Costs

Direct Reseeding

In 13 cases the silage crop was taken wholly or partially from first year's grass, established by direct reseeded without a nurse crop. On those 13 farms, 159½ acres of grass was reseeded at a total cost of £1363, giving a weighted average cost of £8.6 per acre. This figure includes the cost of the seeds and all cultivation costs prior to sowing and immediately after sowing the seeds.

The range of reseeded costs was from £5.5 to £11.5 per acre, a range to some extent explained by the fact that, in some cases reseeded was done after potatoes with no ploughing necessary, while in other cases the land was broken by ploughing followed by the usual cultivations.

Sow-Out

On 13 farms part or all of the silage crop came from first year's grass established by sowing out under a nurse crop in 1963. On these 13 farms, 141½ acres were sown out at a total cost of £846 giving a weighted average cost of £5.98 per acre. This figure includes cost of seeds, harrowing and sowing seeds and subsequent rolling. The range of sow-out costs varied from £4.73 to £8.00 per acre.

On 11 farms the silage crop was taken from established leys and in these cases no reseeded or sow-out costs were charged against the silage crop.

Both reseeded and sow-out costs are influenced by the type of seed mixtures used and many variations were found, not only from farm to farm but also from one field and another on the same farm. Briefly summarising, the position found was as follows.

On 5 farms the silage crop came mainly from Italian ryegrass mixtures sown after potatoes, while in 9 cases a portion or the whole of the crop came from a special silage mixture. Timothy meadow fescue mixtures were used on 7 farms, while on 21 farms the silage came from leys with a general purpose, mainly ryegrass dominant, sward.

Farmyard Manure

This item covers both dung and slurry and of the total 1158½ silage acres costed, 305 acres on 22 farms received applications of slurry or dung. The total cost of man and tractor hours, plus overheads on same, for applying this manure was £1413 giving a weighted average cost of £4.6 per acre. Costs ranged from £1.9 to £6.7 per acre, and while in all cases

the manure was mechanically loaded and spread there were great variations in the distances the manure had to be hauled, some fields being next to the farm dungstead and in other cases the fields being up to 1 mile distant.

From the Appendix Tables the higher yields of silage from the dunged crops will be noted, although these are to some extent masked by the varying acres treated, and in the Multiple Cut Crops by the interaction of the varying acres cut 2 or 3 times. Taking the Single Cut Crops only however, on the 12 farms using dung the average yield of silage was 7.6 tons per acre as compared to 6.4 tons per acre on the farms where no dung was used. This superiority in yield of 1.2 tons per acre from the dunged crops is all the more impressive when it is realised that on those 12 farms only 115 of the 264 acres of silage grown were actually dunged. In short the superiority of dunged crops is even greater than these figures indicate.

Manuring Costs

Lime and slag, or lime alone, was applied to a portion, of all, of the silage fields on 12 farms, mainly to the young seeds. On the other farms the main manures applied were compounds and in the case of those taking more than one cut, top dressings of nitrogen in the form of Nitro Chalk were most common, at rates of 2-4 cwt. per acre.

The figures indicating the cost of the fertilisers shown in the tables give some indication of the level of manuring. For the 18 farms taking one cut of silage only, the average cost of manures applied and charged to the silage crop was £3.6 per acre with a range of costs from £2.4 to £5.4

Cost of Grass ready to cut

An additional figure calculated for those 18 Single Cut Crops was the total cost of the grass ready to cut (excluding reseeding and dung work costs). The average cost here was £4.5 per acre with a range of costs from £2.8 to £6.2 per acre.

This figure includes costs of manures and any other work such as rolling, weed spraying etc., carried out on the silage fields prior to cutting. Because of the varying acreages cut more than once, comparisons of manurial costs and growing costs for the multiple cut crops are not valid.

Time of Cutting

The Single Cut Crops were mainly harvested in June with a few commencing as early as late May and some extending over the period June and July onwards over several fields. In the Multiple Cut Crops generally the first cut was in May and/or June and the second and third mainly in August and September.

Harvesting Costs

While the tables show the total cost of farm labour and power, such figures cannot be compared easily as a result of the varying circumstances. However an analyses was made of the Man and Tractor Work from cutting to the final securing of the crop.

For the 18 Single Cut Crops and the 16 Multiple Cut Crops the average Man and Tractor Hours for cutting and securing the crop per cut-over acre and per ton were as in the following Table:-

	<u>Per cut-over acre</u>		<u>Per ton of silage</u>	
	<u>Man Hours</u>	<u>Tractor Hours</u>	<u>Man Hours</u>	<u>Tractor Hours</u>
Single Cut Crops				
Average figures	9.2	9.0	1.3	1.2
Multiple Cut Crops				
Average figures	7.8	6.7	1.6	1.4

Factors affecting these figures were, of course, distance of the silage fields from the silo and yields per acre, but broadly speaking the figures do give a fair comparison, for in all cases the silage was harvested by forage harvester but in a few cases the crop was wholly or partially wilted thus adding an extra operation in harvesting.

In only one case was the silage stored in a tower silo involving extra machinery and man power during harvesting. Almost all farms used a buckrake for filling the silo, but there were many variations in the organising of the harvesting teams. Only three farms used additives or preservatives in the silage.

Silos and Silage Equipment

The silage matured in various containers but the most common type of silo used was the converted hayshed type, where the sides of the silo were made of wood (mainly sleepers) or concrete. In many cases the building had been constructed with the dual purpose use of a combined silage, and hay or straw store, in mind. The following table summarises what was found in this respect.

	<u>Single Cut Crops</u>	<u>Multiple Cut Crops</u>
Covered silo in bays of hayshed type	14	13
Open silo with lined sides	3	3
Open clamp on ground and no side walls	1	2
Tower silo	-	1
Total	<u>18</u>	<u>19</u>

In the case of the open unroofed silos, three of the farms used polythene sheets for covering the silage while in the other instances they were left entirely exposed.

As regards special silage harvesting equipment all farms used forage harvesters, and on five farms all or nearly all the crop was cut and allowed to wilt before picking up with the forage harvester.

The forage harvesters used were of several different makes, some being of the 'double chop' type and 'in line' and 'side mounted' trailers were equally common. On the whole they were all satisfactory, but in a few cases some models were found rather less satisfactory when picking up wilted material.

Comments on Wastage and Analyses.

Very little can be added to what appears in the summary regarding wastage beyond adding that estimates varied from almost none whatever, up to 14%. Considering the great variations in the silos and the fact that some wastage is inevitable where the silos are uncovered, the range of variation in the figures is not surprising.

As regards the analyses, only four samples were classified as being high in protein, indicating a suitability for use in a production ration. The Starch Equivalent (S.E.) of the samples analysed were also fairly low ranging from 7.2 to 10.7%. The range in Dry Matter percentage was from 15.9% to 34.5% the higher figure being from a wilted crop. In other cases the higher dry matter figures were due to the fact that the crop was cut at the hay stage in good weather conditions. The pH of the samples ranged between 3.8 and 4.9 and in a number of cases there had been overheating, but all of the silages were quite satisfactory maintenance feeds and very few had objectionable smells.

Methods of Feeding

Notes were made on the methods of feeding the silage and the position can be summarised as follows.

On 16 farms the silage was cut and hand fed to cows or other stock housed in byres during the winter. On four farms the silage was cut and hauled out by tractor and trailer to outwintered stock in the fields. A moving floor trailer was used for this purpose in one case, while in another a special box fitted to the rear of the tractor was used, being found more satisfactory when the ground was soft.

Self feeding was practised on five farms, with some of the silage also being cut, and carted out to young stock, usually the poorer top layers from the silo. What is known as the "Easy feed" System was used on three farms. Here the stock are housed adjacent to or in the same building as the silage, but the silage is cut and rationed, being fed over a barrier to the stock twice daily.

On the remaining farms combinations of these various methods were practised, the silage being hauled out to the fields in the early part of the winter and barrowed to the stock houses later. While considerable man and tractor hours were spent where hand feeding was adopted, most of the co-operators considered less waste was likely by this system than by self feeding, while being able to ration the silage throughout the winter was also a factor of importance where a limited quantity was made.

Other uses of silage fields

From the appendix Tables the considerable variations in the estimates of deductions from the gross costs, for other uses of the silage fields are worth noting. The average deduction per acre over the 18 Single Cut Crops for other uses of the fields was £2.8 per acre and for the 16 Multiple Cut Crops £2.1 per acre. (Note only 302½ acres were cut more than once in this group).

The figures in each case were arrived at by carefully estimating what share of the joint costs for all field uses were really chargeable to the silage crop and what share to the grazing animals. In making these estimates considerable weight was put on the information available on the allocation of field uses and many factors were involved. The charges for grazing were weighted according to the months when the stock were grazed and also according to the intensity of stocking and the length of the grazing period.

The ranges of estimates were from £0.6 to £8.9 per acre in the case of the single cut crops and from £0.4 to £3.9 per acre in the multiple cut crop group. Factors of importance here were the type of land, and earliness or lateness of the district, and it is to be appreciated that the estimate was not entirely an arithmetical calculation but much more a judgment based on all the factors involved and facts given.

COSTING METHOD AND CHARGES

Grass Silage Crop, 1964

A feature of costings for grass silage crops is that some of the costs incurred, or charges made, can be allocated clearly and directly to the grass silage, while other costs and charges should in fact be shared between the other uses made of the silage, fields e.g. early spring grazing, grazing between cuts and the use of the fields in autumn and winter. These two sections have been termed ... COSTS: SILAGE ONLY and COSTS: ALL FIELD USES. In the latter case a deduction has been made from some or all of the items, for example from Rent and from 'Overheads - by per acre' leaving only part to be charged to silage. Also, where it was considered that some part of applications of fertilisers ('Certain fertilisers and Lime') were meant to give considerable benefit for grazing etc., a sharing has been done.

It is to be noted that the term Depreciation and Repairs: Machinery refers to specialist silage machinery, e.g. forage harvesters, trailers, etc. The charge for such an item for all normal farm equipment is made by means of the rates used in applying part of the Overheads charge.

As in other 'enterprise' costings no account is taken of residues or unexhausted manurial values. Thus fertilisers are charged wholly against the crop to which applied. Also, because in the livestock costings, no credit is given for the manurial values of food or litter, (i.e. production of dung) the crop and grass costings do not carry any charge for dung, but they do carry a charge for the cost of man, tractor, etc. work in applying it. This item of 'Dung Work' is charged wholly against the crop to which it is applied, i.e. it is not spread over this crop and future crops.

1. Labour Rates used for hired labour were actual hourly rates paid including perquisites, plus 7 per cent to allow for broken time, sick time etc. over the year. For family and other labour the following rates per hour were used.

	<u>MEN</u>		<u>WOMEN</u>
Farmer & Sons over 21	5/6	Wife & daughter over 21	4/-
Sons over 20	5/-	Daughters 18-20	3/5
" " 19	4/3	" 17	2/9
" " 18	3/6	" 16	2/5
" " 17	2/10	" 15	2/-
" " 16	2/6		
" " 15	2/2		

2. Charges for Horse and Tractor work were:-

Horse (excluding man) 2/- per hour

Tractor (excluding driver) 4/6 per hour
(Wheeled tractors).

All hire of Machines or Contract Work is entered at actual cost. The rent charge is based on the agreed rental value of the fields costed.

3. Overheads (Share of Farm General Expenses) This charge is inserted as an estimate to cover the overhead expenses against this crop and includes an allowance for the depreciation of all normal machinery. Not having "complete" costings for each farm the overhead charges were at estimated rates obtained from a large sample of the accounts of Scottish farms, the rates used being:-

	<u>Dairy Farms</u>	<u>Other Farms</u>
(a) For each acre costed	11/-d.	8/6d.
(b) For each £ of farm labour used on the crop.	7/6d.	7/6d.
(c) For each T.E. Hour (i.e. the tractor hours plus $\frac{1}{4}$ of horse hours worked on the crop).	8/6d.	5/-d.

The (a) item - per acre - is applied under the COSTS: ALL FIELD USES section while (b) per £ of labour and (c) per T.E. Hour are applied according to the use of horse and tractor work.

In this way estimated shared charges are brought into the costing for the following (and other) items.

- (i) A share of car running and depreciation.
- (ii) A share of miscellaneous farm expenses.
- (iii) A share of repairs to buildings, fences and drains.
- (iv) Shares of implement repairs, rates, insurances and depreciation on tenants' fixtures.
- (v) The share of the farm bill for wages, fuel, light and power and for tractor and fixtures depreciation and repairs, which cannot be allocated to any particular crop or department.

In the case of any particular farm the charges applied by the above method are national estimates, and can, if desired, be replaced by a closer estimate where an individual can insert his own figures.

4. Lime and Fertilisers This is the cost (less subsidy) of these items applied specifically for the silage crop or an estimate of the share of these chargeable to the silage crop.

5. Dung Where applied, only the cost of the labour and power applying it, is charged. This item also covers slurry. The cost of the work is applied wholly against this grass crop, year 1964.

6. Direct Reseeding and Other Sow-Out Costs Again, in these cases, no residues have been brought forward or carried to the future. The whole cost of a direct reseed is charged against the total silage acreage costed, and similarly with the cost of a sow-out under a nurse crop; the first grass crop bears the whole sow-out cost, as explained in the preliminary explanations.

7. Sundry Materials and Charges Covers all sundry items such as weed sprays, baler twine, additives to the silage, and any short-life covering materials used to secure and protect the stored silage.

8. Other Uses of Fields Since grass silage may represent only a proportion of a field's use for a year, especially if made from hay aftermath, estimates of the value of grass used for other purposes such as hay or grazing were made, and charges for such deducted, accordingly. The various items requiring sharing in this way would vary with the circumstances. The grazing value was weighted monthly according to the district and density of stocking during the grazing period.

APPENDIX TABLES

These tables show how the silage costs are made up per acre of silage grown, and in the case of the Multiple Cut Crops the yields are shown both per acre grown and also per 'cut-over' acre. For this group also the Net Cost per 'cut-over' acre is shown as the figures here are more comparable from farm to farm than the costs per acre grown.

The figures shown for depreciation on Silos and Silage Machinery vary greatly depending on the number of acres of silage grown, and in this connection a few comments may be made.

In the case of the Single Cut Crops the smallest acreage of silage costed was 7 acres and the largest 54 acres, while in the Multiple Cut Crop group the smallest farm silage acres costed was 6 acres and the largest $140\frac{1}{2}$ acres.

The typical case costing in the Multiple Cut Crops group Table, is where three cuts of silage were taken from the same 6 acres, which were ploughed and direct reseeded annually for this purpose. A special silage seeds mixture of Westernwolph and Tetraploid ryegrasses was used, the cost of the seeds being 67/6d per acre. It is worth noting that this special silage crop gave a total yield of 20 tons of silage per acre and the yield of Dry Matter worked out at 3.65 tons which is roughly equal to the dry matter from a 32 ton crop of Swedes.

No contract work or casual labour was used in this case but to the cost of fertilisers and sundry materials the grass seed costs would require to be added as a variable cost and thus the total variable costs of this silage crop were £16.7 per acre. The sundry materials charge was for weed spraying the crop with agroxone, which is usually a necessary operation under these circumstances. While the cost of this crop per acre at £73.4 seems high, it does show the great potential obtainable from a special grass mixture with generous fertiliser treatment. The cost per ton was by no means exorbitant, there being several higher costs in this group.

No attempt has been made to classify the costs into high or low costs per acre or per ton as conditions varied so greatly from farm to farm. The following summary of the groups, showing the range of yields and costs per ton emphasises this, and is worth bearing in mind when considering the Appendix Tables.

SINGLE CUT CROPS

- Group A - Single Cut Crops where no Dung was applied to any of the silage crop acres.
- Group B - Single Cut Crops bearing a dungwork charge and also a reseeding or sow-out charge.
- Group C - Single Cut Crops with no reseeding or sow-out charges i.e. from established leys. (All farms in this group bore a dungwork charge also.)

	<u>Range of yields per acre</u>	<u>Range of costs per ton</u>
Group A	4.8 to 8.0 tons	£2.4 to £3.2
Group B	6.1 to 10.0 tons	£2.7 to £3.6
Group C	4.3 to 11.1 tons	£2.1 to £4.1

MULTIPLE CUT CROPS

- Group D - Dunged Crops with a reseeding or sow-out charge.
- Group E - Non-dunged Crops with a reseeding or sow-out charge
- Group F - Crops with no reseeding or sow-out charges.

	<u>Range of yields per cut-over acre</u>	<u>Range of costs per ton</u>
Group D	2.2 to 6.7 tons	£2.4 to £6.1
Group E	4.5 to 5.6 tons	£2.2 to £3.7
Group F	4.1 to 6.1 tons	£2.3 to £3.4

APPENDIX TABLE I

GROUP AVERAGES - SINGLE CUT CROPS

<u>Group</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Groups Totals & Averages</u>	<u>A Typical Case</u>
Number of farms in the group	<u>6</u>	<u>6</u>	<u>6</u>	<u>18</u>	
Number of silage acres costed	170	165	119	454	£ 16
Number of silage acres reseeded	40	67	-	107	£ 6
Number of silage acres dunged	-	70	45	115	£ 7
Yield per acre - average - tons	6.4	7.9	7.4	7.2	7.2
<u>Costs per acre (Silage only)</u>	<u>£</u>	<u>£</u>	<u>£</u>	<u>£</u>	<u>£</u>
Fertilisers	3.6	3.8	3.6	3.6	3.4
Sundry Materials	0.1	0.3	0.5	0.3	-
Contract Work and Casuals	-	0.2	0.1	0.1	0.8
Farm Labour and Power	5.1	4.4	4.9	4.8	5.2
Overheads on same	3.7	4.5	4.6	4.3	4.6
Depreciation on Silos and Silage Machinery	2.2	3.2	2.6	2.7	2.8
<u>Costs per acre (All field uses)</u>					
Certain Fertilisers and Lime	0.8	0.4	0.3	0.5	2.1
Rent	2.5	4.1	3.5	3.4	1.5
Overheads on Acreage	0.4	0.5	0.5	0.5	0.6
Sow-out and/or reseeded costs	1.9	3.0	-	1.6	3.1
Dungwork including overheads	-	<u>3.2</u>	<u>2.8</u>	<u>2.0</u>	<u>1.0</u>
Gross Cost per acre	20.3	27.6	23.4	23.8	25.1
Less to other uses of fields	<u>1.9</u>	<u>3.9</u>	<u>2.4</u>	<u>2.8</u>	<u>2.2</u>
Net Cost per acre	<u>18.4</u>	<u>23.7</u>	<u>21.0</u>	<u>21.0</u>	<u>22.9</u>
Silage Cost per ton	<u>2.9</u>	<u>3.0</u>	<u>2.8</u>	<u>2.9</u>	<u>3.2</u>

APPENDIX TABLE II

GROUP AVERAGES - MULTIPLE CUT CROPS

<u>Group</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>Groups Totals & Averages</u>	<u>A Typical Case</u>
Number of farms in group	9	4	3	<u>16</u>	
Number of silage acres costed	485½	151	68	704½	* 6
Number of silage acres reseeded	131	63	-	194	* 6
Number of silage acres dunged	280½	-	17	297½	* 6
Number of silage acres 'cut-over'	676	229	108	1013	18
Yield per acre grown - average - tons	8.7	7.9	7.7	8.3	20.0
Yield per acre 'cut-over' - average - tons	5.3	5.0	4.9	5.1	6.7
<u>Costs per acre grown (Silage only) £</u>	<u>£</u>	<u>£</u>	<u>£</u>	<u>£</u>	<u>£</u>
Fertilisers	5.4	4.2	5.8	5.2	12.6
Sundry Materials	0.1	0.1	0.1	0.1	0.7
Contract Work and Casuals	0.1	0.4	0.9	0.3	-
Farm Labour and Power	6.4	8.3	4.9	6.6	16.8
Overheads on same	6.4	7.8	3.6	6.2	16.2
Depreciation on Silos and Silage Machinery	2.7	1.4	2.7	2.3	8.9
<u>Costs per acre (All field uses)</u>					
Certain Fertilisers and Lime	0.4	1.0	0.5	0.6	-
Rent	3.4	4.8	2.5	3.6	4.0
Overheads on Acreage	0.6	0.6	0.4	0.5	0.6
Sow-out and/or reseeded costs	3.1	3.9	-	2.8	9.5
Dungwork including overheads	<u>1.8</u>	<u>-</u>	<u>1.4</u>	<u>1.3</u>	<u>4.6</u>
Gross Cost per acre grown	30.4	32.5	22.8	29.5	73.9
Less to other uses of fields	<u>1.9</u>	<u>3.1</u>	<u>1.3</u>	<u>2.1</u>	<u>0.5</u>
Net Cost per acre grown	<u>28.5</u>	<u>29.4</u>	<u>21.5</u>	<u>27.4</u>	<u>73.4</u>
Net Cost per acre 'cut-over'	<u>16.8</u>	<u>18.0</u>	<u>13.4</u>	<u>16.4</u>	<u>24.4</u>
Silage cost per ton	<u>3.4</u>	<u>3.7</u>	<u>2.8</u>	<u>3.3</u>	<u>3.7</u>