Silage - Cost of production O.S

THE WEST OF SCOTLAND AGRICULTURAL COLLEGE

GRASS SILAGE IN SOUTH-WEST SCOTLAND

The Position in 1958, with Costings

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FOREWORD

Agricultural statistics supplied by the Department of Agriculture for Scotland for the 11 counties (excluding West Perthshire) of this College area show the acreage of temporary and permanent grassland from which silage was made over the past 8 years:-

1958	25,800 acres	1954	15,700 acres
1957	22,100 "	1953	16,000 "
1956	17,500 "	1952	14,000 "
1955	18,100 "	1951	12,000 "

The acreage in 1958 was rather over double what it had been in 1951.

This report deals with some aspects of the grass silage crop in this area. Cost records, obtained from 39 farms for the crop of 1958, are reviewed. In addition each of the Agricultural Advisers contributed a note on conditions in his own area in order to give a picture of the methods of making grass silage in 1958. These are dealt with in Part 1 which covers "Grass Silage Making".

Conditions during the spring and summer of 1958 were rather unfavourable for grass silage. A cold and dry March was followed by similar weather conditions in the first half of April. In general, farmers were about one month later in starting to utilise grass than in 1957.

The costs given were obtained by "enterprise costing", using estimates for the cost per hour of tractor work, horse work, etc. Detail of the charges made is given in a later section.

The costing of grass silage crops presents problems not met with in costing cereal or root crops. The main difficulties arise through the varied uses of the grass crop, for example, winter or spring grazing before silage cuts, grazing of aftermath following silage and in the case of "Double-cut" crops, grazing between the first and final cuts. There are, therefore, two types of cost items involved (i) costs such as rent, basic manuring, etc. which have to be shared between "all uses" of the fields and (ii) costs incurred directly for silage. The method of handling these "joint" and "direct" costs is described later.

Acknowledgement is gratefully made of the co-operation by the farmers who gave the costing information and by the Agricultural Advisers who provided information for their areas. R. Rowat, (Regional Director of County Work) collated the information given by the Advisers, as contained in pages 1 to 4. The Chemistry Department at Auchincruive provided the analyses.

P.G. Smith.

PART 1

GRASS SILAGE MAKING IN THE WEST OF SCOTLAND COLLEGE AREA, 1958

THE GENERAL SITUATION

Over most of the College area, grass silage making continues to show steady progress.

In the northern parts of the area, there is still relatively little interest in silage. In the mainland area of North Argyll and in the Argyll Islands, the preference is for good hay. In West Perth, the introduction of precision seed drilling and the mechanisation of shawing have increased the popularity of the root crops, which fit well into the rotation and are more suitable for feeding in conjunction with straw. In the neighbouring county of Stirling, on the other hand, silage-making is reported to have increased very considerably, particularly on the heavy clay soil of the Carse, where root growing has always been difficult.

As is to be expected, the greatest interest in silage is shown in those counties where the dairy cow predominates. Even here, however, the actual proportion of dairy farmers making silage remains quite low. In the Stewartry of Kirkcudbright, for example, the most recent figure was under 20%, and in Wigtownshire, around 11%. The main effect of the recent Government silo schemes appears to have been to increase the quantity of silage on those farms already making it. The number of new "converts" in any one year is not large.

THE CONSTRUCTION AND COVERING OF SILOS

Great improvement in the construction and covering of silos is reported from all areas, although not all Advisers are agreed that there has been a corresponding improvement in the quality of the silage made.

Thanks largely to the Silo Subsidy, there is a rapid movement away from the "hole in the ground" or the "clamp in the field" idea of a silo. Permanent floors and sides, proper drainage and protective roofs, are becoming the accepted practice, together with greater attention being paid to the siting of the silo to give maximum convenience when feeding the silage. The question of self-feeding is discussed later, but it is appropriate to mention here that, while as yet few farmers have adopted this practice, many are evidently keeping the possibility in mind when planning their silos.

The roofs being put on silos fall into two types: (a) the temporary or removable kind, and (b) the more permanent, hayshed type. Of the former, an interesting example is reported from Kirkcudbright. A silo there has a ridged roof hinged at the eaves to allow the two parts to be swung clear when filling and emptying. The sections are fastened at the ridge with wing-nut screws. This makes for a secure type of roof in exposed situations. The hayshed type has the advantage not only of greater permanence, but it gives weather protection to the farm staff, when working in the silo, and also provides useful additional storage space for hay, sheaves or straw, on top of the silage.

With the unroofed silos, ground limestone is frequently used as a covering material. Other materials reported are sawdust, straw, hay, soil and even farmyard manure. Many instances are still recorded where no sealing-off layer is used at all.

FIELD HANDLING METHODS AND MACHINERY

These have changed considerably in recent years, and a wide variety of methods and machines are now being used.

For the small farm, and where field-to-silo distances are short, the buck-rake continues to be the most popular way of transporting cut grass. Its low capital, labour and power requirements will make it very difficult to replace on the smaller farm. In some areas, greencrop loaders are still used, but less so than formerly. Pick-up balers for silage work are probably decreasing in popularity. The cost of buying a baler or of hiring a contractor is expensive, and handling the bales is heavy work.

For the larger farm especially, the flail-type forage harvester is the machine now finding most favour. Apart from the cost of the machine itself, however, other expenditure may be heavy. Trailers may have to be adapted or purchased, and the existing tractor on the farm may be of insufficient power to obtain maximum output from the harvester. With the smaller and less expensive machines now available, the numbers in use are growing rapidly.

The lacerated material from forage harvesters has reduced the problem of even spreading in the silo. An interesting point made by several Advisers, is that the consequent need for less rolling and compaction is frequently not realised at first. Over-compacting results in a cold silage. From Stirlingshire and elsewhere, it is reported that several farmers now consider the trailer loads are too heavy to be taken over the silo each time. After the first day's filling the grass is dumped on the concrete apron, from where it is buckraked into the silo.

THE GRASS FOR SILAGE

The greater part of the silage made comes from rotation grass. On many farms, it is the first year's grass, or "seeds", which is cut for silage instead of for hay. On others, for example in Ayrshire, Stirlingshire and Wigtownshire, second year's grass is more frequently chosen. A few farmers use the same fields year after year, because they are close to the silo. The number of cuts also varies, from one to two per annum. The practice of taking a cut of aftermath for silage seems to be decreasing. In recent years, too, there has been a change of emphasis with many farmers, in that they are now more interested in making the maximum amount of a medium quality silage, of high dry matter content, rather than in attempting to obtain high protein content. This process entails less frequent cutting.

On farms where more intensive grassland management is practised, the system is somewhat different. In these cases, a cut for silage is generally taken from all the grass fields at least once each year. This helps to maintain good quality pasture, especially for dairy cows. Also, in fields which have been strip-grazed, it reduced the problem of the ungrazed, rank, dunged patches.

A practice which is increasing in all areas is to extend the arable rotation by undersowing the lea oats, or other cereal, with Italian ryegrass. In some instances this replaces the traditional root break. The Italian ryegrass is cut the following year for silage (or hay). It may then be retained to provide some late grazing, or be ploughed (i) for broadcast kale or rape, (ii) for direct reseeding.

GRASS SEEDS MIXTURES

Most of the grass seeds mixtures used are of the general purpose, Cockle Park type, sown normally at rates of up to 40 lbs per acre. The use of the more leafy strains is extending, and there is a widespread interest in special-purpose mixtures for silage and grazing. The most popular one of these so far, is Timothy/Meadow Fescue. Satisfactory results with these mixtures, sown at seed rates of 20 to 24 lbs per acre, are reported from several counties.

Where Italian ryegrass has been sown alone, seed rates have varied from 15 to 40 lbs per acre. In many instances, the experience has been that better establishment resulted from the heavier seedings. Under West of Scotland conditions, certain strains of Italian have appeared to be less winter hardy than, for example, Ayrshire, Danish and Irish.

MANURING

The general experience is that there is a heavier use of fertilisers, particularly of nitrogen, on the silage-making farms. Typically, the "artificials" used consist of 3-6 cwts/ acre of a high nitrogen/high potash compound in early spring. This may be supplemented with 1½ - 2 cwts/ acre Nitro Chalk or sulphate of ammonia, 2 or 3 weeks before cutting. The customary dressing for cuts after the first is 2 cwts/acre Nitro Chalk or sulphate of ammonia.

In many areas, first year's grass for silage, other than Italian ryegrass, is dunged, where possible, in the previous autumn or winter. This is preferably done by a mechanical spreader, to give a better and finer distribution and so minimise stoppages at cutting time. From Kirkcudbright, it is reported that on many intensive grassland farms, the spinner type of fertiliser distributer has replaced the other types of fertiliser barrow. The use of concentrated fertilisers, with a consequent saving in handling, is extending quickly.

ADDITIVES

One of the main changes in the process of silage-making is the decreased use of additives. From all areas it is reported that only a few silage makers now use molasses, and usually only to the bottom layers to stimulate fermentation when very leafy material is being ensiled. Still fewer are using sodium metabisulphite due to its high cost. Most of the silage is now being made, satisfactorily, without any additives.

UTILISATION AND FEEDING METHODS

On most dairy farms, silage may be fed to all classes of cattle. Where some roots and/or kale are grown, silage is not usually fed until after the New Year, the quantities being rationed to ensure that the silage will last until the cows go to grass. Most silage is hand-fed and the bulk of it is still transferred from the silo to the byre by hand barrow. Several farms have motorised barrows and tractors with rear loaders, to facilitate handling, but, as yet, relatively few byres have doors wide enough to admit a tractor.

Undoubtedly, the aspect of silage-making on which there still remains greatest room for improvement is the handling of the material from the silo. This has given rise to the considerable interest in self-feeding. Although so far, only a few farmers have adopted such a system, many others are watching this progress and are investigating the possibilities for their own farm. Under the prevailing byre system of housing dairy cows, there are serious problems of building layout to be solved. Also, from what has been seen of the system so far, a good deal of wastage of silage seems to be inevitable, unless considerable sums are spent on concreting areas around the silo.

In West Perthshire, a farmer is trying an intermediate course, whereby the silage is simply thrown over a barrier to stock, which may be tied or loose. This method uses a minimum of labour and allows silage consumption to be controlled. It may eventually prove to be a very suitable system for feeding and rearing farms, as distinct from dairy farms.

From Stirlingshire, it is reported that as a result of visits to see the methods used in Northern Ireland, several farmers have made adaptations to their lay-out so that silage can be either hand-fed or self-fed. One farmer in that county has built three new silos side by side, each capable of holding over 200 tons, with cattle courts on each side, all under one roof. Fences and gates around the building are so arranged that six lots of cattle can be feeding at the same time, each at its own face of silage, without inter-mixing. The system is used in conjunction with a milking parlour.

Similar modifications are under way on at least two farms in Wigtownshire, both of them dairy farms each carrying over one hundred cows. If the capital outlay can be justified in terms of labour saved and results obtained, it is likely that much more will be heard about self-feeding in the near future.

PART 2

COSTINGS, 1958

DEFINITION OF SOME TERMS

The cost records relate to three types of grass silage crops.

Single Cut. The grass was cut once for silage, this being the principal early summer use, although in a few cases the field may have been used for "early bite".

Double Cut. The principal use of the grass for the whole growing season was for silage which was taken off in two cuts.

Aftermath. A cut conserved into silage directly after hay. (In this report there is only one costing of this type).

Yields. The figures given refer to the amount of mature silage or made silage and not to the green-cut yield.

Cost "Per Acre" and "Per Ton". are complete costs, containing a share of the joint costs (for all uses of fields in 1958) and of direct, specific costs for growing and handling the silage. A share of Farm General Expenses (Overheads) is included.

Figures per Acre, for both Single Cut and Double Cut crops, relate to the actual acreage from which the crop was cut. Figures per Ton relate to the estimated yields of mature or made silage.

F.Y.M. is used throughout as an abbreviation for Farmyard Manure.

Averages. All averages given are unweighted.

Tables in Report and Appendix. In some of the tables there are minor differences in additions due to the rounding of figures to the nearest shilling.

SUMMARY

This report covers 42 cost records from 38 farms within the College area during the 1958 silage season, which was generally wet and unfavourable for grass silage.

Yields per Acre

Group	No. of farms	Average Yield	Range of Yields - Tons	
			Maximum	Minimum
Single Cut	36	6.6	10.8	2.7
Double Cut	5	11.3	14.3	8.0

Analyses. Only 37 analyses were available for all the types of silage.

Group	No. of farms	Protein Classification			Dry Matter
		High	Medium	Low	%
Single Cut	31	3	9	19	18.6
Double Cut	5	-	1	4	19.5

Cost of Production

Group	No. of farms	Per Acre	Per Ton
Single Cut	36	£19. -s.	£2. 19s.
Double Cut	5	£34.15s.	£3. 4s.

With the small number of costs available, no method of harvesting showed a cost structure more favourable than any other.

Labour and Power Requirements

The total requirements for all work connected with silage production:-

	No. of farms	Hours per Acre			Hours per Ton		
		Man	Horse	Tractor	Man	Horse	Tractor
Single Cut	36	18.2	0.3	11.9	2.8	0.5	1.9
Double Cut	5	33.5	0.3	22.5	3.1	neg.	2.1

The Labour and Power used only on the harvesting operations for the various methods of harvesting was:-

Single Cut	No. of Farms	Hours per Acre Man	Horse	Tractor	Hours per Ton Man	Horse	Tractor
Baler	9	12.1	-	6.6	2.0	-	1.1
Buckrake	10	13.4	-	9.7	1.8	-	1.4
Buckrake and Baler	5	17.1	-	11.3	2.1	-	1.4
Buckrake to Trailers	2	15.3	-	12.4	2.6	-	2.0
Forage and Wilde Harvesters	1	18.3	-	12.6	2.6	-	1.9
Greencrop Loader	5	9.1	0.4	4.4	1.6	0.1	0.9
Hand Loading	1	21.3	4.2	6.3	3.8	0.7	1.1
Silorator	3	11.9	-	7.4	2.5	-	1.6
Average for Single Cut	36	13.3	0.2	8.3	2.0	neg.	1.3
Double Cut							
Buckrake	4	25.6	0.2	18.5	2.2	neg.	1.6
Greencrop Loader	1	23.9	-	12.4	2.7	-	1.4
Average for Double Cut	5	25.2	0.1	17.2	2.3	neg.	1.6
Aftermath Cut							
Forage Harvester	1	7.5	-	5.5	2.2	-	1.6

THE SEASON

Conditions during the spring and summer of 1958 were rather unfavourable for grass silage. During March, the weather was cold and dry (30% of average rainfall) with the sun much in evidence and this winter weather persisted for the first two weeks of April. The rest of April had average sunshine although drier than usual. This long cold spell of dry weather retarded spring growth so that in many districts farmers were four weeks later than in the previous year in starting to utilise their grass.

May was cool and wet but with plenty of sunshine and this weather continued throughout June and July except in Argyll where the rainfall was below average. August was dull with persistent rain. Thus, during the harvesting of grass for silage there was much broken time due to rain, which also resulted in wet grass being ensiled. The weather in early summer was in contrast to 1957 when there was a lack of rain and the change in 1958 appears to have resulted in many silage pits failing to reach a suitable temperature for fermentation, as farmers had over-consolidated the grass in expectation of a rise in temperature in the pits similar to that in 1957 when the grass was much drier.

The general result of the weather in 1958 on the silage, was to result in a silage of lower than average quality.

HARVESTING DATES

The most common time for starting to cut was the first fortnight in June, though a number of farmers commenced cutting in early May.

Within the Single Cut group 15 farms commenced cutting silage between the 29th May and 18th June having hained the grass all winter. A further 9 farms commenced cutting in this period having grazed the grass in the early spring with either sheep or dairy cows.

The earliest date for the first spring cutting that was recorded was the 5th May. The latest cutting date was the 23rd August but this farm had grazed heavily in the spring with ewes and lambs. In both these cases the yield of mature silage was low but the crude protein content was high as both farms had shut up their grass for an equal period of time. All the farms where the grass was hained and not cut until June produced silage of low crude protein content as the grass was cut when it was approaching a stage of growth more suitable for hay. A number of farmers in this group said that their policy was to cut their grass for silage but if the weather became suitable for hay they made hay.

Where a second cut of grass was taken, this followed the start of the first cut by about 10 weeks. The first cut occurred at the end of May or early June in all cases, all the fields having been hained since the year commenced.

THE COSTING SAMPLE

NUMBERS AND COUNTY DISTRIBUTION

Cost records were obtained from 39 farms. As some of these farms provided more than one record, a total of 43 cost records were available. On one farm circumstances were not typical and the figures for this cost record were omitted, while one crop, covering an aftermath cut, is used only for comment.

Over 100 farms were visited in the canvass for co-operators.

Distribution of Farms by Counties and Acreage of Silage Costed

	Acreage Costed						
County	0-5	5-10	10-15	15-20	20-25	25+	Total
Argyll	1	1	-	-	2	2	6
Ayr	1	4	-	1	1	2	9
Bute	-	-	-	-	-	-	-
Clackmannan	-	-	-	-	-	-	-
Dumfries	1	1	2	1	-	2	7
Dunbarton	-	1	-	-	-	-	1
Kirkcudbright	-	1	-	-	-	2	3
Lanark	-	-	4	-	-	2	6
Renfrew	-	1	-	-	-	3	4
Stirling	-	1	-	-	-	-	1
West Perth	-	-	-	-	-	-	-
Wigtown	-	-	-	-	-	2	2
	3	10	6	2	3	15	39

GRASSLAND TYPES

Most of the acreage was described as being "General Purpose" leys though a few farms made silage from "Permanent" pasture or "Special 1-2 year" leys. The acreage and type of grassland used for silage by the 38 farms were:-

Acreage of Silage Costed by Counties

	Grassland Types			
County	Permanent	Special	General Purpose	Total
Argyll	3	28	78	109
Ayr	-	11	126.5	137.5
Dumfries	10	11.5	89	110.5
Dunbarton	-	6	-	6
Kirkcudbright	9	8	58	75
Lanark	-	14	154	168
Renfrew	-	-	111.8	111.8
Stirling	-	-	9	9
Wigtown	-	16	63	79
	22	94.5	689.3	805.8

The Special leys were based on Italian Ryegrass.

CLASSIFICATION OF COST RECORDS

The 42 cost records (1 excluded as untypical) were grouped as:-

	Single Cut	Double Cut	Aftermath
Number of cost records	36	5	1
Number of acres costed	732.5	63.3	10
Average acreage costed	20.35	12.46	-
Range of acreage costed (maximum	88.0	20.5	-
(minimum	2.5	3.0	-

YIELDS

Yield was estimated from the volume of mature silage made, assuming a density of 1 ton per 50 cubic feet.

In all but three cases the type of silage required was for a "maintenance feed", corresponding, generally, to a high yield with a low protein content. The farms that were exceptions were all trying to produce a silage that would be suitable in a production ration for dairy cows (a high protein content with a resulting lower yield). Only 2 of these farms attained their object.

The yields obtained in the groups were:-

	Single Cut	Double Cut
Yields per acre		
Average of mature silage - tons	6.6	11.3
Range of yields (maximum - tons	10.8	14.3
(minimum - tons	2.7	8.0
Number of crops with yields		
Under 4 tons per acre	2	-
4 - 8 " " "	26	-
8 -12 " " "	8	2
above 12 tons " "	-	3
	36	5

SILAGE ANALYSES

Silage analyses were available for only 31 Single Cut crops, 5 Double Cut crops and the one Aftermath Cut crop.

The 1958 silage in this sample was generally low in Dry Matter and Crude Protein. Some of the silage also had been made at too low a temperature for the desirable type of fermentation to occur. In most cases this was explained by over-rolling or filling the pit too quickly with wet grass.

The average analysis for each of the silage groups was :-

	No. of Analyses	Protein Classification* High	Medium	Low	Average % Dry Matter	Average Crude Protein as % of Dry Matter
Single Cut	31	3	9	19	18.6	13.0
Double Cut	5	-	1	4	19.5	12.9
Aftermath	1	1	-	-	12.1	23.7

(* Protein Classification:
High = above 15% Crude Protein as % of Dry Matter
Medium = 12-15% " " " " " " "
Low = below 12% " " " " " " "

Should the silage, however, be severely overheated or of extreme maturity the silage is placed in a lower category than that indicated by its % Crude Protein as % of Dry Matter.)

COSTS OF PRODUCTION

GENERAL AVERAGES

Taking the 36 Single Cut crops as one group and the 5 Double Cut crops as the second group, gives general averages, (irrespective of variations in yield, fertiliser applications and harvesting methods) of:-

	Costs per Acre	
	Single Cut	Double Cut
Number of records	36	5
Yield - mature tons per acre	6.6	11.3
Costs per Acre	£ s.	£ s.
Manures (1958 applications)		
Lime	-. 5	-
Fertilisers	4. 7	2. 18
Top dressing Nitrogen	-. 15	1. 18
Other Materials	-. 16	-. 4
Labour and Power	5. 7	9. 14
Depreciation on Equipment	1. 15	-. 16
Rent	1. 12	1. 13
Share of Farm General Expenses	4. 16	9. 13
Farmyard manure application	7. -	13. 5
	26. 11s.	40. -s.
Add residues from past	3. 14	4. 10
	30. 5s.	44. 10s.
Less residues to future	5. 6	7. 12
"A" Silage and Annual Field Costs	24. 19s.	36. 18s.
Less For other uses of field	5. 19	2. 3
"B" Silage Costs	£19. -s.	£34.15s.

The average cost per acre, after giving credit for the other uses of the silage fields, was £19.-s. for the Single Cut crops and £34.15s. for the Double Cut crops.

	Costs per Ton	
	Single Cut	Double Cut
Number of records	36	5
Yield - mature tons per acre	6.6	11.3
Manures (1958 application)	£ s.	£ s.
Lime	-. 1	
Fertilisers	-. 14	-. 5
Top-dressing Nitrogen	-. 1	-. 4
Other Materials	-. 3	neg.
Labour and Power	-. 16	-. 18
Depreciation on Equipment	-. 6	-. 2
Rent	-. 5	-. 3
Share of Farm General Expenses	-. 15	-. 18
Farmyard manure application	1. 2	1. 4
Total Cost above items.	£4. 4s.	£3. 13s.
Silage cost per ton having allowed for all residues and other uses of field.	£2. 19s.	£3. 4s.

The average cost per ton, after giving credit for the other uses of the silage fields was £2.19s. for the Single Cuts and £3.4s. for the Double Cuts.

COST GROUPING BY HARVESTING METHODS

The broad classifications of 'Single' and 'Double' Cuts cover wide differences in harvesting methods, yields, etc. Although the number of records in each harvesting method group was small, this grouping gives a way of breaking up the general average of the cost structure for single cuts into smaller groups.

Taking only the harvesting methods for which three or more cost records are available for single cuts.

	Average Cost, per Acre				
	Buck-rake	Baler	Buckrake and Baler	Greencrop Loader	Silorator
No. of farms	10	9	5	5	3
Yield - mature tons/acre	7.2	6.3	8.3	5.2	4.6
Costs per Acre	£ s.	£ s.	£ s.	£ s.	£ s.
Manures	4.14	5. 3	6.18	4. 2	6. 4
Other Materials	-. 6	2. 2	-. 5	-.15	-. 2
Labour and Power	5. 5	4.13	8. 4	3. 7	4.13
Depreciation	1. 3	3. -	1. 8	1. 5	2.16
Rent	1.10	2. 2	1. 5	1.10	1. 5
Farm General Expenses	5. 8	4. 6	5.13	3. 3	4. 7
F.Y.M. application	7. -	8. 8	9.11	3.14	2.11
	25. 5	29.14	33. 4	17.17	21.18
(+) Residues	3.12	4.11	4.16	2.13	2.12
	28.17	34. 5	38. -	20.10	24.10
(-) Residues	5. -	6. 1	7. 8	3. -	3.11
"A" Silage and Annual Field Cost	23.17	28. 4	30.12	17.10	20.19
(-) Other field uses	5.19	6.11	6. 3	4. 5	4. 4
"B" Silage Cost	£17.18s.	£21.13s.	£24. 9s.	£13. 5s.	£16.15s.
Silage Cost per Ton	£2.10s.	£3.11s.	£2.19s.	£2.13s.	£3.10s.

A definition of the harvesting methods is given later.

COST OF STARCH EQUIVALENT (S.E.)

The average yield per acre of Starch Equivalent (S.E.) was, for Single Cut crops 11.5 cwt S.E. per acre and for Double Cut - 20.5 cwt S.E. per acre. The average cost per cwt of S.E. from the costed grass silage is shown below with a comparison of the cost per cwt of Starch Equivalent from certain bought concentrates taken at prices ruling at Glasgow in December, 1958.

	Single Cut	Double Cut
Number of analyses	31	5
Applicable to mature silage - tons	3642	679
Average % Dry Matter - %	18.6	19.5
" % Crude Protein as % Dry Matter - %	13.0	12.9
Average cost of silage - per ton	£3. -s.	£3. 4s.
Yield of S.E. per acre - cwt	11.5	20.6
Average cost of S.E. from silage; per cwt	£1.15s.	£1.15s.

Cost per cwt of S.E. from	£ s.
Barley	2. -
Oats	2. 4
Beet Pulp	2. 6
Dried Grains	2.16
Linseed Meal	2.19
Bean Meal	2.14

Similar information for the different methods of harvesting is shown in Appendix Table V.

PART 3

METHODS OF GROWING AND HANDLING MANURIAL POLICIES

LIME AND FERTILISERS

SINGLE CUT

Lime. Eight farms applied lime. Shell lime was used on one farm, and on seven other farms Ground Limestone was applied. The average rate of application where used, was 1T. 5cwt per acre for Ground Limestone. Six of these farms applying lime also applied F.Y.M.

Phosphatic Manures. Thirteen farms applied some form of phosphatic manure and on ten, F.Y.M. was also applied to the grass. Basic Slag was the most common phosphatic manure and averaged 19% P_2O_5, being applied on 6 farms at 6 cwt per acre. Potassic Mineral Phosphate was applied on 4 farms at 2.5 cwt per acre. The remaining three farms applied Ground Mineral Phosphate, 2.5 cwt per acre; Triple Superphosphate, 10 cwt per acre; Potassic Superphosphate, 2 cwt per acre.

Compound Fertilisers. The two principal groups of compounds were "C.C.F." on 11 farms, and a "Potato type" compound fertiliser, on 15 farms. A further six farms applied a 'Miscellaneous' group of proprietary compound fertilisers. The average rate of application for all compound fertilisers was 4 cwt per acre.

Nitrogenous Fertilisers. "Nitro-Chalk" was the most common, applied on 15 farms at 2.5 cwt per acre, but 2 farms applied "Nitra-Shell" at 1.75 cwt per acre, and one remaining farm applied Sulphate of Ammonia at 2 cwt per acre.

F.Y.M. was applied on 22 farms at an average rate of 8 tons per acre, and for the Single Cut group this gave an average dressing of 5 tons per acre on all farms.

Average Application of Nutrients from Fertilisers

The average dressing of Nitrogen (N) Phosphorus (P_2O_5), and Potassium (K_2O) for the 36 Single Cut crops was:-

	N	P_2O_5	K_2O
cwt per acre	0.53	0.80	0.53

Only one farm did not apply any F.Y.M. or artificial fertiliser other than a top dressing of "Nitro-Chalk" which followed late grazing by ewes and lambs.

Average Cost of Fertilisers

Before making any allocation between silage and other uses of the fields, average costs were:-

	Per Acre	Per Ton
Lime	£-. 5s.	£-. 1s.
Basic and Compound Fertilisers	£4. 7s.	£-.14s.
Nitrogenous fertilisers (top dressing)	£-.15s.	£-. 2s.

DOUBLE CUT

In this group of five farms, no Lime or Phosphatic manures were applied on any farm. Compound Fertilisers were applied on four farms, the most common being "C.C.F." at 4 cwt per acre on three farms; the remaining farm applied a "Potato type" compound fertiliser at 2 cwt per acre, this farm did not apply F.Y.M. The other four farms applied 12 tons F.Y.M. per acre.

"Nitro-Chalk" was the only fertiliser used as a top dressing; one farm did not apply any and two farms applied "Nitro-Chalk" only for the second cut. The other two farms applied the fertiliser for both first and second cuts. The average rate of application was:- for first cut - 2.5 cwt per acre.
" second " - 2.5 cwt per acre.

Average Application of Nutrients from Fertilisers

	N	P_2O_5	K_2O
cwt per acre	0.77	0.31	0.46

Average Cost of Fertilisers

Before making any allocation between silage and other uses of the fields, average costs were:-

	Per Acre	Per Ton
Compound Fertilisers	£2.18s.	£-. 5s.
"Nitro-chalk"	£1.18s.	£-. 4s.

FARMYARD MANURE (F.Y.M.) APPLICATION

The average rate of application of F.Y.M., where applied, was Single Cut - 8 tons per acre; Double Cut - 12 tons per acre and the Aftermath Cut - 15 tons per acre; at an average cost to the Single Cut group of £7.-s.per acre; Double Cut group £13.5s. per acre; and Aftermath Cut £16.10s. per acre. (These costs per acre have to be shared with the other farming enterprises using the silage acreage).

During the course of this investigation further information on the F.Y.M. application was made available. This information was for the 27 farms that applied F.Y.M.

On these 27 farms the acreage to which F.Y.M. was applied totalled 335 acres at an average distance from the field clamp or dung-stead of 560 yards.

Method of Application

On the farms co-operating, four methods of loading and applying F.Y.M. were found. These were:-

1. Hand loading of trailers and hand spreading in the field (Hand-Hand).
2. Hand loading of F.Y.M. trailer-spreaders and spread by this machine in the field. (Hand-Machine).
3. F.Y.M. trailer-spreaders used for spreading in the field having been loaded by front-mounted loaders (Machine-Machine).
4. Front-mounted loader used to load trailers with hand spreading in the field. (Machine-Hand).

The most common method was Machine-Machine, 10 farms; Hand-Machine used on 9 farms; Hand-Hand and Machine-Hand were used on 4 farms each. The average application rate for all methods of application was approximately 11 tons per acre.

Labour and Power Use per Acre

As might be expected, and accepting the small numbers in the sample, the lowest man hour usage per acre was on the Machine-Machine method farms, followed in sequence by the Hand-Machine method, the Hand-Hand method and finally the Machine-Hand method farms. The utilisation of tractor hours followed a similar pattern. It should be noted that in the Machine-Hand group the average distance over which the F.Y.M. was transported was nearly double the distance for the other three groups. This partly explained why the Machine-Hand group required more Labour and Power per acre. The costs of Labour and Power followed a similar pattern.

Costs of F.Y.M. Application

The total cost of application (including F.Y.M. at 17/6d per ton) differed by only £2.17s. per acre over the 4 groups. The lowest costed method was that in which the lowest Labour and Power hours occurred (Machine-Machine), even though this group had the highest charge for depreciation of machinery.

Method of Application: Labour and Power Use; and Costs per Acre; for 27 farms

	Hand-Hand	Hand-Machine	Machine-Machine	Machine-Hand	Average
No. of farms in group	4	9	10	4	(27)
Acreage costed	25	84	147	79	(335)
Average distances transported: yards	620	520	390	1000	560
Average F.Y.M. applied - tons	11.5	11.2	11.4	11.1	11.3
Labour and Power Use					
Man hours	11.6	7.4	3.9	15.8	8.0
Tractor hours	5.5	5.0	4.5	6.8	5.1
Costs per acre	£ s.	£ s.	£ s.	£ s.	£ s.
Cost of Labour & Power	3.11	2.10	1.15	4. 5	2.12
Depreciation on Equipment	-	-.10	-.19	-. 2.	-.11
Share of Farm General Expenses (this operation only)	2.18	2. 6	1.19	3. 9	2. 9
	6. 9	5. 6	4.13	7.16	5.12
F.Y.M.	10. 1	9.16	10. 0	9.14	9.18
Total Cost per Acre	£16.10s.	£15. 2s.	£14.13s.	£17.10s.	£15.10s.
Total Cost per Ton	£1.10s.	£1. 7s.	£1. 6s.	£1.12s.	£1. 8s.

It requires to be noted that in the Machine-Machine group the tractor hours exceed the available man hours. The explanation of this is that on one farm, two tractors were kept running during loading, one tractor loading and one attached to the trailer, even though only one man was operating the unit.

Costs Per Acre for Three Application Rates

It was possible to group the F.Y.M. applications by their application rate. Three groups were taken -(i) Under 10 tons per acre.
(ii) 10 - 13.9 " " "
(iii) Over 13.9 " " "

The most common rate of application, was 10 - 13.9 tons per acre.

The average distance over which the F.Y.M. was transported differed by only 110 yards over these three groups. This was so small as to have no significant affect upon the group costs. The range of distances between field clamp or dung-stead and field was:-

	Under 10 tons	10 -13.9 tons	Over 13.9tons
Range maximum - yards	740	1760	880
minimum - yards	300	50	220
Average distance transported - yards	500	560	610

Labour and Power Use; and Costs per Acre for Three Application Rates

	Under 10 tons	10—13.9 tons	Over 13.9 tons
No. of farms in group	8	12	7
Acreage costed	98	165	72
Average distance transported - yards	500	560	610
Average F.Y.M. applied - tons	~~7.3~~ 8.4	~~9.7~~ 11.1	~~13.1~~ 15.0.
Labour and Power Use			
Man hours	5.9	8.4	9.5
Tractor hours	4.8	5.1	5.6
Costs per acre	£ s.	£ s.	£ s.
Total cost - Labour and Power	2 . 2	2.13	3. 3
Depreciation on Equipment	-.12	-.11	-. 9
Share of Farm General Expenses (this operation only)	2. 3	2. 9	2.15
	£4.17s.	£5.13s	£6. 7s.
F.Y.M.	7. 7	9.14	13. 2
Total Cost per Acre	£12. 4s.	£15. 7s.	£19. 9s.
Total Cost per Ton	£1. 9s.	£1. 8s.	£1. 6s.

METHODS OF HARVESTING

DESCRIPTION OF GROUPS

Various methods of harvesting were employed and the cost records have been grouped according to the implements used, using group names as follows:-

Baler - all the grass was baled in the field by pick-up balers and, with one exception where a bale loader was used for part of the time, all the bales were hand loaded into trailers and/or lorries.

Buckrake - the grass was conveyed to the silage pit on a buckrake.

Buckrake and Baler - cases where one-third to one-half of each farm's acreage of grass for silage was baled and then hand loaded into trailers, the remainder was taken to the silage pit by buckrake.

Buckrake to Trailers- Buckrakes were used to cart the grass to trailers in the field where the grass was loaded by hand or front fork loader.

Forage and Wilde Harvesters - on this particular farm three separate implements - a Wilde Harvester, a large flail-type Forage Harvester and a smaller 40" flail-type Forage Harvester, were used in succession. (It was impossible to make separate cost records for each implement).

Greencrop Loader - was the method used to load the grass on to trailers direct from the swathe. (On one farm 9% of the silage acreage was baled).

Hand Loading Trailer - the cut grass was loaded by hand on to trailers.

Silorator - was the implement used to cut the grass and load trailers.

Forage Harvester - a 40" flail-type model was used to cut and load the grass.

SINGLE CUT

Methods of Harvesting and Storage

The number of farms using the various methods were:-

Methods of Harvesting, Cutting and Loading

Cutting Method	Baler	Buck-rake	Buckrake and Baler	Buckrake to Trailers	Forage and Wilde Harvesters	Green-crop Loader	Hand Loading	Silo-rator	Total
Mower	9	10	5	2	-	5	1	-	32
Silorator	-	-	-	-	-	-	-	3	3
Mower & Harvester	-	-	-	-	1	-	-	-	1
No. of Farms	9	10	5	2	1	5	1	3	36

The recent developments in field implements for silage production have all tended to reduce manual work and to increase the amount of grass that can be carted from a field in a given time. Yet the numbers in the foregoing table show that 14 farms were still faced with the hard work of loading the bales on to trailers. One reason for this is that a number of farmers found bales very much easier to feed than cutting loose silage out of a pit.

As there are various methods of ensiling grass, the table below shows the combination of silo and harvesting method. The types of silo in use were:-

Pit - open
Pit - covered
Pit - roofed
Hayshed
Tower silo
Other storage

Types of Silo and Methods of Harvesting

Silo Type	Baler	Buck-rake	Buckrake and Baler	Buckrake to Trailers	Forage and Wilde Harvesters	Green-crop Loader	Hand Loading	Silo-rator	Total
Pit- open	1	2	3	1	1	-	-	-	8
Pit- covered	3	4	1	1	-	2	1	2	14
Pit- roofed	-	1	1	-	-	-	-	-	2
Hay-shed	4	3	-	-	-	2	-	1	10
Tower Silo	-	-	-	-	-	1	-	-	1
Other storage	1	-	-	-	-	-	-	-	1
All types	9	10	5	2	1	5	1	3	36

Acreage Costed

The distribution of the acreage costed (in most cases, the acreage of grass cut for silage on the farm) shows that where only a small acreage was being cut the Buckrake was the most popular. The Baler was comparatively common in use on small acreages but this was principally due to the fact that the baler was owned and was used for baling hay, straw and on contract work.

The methods using the specialist silage equipment, Greencrop Loader, Silorator, Forage Harvesters were only found on farms making at least 20 acres of grass into silage and in most cases the equipment harvested over 40 acres of crops for silage annually.

Frequency Distribution of Acreage Costed and Method of Harvesting

Acreage Costed	Baler	Buck-rake	Buckrake and Baler	Buckrake to Trailers	Green-crop Loader	Silo-rator	Single Cut
0 - 5	-	1	1	-	-	-	3
5 - 10	3	6	1	1	-	-	11
10 - 15	1	2	-	-	-	-	3
15 - 20	-	1	2	-	-	-	3
20 - 25	1	-	1	-	-	1	3
25 - 30	3	-	-	-	2	-	5
30 - 35	-	-	-	-	-	1	1
35 - 40	-	-	-	-	2	-	3
40 +	1	-	-	1	1	1	4
No. of farms	9	10	5	2	5	3	36
Average Acreage	19.5	8.5	13.5	23.25	35	47	20.35

The Forage and Wilde Harvesters were in use on 1 farm where the acreage costed was 39 acres. The Hand Loading method was used on 1 farm where 3 acres were costed.

The table below shows the total acreages harvested by each method, the average yield of mature silage per acre, and the average distance between field and silo. It also shows that new-comers to the silage crop were generally starting with the well tried methods before buying specialist machinery. In the Single Cut group, 12 farms were increasing their acreage for silage; of these 6 farms had used a Baler and 2 farms Buckrakes in 1958, but no indication was given of the implements to be used in 1959.

Although the Buckrake is perhaps the slowest method of carting grass to the silo, it is still used for transporting grass over distances comparable with the other methods. The explanation of this is that a number of small farms were included in this group and though they carted the grass comparatively long distances they preferred this to buying additional capital equipment.

	Baler	Buck-rake	Buckrake and Baler	Green-crop Loader	Silo-rator	Single Cut
Acreage costed	175	85.8	67.5	174.2	141.5	732.5
Average yield per acre mature silage - tons	6.3	7.2	8.3	5.2	4.6	6.6
Distance transported - yards	620	450	590	580	500	530
Years making silage						
2 - 3 years	5	3	1	2	2	13
4 - 6 "	2	3	1	1	1	9
7 + "	2	4	3	2	-	14
No. of farms	9	10	5	5	3	36

The 2 farms using the Buckrake to Trailers method harvested 46.5 acres with a yield per acre of 6.7 tons mature silage. The average distance that the grass was transported was 540 yards. These 2 farmers had been making silage for more than 7 years.

The farm using the Forage and Wilde Harvesters had been making silage for more than 7 years. The year 1958 was the first with the new equipment, which harvested 39 costed acres with a yield of 6.9 tons per acre. The average distance that the grass was transported was 440 yards.

The Hand Loading method, used on 1 farm, harvested 3 acres with a yield of 5.7 tons per acre. The average distance that the grass was transported was 200 yards. This farmer had been making silage for 6 years.

DOUBLE CUT

Similar information to that above is now given for the Double Cut group.

Methods of Harvesting and Storage

The methods of harvesting within this small group were limited to the Buckrake (4 farms) and the Greencrop Loader (1 farm). The types of silos used were all pits and those farmers who covered their silage used earth, sand or green-cut oats and barley.

Types of Silo and Methods of Harvesting

	Buckrake	Greencrop Loader
Pit - open	1	-
- covered	3	1
Number of farms	4	1

All the pits were of simple construction, "holes in the ground" lined with concrete and wooden sleepers, bricks, or walls and floor left unlined.

Acreage Costed

On the farms where two cuts were taken for silage, the Buckrake was used over distances between fields and silo not exceeding 880 yards; the Greencrop Loader was used on a farm where the cut grass was transported 1 mile. This latter farm did not have a large acreage to harvest compared with those using the Greencrop Loader in the Single Cut group.

Frequency Distribution of Acreage Costed (grown acreage) and Method of Harvesting

Acreage Costed	Buckrake	Greencrop Loader	Double Cut
0 - 5 acres	1	-	1
5 - 10 "	-	-	-
10 - 15 "	2	1	3
15 - 20 "	-	-	-
20 - 25 "	1	-	1
Total Acreage Costed - acres	49.3	14	63.3
Average Yield per Acre of Mature Silage - tons	11.9	8.8	11.3
Average Yield per Acre S.E. - Cwt	22.2	14.1	20.6
Average Distance Transported - yards	400	1760	670
Years making silage:-			
2 - 3 years	2	-	2
4 - 6 "	1	1	2
Over 7 years	1	-	1
No. of farms	4	1	5

LABOUR AND POWER USAGE

SINGLE CUT

Labour and Power usage was obtained for all aspects of silage production.

The total usage (from preliminary cultivations to crop secured in silo) for farms applying F.Y.M. are shown against those that did not apply F.Y.M. and the average for the Single Cut group.

	Hours per Acre			Hours per Ton		
	F.Y.M.Applied	No F.Y.M.	Average	F.Y.M.Applied	No F.Y.M.	Average
Man	21.27	13.27	18.16	3.22	2.18	2.82
Horse	0.31	0.15	0.25	0.06	0.04	0.52
Tractor	13.72	9.12	11.93	2.10	1.48	1.86
No. of farms	22	14	36	22	14	36

As would be expected more labour and power was used when F.Y.M. was applied. If however, the labour and power used for applying F.Y.M. was excluded, the times for both groups were similar, particularly in the Hours per Ton. The difference in the Hours per Acre is explained by the slightly higher yield and larger fertiliser application in the"F.Y.M. Applied" group, both requiring more work per acre.

Total Labour and Power Used excluding F.Y.M. Application

	Hours per Acre			Hours per Ton		
	Farms applying F.Y.M.	No F.Y.M.	Average	Farms applying F.Y.M.	No F.Y.M.	Average
Man	15.63	13.27	14.71	2.35	2.18	2.29
Horse	0.31	0.15	0.25	0.06	0.04	0.05
Tractor	9.70	9.12	9.47	1.46	1.48	1.47
No. of farms	22	14	36	22	14	36

The two tables above show that where F.Y.M. was applied (22 farms), it required, per acre, 5.64 man hours and 5.02 tractor hours or, per ton of silage 0.87 man hours and 0.64 tractor hours to apply the F.Y.M.

The preliminary cultivations and top dressing work used on average -

Per Acre	Per Ton
1.39 Man hours	0.26 Man hours
0.07 Horse hours	0.02 Horse hours
1.13 Tractor hours	0.18 Tractor hours

For the Single Cut group the average man hours required for harvesting were 13.33 hours per acre or 2.03 hours per ton and the tractor time averaged 8.34 hours per acre or 1.29 hours per ton. For the group, horse hours averaged 0.17 hours per acre or 0.04 hours per ton, while lorry work (on one farm only) averaged 0.08 hours per acre or 0.01 hours per ton.

Labour and Power Usage for Silage Harvesting

Hours per Acre	Baler	Buck-rake	Buckrake and Baler	Green-Crop Loader	Silo-rator	Single Cut
Man	12.13	13.39	17,08	9.05	11.91	13.33
Horse	-	-	-	0.04	-	0.17
Tractor	6.60	9.68	11.29	4.35	7.41	8.34
Lorry	0.32	-	-	-	-	0.08
Hours per Ton						
Man	1.97	1.79	2.06	1.61	2.52	2.03
Horse	-	-	-	0.11	-	0.04
Tractor	1.14	1.35	1.37	0.85	1.56	1.29
Lorry	0.04	-	-	-	-	0.01
No.of farms	9	10	5	5	3	36

The Buckrake to Trailers method, 2 farms, used on average 15.29 man hours per acre or 2.61 man hours per ton, and 12.41 tractor hours per acre or 2.00 tractor hours per ton.

The Forage and Wilde Harvesters used 18.28 hours per acre or 2.64 man hours per ton and 12.62 tractor hours per acre or 1.94 tractor hours per ton.

The farm that was Hand Loading used 21.33 Man hours per acre or 3.77 man hours per ton, 4.17 horse hours per acre or 0.74 horse hours per ton, and 6.33 tractor hours per acre or 1.12 tractor hours per ton.

The Greencrop Loader being a comparatively conventional method of harvesting silage the farms using this technique have developed a very economical method of working. The farm using the Forage and Wilde Harvesters is not typical but it does demonstrate that even with the new methods trouble from weather and unsatisfactory machines can soon raise the costs of production. The Buckrake again appears as a very economical method of harvesting, particularly with regard to the use of man labour.

The frequency of distribution of man labour usage and the method of harvesting shows that a few farms were much above average. The majority were reasonably consistent and for the Single Cut group 28 farms (81%) used between 1.0 and 2.5 man hours per acre.

Frequency Distribution of Manual Labour per Ton of Silage

Harvesting Man hours per Ton	Baler	Buck-rake	Buckrake and Baler	Buckrake to Trailers	Forage & Wilde Harvester	Green-Crop Loader	Hand Loading	Silo-rator	Total
1.0 - 1.5	3	3	2	-	-	1	-	-	9
1.5 - 2.0	2	5	1	1	-	3	-	-	12
2.0 - 2.5	3	1	1	-	-	1	-	2	8
2.5 - 3.0	-	1	-	-	1	-	-	-	2
3.0 - 3.5	-	-	-	-	-	-	-	1	1
Above 3.5	1	-	1	1	-	-	1	-	4
No.of farms	9	10	5	2	1	5	1	3	36

The range of man hours for the Single Cut group was from 5.75 to 30.72 man hours per acre or from 1.07 to 3.91 man hours per ton.

The narrowest range within any method of harvesting occurred with the Greencrop Loader group - 1.12 to 2.47 man hours per ton. The widest range was in the Buckrake and Baler group 1.28 to 3.91 hours per ton. The narrow limits of the man hour range in all groups indicate that while the more modern methods have not reduced the labour requirements per ton, they have reduced the actual hard physical work.

Tractor Labour

The Greencrop Loader as a method of harvesting was again the most economical method. Tractor requirements for the Greencrop Loader method averaged 4.35 hours per acre or 0.85 hours per ton. This was considerably less than for all the other methods.

Horse Labour

Horses, when used, were for the operations of cutting and for raking the fields after the grass had been lifted.

Lorry Labour

A lorry was used on one farm only, but it did not provide a solution to the hard work involved in handling bales. The use of a lorry probably made the work more fatiguing as the lorry platform was higher than the usual trailer platforms on to which the bales had to be lifted.

DOUBLE CUT

In this group the 4 farms using a Buckrake to lift and convey their grass to the pit applied F.Y.M., hence their total Labour and Power usage was in excess of that for the Greencrop Loader. However the various methods do not differ very greatly in their usage of man labour, but tractor hours for the Greencrop Loader were about two-thirds those used for harvesting with the Buckrake. The per Acre results are based on the grown acreage and the per Ton on the total silage produced.

Labour and Power Usage

	Hours per Acre					Hours per Ton				
	Buckrake			Greencrop Loader		Buckrake			Greencrop Loader	
Harvesting	Man	Horse	Tractor	Man	Tractor	Man	Horse	Tractor	Man	Tractor
1st cut	13.97	0.11	10.98	11.02	5.89	1.18	0.01	0.94	1.25	0.67
2nd cut	9.74	0.04	6.86	12.75	6.38	0.85	0.01	0.61	1.45	0.73
Final work	1.85	-	0.61	0.11	0.11	0.16	-	0.06	0.01	0.01
Total Harvesting	25.56	0.15	18.45	23.88	12.38	2.19	0.02	1.61	2.71	1.41
Preliminary cultivations	1.86	0.19	1.58	1.26	1.26	0.18	0.02	0.14	0.15	0.14
Total excluding Labour & Power for F.Y.M.	27.42	0.34	20.03	25.14	13.64	2.37	0.04	1.75	2.86	1.55
F.Y.M.	8.16	-	4.72	-	-	0.80	-	0.43	-	-
Total	35.58	0.34	24.75	25.14	13.64	3.17	0.04	2.18	2.86	1.55

The difference between the usage for the first and second cut harvesting work with the Buckrake was caused by one farm having a very much lower yield in its second cut and this required less work at harvesting.

A comparison between the Single and Double Cut groups using the same methods of harvesting showed very little difference between the Labour and Power usage for similar operations.

Buckrake	Hours per Acre Single Cut	Double Cut 1st cut only
Man	12.90	13.97
Horse	-	0.11
Tractor	9.45	10.98

Greencrop Loader	Hours per Acre Single Cut	Double Cut 1st Cut	Double Cut 2nd Cut
Man	9.05	11.02	12.75
Horse	0.40	-	-
Tractor	4.35	5.89	6.38

It is not possible to compare Hours per Ton as this figure for the Double Cut was calculated on the total silage and not on the silage crop of any one cut.

The Average Hours of Labour and Power used by the 5 Double Cut farms were:-

	Hours per Acre			Hours per Ton		
	Man	Horse	Tractor	Man	Horse	Tractor
Harvesting 1st cut	13.38	0.09	9.96	1.20	0.01	0.89
2nd cut	10.34	0.03	6.76	0.97	neg	0.63
Final work at silo	1.50	-	0.51	0.13	-	0.05
Total Harvesting	25.22	0.12	17.23	2.30	0.02	1.57
Preliminary Cultivations	1.74	0.15	1.53	0.16	0.03	0.14
F.Y.M. application	6.53	-	3.77	0.65	-	0.35
Total	33.49	0.27	22.53	3.11	0.03	2.06

AFTERMATH CUT

As there was only one costing record(of a 40" flail-type Forage Harvester), the usage is of no real significance but the figures may give an indication of its requirements. The figures below show the usage for this Aftermath Cut compared with the average of the Labour and Power used by the Forage Harvester in the Single Cut group where operations were similar.

	Hours per Acre				Hours per Ton			
	Aftermath Cut		Single Cut		Aftermath Cut		Single Cut	
	Man	Tractor	Man	Tractor	Man	Tractor	Man	Tractor
Harvesting	7.45	5.50	13.10	7.97	2.19	1.62	1.89	1.15
Preliminary cultivation	1.00	1.00			0.30	0.29		
F.Y.M. application	5.34	2.67			1.67	0.79		
Total	13.79	9.17			4.06	2.70		

INFORMATION ON SOME OPERATIONS

During the investigation it was possible to extract information on specific operations for grassland, i.e. cutting, baling, etc. It was not possible on all farms to obtain this information as some farmers provided total hours worked on groups of operations.

The table overleaf summarises the information that was available:-

Operation	No. of Farms	Acreage Worked	Hours per Acre Man	Horse	Tractor
With Tractor					
Sowing Spring Fertilisers(a)	30	578	0.57		0.53
Top Dressing with Nitrogenous manures (a)	19	272	0.50		0.48
Harrowing (one run)	14	169	0.48		0.48
Rolling field (one run)	20	299	0.42		0.42
Mowing	23	413	1.10		1.10
Baling (PTO)	9	134	1.44		1.44
Forage Harvester - (PTO)40" Flail-type, cutting and lifting	2	40	2.61		2.61
With Horse					
Sowing Spring Fertilisers(a)	4	41	1.06	0.92	0.13(b)
Rolling field (one run)	3	35	0.70	0.70	-
Mowing	1	44	0.99	1.99	-

(a) Average of all methods

(b) A tractor was used in certain cases to convey the fertilisers to the fields.

METHOD OF STORAGE AND TYPES OF SILO

In this investigation three types of silos were being used - pits, towers and clamps. The pit silos were divided into various classes.

PITS

The pits were classified on the basis of the protection they provided from the weather. The actual construction of pits varied, "holes in the ground", (an old quarry floor was used in one case); pits dug out of the earth but unlined or alternatively lined with concrete and/or wooden sleepers, or brick built pits contained within haysheds. The classification of the pits for costing purposes was:-

1) Open - No covering material over the silage, the top layer of which had been rolled into a mulch to provide the only cover. In this group 6 pits were unlined while 2 were lined with concrete.

2) Covered - Pits of varied construction the majority being unlined but covered by earth, ground limestone, straw, rushes, plastic material, etc. The number unlined was 9, while 2 had concrete linings and 3 used miscellaneous bought materials, e.g. bricks, wooden sleepers, and stone.

3) Roofed - Pits were lined with brick but covered by moveable corrugated iron sheeting. There was no storage accommodation between the roof of the cover and the top of the silage.

4) In Haysheds - Brick or concrete pits specially built for silage within a hayshed. The space between the roof and the top of silage in the pit was used to store hay or corn sheaves. This served the dual purpose of keeping the silage compressed and also protected from the weather; particularly when cutting out the silage for feeding. The only draw-back to this dual purpose type was that the lower portion of the crop stored on top of silage got damp and hot with the heat and moisture given off by the silage. The hayshed also served as machinery sheds during the period in which they were empty. In such cases the depreciation charge was shared between silage and other uses.

CLAMP - This was made in a shed so that the silage was protected from the weather.

TOWER - This tower was about 35 years old and had a capacity for about 200 tons.

Depreciation Charges

The charges allowed for the silo depreciation in the two main groups was:-

	Single Cut			Double Cut		
	No. of farms	Per Acre	Per Ton	No. of farms	Per Acre	Per Ton
		£ s.	£ s.		£ s.	£ s.
Pits - Open	8	-. 5	-. 1	1	-. 2	neg.
Covered	14	-. 7	-. 1	4	-.12	-. 1
Roofed	2	1.11	-. 4	-	-. -	-
Hayshed	10	2.11	-. 6	-	-. -	-
Tower	1	-. 8	-. 2	-	-. -	-
Clamp - Covered	1	1. 6	-. 6	-	-. -	-
Average charge		-.18s.	-. 3s.		-.10s.	-. 1s.
No. of farms	36			5		

Within the Single Cut group of Pits, Open and Covered, 15 were unlined and the average depreciation charge was 3s. per acre or a negligible sum per ton, while the 4 concrete lined pits averaged 16s. per acre or 4s. per ton.

USE OF "ADDITIVES"

The use of various substances to preserve the silage or facilitate bacterial action was limited to molasses or salt.

The molasses were used either as straight molasses, or "molassine meal" while "feeding salt" was the source of salt.

Only a few farms used an additive and from the analysis, no apparent benefit was derived, nor was there any indication that where additives were used the aim was high quality silage. In the farmers' opinion the main function of additives was to make the silage more palatable to the livestock.

	No. of farms using additives	Cost per Ton of Silage
		£. s.
Molassine Meal	2	-. 5
Molasses	6	-. 2
Salt	1	-. 8

PART 4

NOTES ON PRODUCTION COSTS BY HARVESTING METHODS

SINGLE CUT

General averages of production costs per Acre and per Ton and the average cost per Acre for some of the Single Cut harvesting methods were stated in Part 2, while information on the Methods of Harvesting was given in Part 3. A grouping of the production costs was made according to the 8 harvesting method groups already used. These are discussed below, although of the 8 method groups only 5 are significant in having 3 or more cost records contained therein. The figures for all groups are, however, given as a matter of interest in Appendix Tables I and II.

Production Costs

The average cost of Single Cut silage in this survey was £19.-s. per Acre or £2.19s. per Ton. Even with many variable cost items, the range of costs around these averages was quite considerable varying from £8.2s. to £33.13s. per Acre and £1.12s. to £4.17s. per Ton.

The frequency distribution of the Cost per Ton of silage within the various methods of harvesting is shown overleaf. The Buckrake had the lowest cost per ton.

	Baler	Buck-rake	Buckrake and Baler	Buckrake to Trailers	Forage and Wilde Harvester	Green-crop Loader	Hand Loading	Silo-rator	Single Cut
Average Yield/Acre	6.3	7.2	8.3	6.7	6.9	5.2	5.7	4.6	6.6
Cost per Ton									
Under £2	-	2	-	-	-	1	-	-	3
£2 - £3	4	6	3	1	-	3	1	-	18
£3 - £4	1	2	2	1	1	1	-	3	11
£4 - £5	4	-	-	-	-	-	-	-	4
No. of farms	9	10	5	2	1	5	1	3	36
Average Cost per Ton	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Harvesting	-.13	-.12	-.18	-.18	-.18	-.11	1. 1	-.16	-.14
All other costs	2.18	1.18	2. 1	1.16	2. 8	2. 2	1.14	2.14	2. 5
Total	£3.11	£2.10	£2.19	£2.14	£3. 6	£2.13	£2.15	£3.10	£2.19
Average Cost per Acre									
Harvesting	3.17	4. 7	7.13	5. 8	6. 2	2.17	6. 2	3.17	4.12
All other costs	17.16	13.11	16.16	11. 7	16.16	10. 8	9.12	12.18	14. 8
Total	£21.13	£17.18	£24. 9	£16.15	£22.18	£13. 5	£15.14	£16.15	£19. -

When the average Cost per Acre is considered the Greencrop Loader had the lowest cost, but with this limited sample and small groups, it is impossible to advance the claims of any method. This is particularly the case in the year being studied as the new methods (with newly acquired equipment) carried a higher depreciation charge on the equipment, than the conventional methods, which offset savings in labour and power.

It is necessary to comment on the various costs within the harvesting groups for which details are given in the Appendix Tables I and II.

Other Materials

In the Baler group the comparatively high cost of other material per acre (£2.2s.) was largely on account of Baler twine, £1.10s. and the use of preservatives (salt, molasses or proprietary chemical compounds) - 10s. The cost of preservatives also affected the cost in the Greencrop Loader group. A number of farms covered their pits with Ground Limestone, cut rushes, plastic covers, etc. and these items were charged at cost value if bought or cost of work if cut and handled by farm staff. Silo maintenance relates to the cleaning and repair of silos particularly open pits.

Other Materials; Costs per Acre

Other Materials	Baler	Buck-rake	Buckrake and Baler	Buckrake to Trailers	Green-Crop Loader	Hand Loading	Silo-rator	Single Cut
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Field Oils	-	-	-	-	-. 3	-	neg.	neg.
Baler twine	1.10	-	-. 1	-	-	-	-	-. 8
Preservatives	-.10	-. 1	-	-. 3	-.10	-	-	-. 5
Silo maintenance	-. 1	-. 1	-. 2	-. 4	neg.	-. 7	-	-. 1
Covering material	-. 1	-. 4	-. 2	-. 1	-. 2	-. 6	-. 2	-. 2
Total	£2..2	£-. 6	£-..5	£-. 8	£-.15	£-.13	£-. 2	£-.16

The farm using the Forage and Wilde Harvesters had no expenses for Other Materials.

No table is given for the cost of Other Materials per Ton as the degree of accuracy in showing costs to the nearest penny is not justified.

Labour and Power Costs

Preliminary cultivation costs were those for Man, Tractor and Horse work done during rolling, harrowing and spreading lime and fertilisers (excluding F.Y.M. application, and Top dressing with Nitrogenous fertilisers). Various rates of working are already shown in the section "Information on Some Operations" (page 20).

Top dressing costs were those for applying a nitrogenous fertiliser.

Harvesting was the cost of work done from first cutting the grass to completing the filling of the silo, but not covering, tidying up, fencing off or any rolling that might have taken place after the harvesting was considered to be finished. These items excluded from "Harvesting" are under the heading "Final work at Silo".

On a number of farms it was impossible to sub-divide the harvesting operation and final work into their component operations, but some grouping was possible. The costs per acre for these groups of operations were:-

Composition of Harvesting Cost per Acre

Operation	Baler	Buck-rake	Buckrake and Baler	Buckrake to Trailers	Forage and Wilde Harvesters	Green-crop Loader	Hand Loading	Silo-rator
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Cut, Transport and Fill silo	3. 1	4. 2	5.13	5. 7	5.14	2.14	6. 2	3.12
Baling	-.12	-	2. 0	-	-	neg.	-	-
Rolling Pit	-. 4	-. 5	-	-. 1	-. 8	-. 1	-	-. 4
Other Operations	neg.	neg.	-	-	-	-. 2	-	-. 1
Harvesting cost	3.17	4. 7	7.13	5. 8	6. 2	2.17	6. 2	3.17
Covering silo	-. 3	-. 2	neg.	-. 2	-	-. 1	-. 1	neg.
General finishing off work	-	-. 1	-. 1	-	-. 2	-	-	neg.
Final work at Pit	-. 3	-. 3	-. 1	-. 2	-. 2	neg.	-. 1	-. 1
Total Cost of Harvesting & Final work at Silo	£4. -	£4.10	£7.14	£5.10	£6. 4	£2.18	£6. 3	£3.18

The cost per acre of cutting, transporting and filling the silo was highest in the groups using a Buckrake with an exception of the Forage and Wilde Harvesters, where there was broken time due to the experimental use of new equipment; and the Hand Loading method where the loading rate was slow.

The explanation of the high cost per acre for baling in the Buckrake and Baler sub-group compared with the Baler sub-group is that in the former group the balers were usually hired and the hiring charge was the cost taken, this included depreciation and profit for the contractor. "Other Operations" includes exceptional work done on certain farms, i.e. field cleaning with a rake, temporary covering of the silo during filling, etc.

All the farms did not cover their silos, even in an open pit as they considered that the mulch developed by rolling the grass formed an efficient water-shedding, air-tight cover. In certain groups no charge occurs for rolling the pit. This is because the rolling was done by the tractors while filling the pit and it was not possible to separate the work done on this job.

When the Cost per Acre for harvesting is considered in conjunction with the Cost per Ton for harvesting, the Greencrop Loader results in the lowest harvesting costs. The group using only a buckrake had a low cost per ton as the yield per acre was high but otherwise the yield had little effect on the relative order of costs in this sample.

Although this limited sample indicated that the actual harvesting costs are lowest with the Greencrop Loader, the Buckrake is a low cost method of harvesting where a heavy yield of grass is obtained.

The difference in the average distance hauled is too small for any conclusions to be drawn as to the method most suitable for long hauls. It is of interest to note that for one small acreage of silage, a buckrake was used to transport the grass approximately one mile to the silo.

Depreciation charges

Although the depreciation charge on new equipment is high, the reason for the low charge with the Forage and Wilde Harvesters was that one of the machines was only on trial and the others harvested about thrice the acreage costed. The depreciation of the silorators was high but the silage also carried a high charge from a baler, even with its diverse uses, on account of its high initial capital cost.

The explanation of the low depreciation charge for Field machinery in the Buckrake and Baler sub-group was on account of the use of hired Balers. This charge for hiring machinery was included in the cost of harvesting, thus partially providing an explanation of high cost of harvesting in this group.

The depreciation of the silo was highest for those sub-groups with the most elaborate types of silos. The types of silos did not differentiate between the different materials used in construction but those with concrete walls and floors as opposed to "holes in the ground" must obviously carry a higher depreciation charge.

In general the costs of silage production can only be reduced by improving the method of working so that the man and tractor hours saved will compensate for the introduction of new machines and silos with their higher depreciation rate.

F.Y.M.

It should be noted that although these costs demonstrate the high cost of applying F.Y.M., the rotation is more important than any particular crop. Some crop must bear the principal proportion of the cost of F.Y.M. and its application, and on 22 farms silage was the selected crop.

It should be noted however, that one half of this cost is later deducted to allow for the residual manurial value carried forward into the succeeding years, though there may also be a charge against the current year from previous F.Y.M. applications. This may reduce the cost for a particular year, but the charge for F.Y.M. applications is considerable.

DOUBLE CUT

General averages of production costs per Acre and per Ton were stated in Part 2, while information on the Methods of Harvesting was given in Part 3. A grouping of the production costs was made according to the 2 harvesting methods already used. These are discussed below although only 1 method group is significant in containing more than 3 cost records. The figures for both groups are, however, given as a matter of interest in Appendix Tables III and IV.

Production Costs

The average cost of Double Cut silage was £34.15s. per acre or £3.4s. per ton. The range of costs was quite considerable, from £1.16s. to £5.1s. per ton and from £24.6s. to £60.13s. per acre. In this Double Cut section, the "per Acre" figures refer to the acreage "grown" not to the acreage "cut-over".

With only 5 costs in this group, the costs cannot be accepted as being representative but they may be useful indicators of probable costs of production.

Other Materials

The cost of these items was due only to silo maintenance and the cost of the material used to cover the silage in this group.

Other Materials; Costs per Acre

Other Materials	Buckrake £ s.	Greencrop Loader £ s.	Double Cut £ s.
Silo maintenance	-. 3	-	-. 2
Covering material	-. 2	-	-. 2
Total	£-. 5	-	£-. 4.

The cost per ton for these items is too small to be shown accurately.

Labour and Power Costs

In this group it was possible to subdivide the cost per acre of Harvesting and Final work at the Silo into their component costs. On one farm the silo was covered between the two harvesting operations, the cost of this covering and stripping is shown separately.

Composition of Harvesting Cost per Acre

Operation:-		Buckrake £ s.	Greencrop Loader £ s.
1st cut:	Cut, Transport and Fill silo	4. 2	3.10
	Rolling pit	1. 6	
	Covering silo	neg.	-
	1st cut Harvesting cost	5. 8	3.10
2nd cut:	Uncovering silo	-. 1	-
	Cut, Transport and Fill silo	3. -	3.11
	Rolling pit	-. 9	
		3.10	3.11
Final Work at silo:-			
	Covering silo	-.11	-. 1
	Total cost of Harvesting and Final work at silo.	£9. 9s.	£7. 2s.

PART 5

COSTING METHOD AND CHARGES

GENERAL COSTING METHOD

"Direct" and "Joint" Costs

The silage costings were prepared as follows:-

(i) The cost items down to point "A" (Appendix and other tables) - 1958 manuring, materials, labour and power, depreciation on equipment, rent, share of farm general expenses (overheads), F.Y.M. and its cost of application to the 1958 crop, manurial and sow-out residues from previous years less manurial residues of 1958 application to future crops - are the annaul charges (for all uses of field) to the silage growing acreage plus the "direct" costs of silage making.

(ii) But certain of these costs:-

(a) Rent.
(b) Share of farm general expenses (the part charged per acre).
(c) Share of original sow-out costs.
(d) Charge for dung, lime and fertilisers exhausted by the 1958 crop,

are "joint" costs due to be shared between silage and the other uses of the silage growing acreage.

The amount of these charged away is shown in total opposite "Less for other uses" giving at point "B" (Appendix and other tables) the estimated cost per acre against the silage.

Sharing of "Joint" costs

The need for sharing these costs was caused by winter grazing and various summer uses of the acreage cut for silage.

The deductions for winter grazing was based on an estimate, by the farmer, of the degree of winter grazing for each acre.

Heavy winter grazing being allowed				$\frac{1}{8}$th	of the	"joint"	costs.
Moderate	"	"	"	1/12th	"	"	"
Light	"	"	"	1/16th	"	"	"

Summer usage of the field was taken on a weekly basis in order to arrive at the share of the "joint" costs to be deducted for other uses. The method of sharing was to allocate each week, from the 15th March (the approximate start of the growing season) to the 30th October, to silage or other uses. The last eleven weeks of this period were less heavily weighted than those in the earlier period of active growth. Having obtained an allocation of the weeks, the proportion devoted to other uses was used for calculating the share of "joint" cost to be deducted.

CHARGES MADE

Lime and Fertilisers are at net cost after deducting subsidies. All the nitrogenous fertilisers have been charged against the crop for which they were applied.

Materials (for example, molasses, bale twine, etc.) are at cost.

Labour - Hired - at actual rates paid plus 7% to allow for time off for holidays and sickness.

Labour - Family	Farmer	4/3d per hour
	Son: 20 and over	4/- " "
	" 18 - 20	3/6 " "
	" under 18	2/- " "
	Wife	3/2 " "

Horse hours 2/- per hour, excluding horseman.

Tractor work Wheeled 4/3d per hour, excluding driver.
Crawler 6/6d per hour, excluding driver.

Contract work charged at cost.

F.Y.M. charged at 17/6d per ton at steading or field clamp. An additional charge, depending on the method of handling, of 7/6d - 8/6d per ton was made for past applications of F.Y.M.

Depreciation on equipment - Rates used:-

(a) machinery - the standard income tax depreciation rates were used but initial allowances were not taken.

(b) silos - one-tenth of the net outlay, except for the tower silo where one-fortieth of the net outlay, per annum was allowed for depreciation.

Rent The annual charge per acre is based on the rental or gross annual value of the lowground part of the farm.

Share of Farm General Expenses (Overheads) As it is not possible to calculate a rate for each individual farm, the charge made is an estimated average for farms in South-West Scotland. This rate is applied as follows to "Dairy" farms and "Other" farms.

	"Dairy" Farms	"Other" Farms
(i) For each £1 of man labour	6/9d.	7/6d.
(ii) For each tractor equivalent hour(a)	7/6d.	4/-d.
(iii) For each acre of silage grown	8/6d.	7/9d.

(a) One tractor equivalent hour = one tractor hour = 4 horse hours.

The charge under item (iii) was included with joint costs. Any overhead charge arising out of the application of F.Y.M. was kept separate.

Exhaustion Rates for F.Y.M., Lime and Fertilisers

F.Y.M. charge to 1st crop year after application, ½ original cost of F.Y.M. and its application. Charge to 2nd crop, ¼ original cost of F.Y.M. and its application. Charge to 3rd crop after application, ⅛th original cost of F.Y.M. and its application. Charge to 4th crop after application, ⅛th original cost of F.Y.M. and its application.

Lime charged to each crop year over seven years, at the rate of 1/7th of original net cost.

Fertilisers, mainly Phosphatic

Charge to 1st crop year after application, ½ original net cost.
Charge to 2nd crop year after application, ¼ original net cost.
Charge to 3rd crop year after application, ⅛ original net cost.
Charge to 4th crop year after application, ⅛ original net cost.

Fertilisers, mainly Potassic

Charge to 1st crop year after application, ½ original net cost.
Charge to 2nd crop year after application, ¼ original net cost.
Charge to 3rd crop year after application, ¼ original net cost.

Compound Fertilisers

Charge to 1st crop year after application, 2/3rds original net cost.
Charge to 2nd crop year after application, 1/6th original net cost.
Charge to 3rd crop year after application, 1/6th original net cost.

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APPENDIX TABLE I

AVERAGE COSTS PER ACRE FOR EACH METHOD OF HARVESTING, - SINGLE CUT

	Baler	Buck-rake	Buckrake and Baler	Buckrake to Trailers	Forage and Wilde Harvesters	Green-Crop Loader	Hand Loading	Silorator	Single Cut
No. of farms costed	9	10	5	2	1	5	1	3	36
Acreage costed	175	85.8	67.5	46.5	39	174.2	3	141.5	732.5
Average yield of silage - tons	6.3	7.2	8.3	6.7	6.9	5.2	5.7	4.6	6.6
Average distance transported - yards	620	450	590	540	440	580	200	500	530
Manures	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Lime	-. 5	-. 8	-	-.11	-	-	-	-.10	-. 5
Fertilisers	4.10	3. 5	6.12	7. 2	4. 1	3. -	3. 7	4.13	4. 7
Top dressing Nitrogenous fertiliser	-. 8	1. 1	-. 6	1. 7	-	1. 2	-	1. 1	-.15
Other Materials (baler twine; covering material, etc.)	2. 2	-. 6	-. 5	-. 8	-	-.15	-.13	-. 2	-.16
Labour and Power									
Preliminary Cultivations	-.12	-.13	-. 9	-.14	-. 7	-. 8	-. 8	-.12	-.11
Top dressing	-. 1	-. 2	-. 1	-. 2	-	-. 2	-	-. 3	-. 2
Harvesting	3.17	4. 7	7.13	5. 8	6. 2	2.17	6. 2	3.17	4.12
Final work at Silo	-. 3	-. 3	-. 1	-. 2	-. 2	neg.	-. 1	-. 1	-. 2
Depreciation - Field machinery	1.15	-. 5	-.15	-. 5	-.14	-. 9	-	1.11	-.17
Silo	1. 5	-.18	-.13	-. 2	-.15	-.16	-. 3	1. 5	-.18
Rent	2. 2	1.10	1. 5	1.18	1. 4	1.10	-.14	1. 5	1.12
Share of Farm General Expenses	4. 6	5. 8	5.13	5. 8	6.14	3. 3	5. 2	4. 7	4.16
F.Y.M. application 1958	8. 8	7. -	9.11	-	14. 7	3.14	18. 4	2.11	7. -
	£29.14	£25. 5	£33. 4	£23. 7	£34. 2	£17.17	£34.14	£21.18	£26.11
Add Residues from past(share of sow-out, F.Y.M.and its application cost, lime and fertilisers)	4.11	3.12	4.16	2.12	5. 4	2.13	1. 6	2.12	3.14
	34. 5	28.17	38. -	25.19	39. 2	20.10	36. 1	24.10	30. 5
Less Residues to future of 1958 F.Y.M.and its application cost, Lime and fertilisers	6. 1	5. -	7. 8	2.17	8.10	3. -	10. 5	3.11	5. 6
"A" Silage & Annual Field Cost	28. 4	23.17	30.12	23. 2	30.12	17.10	25.16	20.19	24.19
Less For other uses of field	6.11	5.19	6. 3	6. 7	7.14	4. 5	10. 2	4. 4	5.19
"B" Silage Cost per Acre	£21.13	£17.18	£24. 9	£16.15	£22.18	£13. 5	£15.14	£16.15	£19. -

APPENDIX TABLE II

CERTAIN AVERAGE COSTS PER TON FOR EACH METHOD OF HARVESTING. - SINGLE CUT

	Baler	Buck-rake	Buckrake and Baler	Buckrake to Trailers	Forage and Wilde Harvesters	Green-Crop Loader	Hand Loading	Silorator	Single Cut
No. of farms	9	10	5	2	1	5	1	3	36
Tonnage costed - tons	1003	597	545	246	270	889	17	797	4334
Average distance transported - yards	620	450	590	540	440	580	200	500	530
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Manures									
Lime	-. 1	-. 1	-	-. 2	-	-	-	-. 2	-. 1
Fertilisers	-.15	-.10	-.17	1. -	-.12	-.12	-.12	-.17	-.14
Top dressing Nitrogenous Fertilisers	-. 2	-. 3	-. 1	-. 3	-	-. 4	-	-. 5	-. 1
Other Materials (baler twine, covering materials, etc.)	-. 6	-. 1	-. 1	-. 1	-	-. 3	-. 2	-. 1	-. 3
Labour and Power									
Preliminary Cultivations	-. 2	-. 2	-. 1	-. 3	-. 1	-. 2	-. 1	-. 2	-. 2
Top dressing	neg.	neg.	neg.	neg.	-	neg.	-	-. 1	neg.
Harvesting	-.13	-.12	-.18	-.18	-.18	-.11	1. 1	-.16	-.14
Final work at Silo	-. 1	neg.	neg.	neg.	neg.	neg.	neg.	neg.	neg.
Depreciation - Field machinery	-. 6	-. 1	-. 2	-. 1	-. 2	-. 2	-	-. 7	-. 3
Silo	-. 4	-. 2	-. 2	neg.	-. 2	-. 3	-. 1	-. 6	-. 3
Rent	-. 7	-. 5	-. 3	-. 6	-. 3	-. 6	-. 2	-. 6	-. 5
Share of Farm General Expenses	-.15	-.15	-.14	-.16	-.19	-.13	-.18	-.18	-.15
F.Y.M. application 1958.	1.10	-.19	1. 2	-	2. 1	-.15	3. 4	-. 9	1. 2
Total cost above items	£5. -	£3.11.	£4. -.	£3.12.	£4.18.	£3.11.	£6. 3.	£4.10.	£4. 4.
Silage Cost per Ton having allowed for manurial residues and other field uses	£3.11.	£2.10.	£2.19.	£2.14.	£3. 6.	£2.13.	£2.15.	£3.10.	£2.19.

APPENDIX TABLE III

AVERAGE COSTS PER ACRE FOR EACH METHOD OF HARVESTING - DOUBLE CUT

	Buckrake	Greencrop Loader	Double Cut
No. of farms costed	4	1	5
Acreage costed	49.3	14	63.3
Average yield of silage - tons	11.9	8.8	11.3
Average distance transported - yards	400	1760	670
Costs per Acre	£ s.	£ s.	£ s.
Manures Lime Application	-	-	-
Fertiliser	3. 4	1.15	2.18
Top dressing Nitrogenous fertiliser	1.13	2.18	1.18
Other Materials (covering material)	-. 5	-	-. 4
Labour and Power			
Preliminary Cultivations	-. 9	-. 3	-. 8
Top dressing - 1st cut	-. 2	-. 3	-. 2
Harvesting - 1st cut	5. 8	3.10	5. 1
Top dressing - 2nd cut	-. 4	-. 6	-. 4
Harvesting - 2nd cut	3.10	3.11	3.10
Final work at silo	-.11	-. 1	-. 9
Depreciation - Field machinery	-. 5	-. 6	-. 5
Silo	-.13	-. 1	-.10
Rent	1. 6	3. -	1.13
Share of Farm General Expenses	10. 5	7. 3	9.13
F.Y.M. application 1958	16.12	-	13. 5
	44. 6	22.16	40. 0
Add Residues from past (share of sow-out, F.Y.M. and its application cost, lime and fertilisers)	3.11	8. 8	4.10
	47.17	37. 4	44.10
Less Residues to future of 1958 F.Y.M. and its application cost, Lime and Fertilisers	9. 8	-.12	7.12
"A" Silage and Annual Field Cost	£38. 9	£30.12	£36.18
Less For other uses of field	2.14	-	2. 3
"B" Silage Cost per Acre	£35.15	£30.12	£34.15

APPENDIX TABLE IV

CERTAIN AVERAGE COSTS PER TON FOR EACH METHOD OF HARVESTING - DOUBLE CUT

	Buckrake	Greencrop Loader	Double Cut
No. of farms costed	4	1	5
Tonnage costed - tons	556	123	679
Average distance transported - yards	400	1760	670
Costs per Ton	£. s.	£ .s.	£ .s.
Manures Lime	-	-	-
Fertilisers	-. 6	-. 4	-. 5
Top dressing Nitrogenous fertilisers	-. 3	-. 7	-. 4
Other Materials (covering material, etc.)	neg.	-	neg.
Labour and Power			
Preliminary Cultivations	-. 1	neg.	-. 1
Top dressing 1st cut	neg.	neg.	neg.
Harvesting 1st cut	-. 9	-. 8	-. 9
Top dressing 2nd cut	neg.	-. 1	neg.
Harvesting 2nd cut	-. 6	-. 8	-. 7
Final work at Silo	-. 1	neg.	-. 1
Depreciation Field machinery	neg.	-. 1	-. 1
Silo	-. 1	neg.	-. 1
Rent	-. 2	-. 7	-. 3
Share of Farm General Expenses	-.18	-.16	-.18
F.Y.M. application 1958	1. 9	-	1. 4
Total Cost above items	£3.18	£2.12	£3.13
Silage Cost per Ton having allowed for manurial residues and other field uses	£3. 3	£3.10	£3. 4

APPENDIX TABLE V

AVERAGE SILAGE ANALYSIS AND CERTAIN COSTS FOR EACH METHOD OF HARVESTING

	SINGLE CUT								DOUBLE CUT	
	Baler	Buck-rake	Buckrake and Baler	Buckrake to Trailers	Forage and Wilde Harvesters	Green-crop Loader	Hand Loading	Silorator	Buckrake	Greencrop Loader
No. of farms using method	9	10	5	2	1	5	1	3	4	1
Analyses available	9	9	4	1	1	3	1	3	4	1
" applies to - tons	1003	562	485	56	270	482	17	767	556	123
Average % Dry Matter - %	18.7	16.9	19.4	16.8	18.9	22.4	19.0	18.9	20.2	16.9
" % Crude Protein as % Dry Matter - %	13.5	12.5	11.6	15.1	12.0	13.4	10.3	14.7	12.7	13.6
Average yield of analysed silage per acre - tons	6.3	7.4	7.9	8.6	6.9	5.1	5.7	4.6	11.9	8.8
Average yield of S.E.per acre - cwt.	11.0	11.7	14.4	14.5	11.8	11.2	9.7	8.9	22.2	14.1
Average cost of analysed silage - per ton	£3.11s.	£2.8s.	£3.-s.	£2. 2s.	£3. 6s.	£2.17s.	£2.15s.	£3.10s.	£3. 3s.	£3.10s.
Average cost of S.E.from silage - per cwt	£2. 2s.	£1.10s.	£1.15s.	£1. 5s.	£1.19s.	£1. 6s.	£1.12s.	£1.17s.	£1.12s.	£2. 3s.