THE NORTH OF SCOTLAND COLLEGE OF AGRICULTURE

AGRICULTURAL ECONOMICS DEPARTMENT

ECONOMIC REPORT NO. 93

SILAGE PRODUCTION AND COSTS SURVEY: 1960 SEASON

by

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May, 1961

Price 1/6d.
plus postage

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Silage Production and Costs Survey -1960 Season

The survey for 1960 was a continuation of those carried out in the 1958 and 1959 seasons. The aim, as in previous years has been to try and establish the level of production (i.e. yield and grazing) possible from grassland set aside for silage production under very intensive and not so intensive farming conditions. The sample includes a number of farmers who went in for intensive production of one-year leys and also farmers who use leys mainly of the three to four years grazing mixtures and cut them mostly in their first or second years although up to fourth year grass was ensiled.

An estimation of grazing yield per acre was also made, based on the number and types of animals kept and the duration of the grazing periods.

Details of hours worked, the cost of manures and seeds were supplied by the majority of co-operating farmers with the result that accurate costing records were also obtained.

Two visits were made to each farmer in the survey: one in early Spring to measure the dimensions of the silos empty and another later in the year when the silos had been filled. Yield was estimated from the volume of silage made, using density of 42 cubic feet per ton on farms where forage harvesters were used and 47 cubic feet per ton on others.

Grazing output was measured in terms of utilised starch equivalent (U.S.E.) based on the normal standards.

Results of the Survey

Eighteen satisfactory records were obtained and the individual results from these records are shown in Table I. Analysis of these does not show any great degree of correlation between yield on the one hand and manuring or type of ley on the other.

There was a wide variation in yields even within groups and also a wide difference in the amount of grazing attained before and after cutting although, on the whole, where only one cut was taken, more livestock were grazed for longer periods. The weather during the summer was quite favourable for grass production although there was a dry spell at the end of June/beginning of July and in some cases the silage aftermath had to be used for grazing instead of cutting the grass for a second time. The highest yield was 14.4 tons per acre and this was produced from a one year ley of Italian Ryegrass only, from which three cuts were taken. The manuring of this field was fairly heavy but the yield can be considered

TABLE I

Type of Ley	Code No.	Grass Seed Mixture	Quantity	Details of Manures	Sum: Nitrogen Manures	Sum
One Year Leys	SP 17	Italian Ryegrass	25 lbs.	4 cwts. Medium Nitrogen) 3 cwts. Nitro Chalk) 2 cwts. Nitro Shell)	5.00	
	SP 3	Westernwolths Barley	20 lbs. + 1 bush. barley	5 cwts. High Nitrogen		
	SP 23	P.R. & I.R. Red Clover	28 lbs.	2 cwts. Nitro Shell) 5 cwts. High Nitrogen)	2.00	
	SP 2	Italian Ryegrass	35 lbs.	4 cwts. Fisons 42) 3 cwts. Nitro Shell)	3.00	
	SP 12	P.R. & Red Clover	32 lbs.	4 cwts. Nitro Chalk) 4 cwts. C.C.F. No. 3)	4.00	
	SP 12	P.R. & Red Clover	32 lbs.	4 cwts. C.C.F. No. 3) 4 cwts. Nitro Chalk)	4.00	
	SP 6	P.R. & I.R.	28 lbs.	1½ cwts.Sulphate Ammonia) 4 cwts. Fisons 42)	1.50	
	SP 14	Westernwolths & Giant Rape	34 lbs.	5 cwts. C.C.F. No. 2) 2 cwts. Nitro Chalk)	2.00	
Three to Four Year Leys	SP 19	Ryegrass, Clover Mixture	34 lbs.	4½ cwts. Fisons 41		
	SP 21	Ryegrass, Clover Mixture	34 lbs.	6 cwts. C.C.F. No. 2 6 cwts. Slag		
Cut in 1st Yr.	SP 5	Ryegrass, Clover Mixture	32 lbs.	6 cwts. High Nitrogen		
	SP 10	Ryegrass, Clover Mixture	30 lbs.	4 cwts. High Nitrogen		
	SP 24	Ryegrass, Clover Mixture	35 lbs.	4 cwts. Nitro Chalk) 2 cwts. C.C.F. No. 2)	4.00	
	SP 8	Ryegrass, Clover Mixture	35 lbs.	2 cwts. Nitro Chalk No.21)	2.00	
	SP 8	Ryegrass, Clover Mixture	35 lbs.	4 cwts. C.C.F. No. 1)		
Cut in 2nd Yr.	SP 22	Ryegrass Clover Mixture	35 lbs.	4 cwts. C.C.F. No. 2) 2 cwts. Nitro Chalk 21)	2.00	
	SP 8	Timothy, Meadow Fescue Mix.	30 lbs.	4 cwts. C.C.F. No. 2		
	SP 3	Ryegrass, Clover Mixture	35 lbs.	2 cwts. Nitro Shell	2.00	
	SP 8	Timothy, Meadow Fescue Mix.	30 lbs.	2 cwts. C.C.F. No. 2		
Cut in 3rd Yr.	SP 20	Ryegrass, Clover Mixture Plant Station Breeding	32 lbs.	5 cwts. Slag) 3 cwts. Nitro Chalk 21) 4 cwts. Kay Nitro)	7.00	
	SP 4	Timothy, Cocksfoot Mixture	35 lbs.	4 cwts. High Nitrogen Manure)		
	SP 6	Ryegrass, Clover Mixture	34 lbs.	4 cwts. Potassic Supers.)		
	SP 8	Ryegrass, Clover Mixture	34 lbs.	4 cwts. Fisons 42		
Cut in 4th Yr.	SP 19	Ryegrass, Timothy, Cocksfoot Mixture	34 lbs.	2 cwts. C.C.F. No. 2 2½ cwts. Fisons 41		
	SP 9	Ryegrass, Cocksfoot, Clover Mixture	34 lbs.	5 cwts. Hadfields A Powder 3 cwts. Nitro Chalk		
Longer Leys Cut in 1st Yr.	SP 1	Ryegrass, Timothy, Cocksfoot Mixture	30 lbs.	3 cwts. C.C.F. No. 2	3.00	
Cut in 2nd Yr.	SP 1	Ryegrass, Timothy, Cocksfoot Mixture	30 lbs.	3 cwts. C.C.F. No. 2 3 cwts. Nitro Chalk	3.00	

LE I

Summary of Manures Used				No. of Silage Cuts	Yield per Acre		Manuring prior to Grazing
Nitrogen Manures	Compounds		Total Manures		Silage	Grazing	
	Conc.	Normal					
cwts. per acre							
5.00		4.00	9.00	3	14.44	3.15 U.S.E.	
	5.00		5.00	2	12.30	5.20 U.S.E.	
2.00	5.00		7.00	2	12.34	3.49 U.S.E.	
3.00	4.00		7.00	2	11.36	5.35 U.S.E.	
4.00	4.00		8.00	2	9.20	3.95 U.S.E.	
4.00	4.00		8.00	2	9.20	0.95 U.S.E.	
1.50	4.00		5.50	1	6.50	9.94 U.S.E.	2 cwts.Sulph. Ammonia
2.00	5.00		7.00	1	4.16	8.07 U.S.E.	
	4.50		4.50	1	11.29	5.67 U.S.E.	
	6.00		6.00	1	9.74	7.97 U.S.E.	2½ cwts.N/C 21
	6.00	6.00	12.00	1	7.86	12.34 U.S.E.	
	4.00		4.00	1	7.07	12.80 U.S.E.	
4.00			4.00	1	5.60	6.00 U.S.E.	
2.00	2.00		4.00	1	3.92	8.68 U.S.E.	
	4.00		4.00	1	3.92	8.26 U.S.E.	2 cwts.N/C 21
2.00	4.00		6.00	2	7.84	1.30 U.S.E.	
	4.00		4.00	2	5.88	5.07 U.S.E.	3 cwts.N/C 21
2.00			2.00	1	5.18	3.59 U.S.E.	
	2.00		2.00	1	3.92	5.59 U.S.E.	2 cwts.N/C 21
7.00		5.00	12.00	1½	6.82	10.91 U.S.E.	
	4.00	4.00	8.00	1	5.02	5.18 U.S.E.	
	4.00		4.00	1	4.13	14.82 U.S.E.	
	2.00		2.00	1	3.92	8.44 U.S.E.	
	2.50		2.50	1	7.65	11.83 U.S.E.	
		5.00	5.00	1	6.00	10.04 U.S.E.	
3.00	3.00		6.00	1	7.80	5.66 U.S.E.	
3.00	3.00		6.00	1	7.80	9.61 U.S.E.	

very good, the farm being situated in the north-lying foothills of Deeside. Five farms growing one year ley mixtures had yields of over 9 tons and two farms cutting three to four years' grazing mixtures only once in the first year had yields of over 9 tons. Fields of older grass however, although cut twice in some cases did not give heavy yields. Therefore, it might be deduced from that, that in order to get high productivity from grassland, either one year mixtures should be grown or that rotational grass should be cut in its first year.

The yields per acre obtained from the different types and ages of ley are summarised in Table II. In addition to the overall average yield of 7.4 tons per acre, it should be noted that grazing was obtained to the extent of 7.2 cwts. of utilised starch equivalent per acre.

TABLE II

Average Yields from Different Leys

Types of Ley 1960	No. of Fields 1960	Average Yield of Silage			
		1960	1959	1958	Three Years' Average
		tons per acre			
One Year Leys:	8	9.9	8.9	8.3	9.0
3-4 Year Leys:					
Cut in 1st Year	7	7.1	7.0	7.8	7.3
Cut in 2nd Year	4	5.7	6.3	6.6	6.2
Cut in 3rd Year	4	5.0		5.2	5.1
Cut in 4th Year	2	6.8			6.8
Longer Leys:					
Cut in 1st Year	1	7.8	10.6		9.2
Cut in 2nd Year	1	7.8			7.8
Cut in 3rd Year				9.1	9.1
Cut in 4th Year			6.0	15.8	10.9
Cut in 5th Year				3.7	3.7
Average of all Leys:		7.4	8.1	7.9	7.8

From these figures it can be seen that in three successive years, the highest yields have been obtained from one year leys and from other leys cut in their first year. The results should be approached, however, with caution as the sample is small and wrong conclusions should not be drawn. It can be seen that, in some exceptional cases, high yields can be achieved from older leys, and possibly under

certain weather and soil conditions and with proper manurial treatment other older leys could give high yields.

The manurial practices varied from farm to farm but in the main, one treatment of a concentrated compound manure was given at the end of March with a possible second treatment of a nitrogenous manure in April. If the grass was cut twice more nitrogen was applied before the second cut, but in only five instances was nitrogen applied before grazing commenced. Some farmers applied lime in the autumn to the first year of the three to four year ley mixtures but in only one case was dung applied to the grassland.

Table III sets out the manurial policies adopted by the farmers taking part in the survey, divided into high yield and low yield groups. The total amount of manures applied on the average was 7.1 cwts. in the case of the high yielding group, compared with 5.8 cwts. for the low yielding farms. Greater quantities of nitrogenous and concentrated compound manures were applied to the high-yielding group to achieve quicker and better growth of grass. This is contrary to what happened in the 1959 season but in that year farmers were reluctant to apply nitrogenous manures particularly, because of the very dry weather.

TABLE III

Manurial Policies

Types of Manures Applied	Type of Silage Production					
	High Yield (9 tons or more per acre)			Low Yield (less than 9 tons per acre)		
	1960	1959	1958	1960	1959	1958
	cwts./acre			cwts./acre		
Nitrogenous Manures	2.6	1.6	3.0	1.9	1.4	1.5
Concentrated Compound	4.0	3.4	1.3	2.8	3.2	2.1
Ordinary Compound	0.5	0.6	1.4	0.5	0.7	1.7
Other Manures	Nil	Nil	Nil	0.6	Nil	0.7
TOTAL MANURES	7.1	5.6	5.7	5.8	5.3	6.0
Silage Yield per acre (tons)	11.2	10.3	10.9	5.8	6.7	6.3
Grazing Yield per acre (cwts. U.S.E.)	4.5	5.2	6.4	8.3	5.7	5.6
Number of Fields studied	8	7	7	19	11	13

The average quantity of silage produced per acre in the high yield group was 11.2 tons, while the corresponding figure for the low yield group was 5.8 tons. In addition to silage grazing was obtained to the extent of 4.5 cwts. utilised starch equivalent (U.S.E.) per acre on the high yielding farms and 8.3 cwts. U.S.E. on the other group i.e. the grazing would be sufficient to keep 2 two-year-old cattle or 9 lambs for about one month in the case of the high yielding farms and 4 three-quarter-old cattle or 16 lambs for about one month in the case of the low yielding group. Most of the grazing was obtained in the late part of the season after the silage has been cut and thus can be regarded as the well-known "late-bite" practice.

The Average Costs of Production of Silage

Table IV shows the average cost of production of silage. The total acreage of silage costed was 388 acres, the average acreage costed on each farm being 21.6 acres. The average cost works out at £19:13:6 per acre and £2:11:9 per ton, the average yield being 7.6 tons per acre.

TABLE IV

Average Cost of Production

Operation	MAN		TRACTOR		Total
	Hours	£ s. d.	Hours	£ s. d.	£ s. d.
Pre-harvesting	1.46	-: 6: 7	1.46	-: 6: 7	
Harvesting	13.19	3: 1: 9	10.45	2: 9:10	
TOTAL	14.65	3: 8: 4	11.91	2:16: 5	6: 4: 9
Seed Cost				1:14:11	
Rent				1: 5: 1	
Manures Applied		5: 5: 1			
Plus R.M.V. b/f.		3: 6: 4			
		8:11: 5			
Less R.M.V. c/f.		3: 3: 5		5: 8: -	
Total Growing Cost				8: 8: -	
Less ¼ to Grazing				2: 2: -	6: 6: -
Other Costs (Equipment Depreciation, etc.)					2: 1:11
Overheads					5: -:10
Average Cost per Acre					£19:13: 6
Average Yield per Acre					7.6 tons
Average Cost per Ton					£2:11:9
Acreage of Silage costed					388
Acreage costed per Farm					21.6

There was a very wide range of figures from the average ones given in Table IV. The lowest cost per acre was £8:19:9 and the highest £23:8:8, while the corresponding range in cost per ton was from £1:6:2 to £4:1:11. The yield per acre was the main reason for the difference in cost per ton, the yield ranging from 3.92 to 14.44 tons per acre. High costs per acre arise when 2 cuts are taken and when the amount of manure applied is high. Forage harvesters and buck-rakes were used in the main for harvesting although a few use mowers, greencrop loaders and buck-rakes thus giving a higher cost of harvesting but a lower cost in equipment depreciation, etc.

Summary and Conclusions

From the records collected for the season 1960, it has been shown that yields averaged 7.6 tons per acre on the 18 farms or 27 fields recorded (Table II). In addition grazing was obtained to the extent of 7.2 cwts. U.S.E. per acre. The highest yield was 14.4 tons and this result along with seven other fields made up the group of eight fields with yields of 9 tons or over of silage per acre as shown in Table III. Manuring was heaviest on farms giving high yields, but heavy applications of fertilisers were also given to fields which did not respond and had low yields. Time of application did not appear to make any appreciable difference.

One year leys did seem to yield more tons per acre than leys laid down for three to four years or over. The average yield per acre of one year leys was 9.9 tons as compared with 7.1 tons per acre from grazing mixtures cut in their first productive year. It must be remembered however, that the majority of the one year leys were cut twice whereas none of the other first year grass was cut twice and 2.6 cwts. more U.S.E. was derived. Some older leys did give fairly high yields but on the whole younger grass did produce better yields.

The average cost of production was calculated for 388 acres. The average cost was £19:13:6 per acre and £2:11:9 per ton. Costs per acre ranged from £8:19:9 to £23:8:8 and per ton from £1:6:2 to £4:1:11. In general the yield per acre influenced the cost per ton: lower costs per ton being associated with higher yields per acre.

Acknowledgment

The staff of the Economics Department wish to thank co-operating farmers for supplying the necessary information and for their kindness and courtesy at all times.