Hay - cost of production O.S.

THE NORTH OF SCOTLAND COLLEGE OF AGRICULTURE

AGRICULTURAL ECONOMICS DEPARTMENT

ECONOMIC REPORT No. 90

HAY MAKING METHODS - COMPARISON OF COSTS

1960

by

R. J. COLLEY

November, 1960

AGRICULTURAL ECONOMICS DEPARTMENT

Provincial Agricultural Economist	Albert D. Imper, M.B.E., B.Sc. (Agr.), M.Sc. (Econ.), Ph.D., N.D.A.
Senior Agricultural Economist	Gordon G. Hayes, B.Sc. (Econ.), N.D.A.
Agricultural Economists	John Clark, B.Sc. (Agr.), N.D.A. Alexander Grant, B.Sc. (Agr.), Dip. Agr. Econ., A.C.W.A. A. B. K. Tracey, B.Sc. (Agr.), N.D.A. Miss Margaret Haughs, B.Sc. (Agr.) Miss Audrey M. Chalmers, B.Sc. (Agr.) R. J. Colley, B.Sc. (Agr.), Dip. Agric. (Leeds)
Executive Officers	George Cowie Walter A. Duthie

The North of Scotland College of Agriculture,
Economics Department,
41½ Union Street,
Aberdeen.

INTRODUCTION

The survey of hay production costs covered a total of 25 fields comprising 258 acres. These may be classified into two main groups:

Deeside:- Eleven fields totalling 94 acres, three of these being between 250 and 500 feet above sea level and the other eight between 500 and 750 feet.

Lowland farms:- Fourteen fields totalling 164 acres, on the lowland between the mountains and the coast, ten being situated in Kincardineshire, two in Aberdeenshire, and two in Banffshire. Four of these fields were below 250 feet above sea level, and nine between 250 and 500 feet.

Most of the haymaking was completed in ideal conditions. The dry summer of 1959 and the spring of 1960 resulted in a poor take of grass and poor growth in some areas on lighter soils. In every case in this survey hay was made from first year grass.

Methods of haymaking

Three main methods of haymaking were employed:-

1) Drying by forced ventilation

2) Using coles with or without tripods

3) Baled from the windrow

A hundredweight of starch equivalent (S.E.) has been taken to be worth 35/-. This is equivalent to barley being worth £22 a ton. The figure obtained in this way may not represent the market value of the hay, which is usually based on visual inspection, but it does represent the difference in feeding value between two samples.

COST OF PRODUCTION

The cost of hay production can be divided into two sections:-

1) Costs incurred before the grass is cut.

2) Costs of harvesting.

Costs incurred before the grass is cut.

RENT. On Deeside the average rent was £1:10/- per acre. Half the farms costed had a rent of £2 per acre. The rest varied downwards as far as 12/- per acre. The average rent on lowland farms was £2:10/-, the range being from £1 to £3.

FERTILISER. On both the Deeside and the lowland farms the average cost of fertiliser applied was £3:3:6. All but one of the Deeside farms was within £1 of the average. On the lowland farms the range was wider with two farms not applying any fertiliser for the hay.

SEEDS On Deeside farms the average cost of seeds was 89/6, most farms being within 10/- of the average. The average for lowland farms was 84/- and in this case 90% of the farms were within 10/- of the average.

COSTS INCURRED IN HARVESTING THE CROP

This year haymaking on the majority of farms costed was done under favourable conditions, so labour costs, especially for the pick up baler, are lower than usual. In some cases also the light hay crop has kept labour costs down.

In Table II, below, and in all following tables the farms have been divided into five groups, by system of harvesting and by area. In some cases this makes the group rather small, but it is better this way than having a large group with widely differing conditions within the group.

The five groups are:-

Group I - 5 fields, 4 in lowland areas and 1 on Deeside using hay conditions.

Group II - 8 fields, farms on Deeside using tripods or coles.

Group III - 6 fields, farms other than on Deeside using tripods or coles.

Group IV - 2 fields, farms on Deeside using pick up balers

Group V - 4 fields, farms other than Deeside using pick up balers.

TABLE I

LABOUR REQUIREMENTS PER ACRE

GROUP	Cutting		Turning		Coling or Tripodding		Baling		Stacking		Total		Yield
	Man	Tractor	Man	Tractor	Man	Tractor	Man	Tractor	Man	Tractor	Man	Tractor	T.C.
I	1.3	1.3	1.1	1.1			1.5	1.0	8.5	3.0	12.4	6.4	2.6
II	1.5	1.2			6.0	2.3			7.1	2.4	14.5	5.9	1.12
III	1.0	1.0			10.0	2.4			8.1	3.3	19.1	6.7	2.8
IV	1.0	1.0	1.1	1.1			- *	- *	2.5	1.1	- *	- *	2.1
V	0.9	0.9	1.0	1.0			1.5	1.1	5.4	2.0	9.8	4.9	2.1

*No total available as one farm used contract work for baling.

The table brings out the low cost of using a pick up baler compared with coling or tripodding, but it does not illustrate the risk involved; this can only be done by comparing the analysis figures for the hay; these are set out in Table III. Five figures are quoted: Dry Matter, Crude Protein, Fibre, Starch Equivalent and visual assessment. Since the hay is being used, as a

rule, for feeding stock on the farm where it is produced, the figure for Starch Equivalent (S.E.) is the important one as protein is usually available in excess for dairy or beef cattle. Even in an ideal haymaking season there is a noticeable increase in S.E. from group V to group I. In a wet season it would be expected that this transition would be more noticeable, and some crops in groups IV and V might be total losses.

It is probable that the actual yields of hay are larger than they would have been using other harvesting methods in the first three groups as a result of less mechanical losses during making, but as no estimate of the crop before harvesting was made it has not been possible to assess this.

The results of group I are of particular interest as this is a method of haymaking new to this area and is still in the experimental stage. The system consists of installing a diesel motor with a large fan at the end of an open sided tunnel, round this tunnel 700 to 1000 bales of partly wilted grass are placed. When the motor is started cold air is blown through the stack of bales which dries out in from five to ten days. The bales are put in, weighing about 75 lbs. During drying about 25 lbs. of moisture is removed, leaving a final bale weighing about 50 lbs. One loading of the hay conditioner usually represents the crop off about ten acres.

It is claimed for this system that it produces higher quality hay. In the farms examined the hay was of similar quality to coled hay from Deeside, but had 5% more S.E. than the coled hay from lowland farms. Compared with the pick up baled hay it had 2% more S.E. than the Deeside and 8% more than the lowland. Comparison between farms using the hay conditioner on one part of the field and other methods on another show an average S.E. of 32.5 with the hay conditioner and 29.0 for other methods, a gain of about 12%. It should be noted, however, that these farmers were all using the hay conditioner for the first time and will probably achieve better results with less labour another year. The quality point is borne out by the fact that on one farm which had been barn hay drying for a number of years a sample of hay was analysed which gave an S.E. of 35.4. This was from the second cut, an earlier cut of better quality was not available for sample as it was in the lower part of the stack at the back of a building, but this second cut was equal to the best obtained from other farms in their first year.

TABLE II

HAY QUALITY, YIELD, COST AND VALUE

	Hay Conditioners	Coles and Tripods		Pick Up Balers	
	Group I	Group II Deeside	Group III Lowland	Group IV Deeside	Group V Lowland
QUALITY					
Starch Equivalent	32.9	32.5	30.9	31.7	29.8
Visual Assessment	9.6	8.5	9.0	9.5	7.1
% Dry Matter	82.0	83.8	81.7	82.9	81.6
Crude Protein (in dry matter)	6.97	8.0	7.0	6.75	7.0
Crude Fibre (in dry matter)	31.4	32.1	33.6	33.3	35.3
YIELD PER ACRE					
Hay	2 t. 6 cwt.	1 t. 12 cwt.	2 t. 8 cwt.	2 t. 1 cwt.	2 t.0 cwt.
Dry Matter (cwts.)	37.9	26.8	39.0	34.0	32.6
Starch Equivalent (cwts.)	15.1	10.5	14.8	13.0	12.0
COST PER ACRE					
Direct Costs	7: 4: 7	4:12: 5	5:12:11	2: 9:10	3: 4: 7
Indirect Costs	8: 3: 7	8: -: 8	8:12: 6	6:13: 3	7: 7:11
TOTAL	15: 8: 2	12:13: 1	14: 5: 5	9: 3: 1	10:12: 6
COST					
Hay (per ton)	6:13: 9	7:18: 2	5:18:11	4: 9: 4	5: 6: 3
Dry Matter (per cwt.)	-: 8: 1	-: 9: 5	-: 7: 4	-: 5: 5	-: 6: 6
Starch Equivalent (per cwt.)	1: -: 4	1: 4: 2	-:19: 3	-:14: 1	-:17: 9
VALUE OF HAY*					
Per Acre	26:10: -	18: 7: -	25:19: -	22:15: -	20:18: -
Per Ton	11: 7: -	11: 8: -	10:15: -	11: 2: -	10:11: -

*Value based on Starch Equivalent of hay, for explanation of calculation see the first page of the report.

The second point claimed for the system is that it produces a yield of hay 20% greater than the traditional methods by cutting down losses from mechanical damage. It has not proved possible to investigate this claim.

CONCLUSIONS

On the farms costed 1960 was a good hay making year so the quality advantage was not as much in favour of tripods, coles and hay conditioners as it would have been in a wet season. This means that on Deeside tripodded or coled hay was only worth some 6/- more a ton in terms of food value, and on other farms worth 3/- more than hay made with the pick up baler. Hay from the hay conditioner was worth 12/- more than coled hay and 15/6 more than baled hay per ton.

Coled hay on Deeside took three times as much labour and nearly twice as much tractor power as pick up baled. On the lowland farms coled hay took double the labour and a third more tractor work as pick up baled. The hay conditioner took too-thirds of the labour of coled hay and similar tractor power, but twenty-five percent more of both labour and tractor power than the pick up baler. There is also £1:5/- worth of diesel fuel for the hay conditioner and depreciation of £2 per acre (see appendix).

In Table II the cost of hay making has been expressed in four different ways: Cost per acre, Cost per ton of hay, Cost per hundredweight of dry matter, and Cost per hundredweight of starch equivalent. It is interesting to note that this year the hay conditioners cost 1/- more than coles or tripods to produce a hundredweight of starch equivalent, i.e. about 5% extra. If the yield of hay in both cases had been identical the cost would also have been identical, for although the cost per ton of hay from the hay conditioner was greater the higher quality of hay brought down the cost of starch equivalent. This is inspite of it being the first year that hay conditioners have been used on the farms costed, that this year has been a favourable one for hay making and that in future years the farmers intend using the hay conditioners on two or three times the acreage of hay - thus reducing the depreciation figure proportionately.

Coles and tripods showed an appreciably higher cost per ton of starch equivalent than pick up balers in this dry year, but as in most cases this extra cost is for labour which is on the farm anyway, the cost to the farmer is not as great as it appears on paper, and this extra cost is almost certainly justified as an insurance against rain during the hay making.

TABLE III

AVERAGE COSTS OF PRODUCTION TO HARVEST

Establishing grass		-: 3: 3
Seed cost		1: 1: 7
Rent		2: -: -
Manures applied	£3: 3: 7	
+ R.M.V. b/f.	2: 6: 6	
	5:10: 1	
- R.M.V. c/f.	2: -: 4	3: 9: 9
Applying manures. 1 man 1 tractor hour		-: 8:10
Overheads		-:15:10
Total growing cost		7:19: 3
Less one-third to grazing		2:13: 1
Average cost to harvesting per acre		5: 6: 2

TABLE IV

HARVESTING AND TOTAL COSTS PER ACRE

	Hay Conditioners		Coles or Tripods				Pick up Balers			
			Deeside		Others		Deeside		Others	
	Hrs.	£ s. d.	Hrs.	£ s. d.	Hrs.	£ s. d.	Hrs.	£ s. d.	Hrs.	£ s. d.
Labour	12.4	2:13: 8	14.5	3: 2:10	19.1	4: 2: 9	5.0	1: 1: 8	9.8	2: 2: 6
Tractor Cost	6.4	1: 9: 3	5.9	1: 6: 7	6.7	1:10: 2	3.6	-:16: 2	4.9	1: 2: 1
Overheads		2:14: 1		2:14: 6		3: 6: 4		1: 7: 1		2: 1: 9
Fuel		1: 5: -								
Depreciation		2: -: -								
Contract				-: 3: -*				-:12: -*		
Harvesting Cost		10: 2: -		7: 6:11		8:19: 3		3:16:11		5: 6: 4
Cost to Harvest (From Table III)		5: 6: 2		5: 6: 2		5: 6: 2		5: 6: 2		5: 6: 2
TOTAL		15: 8: 2		12:13: 1		14: 5: 5		9: 3: 1		10:12: 6
Av. Yield per acre	2 tons 6 cwt.		1 ton 12 cwt.		2 tons 8 cwt.		2 ton 1 cwt.		2 tons 0 cwt.	
Av. Cost per ton	£6:13: 9		£7:18: 2		£5:18:11		£4: 9: 4		£5: 6: 3	
Value of hay per ton on S.E. (From Table II)	£11: 7: -		£11: 8: -		£10:15: -		£11: 2: -		£10:11: -	
Acreage Hay costed	53 acres		69 acres		78 acres		18 acres		40 acres	

*£1: 4/- per acre on one farm only in each group.

It must be emphasised that these results are only based on a small sample on a single year's work. It is hoped to continue this investigation next year with a larger number of records.

ACKNOWLEDGMENTS

The staff of this department wish to thank co-operating farmers for keeping records and supplying information used in this report. They would also like to thank the Chemistry Department for analysing the hay samples and the Animal Husbandry Department and Machinery Instructors for their advice in the preparation of this report.

APPENDIX

Labour, tractor work and overheads have been charged as follows:-

Labour	-	4/4 per hour
Tractor work		4/6 " "
Overheads	-	9/- per acre
		7/6 per £1 man labour
		5/3 per tractor hour

Overheads on the "per tractor hour" basis cover depreciation on machinery with the exception of the hay conditioner, this being a high cost specialised piece of equipment. This has been depreciated at 12½%, i.e. purchase price £500, depreciation £62:10/-. Besides hay drying the machine can be used for irrigation, grain drying and ventilating potatoes. As all the machines were new this year and farmers are still experimenting with them the hours of work on each operation are not available. It has been decided, after discussion with the machinery instructors, that it is reasonable to assume that a third of the hay conditioners' time was spent on the hay crop. This year the average acreage per machine was just over ten as farmers were only experimenting on part of their crop, but in future years the acreage per machine will probably be higher. Depreciation has thus been taken at £2 per acre for the hay crop.

The cost of establishing the grassland has been spread over four years and costs not directly chargeable to the hay crop have been split in the ratio two-thirds to hay and one-third to grazing.