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- Combine Harvesters in East and South East Scotland, 1944, 1945, 1946, 1947.
- Economic Aspects of Farm Mechanisation.

[‡] No further copies available.

Enquiries regarding the above publications should be addressed to either the Secretary of the College or the Provincial Agricultural Economist.

ECONOMICS OF LIVESTOCK PRODUCTION.

WINTER FATTENING OF SHEEP, 1947-48.

GENERAL INTRODUCTION

Sheep fattening on turnips plays an important part in the economy of many farms in South East Scotland. This is true, not only of the best arable farms on which folded sheep are kept, but also of the better types of high ground farms on which the turnip break is a common feature of the rotation. It is true also, though to a lesser extent, of those hill farms with a small area of arable land. The turnip break not only provides a feeding crop but enables the land to be well cleaned, cultivated and dunged. Hoggs, either reared from a flying flock on the farm or bought at the autumn sales, are fattened off during the winter and so, apart from any consideration of cash profits, winter fattening is important to the farmer who relies on the sheep to maintain fertility by consuming a cleaning crop of turnips on the land.

During the later war and post-war years the increased arable acreages brought about a general move towards cash cropping. Below are set out the acreages under turnips and swedes in Scotland since 1943 as compared with the immediate pre-war years.

ACREAGE UNDER TURNIPS & SWEDES IN SCOTLAND (1000's of acres)

Year	1936-38	1943	1944	1945	1946	1947	1948
Turnips & Swedes	333	332	335	329	317	307	295

These acreage figures show that the turnip crop at the end of the war had barely managed to maintain its position as compared with the pre-war years. There has, however, been a steady reduction in the acreage since 1945. To hazard a reason for this, turnips require a great deal of hand labour and wage rates have risen considerably during the last three years. However, many farmers still seem to regard the root break as being an integral part of the farm rotation. If this is accepted, the sheep feeder has two problems before him -

- (1) Will sheep fattening pay?
- (2) Is it the most efficient method of maintaining fertility on the farm?

Any information which can throw light on the first question will put the farmer in a better position to answer the second.

Published figures show the following relative changes in the prices of store and fat sheep since 1942.

ANNUAL INDEX NUMBERS OF PRICES OF STORE SHEEP AND FAT SHEEP, AND THE GENERAL AGRICULTURAL INDEX NUMBERS SCOTLAND 1942-47 ⁺

	Base: 1942 = 100					
	1942	1943	1944	1945	1946	1947
Store Sheep	100	117	128	137	144	160
Fat Sheep	100	109	114	119	126	140
General Index	100	108	114	119	125	135

⁺ Adapted from 'Scottish Agriculture' Autumn, 1948.

The index numbers for fat sheep (a price controlled product) have risen steadily in close keeping with the general index numbers for all agricultural products; but by 1947 those of store sheep (an uncontrolled product) had risen well above the levels of either fat sheep or all agricultural products. This can only have had the result of reducing the margin available to cover the cost of fattening plus some profit to the farmer.

The rise in the price of store sheep may have been due to the growing scarcity of the numbers available in the market. This is suggested by the figures given in the Agricultural Statistics for Scotland, 1944-47.

NUMBER OF SHEEP IN SCOTLAND
(at December each year)

	<u>1944</u>	<u>1945</u>	<u>1946</u>	<u>1947</u>
All Sheep	5,264,935	5,191,773	5,077,857	4,778,603
Sheep, not breeding	1,136,553	1,041,175	960,315	829,354

It may be that more stores will be available when sheep stocks recover from the effects of the 1946-47 winter.

It would appear that the winter fattening of sheep, even though their numbers may be less than in former years, still has an important part to play in the economy of Scottish agriculture. At the same time the feeder is faced with the problem of working on a relatively narrower margin over the price he must pay for his stores.

This report is concerned with the costs and returns of the winter fattening of sheep.

WINTER FATTENING OF SHEEP.

In the autumn of 1947 an investigation was commenced to obtain up-to-date information on the costs of, and returns from, the fattening of sheep on turnips. Thirty-three farms in the South East of Scotland co-operated with this Department and furnished weekly records.

The farms are distributed geographically as follows: Midlothian 2, East Lothian 2, West Lothian 1, Peeblesshire 4, Roxburghshire 3, Berwickshire 12, Fife 7, Angus 2. Good arable farms predominate in this sample; many of them also fatten cattle in courts.

The sheep were put on the turnips at various dates from the end of September to the beginning of December but on the majority of farms root feeding commenced within a fortnight of the 1st of November. The commencement on any particular farm is governed by such factors as the openness of the year or the quantities of other feeding available, e.g. aftermath, beet tops or rape to be finished; but custom also dictates.

The period spent on turnips ranged from an average of 45 days per sheep on one farm to 162 days on another. The average number of days was 99; that is just over three months.

The distribution of the average period of root feeding on each farm is/

is detailed below.

<u>NUMBER OF DAYS PER FARM ON TURNIPS</u>						
No. of days	25-49	50-74	75-99	100-124	125-149	150-174
No. of flocks	1	8	7	11	5	1

Altogether 9,272 sheep were included in the investigation. This works out at an average of 281 sheep for each flock costed but the size ranged from 90 sheep to 868 sheep. The distribution according to size of flock on the thirty-three farms is as follows:-

<u>SIZE OF FLOCK</u>					
No. of sheep	Under 100	100-199	200-299	300-399	Over 399
No. of flocks	1	10	11	7	4

The size of the flock appeared to be determined by the quantities of roots available and the organisation of the farm labour.

All the 9,272 sheep, apart from a few cast ewes and rams, were hoggs born the previous spring. Of these, 66% were bought and 34% were own-bred or reared on the farm. This illustrates the custom on the good arable farms, which predominate in this area, of buying-in hoggs. The breeds represented may be classified thus, Oxford Crosses 51%, Suffolk Crosses 31%, Half-Bred (Leicester X Cheviot) 11%, Cheviot 2%, Grey-face (Leicester X Black-face) 3% and Black-face 2%.

For those not familiar with cross-breeding practices in the South East of Scotland it may be mentioned in passing, that there is a steady movement of sheep stocks from the higher to the lower and better ground. This is based on the use of suitable crosses, e.g. Border Leicester tups are crossed on Cheviot Ewes to give the famous Half-Bred ewes. These in turn are crossed with another Border Leicester or Down to give a heavy cross lamb to be fattened off.

In this study the Oxford Crosses were most popular, no doubt because of their heavier weights. The average estimated dead-weight of all sheep at the beginning was 51 lb. per head and they ranged in weight from 28 lb. to 64 lb. per head.

Not all the sheep costed were graded fat. Some sheep which were not fit to grade by the end of the period went out as stores, perhaps to be finished on grass at a later date. There were also those which died or were graded as casualties. Percentage figures for the disposal of the 9,272 head costed were as follows - fat 95%, casualties 1.3%, deaths 1.8% and stores 1.9%. The deaths and casualties were low, possibly due to the comparatively mild winter of 1947-48.

In each record the sheep were divided into the above four classes according to the method of their disposal. The arbitrary principle was adopted of allocating the cost of feeding, labour, power and sundry expenses to each class of sheep in proportion to the number of feeding days each spent on turnips.

COSTS AND RETURNS

Below is set out a summarised statement of the costs and returns of the thirty-three flocks. These have also been divided into two groups for the sake of comparison - those showing a loss and those showing a profit. The statement is primarily concerned with the 8,810 sheep which were graded as fat off the turnips.

TABLE I. PROFIT AND LOSS ACCOUNT 8810 FAT SHEEP

Column I.	Column II.			Column III.			Column IV.							
	All Flocks			21 Profitable Flocks			12 Unprofitable Flocks							
	8810 Sheep			5253 Sheep			3557 Sheep							
	All Sheep	Per Head	Per Cent	All Sheep	Per Head	Per Cent	All Sheep	Per Head	Per Cent					
	£	£	s. d.	£	£	s. d.	£	£	s. d.					
Food - purchased	1163	-. 2.	8	1.8	933	-. 3.	7	2.6	230	-. 1.	4	.8		
- home-grown	14591	1.13.	2	22.1	6975	1. 6.	6	18.9	7616	2. 2.	10	26.3		
Labour - shepherd	1558	-. 3.	5	2.4	988	-. 3.	9	2.7	570	-. 3.	3	2.0		
- other	503	-. 1.	2	.8	340	-. 1.	4	.9	163	-. -.	11	.5		
Power - tractor	99	-. -.	3	.2	49	-. -.	2	.1	50	-. -.	3	.2		
- horse	71	-. -.	2	.1	51	-. -.	2	.1	20	-. -.	1	.1		
Sundry Expenses	509	-. 1.	2	.7	299	-. 1.	2	.8	210	-. 1.	2	.7		
Overheads	696	-. 1.	7	1.0	452	-. 1.	9	1.2	244	-. 1.	4	.8		
TOTAL FEEDING COSTS	19190	2.	3.	7	29.1	10087	1.18.	5	27.3	9103	2.11.	2	31.4	
Initial Cost of sheep	46698	5.	6.	-	70.9	26833	5.	2.	72.7	19865	5.11.	8	68.6	
TOTAL COSTS	65888	7.	9.	7	100%	36920	7.	-.	7	100%	28968	8.	2.10	100%
Less Credits	567	-. 1.	4			245	-. -.	11		322	-. 1.	10		
NET COSTS	65321	7.	8.	3		36675	6.19.	8		28646	8.	1.	-	
RETURNS	64722	7.	6.11			39552	7.10.	7		25170	7.	1.	6	
PROFIT (+) OR LOSS (-)	(-)	(-)			(+)	(+)			(-)	(-)				
	£599	-. 1.	4		£2877	-. 10.	11		£3476	-. 19.	6			

Before going on to discuss the costs and returns included in the above Profit and Loss Account, it will be helpful to indicate how these items were compiled.

Foods.

Home-grown feeding stuffs have been charged at prices representing costs of production. The costs of the purchased feeding stuffs are the actual price paid including delivery.

The more important home-grown foods were valued as follows:-

Turnips £ 1.15/- per ton, lifted, shawed and carted off.
 Turnips £ 1.10/- per ton, growing in the field.
 Oats £15.10/- per ton, bruised.
 Hay £ 5. 6/8d. per ton.

Standard residual manorial values have been deducted from the gross cost of both purchased and home-grown foods to arrive at the costs shown in the table.

Labour. /

Labour.

This is based on the actual wages, (including perquisites), paid to the shepherd; where the farmer himself worked with the sheep his time has been included at current rates. Other labour comprises the help given to the regular shepherd in such tasks as carting-out feeding stuffs, shifting nets and cutting turnips.

Power.

The tractors and horses were chiefly used for the haulage of feeding stuffs and equipment, and have been charged at 3/- per hour for tractors and 1/3d. per hour for horses.

Sundry Expenses.

These are the costs of such items as droving, haulage, dip, medicines, insurance, petrol for the turnip cutter, and incidental replacements of equipment.

Overheads.

In conformity with the principles adopted by the Scottish Conference of Agricultural Economists these have been calculated at the following rates based on the direct labour and power used -

5/- per fl of direct labour.
3/- per tractor hour.
9d. per horse hour.

Total Feeding Costs.

The costs of feeding and the original costs of those sheep which died or were graded as casualties have been included in the feeding costs of the fat sheep.

Initial Cost of Sheep.

This consists of the actual costs of those sheep which were purchased and, in the case of home-reared stores, the farmer's estimates of their market values. In this way all the sheep included in the survey have been brought in on the same basis - market price.

Credits.

Receipts from the grading of casualties have been shown as credits and deducted to arrive at the Net Costs.

Returns.

These are the receipts from the sales of fat sheep.

The costs of and returns from sheep finishing as stores have been completely excluded from the Profit and Loss Account.

AVERAGE COSTS - All Flocks. (Column 2)

An examination of the costs shows that the following are the items of cost in order of importance:-

Initial Cost of Sheep	70.9%
Home-grown Foods	22.1%
Labour	3.2%
Purchased Foods	1.8%
Other items	2.0%

These/

These figures indicate the over-riding importance of the original cost of the store sheep and of the cost of home-grown foods. The cost of labour is relatively of little importance. On an average, the cost of purchased foods is of still lesser importance, being less than the cost of miscellaneous items.

The average cost of the store works out at £5.6/- per head. The distribution of the costs per head is set out below; this has been linked with the price per lb. of the estimated dead weight of the sheep when put on the turnips.

TABLE II. DISTRIBUTION OF INITIAL COST PER HEAD AND PRICE PER LB. DEAD WEIGHT.

Prices per lb.	Flocks	Costs per head				
		Under 80/-	80/- - 99/-	100/- - 119/-	120/- - 139/-	Over 139/-
Over 2/5d.	3	-	1	-	1	1
2/4d. - 2/5d.	2	-	-	2	-	-
2/3d. - 2/4d.	3	-	1	1	1	-
2/2d. - 2/3d.	7	-	3	2	2	-
2/1d. - 2/2d.	4	1	-	1	2	-
2/- - 2/1d.	10	-	6	4	-	-
1/1ld. - 2/-	2	-	-	2	-	-
Under 1/1ld.	2	-	1	1	-	-
Number of Flocks	33	1	12	12	6	1
Average Prices per lb.		2/2d.	2/1½d.	2/1½d.	2/3½d.	2/3d.
						2/5½d.

Table II shows that costs per head range from under £4 to over £7. It also shows that the price per lb. of estimated dead weight at the start ranges from under 1/1ld. per lb. to over 2/5d. per lb. The initial average price per lb. estimated dead weight is 2/2d. which is slightly below the average price per lb. dead weight received for the sheep when graded fat.

The next item is the cost of food amounting to 23.9% of the total cost. An analysis by cost of the various foods fed is given below.

TABLE III. /

TABLE III. FOOD COSTS

	<u>Kind</u>	<u>Per Cent. of total</u> %	<u>Cost per head</u> £ s. d.
PURCHASED 7.4%	Miscellaneous	1.5	7
	Cake	1.5	6
	Cereal	3.2	1. 2
	Beet pulp	1.2	5
	Miscellaneous	4.9	1. 9
	Hay	4.1	1. 5
	Oats	17.6	6. 4
HOME-GROWN 92.6%	Turnips	66.0	1. 3. 8
TOTAL	<u>100.0%</u>	<u>100.0%</u>	<u>£1.15.10</u>

Home-grown food, as would be expected, takes up by far the greater part - 92.6% - of the total cost of food, equivalent to £1.15.2d. per head. Turnips amount to 66.0% of the total at a cost of £1.3.8d. per head, with oats coming next at 17.6% and 6/4d. per head. The costs of hay and other home-grown foods are approximately the same at 4.1% and 4.9%, equal to a total of 3/2d. per head. Purchased foods only amount to 7.4% of the food costs or 2/8d. per head.

The above figures deal with the average costs and types of foods fed to the sheep and suggest a rather complex form of diet whereas, in fact, on most of the farms the ration was a very simple one - roots plus a limited range of supplementary foods. Every farm fed at least a few pounds of cereal per head, usually bruised oats; about half fed a little purchased cake, while beet pulp was fed on fifteen farms. No hay was fed on ten of the farms; no purchased foods were fed on five of the farms. In a few cases the turnips were supplemented by other succulents such as rape or beet tops, but in no case was kale fed to the sheep.

The only other item of importance is labour amounting to 3.2% of the total cost. There does not seem to be much scope for economy in the reduction/

reduction of the labour bill on most of the thirty-three farms. Although the lowest percentage of cost devoted to labour was .4% and the highest 7.2%, these were exceptions. Twenty records showed a labour bill lying between 2% and 4% of the total cost. There is only the slightest tendency for the labour cost per head to decrease with an increase in the number being handled. If the farms are divided into two groups, sixteen on which more than 250 sheep were fed and seventeen on which less than 250 sheep were fed, the cost of labour on the former works out at 4/5d. per head and on the latter at 5/- per head.

Taking an overall average figure and allowing for a normal working week, a man may be considered to be fully occupied if he is tending 250 sheep without additional help.

The remaining items of cost - sundry expenses (amounting to .7% of the total cost) and power (amounting to .3%) are too small for changes to have any significant effect on the total cost.

PROFITABILITY (Columns 3 and 4)

Table I shows that profits were made on twenty-one farms and losses on twelve farms. The figures for costs on the profitable and unprofitable farms bring out some interesting points of difference.

The extent of the profits and losses per head can be gauged by the following figures which show a very wide range.

DISTRIBUTION OF PROFITS AND LOSSES PER SHEEP

No. of farms	----- Losses -----			----- Profits -----		
	Over 20/-	10-20/-	0-10/-	0-10/-	10-20/-	Over 20/-
7	2	3		12	5	4

In the following table the profits and losses have been expressed as percentages of the net cost. By doing so it is possible to show what returns have been obtained from the outlays involved in feeding sheep.

DISTRIBUTION OF PROFITS AND LOSSES AS PER CENT OF NET COST

No. of farms	----- Losses -----			----- Profits -----		
	Over 20%	10-20%	0-10%	0-10%	10-20%	Over 20%
4	4	4		15	4	2

The profits and losses ranged from 24.9% loss to 35.6% profit. There was an overall average loss of 0.9%; only six farms made a profit of more than 10% of the net cost. It can be safely stated that on the costs shown in this report very few farmers can expect to make a cash profit from fattening sheep; even so, an actual cash loss is a serious matter.

The principal differences between profitable and unprofitable management appear to be

- (a) Length of fattening period and weight increase.
- (b) Cost and kind of food.
- (c) Cost of store sheep.
- (d) Extent of casualties and deaths.

(a) /

(a) Length of Fattening period and Weight Increase.

On the unprofitable farms the average period spent in fattening was 103 days and on the profitable farms 96 days - a week's difference. On top of this, the average weight increase per head for the unprofitable farms amounted to 14.5 lb., and on the profitable farms to 17.1 lb. This means a difference in live weight increase per week of .99 lb. for the unprofitable as compared with 1.25 lb. per head for the profitable farms. This indicates a tendency on the less successful farms to have a slower turnover and a less intensive fattening period.

(b) Cost and Kind of Food.

From columns 3 and 4 in Table I, it may be seen that on the profitable farms home-grown foods cost much less than on the unprofitable farms (18.9% of the total cost compared with 26.3%, or £1.6.6d. per head compared with £2.2.10d.). Another obvious difference is that there is much to be gained by a judicious use of purchased or home-grown concentrates. On the profitable farms purchased foods were fed to the extent of 3/7d. per sheep (i.e. 2.6% of total cost), but on the unprofitable farms only at the rate of 1/4d. per sheep. The same difference is seen when both the home-grown and purchased feeding stuffs are combined. If the total cost of food is divided into the costs of roots and roughage on the one hand, and concentrates including oats, on the other, it is found that on the profitable farms 34.5% of the food is made up of concentrates and on the unprofitable farms only 23.5%.

(c) Cost of Store Sheep.

From columns 3 and 4 it will also be seen that there was a lower initial cost for the store sheep on the profitable farms, £5.2.2d. per head, as compared with £5.11.8d. per head on the unprofitable farms, yet the profitable farms have a slightly heavier sheep at the start. This can best be summed up by saying that on the profitable farms, at least in the case of the bought-in sheep, an element of shrewd buying is in evidence.

(d) Extent of Casualties and Deaths.

The incidence of disease and deaths is another point. The death rate on the unprofitable farms amounts to 2.5% of all the sheep, compared with 1.3% on the profitable. The credits for casualties shown in Table I (columns 3 and 4) indicate that the wastage from disease etc. is higher in the case of the unprofitable farms.

SUMMARY

As the foregoing records show, thirty-three flocks of feeding sheep of an average size of 281 hoggs, folded on roots for approximately 99 days, sustained an average loss of 1/4d. per head in 1947-48.

There is (as in all farming enterprises) no one factor which, if attended to, can ensure success in sheep fattening on turnips. The examination of the individual records brings out a number of factors which are important for the success or failure of sheep fattening on roots as a profit-making enterprise. This report draws attention to what appear to be the four principal factors:-

- (a) A reasonably priced store must be obtained.
- (b) A quick live weight increase should be aimed at.
- (c) Attention must be given to the importance of the cost of foods coupled with the judicious use of concentrates whether home-grown or purchased.
- (d) Careful management to reduce the number of deaths and casualties is important.

Wherever/

Wherever these four can be achieved and the general management of the sheep is on sound lines, the folding of sheep on turnips can be carried on without financial loss. Though the answer to the first question put at the beginning of this report i.e. Will sheep fattening pay? is a cautious affirmative, a complete answer to the second i.e. Is it the most efficient method of maintaining fertility on the farm? cannot be given without consideration of all possible alternative methods. This is outside the scope of the present investigation but the possibility of a margin on the costs incurred in fattening sheep does relieve the farmer of a good deal of anxiety on that score.

ACKNOWLEDGMENT

Grateful acknowledgment is made of the help given by the farmers who have co-operated in this investigation by keeping the necessary records and furnishing the other information required. It is hoped that the full details of their own costs, which have been sent to all co-operators, will have been of interest and, together with the present report, will be of some help in assessing the place of sheep on the economy of the farm.