MANAGING SHEEP for Greater Returns . . . .

T. R. NODLAND
G. A. POND

Agricultural Experiment Station
═ UNIVERSITY OF MINNESOTA ═

Contents

THERE were 972,435 sheep on Minnesota farms April 1, 1940, according to the federal census. These are distributed all over the state with the greatest concentration in type-of-farming areas 1, 3, 4, 6, and 7 (see figure 1). Eighteen per cent of all farmers in the state in 1940 reported maintaining breeding flocks of sheep. The average number of ewes per farm was 26. The characteristic sheep enterprise in Minnesota is the small farm flock, although there are a few areas along the eastern edge of the Red River Valley where large bands of sheep are ranged on native grass and brushland pastures.

Although the enterprise is generally a minor one, it has certain advantages that make it profitable when combined with the other farm enterprises. Sheep are especially adapted to the grazing of rough and hilly land and to the utilization of low-grade roughages. They are unexcelled as weed consumers and frequently are kept to clean up farmsteads, fence rows, and stubble fields. Sheep require relatively little labor other than at lambing time. They do not require expensive buildings or equipment, but good fences must be maintained. Investment in the foundation stock is small and returns come quickly. With good pasture it is possible to market high quality lambs in this state without grain feeding.

MANAGING SHEEP
for Greater Returns

T. R. NODLAND and G. A. POND

Introduction

Purpose of the Study—Differences of as much as $10 per head in income received from sheep on similar farms are not unusual. This difference is found in years when conditions are favorable as well as in years when conditions are relatively unfavorable. Even in the most favorable years some farmers fail to receive sufficient income from their sheep enterprise to cover all of the costs incurred. Such variations are due in the main to differences in the organization of the enterprise and in the practices followed.

The purpose of this study is to analyze the sheep enterprise on a group of southeastern Minnesota farms to determine the major factors and practices followed which account for these large variations in the financial returns from sheep raising. To the extent that these factors and practices are within the control of the individual farmer it should enable those who are striving to improve the returns from their sheep enterprise to select the methods which have proved to be the most profitable. It should also be useful in pointing out how farm accounts may be used as a basis for improving the financial returns from a farm flock of sheep.

Source of Data—All the data used in this study are based on carefully kept farm records submitted by the Southeastern Minnesota Farm Management Service. This Service is conducted cooperatively by the Division of Agricultural Economics and the Division of Agricultural Extension, Department of Agriculture, University of Minnesota, and the Bureau of Agricultural Economics of the United States Department of Agriculture. An average of 146 farmers in 10 counties submitted records for the years 1928 to 1937. Approximately one third of these farmers maintained farm flocks of sheep. The location of the counties from which records were obtained is shown in figure 1. There was some change in farms from year to year. In this study each yearly farm record has been treated as a separate case.

The farmers included in this study are, in general, above the average in managerial ability and are on farms somewhat larger and more productive than the average in the area.[1] There were, nevertheless, wide variations in the methods and practices followed by these men. It is reasonable to assume that similar variations occur among other farmers in the area.

Variations in Factors of Cost and Returns

The flocks included in this study are farm flocks with an average of 25 ewes (table 1). The number of head of sheep

[1] For a description of the area see Engene, S. A., and Pond, G. A., "Agricultural Production and Types of Farming in Minnesota," Minnesota Bulletin 347, May 1940.

Table 1. Factors of Costs and Returns from Sheep, 1928-1937

	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	Ten-year average
Number of farms	29	41	48	47	44	32	43	46	51	65	45
Head of sheep per farm*	28	30	29	38	42	36	41	36	40	37	36
Number of ewes kept for lamb-ing	22	24	21	29	29	24	27	25	28	24	25
Per cent lamb crop	90	79	98	94	104	106	100	93	95	97	96
Per cent death loss	6	9	8	6	8	7	10	11	8	16	9
Feeds used per head, lbs.:											
Concentrates	35	69	58	67	48	96	74	56	54	41	60
Alfalfa	44	52	42	60	68	84	86	61	164	90	75
Other tame hay	52	44	63	47	41	79	84	87	102	89	69
Wild hay and corn fodder	31	105	138	58	112	86	97	120	53	72	87
Silage	115	157	104	84	101	114	143	195	160	123	130
Feed cost per head:											
Concentrates	$ .53	$ .85	$ .61	$ .52	$ .29	$ .43	$ .61	$ .66	$ .52	$ .47	$ .55
Roughages	.96	1.22	1.11	.93	.89	.76	1.13	1.69	1.02	1.21	1.09
Pasture	1.07	1.11	1.09	.93	.65	.66	.62	.87	.85	.85	.87
Total feed cost	$2.56	$3.18	$2.81	$2.38	$1.83	$1.85	$2.36	$3.22	$2.39	$2.53	$2.51
Value of produce per head:											
Wool	$2.60	$2.29	$1.29	$ .72	$ .56	$1.55	$1.40	$1.44	$2.04	$2.52	$1.64
Net increase in value of sheep	6.68	4.92	1.84	1.89	1.63	3.05	3.15	4.21	3.98	3.71	3.51
Total value of produce	$9.28	$7.21	$3.13	$2.61	$2.19	$4.60	$4.55	$5.65	$6.02	$6.23	$5.15
Returns above feed cost per head	$6.72	$4.03	$ .32	$ .23	$ .36	$2.75	$2.19	$2.43	$3.63	$3.70	$2.64
Value per lamb sold	$10.02	$9.25	$5.92	$4.29	$3.62	$4.67	$5.13	$6.74	$6.97	$7.37	$6.40
Price received per lb. wool sold, cents	42.0	30.5	18.4	12.7	8.0	22.8	19.2	20.0	29.0	32.0	23.5

* Two lambs under six months of age considered as one head.

per flock and the number of ewes kept for lambing increased to a high point in 1932 and thereafter declined slightly. Two lambs under six months of age were considered as one head in the computation of total number of sheep in the flock. The per cent lamb crop varied from 79 in 1929 to 106 in 1933; the 10-year average was 96 per cent.

The quantity of concentrates and roughages consumed per head fluctuated a great deal. In 1932 the average feed cost per head was 43 per cent below the high average occurring in 1935. Feed is the most important single item of cost[2] in the production of sheep, amounting to approximately 50 per

[2] Engene, S. A., Pond, G. A., and Anderson, A. W., "A Preliminary Report of Livestock Costs and Returns from Data Secured in 1940 in the Farm Accounting Route in Winona County, Minnesota," Mimeographed Report No. 124 of the Division of Agricultural Economics, University of Minnesota, June 1941, page 11.

cent of the total costs. Man labor and shelter each represent approximately 20 per cent of the total cost. The others, namely, equipment, power, interest, and miscellaneous cash costs, are very minor. The charge for feed was computed on the basis of average farm prices in the area.

The value of the product and the return over feed cost per head showed an even greater variation than the feed cost. The value of the product (gross returns) is determined by adding the receipts from wool to the net increase in the value of the sheep. The net increase in the value of sheep is calculated by subtracting the value of the purchases and the value of the beginning inventory from the sum of the value of the closing inventory, sales, and sheep butchered for home use. The total value produced decreased 76

per cent from $9.28 per head in 1928 to $2.19 in 1932. This drastic decline was due to an 81 per cent decrease in wool prices and a 74 per cent decrease in lamb prices during this period. During three of the 10 years studied (1930, 1931, and 1932) the average cost of the feed was approximately equal to the total value of the product.

The differences in the return over feed cost from year to year are due to changes in the general price level— changes over which the individual farmer has little or no control. That there are factors under the control of the farmers is illustrated by the wide variation in return over feed cost among the flocks during each of the 10 years included in this study (table 2). In all but one of the 10 years, some farmers failed to receive a return sufficient to cover feed cost. At the same time, other farm operators received a comparatively high return per head over feed cost. The balance of this discussion will deal with some of the more important factors which account for this large variation among flock-owners in the same year.

Table 2. Returns above Feed Cost per Head of Sheep, 1928-1937

Year	High- est	Aver- age	Low- est	Range
1928	$17.17	$6.72	$—1.18	$18.35
1929	9.27	4.03	—3.09	12.36
1930	9.95	0.32	—6.68	16.63
1931	3.08	0.23	—4.87	7.95
1932	3.29	0.36	—3.56	6.85
1933	5.49	2.75	0.55	4.94
1934	7.17	2.19	—3.18	10.35
1935	6.41	2.43	—1.95	8.36
1936	8.72	3.63	—0.23	8.95
1937	12.72	3.70	—5.03	17.75
Ten-yr. average	8.33	2.64	—2.92	11.25

Relation of Size of Enterprise to Returns

The data in this study do not show a relationship between the size of the enterprise and the return over feed cost. Two measures of size of flocks are available—the total number of head of sheep in the flock and the number of ewes kept for lambing. The relation of number of ewes kept for lambing to the return over feed cost and to other sheep production factors is presented in table 3.

The larger flocks were fed more concentrates and roughages and had the highest feed cost per head. There was no significant relationship between size of enterprise and return over feed cost. It might be expected that the most profitable flocks would be the small flocks utilizing waste feeds. There are two reasons why this did not occur. First, the larger flocks are on the larger farms and consequently they also have access to a considerable amount of waste feed. Second, the feed costs include a uniform charge for pasturage based on the number of months sheep had access to pasture regardless of type or quality. In some cases the sheep grazed for a large portion of the growing season on miscellaneous herbage growing on the farmstead or in stubble fields, while other

LEGEND
1. SOUTHEAST, DAIRY AND LIVESTOCK.
2. SOUTH-CENTRAL, DAIRY AND LIVESTOCK.
3. SOUTHWEST, LIVESTOCK AND CASH GRAIN.
4. WEST-CENTRAL, LIVESTOCK AND CASH GRAIN.
5. EAST-CENTRAL, DAIRY AND POTATOES.
6. NORTHWESTERN, DAIRY AND LIVESTOCK.
7. RED RIVER VALLEY, SMALL GRAIN, POTATOES, AND LIVESTOCK.
8. NORTHERN CUTOVER, DAIRY.
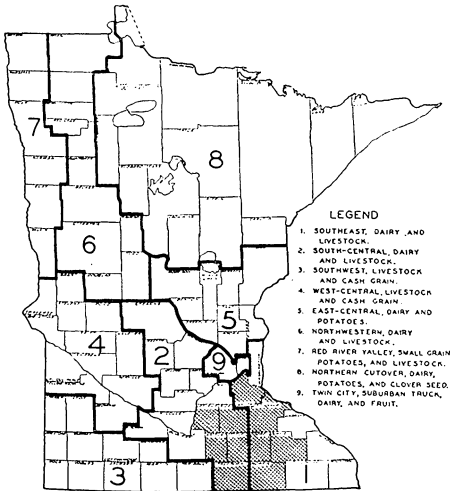9. TWIN CITY, SUBURBAN TRUCK, DAIRY, AND FRUIT.

FIG. 1. Farms included in this study were located in the shaded counties

Table 3. Relation of Number of Ewes Kept for Lambing to Various Sheep Production Factors, 1928-1937

Number ewes kept for lambing		Num-ber farms	Re-turn over feed	Index gross re-turns	Index value wool	Index feed cost	Lbs. con-cen-trates fed	Lbs. rough-ages fed	Per cent lamb crop	Per cent death loss	Index avg. value lambs sold	Index price recd. for wool	Total sheep per farm
Range	Aver-age												
					Per head								
6.0 and less	4.6	49	$2.92	102	106	93	44	330	94	7.1	103	97	8.6
7.0-16.9	11.2	143	2.72	100	102	97	55	352	93	9.5	101	101	15.8
17.0-26.9	20.4	94	2.51	96	100	97	58	328	100	10.9	97	97	28.3
27.0-36.9	31.0	45	2.59	98	94	98	53	406	99	8.1	103	103	42.7
37.0-46.9	41.6	49	2.71	103	97	103	72	369	98	9.3	94	100	60.6
47.0-56.9	51.3	30	2.70	107	98	112	65	428	104	7.8	101	99	73.1
57.0 and over	86.5	25	2.04	98	103	120	78	498	90	11.7	102	106	115.8

Table 4. Relation of Feed Cost to Various Sheep Production Factors, 1928-1937

Index of feed cost per head		Num-ber farms	Re-turn over feed	Index gross re-turns	Index value wool	Lbs. con-cen-trates fed	Lbs. rough-ages fed	Per cent lamb crop	Per cent death loss	Index avg. value lambs sold	Index price recd. for wool	Total sheep per farm	Num-ber ewes*
Range	Aver-age												
					Per head								
54 and less	42	39	$3.69	92	106	7	67	83	9.8	104	104	20.1	14.7
55-84	70	113	3.13	95	103	27	217	95	9.8	97	101	29.2	21.2
85-114	100	155	2.85	104	99	62	396	99	9.1	102	99	38.6	27.6
115-144	128	96	1.99	101	98	79	506	98	9.6	97	101	42.3	29.3
145 and above	170	43	1.19	106	95	130	615	101	7.8	103	92	43.5	29.8

* Number of ewes kept for lambing.

flocks had access to good grass or legume pasture.

There was no significant relationship between size of flock and per cent lamb crop, per cent death loss, value per lamb sold, or price received for wool.

Cost of Feed

While the cost of feed does not represent as large a proportion of the total costs as in the case of hogs, for example, nevertheless it is the largest single item of expense. Consequently, efficient utilization of feed has a decided effect on the returns from the flock.

There was a considerable variation among the farms in the amount of concentrates fed to sheep. Approximately 20 per cent of the farmers did not feed concentrates, and 35 per cent fed up to 50 pounds per head or an average of 28 pounds. At the other extreme 5 per cent fed an average of 235 pounds per head. This 5 per cent includes those who fed grain to lambs.

There was a wide range among the farms in the feed cost per head. Out of 446 cases, 39 farmers had an average feed cost of only $1.05 per head, while 43 had an average feed cost of $4.27, a difference of $3.22. There is a definite relationship between low feed cost and a high return over feed (table 4). The income from wool decreases with increased feed cost per head. This is due to the greater relative production of lambs and mutton on those farms having high feed costs as indicated by the increasing percentage lamb crop. Wool production, therefore, represents a smaller part of the gross return. During the 10 years 1928 to 1937, the returns from wool amounted to approximately one third of the gross income from sheep (see table 1).

In general, the feed cost per head is lowest in the small flocks. Many farmers keep sheep to utilize low value feeds. Consequently, when the data were grouped on the basis of feed cost per head, the group with the lowest feed cost included many flocks fed largely low value feeds.

As no record was made of the waste feed other than the number of months of pasture, it is difficult to analyze the rate of feeding and feed cost or to base definite conclusions on them. Many farmers allow the farm flock to rustle for their feed in the cornstalks and straw stacks throughout the winter. In some instances, a substantial amount of feed is secured from the feed refused by cattle on the farm. The data in this study show that it is not only the farmers with five or six ewes that follow this practice, but that some fairly large flocks secure most of their feed in this manner.

Gross Returns

The gross returns per head of sheep (value of the wool produced plus the net increase in the value of the sheep) are very definitely related to return over feed cost (table 5). Even though higher feed costs accompanied higher gross returns, the difference in gross returns was enough larger to bring about a decided increase in the return over feed cost per head.

Several other sheep production factors were related to gross returns. The

value of the wool clip is figured directly into gross returns and hence it showed a decided relationship. A high per cent lamb crop and a low death loss spread the cost of maintaining the breeding flock over a larger number of animals and thereby brought about a higher return over feed.

Factors Affecting the Production of Lambs

Time of Lambing—The time of lambing is an important factor in sheep production. Table 6 shows very little difference in financial returns among the flocks lambing in the months of March to June. The flocks lambing in February show a very low return over feed, partly because of heavier feeding of both concentrates and roughages. February lambs were unable to secure as much feed from pastures.

The March lambs received the highest prices and hence show the greatest gross return per head. To secure the best prices the lambs from the farm flocks should be ready for sale before the grass-fat lambs from the range states arrive on the market in the late summer and early fall.

One would expect that the death loss would be highest for the February and March lambs because of severe weather. On the contrary, the highest death loss occurred in the flocks lambing in May and June. This is probably due to lack of care given to the late

Table 5. Relation of Gross Returns per Head to Various Sheep Production Factors, 1928-1937

Index of gross returns per head		Num- ber farms	Re- turn over feed	Index value wool	Index feed cost	Lbs. con- cen- trates fed	Lbs. rough- ages fed	Per cent lamb crop	Per cent death loss	Index avg. value lambs sold	Index price recd. for wool	Total sheep per farm	Num- ber ewes*
Range	Aver- age												
						Per head							
69 and less	45	70	$ .04	92	91	51	329	69	14.3	90	95	36.9	26.9
70-89	80	86	1.61	93	100	52	364	88	9.6	96	94	30.9	22.0
90-109	101	119	2.69	96	100	57	373	97	9.9	99	100	37.2	26.7
110-129	120	91	3.64	109	101	61	393	109	7.4	103	103	38.8	27.0
130 and over	147	80	4.91	110	106	71	362	114	5.9	108	106	35.1	24.3

* Number of ewes kept for lambing.

Table 6. Relation of Time of Lambing to Various Sheep Production Factors, 1928-1937

Time of lambing	Number farms	Return over feed	Index gross returns	Index value wool	Index feed cost	Lbs. concentrates fed	Lbs. roughages fed	Per cent lamb crop	Per cent death loss	Index avg. value lambs sold	Index price recd. for wool	Total sheep per farm	Number ewes*
						Per head							
February	12	$1.42	85	95	118	74	456	96	6.9	98	95	37.4	27.8
March	61	2.90	107	96	104	62	364	97	7.4	104	100	29.7	20.8
April	84	2.79	99	102	92	51	306	98	9.0	101	98	22.3	16.9
May and June	61	2.66	102	102	103	65	331	92	9.6	96	101	27.9	20.5

* Number of ewes kept for lambing.

Table 7. Relation of Per Cent Lamb Crop to Various Sheep Production Factors, 1928-1937

Per cent lamb crop Range	Average	Number farms	Return over feed	Index gross returns	Index value wool	Index feed cost	Lbs. concentrates fed	Lbs. roughages fed	Per cent death loss	Index avg. value lambs sold	Index price recd. for wool	Total sheep per farm	Number ewes*
							Per head						
69 and less	44	71	$1.35	71	101	92	59	320	12.9	98	101	29.9	25.3
70-89	80	86	2.26	92	102	99	37	380	10.1	99	100	33.1	23.8
90-109	100	131	2.71	103	96	103	57	381	8.5	101	98	41.6	29.0
110-129	119	99	3.13	109	100	99	62	361	8.6	98	98	35.5	24.1
130 and above	143	55	3.78	126	99	108	70	384	7.0	106	103	36.3	23.8

* Number of ewes kept for lambing.

lambs because of the busy season. If the farm operator is equipped to handle early lambing, the March lambs have the advantage of coming before the rush of spring work.

Per Cent Lamb Crop—In order to get a high return from a farm flock of sheep it is necessary to secure a high per cent lamb crop. The return from sheep must come from the sale of wool and lambs. The return from the latter is considerably the larger of the two and hence has the greatest effect on return over feed. Table 7 shows a very strong relationship between the per cent lamb crop and return over feed and gross returns per head. The index of feed cost also tended upward with the larger lamb crops but at a much slower rate than returns. The percentage death loss was less when the per cent lamb crop was the highest. The flocks with the high lamb crop probably received the best care. This is reflected by a somewhat higher rate of feeding and a slight ten-

dency toward higher prices received for the lambs sold. There was little or no relationship with the other factors such as the value of the wool clip and number of ewes kept for lambing.

Death Loss

It is essential with all classes of livestock that the death loss be kept at a minimum. The cost of the feed and care spent on animals which later die is carried by the animals remaining in the flock. Hence, it is not surprising that the flocks with the highest death loss had the lowest gross return per head and return over feed cost (table 8).

There was a very wide range in the amount of death loss among the flocks on the farms studied. Much of it represents the loss of small lambs soon after birth.[3] On some farms, however, older

[3] For a discussion of the common ailments of sheep see Anderson, P. A., and Morris, W. E., "Sheep on Minnesota Farms," University of Minnesota Agricultural Extension Bulletin 141, Revised June 1943, pp. 21-24.

Table 8. Relation of Amount of Death Loss to Various Sheep Production Factors, 1928-1937

Per cent death loss Range	Aver-age	Num-ber farms	Re-turn over feed	Index gross re-turns	Index value wool	Index feed cost	Lbs. con-cen-trates fed	Lbs. rough-ages fed	Per cent lamb crop	Index avg. value lambs sold	Index price recd. for wool	Total sheep per farm	Num-ber ewes*
						—Per head—							
0	0	66	$3.13	107	114	95	46	341	93	101	98	16.7	12.0
0.1-6.9	4.1	124	2.90	107	89	104	67	367	102	101	99	44.5	31.0
7.0-12.9	9.0	145	2.71	102	100	101	63	379	98	99	101	36.6	25.8
13.0-18.9	15.2	56	2.61	95	104	91	53	339	100	98	100	39.8	28.4
19.0 and over	26.8	55	1.32	76	102	103	65	391	82	102	100	33.5	24.6

* Number of ewes kept for lambing.

Table 9. Relation of Average Value per Lamb Sold to Various Sheep Production Factors, 1928-1937

Index of average value per lamb sold Range	Aver-age	Num-ber farms	Re-turn over feed	Index gross re-turns	Index value wool	Index feed cost	Lbs. con-cen-trates fed	Lbs. rough-ages fed	Per cent lamb crop	Per cent death loss	Index price recd. for wool	Total sheep per farm	Num-ber ewes*
						—Per head—							
69 and under	54	24	$1.74	82	92	99	53	334	99	9.8	94	36.0	22.2
70-89	82	90	2.13	92	96	104	58	382	96	9.5	98	33.3	24.3
90-109	99	174	2.66	102	100	103	60	413	101	8.9	101	44.0	31.2
110-129	117	92	3.39	113	98	97	65	306	100	9.1	100	32.9	23.7
130 and over	153	122	3.57	117	112	98	63	302	94	10.6	105	31.4	21.3

* Number of ewes kept for lambing.

animals die from bloating or other causes. In either case a high death loss brings about a high feed charge for the remaining animals in the flock.

Marketing

The farmer must be efficient in marketing as well as efficient in the growing and handling of livestock. It is necessary that he watch the time and place to market in order to secure the highest possible returns. Part of his success in marketing is also a reflection of his ability as a feeder. The livestock must have the condition and finish required by the market.

Average Value Received per Lamb Sold—The production of lambs is the more important of the two products secured from sheep. Hence, the value received per lamb sold has a decided bearing on the return over feed cost

and the gross return received per head in the farm flock (table 9). The total value received per lamb sold is used rather than the average price received per 100 pounds sold because weights were omitted in some records.

Although the lambs raised in this part of the state are fattened mainly on grass, there is an association between value per lamb sold and amount of concentrates consumed per head of sheep in the flock. This indicates that the higher-valued lambs either received some concentrates or the ewes were better fed and therefore produced vigorous lambs that could be marketed at an earlier date.

Time of Sale of Lambs—Lamb prices average highest during the spring and early summer when the receipts on the markets are low, usually reaching a peak at approximately June 1. Prices average lowest at approximately October 1 when the receipts on the cen-

Table 10. Relation of Time of Sale of Lambs to Various Sheep Production Factors, 1928-1937

Time of sale of lambs	Number farms	Return over feed	Index gross returns	Index value wool	Index feed cost	Lbs. concentrates fed	Lbs. roughages fed	Per cent lamb crop	Per cent death loss	Index avg. value lambs sold	Index price recd. for wool	Total sheep per farm	Number ewes*
					Per head								
May and June	14	$2.02	87	101	98	47	351	90	13.5	93	101	23.8	17.4
July	20	2.46	94	103	95	37	336	97	8.6	94	96	25.0	19.0
August	28	2.39	98	110	106	67	301	93	9.4	95	99	29.4	21.3
September	43	2.77	105	98	105	49	415	106	7.9	101	98	23.3	17.2
October	48	2.92	103	103	95	48	368	96	8.5	99	99	29.8	21.8
November	26	2.59	103	96	108	88	359	97	10.5	100	98	32.9	22.5
December	19	2.15	92	89	103	79	365	92	10.7	107	106	44.2	30.5

* Number of ewes kept for lambing.

Table 11. Relation of Price Received for Wool to Various Sheep Production Factors, 1928-1937

Index of price received for wool		Number farms	Return over feed	Index gross returns	Index value wool	Index feed cost	Lbs. concentrates fed	Lbs. roughages fed	Per cent lamb crop	Per cent death loss	Index avg. value lambs sold	Total sheep per farm	Number ewes*
Range	Average												
					Per head								
78 and below	65	39	$1.42	84	70	116	71	452	97	9.1	101	37.4	25.6
79-92	87	64	2.23	95	96	106	67	403	97	9.0	100	37.1	27.7
93-106	100	168	2.74	100	105	96	53	341	97	10.1	103	32.9	23.2
107-120	111	103	2.90	105	116	100	64	374	96	9.3	98	40.8	28.8
121 and over	138	24	3.90	122	144	95	51	407	106	8.0	103	49.9	33.3

* Number of ewes kept for lambing.

tral markets are largest for the entire year. A heavy movement of lambs from the range states and native lambs from the Middle West account for the large receipts on the markets in the fall.[4]

Where native lambs are raised with plenty of good pasture, it is usually considered more profitable to sell them as grass-fat lambs at or before weaning time. However, the data presented in table 10 show that the greatest return over feed cost per head of sheep in the flock was secured when the lambs were marketed in September and October. This is partly due to the fact that the lambs were increasing in value during the late summer and early fall faster than the increase in feed cost per head. Although feed records on the lambs alone are not available, the flocks from which lambs were

[4] Waite, Warren C., and Cox, Rex W., "Seasonal Variations of Prices and Marketings of Minnesota Agricultural Products, 1921-1935." Minnesota Agricultural Experiment Station Technical Bulletin 127, March 1938, pages 30 to 33.

marketed in September and October received a comparatively small amount of concentrates. If no charge was made for aftermath pasture secured from meadows and grain fields, the lambs marketed late in the summer or early fall would show an even higher return.

Price Received per Pound of Wool Sold—The return from wool amounts to approximately one third of the total value of the produce from sheep; hence the price received per pound of wool sold has a direct relationship to the return over feed cost and the gross returns secured per head in the flock (table 11). There was a wide variation among the farmers in the price received for wool. The very low prices were probably due to poor handling of the wool on the part of the grower. To secure a good price it is necessary to market a reasonably clean wool that is free from tags and handled in a manner acceptable to the wool buyers.

Relation of Factors in Which Farmers Excelled in Sheep Production to Return over Feed Cost

In the preceding discussion a number of management factors and practices have been studied with the view of determining the major factors causing the variation in return over feed cost among farms. The relationship of each factor to return over feed cost has been shown. Some of the factors were found to be highly significant, while others showed little or no relationship to return over feed cost. Because of the interrelationships between the factors it is difficult to secure the independent relationships of these factors to return over feed cost. An individual who follows good feeding practices, for example, is very apt to follow other good management practices.

The combined or cumulative effect of these factors on returns can be shown even though the independent relationship of each factor cannot be measured exactly. Six of the various factors found to have a considerable relationship to return over feed cost were: (1) gross returns per head, (2) per cent lamb crop, (3) value per lamb sold, (4) prices received for wool, (5) per cent death loss, and (6) feed cost per head. A relatively high standing in these factors may be expected to have a favorable influence on the return over feed.

Some farmers excelled in all six factors while others were below the average of the group in all the factors. Others were above average in some of the factors and below in some. The cumulative effect on return over feed cost from excelling in the six selected factors is shown in figure 2. During the 10-year period 1928-1937 the average

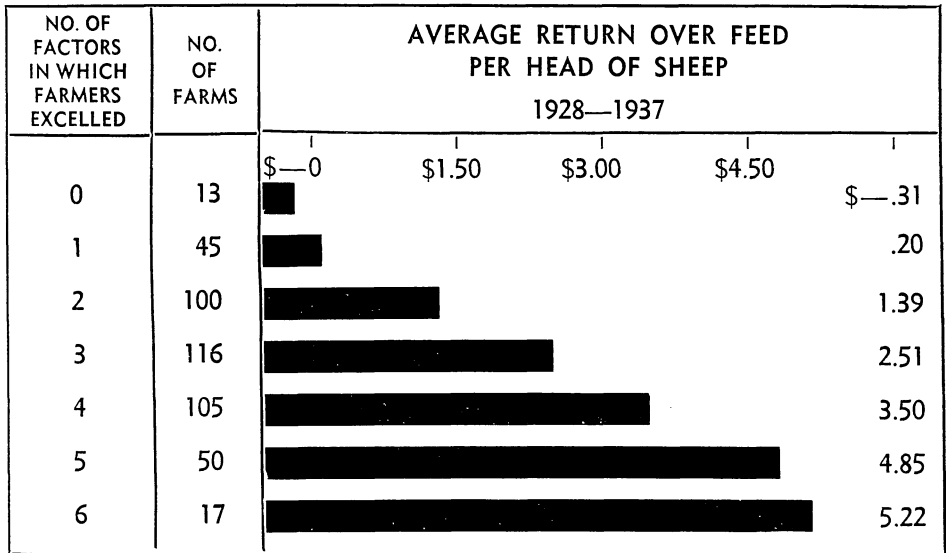| NO. OF FACTORS IN WHICH FARMERS EXCELLED	NO. OF FARMS	AVERAGE RETURN OVER FEED PER HEAD OF SHEEP 1928—1937	
		$—0 $1.50 $3.00 $4.50	
0	13		$—.31
1	45		.20
2	100		1.39
3	116		2.51
4	105		3.50
5	50		4.85
6	17		5.22

FIG. 2. Average return over feed cost per head of sheep on farms grouped according to number of selected factors in which the farmer was above average, 1928-1937

The six factors used as a basis for this chart are: (1) gross returns, (2) per cent lamb crop, (3) average value per lamb sold, (4) price received for wool, (5) percentage death loss, and (6) feed cost.

return over feed cost per head of sheep for the 17 flocks which excelled in all six factors was $5.22. The 13 farmers who were below the average of the group in all the factors did not receive an income sufficiently large to cover the value of the feeds consumed. The difference between the two extremes amounts to $5.53 per head.

The above comparisons indicate that although the individual effect on return over feed cost of each factor studied may not have appeared large, the combined effect of the six selected factors shows a marked correlation with return over feed cost. There may be other factors of importance that do not lend themselves to this type of analysis or were not measured in this study. However, these six factors are sufficient to account for a considerable proportion of the range in return over feed cost among farmers.

Using Records to Increase Returns from Sheep

The facts presented in this study were obtained from farm account records. They serve to bring out the factors that affect the profitability of sheep as a farm enterprise. As such they are useful as a general guide to all farmers raising sheep in southeastern Minnesota. The individual, however, who has available for comparison records on his own flock will get the greatest benefit from this type of analysis. A farmer may know fairly well his lamb crop, the price he receives for lambs and wool, and the extent of his death losses, but unless he records these from year to year, the facts are likely soon to be forgotten. Without some financial and inventory records he has only a general idea of his gross return, and without feed records little information of his feed costs. The farmer who is trying to increase the returns from sheep can do

so much more effectively if he has available simple farm records to indicate his accomplishment each year in the various factors affecting returns. Such records are even more valuable if he has available for comparison the records of other farmers in the same area, as do the members of the farm management services who furnished the information for this study. These men have a definite check on their own accomplishment and a concrete factual basis for improvement in their management practices.

Summary

The purpose of this study was to show how farm records can be used in the analysis of the sheep enterprise on Minnesota farms and to point out practices and methods that will increase financial returns.

Efficient utilization of feed has a decided influence on returns. A high gross return was an important factor contributing to a high return over feed cost, even though higher feed costs accompanied higher gross returns.

Flocks lambing in March proved to be the most profitable. A high percentage lamb crop and a low death loss were important factors.

The average value received per lamb sold varied considerably among farms and had a decided bearing on the return over feed cost received per head of sheep in the flock. The highest return over feed cost was secured when the lambs were marketed in September and October. One third of the income was from the sale of wool. There was a wide variation in the price received for wool.

The farmers who were above the average of the entire group in six of the more important sheep production factors received $5.22 return over feed cost as compared to a loss of $.31 per head for those below the average.