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FATTENING LAMBS

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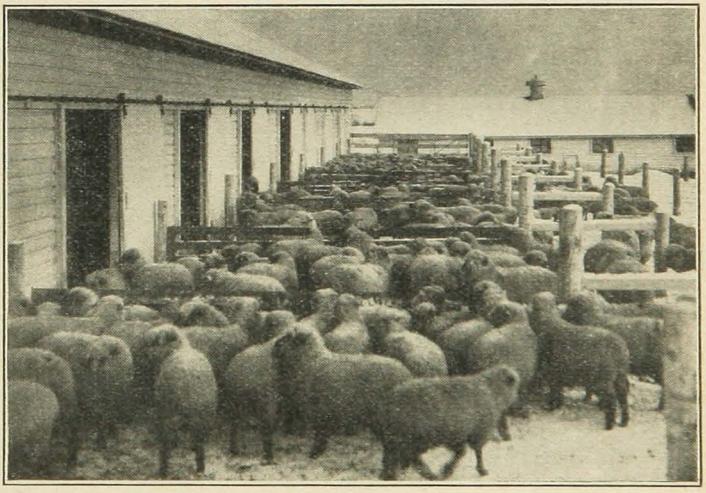

UNIVERSITY FARM, ST. PAUL

SUMMARY

1. When a full feed of corn is given with alfalfa hay, it is profitable to add a protein supplement, provided the normal relative price of feeds prevails.
2. The addition of a protein supplement to a ration of ground barley and a legume hay resulted in a decided increase in rate of gain but slightly increased the cost of gain. When quick gains are desired, the addition of a protein supplement will be profitable.
3. The three protein supplements—linseed meal, cottonseed meal, and corn gluten meal—when fed with ear corn and alfalfa hay, are practically equal in value for fattening lambs, with a slight preference in favor of linseed meal.
4. There was little or no advantage in combining two of the protein supplements.
5. Combining linseed meal, cottonseed meal, and corn gluten meal in equal proportion showed a decided advantage over any single supplement or a combination of any two supplements.
6. A self-feeder for grain may be used satisfactorily in fattening lambs when a full feed of grain is to be fed.
7. Whole grain is better than ground grain for fattening lambs.
8. Sweet clover hay of good quality may be substituted for alfalfa hay with equally good results.
9. Ear corn may be used successfully for fattening lambs and is practical in the early fall months.
10. Shelled corn produced a more rapid gain at a lower cost per hundredweight and returned a larger margin over feed cost per lamb than did ear corn.
11. Barley is a very satisfactory feed for fattening lambs and is about the equal of ear corn.
12. Shelled corn produced a more rapid gain and higher finish than whole barley, at a lower cost per hundredweight of gain.
13. Corn and barley proved much superior to oats as a single grain for fattening lambs.
14. The use of oats in the early part of the feeding period in place of corn or barley reduced the rate of gain and increased the cost of gains.
15. The addition of oats to a ration of corn or barley, linseed meal, and alfalfa hay decreased the rate of gain, increased the cost of gains, and lessened the margin over feed cost.
16. Thrifty active lambs, weighing 40 to 55 pounds, proved just as satisfactory feeders as heavier lambs and returned just as much profit per lamb.
17. The lamb feeder may frequently purchase the lightweight lambs at a discount and feed them to advantage.

FATTENING LAMBS

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INTRODUCTION

Lamb feeding investigations have been conducted at the West Central branch of the Minnesota Experiment Station at Morris in co-operation with the Division of Animal Husbandry, University Farm, St. Paul, for four years, beginning with the winter of 1925-26 and continuing through the winter of 1929-30. Eight different trials were conducted, using eight lots of 30 lambs each in all trials but one, in it only five lots were used. The purpose of these experiments was to learn the relative value of the various grains, roughages, and concentrates for fattening lambs for market; also the most efficient form and method of feeding.

Some of the questions to be answered by these experiments are:

1. Shall linseed meal be added to a ration of corn and alfalfa hay?
2. Does barley need a protein supplement with legume hay?
3. When a protein supplement is used, what shall it be?
4. How does the self-feeder compare with hand feeding?
5. Is whole grain better than ground grain?
6. How does sweet clover hay compare with alfalfa hay as a roughage?
7. Is shelled corn better than ear corn?
8. How does barley compare with corn?
9. How does oats compare with barley or corn?
10. Are lightweight lambs as suitable for fattening as heavier lambs?

METHOD OF PROCEDURE

Purchase and preparation of lambs.—The lambs fed in the fall months, except in one year, were brought directly from Montana ranges, having been contracted for earlier in the season. They were mostly white-faced, close-wooled, largely of Rambouillet breeding. Those fed during the early spring months were purchased at the market at South St. Paul. They were the thin lambs out of various shipments sent to the yards from the farms of Minnesota and the Dakotas. They were not considered top feeder lambs and were purchased about a dollar per hundredweight below the top grade of feeder lamb prices. Upon arrival at the Station the lambs were rested for about two weeks before the trials were started. For the first two days they were fed only upland or mixed hay, later they were gradually changed to alfalfa hay and light feeds of grain.

Allotments of lambs.—In each trial the lambs were divided into lots as evenly as possible with respect to size, weight, quality, and breeding.

Equipment and yards.—All lots were sheltered in a large shed divided into eight pens, 14 x 22 feet, with a feed bunk down the center. Each lot had access at all times to a self-waterer inside the shed. Each pen opened to the south into a lot 14 x 100 feet by means of a large sliding door which was left open except in stormy weather.

Weighing the lambs.—Weights of each lot were taken on three consecutive days at the beginning and close of the experiment and the average of the three consecutive weighings taken as the initial and closing weight. The middle day of the three was used as the starting and closing date. Weighings were also made at 28-day intervals during the trials.

Buying and selling prices.—The cost of the lambs delivered at Morris plus the cost of feed from the time of their arrival to the date of beginning the trial was used as the initial cost price. Final values were determined by a commission man from the South St. Paul market, except where otherwise noted.

Feeds and methods of feeding.—All feeding was done inside the shed twice a day. The grain, including the protein supplement, when used, was fed first, allowing about three-quarters of an hour to clean it up; this was followed by the hay. After the lambs had reached a full feed of grain, the amount of hay allowed per lamb was limited to about from three-quarters of a pound to a pound per day, which was all they would clean up without reducing the amount of grain eaten. When choice alfalfa hay was fed, the lambs would have eaten more hay but less grain.

The grain was average feed grain purchased through the local elevator, no attempt being made to get choice quality. The corn was purchased from local farmers and averaged about No. 5, owing to the high water content. (Most local corn grades Nos. 5 or 6.) The alfalfa and sweet clover hay was grown locally and was of good to choice quality. All feeds were charged at the local purchase price at the elevator and were somewhat higher than farm feeds.

Getting the lambs on feed.—When the lambs first arrived they were carefully fed. They were kept in a dry lot and given a couple of days of upland or mixed hay with no grain. They were gradually changed to alfalfa hay and accustomed to grain. At the opening of the trials they were given two pounds of hay and one-half pound of grain per lamb per day. The grain was increased at the rate of about one-tenth pound and the hay reduced in such amount not to retard the consumption of grain. A full feed of grain was reached in approximately three weeks.

Feed records.—All feeds were weighed and a complete daily feed record was kept.

Financial statement.—The financial statements do not include a charge for labor or equipment nor do they include interest on investment. It is generally conceded that in fattening any group of animals the fertility value of the manure produced is sufficient to offset these cost items. The reader should also keep in mind that the purpose of these trials was to obtain information as to the feeding value of the various feeds and the most efficient methods of feeding them, hence the financial statements are incidental.

TABLE I

LINSEED MEAL ADDED TO A RATION OF CORN AND ALFALFA HAY
OCTOBER 26 TO DECEMBER 28, 1926 (63 DAYS)
Thirty Lambs per Lot

Lot No.	I	II	III	IV
Rations	Ear corn Alfalfa hay	Ear corn Alfalfa hay Linseed meal	Shelled corn Alfalfa hay	Shelled corn Alfalfa hay Linseed meal
Initial weight, lb.	71.4	70.6	70.7	71.0
Final weight, lb.	92.1	95.2	93.3	97.5
Total gain per lamb, lb.	20.7	24.6	22.6	26.5
Average daily gain, lb.	0.328	0.39	0.358	0.42
Feed per cwt. gain, lb.				
Ear corn*	480.5	402.8		
Shelled corn			434.5	378.6
Linseed meal†		51.4		47.4
Alfalfa hay	421.2	355.7	367.2	320.2
Cost of feed per cwt. of gain	$8.73	$8.62	$8.18	$8.31
Initial cost of lamb per cwt. Morris	11.25	11.25	11.25	11.25
Initial cost per lamb	8.03	7.94	7.95	7.99
Feed cost per lamb	1.80	2.12	1.85	2.15
Total cost per lamb	9.83	10.86	9.80	10.14
Selling price per hundredweight, South St. Paul	11.80	11.80	11.80	11.80
Net selling price per hundredweight, Morris	10.80	10.80	10.80	10.80
Net selling price per lamb, Morris	9.94	10.28	10.07	10.53
Margin per lamb	0.11	0.22	0.27	0.39

* Ear corn weight reduced to shelled corn basis. Both ear and shelled corn was of the 1925 crop.

Feed prices—Average Morris quotation during the period of feeding: Ear corn, 65 cents per bushel; shelled corn, 70 cents per bushel; alfalfa hay, $15 per ton; linseed meal, $50 per ton.

† Linseed meal—All lots receiving linseed meal were fed 0.2 pound per head daily.

SHALL LINSEED MEAL BE ADDED TO A RATION OF CORN AND ALFALFA HAY?

That the addition of linseed meal to a ration of corn and alfalfa hay was profitable is shown in Table I. Four lots of western feeder lambs with 30 lambs in each lot were used in this trial. Ear corn

was used in Lots I and II and shelled corn in Lots III and IV. All the lots received what alfalfa hay they could clean up and in addition Lots II and IV were fed 0.2 pound of linseed meal per lamb per day.

The lambs receiving the linseed meal in addition to corn and alfalfa hay made appreciably larger daily gains than those receiving only corn and alfalfa. It reduced the cost of gains in the lots fed ear corn, but slightly increased it in the lots fed shelled corn. In both these lots the margin of profit per lamb was greater when linseed meal was added to the corn and alfalfa ration. The lambs were sold as a straight carload rather than by lots. In all probability the greater gain and finish made by the lots receiving linseed meal would have brought a higher price per pound and consequently a still greater margin per lamb over those given no linseed meal, had they been sold separately.

DOES BARLEY NEED A PROTEIN SUPPLEMENT WITH A LEGUME HAY?

As pointed out in the preceeding discussion, the use of linseed meal with corn and alfalfa hay proved profitable, increasing the rate of gain, producing a higher finish and a greater margin per lamb.

TABLE II

LINSEED MEAL ADDED TO A RATION OF BARLEY AND LEGUME HAY
OCTOBER 26 TO DECEMBER 28, 1926 (63 DAYS)

Thirty Lambs per Lot

Lot No.	V	VI	VII	VIII
Rations	Ground barley Alfalfa hay	Ground barley Alfalfa hay Linseed meal	Ground barley Sweet clover hay	Ground barley Sweet clover hay Linseed meal
Initial weight, lb.	70.6	70.8	70.8	70.5
Final weight, lb.	89.5	92.3	90.7	92.8
Total gain per lamb. lb.	18.9	21.5	19.9	22.3
Average daily gain, lb.	0.3	0.34	0.315	0.353
Feed per cwt. gain, lb.				
Ground barley	546.8	467.9	521.5	440.3
Linseed meal*		58.5		56.4
Alfalfa hay	460.6	400.9		
Sweet clover hay			455.6	405.5
Cost of feed per cwt. gain	$95.9	$9.72	$8.13	$8.38
Initial cost of lamb per cwt.				
Morris	11.25	11.25	11.25	11.25
Initial cost of lamb	7.94	7.86	7.96	7.73
Feed cost of each lamb	1.81	2.08	1.61	1.86
Total cost per lamb	9.75	10.04	9.57	9.78
Selling price per cwt.				
South St. Paul	11.80	11.80	11.80	11.80
Net selling price per cwt.				
Morris	10.80	10.80	10.80	10.80
Net selling price per lamb, Morris	9.66	9.96	9.79	10.02
Margin per lamb	0.09	0.08	0.22	0.23

Feed prices charged—Average Morris quotation during the period of feeding: Barley, 50 cents per bushel; alfalfa hay, $15 per ton; sweet clover hay, $10 per ton; cost of grinding, 8 cents per hundredweight; linseed meal, $50 per ton.

* Linseed meal—All lots receiving linseed meal were fed 0.2 pound per head daily.

Table II gives the results of a trial in which linseed meal was added to a ration of ground barley and legume hay, using four lots of 30 lambs each. Two lots received alfalfa hay and two lots sweet clover hay. In addition to the barley, one lot on alfalfa hay received linseed meal and one lot on sweet clover hay received linseed meal at the rate of 0.2 pound per lamb per day.

The lots receiving linseed meal gained more rapidly and carried more finish at the close of the experiment. However, at the feed prices given, the cost of gains was a little higher in the lots where linseed meal was fed. Owing to the fact that the lambs were sold as a straight carload, rather than by lots, the same selling price per hundredweight is used in all lots. At the same selling price per hundredweight, the use of linseed meal with barley and a legume hay did not increase the net margin per lamb; on the other hand, it did not lessen it. Had the lots sold separately upon their own merits, the lots receiving linseed meal in addition to ground barley and a legume hay would undoubtedly have shown the larger margin over feed cost.

WHEN A PROTEIN SUPPLEMENT IS USED, WHAT SHALL IT BE?

The addition of a protein supplement in the form of linseed meal to a ration of corn or barley and alfalfa hay considerably increases the rate of daily gain. As there are three common high protein supplements, which is the best, linseed meal, cottonseed meal, or corn gluten meal, or will some combination of the three be more efficient?

Tables III and IV show the results of two trials in which these three popular supplements were used alone and in various combinations at the rate of 0.2 pound per head daily, in a ration of ear corn and alfalfa hay. Eight lots of thirty lambs each were used in the first trial and seven lots of thirty each in the second trial.

First Trial

In the first trial the lots receiving any one of the three protein supplements or any combination of them with corn and alfalfa hay returned a larger margin over feed cost than the lot getting no protein supplement. The lot receiving corn gluten meal alone put on a little better finish, received a higher valuation, and returned a larger margin over feed cost than the lots receiving linseed meal or cottonseed meal. The feed required per hundredweight of gain in the lot receiving corn gluten meal and that receiving linseed meal was almost identical, as was also the gain made. Cottonseed meal, in this trial, made a considerably poorer showing than either corn gluten meal or linseed meal, making slower gains with a higher feed consumption per hundredweight gain and receiving a much lower valuation per hundredweight. In justice

to cottonseed meal, it should be said that it made a much better showing in the second trial, closely approaching the lots given linseed and corn gluten meal in rate of gain and in feed required per hundredweight of gain and equaling them in finish and selling price.

Combining two of the protein supplements gave no advantage over the feeding of the supplements alone except that a mixture of cottonseed meal with either linseed meal or corn gluten meal was superior to cottonseed meal alone.

A combination of the three protein supplements in equal proportion showed a decided advantage over any one of them fed singly or a combination of any two. The triple combination resulted in the most rapid gain, the lowest feed cost, and the lots fed the combination sold for the highest price.

Second Trial

In the second trial the rations including the double combination of the protein supplement were omitted. The lots receiving no protein supplement and those receiving the triple combination were duplicated.

The second trial verified the results of the first. It again proved the efficiency of the triple protein combination. These lots made the most rapid gains on the lowest feed consumption per hundredweight of gain and carried the highest finish as shown by a 10-cent per hundredweight higher valuation than the single protein supplement lots and 15-cent per hundredweight higher valuation than the lots having no supplement. The comparison of linseed meal, corn gluten meal, and cottonseed meal showed a slight superiority for linseed meal over corn gluten meal in rate of gain and feed required per hundredweight of gain. In this trial the lot given cottonseed meal made just as rapid gains as that given gluten meal but required slightly more feed per hundredweight of gain. All three lots received the same valuation. The greater profit shown those given cottonseed meal over those given gluten meal was due to the heavier fleece. This can hardly be credited to the difference in the feed in so short a feeding period.

The conclusions may be drawn from the two trials that with corn and alfalfa hay in the ration it is profitable, under normal price conditions, to add a protein supplement to the extent of 0.2 pound per lamb per day. That of the three common protein supplements, linseed meal, corn gluten meal, and cottonseed meal, linseed and corn gluten meal are practically equal pound per pound and cottonseed meal only slightly less valuable; that a mixture of any two supplements in equal proportions shows little or no advantage over a single supplement; that a mixture of all three supplements in equal proportions showed a decided advantage in both trials over any single supplement or a combination of any two supplements.

TABLE III

PROTEIN SUPPLEMENTS FOR FATTENING LAMBS—FIRST TRIAL
NOVEMBER 6, 1927 TO JANUARY 24, 1928 (78 DAYS)
Thirty Lambs per Lot

Lot No.	I	II	III	IV	V	VI	VII	VIII
Rations	Ear corn Alfalfa hay	Ear corn Alfalfa hay Linseed meal	Ear corn Alfalfa hay Cottonseed meal	Ear corn Alfalfa hay Gluten meal	Ear corn Alfalfa hay Cottonseed meal Linseed meal	Ear corn Alfalfa hay Linseed meal Gluten meal	Ear corn Alfalfa hay Cottonseed meal Gluten meal	Ear corn Alfalfa hay Cottonseed meal Linseed meal Gluten meal
Initial weight, lb.	63.6	63.6	63.5	63.2	63.4	63.1	63.8	63.6
Final weight, lb.	82.6	89.4	87.3	88.9	88.1	88.6	87.4	90.2
Gain per lamb, lb.	19.0	25.8	23.8	25.7	24.7	25.5	23.6	26.6
Average daily gain, lb.	0.243	0.331	0.305	0.329	0.317	0.327	0.303	0.341
Average daily ration, lb.								
Ear corn	1.94	1.97	1.95	1.96	1.97	1.96	1.98	2.01
Alfalfa hay	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27
Protein supplement		0.20	0.20	0.20	0.20	0.20	0.20	0.20
Feed per 100 lb. gain, lb.								
Ear corn	794.7	597.2	639.4	596.6	623.5	599.6	653.0	588.2
Alfalfa hay	521.5	385.4	418.1	386.0	402.3	389.0	420.5	373.4
Protein supplement	.....	61.3	66.5	63.9	64.0	61.9	66.9	59.4
Cost of feed per 100 lb. gain	$9.22	$8.61	$9.35	$8.69	$9.02	$8.73	$9.45	$8.45
Initial cost per 100 lb.	12.59	12.59	12.59	12.59	12.59	12.59	12.59	12.59
Initial cost per lamb	8.01	8.01	7.99	7.96	7.98	7.94	8.03	8.01
Feed cost per lamb	1.75	2.22	2.22	2.23	2.23	2.23	2.23	2.25
Total cost per lamb	9.76	10.23	10.21	10.19	10.21	10.17	10.26	10.26
Selling price per cwt., South St. Paul	12.50	13.25	12.50	13.50	13.25	13.50	13.25	13.65
Selling price per lamb, South St. Paul	10.32	11.84	10.91	12.00	11.67	11.96	11.58	12.31
Selling price per cwt., Morris	11.40	12.15	11.40	12.40	12.15	12.15	12.15	12.55
Selling price per lamb, Morris	9.42	10.86	9.95	11.02	10.70	10.77	10.61	11.32
Margin per lamb	0.34	0.63	0.26	0.83	0.49	0.60	0.35	1.06

Feed prices charged—Ear corn, 60 cents per bushel; alfalfa hay, $10 per ton; cottonseed meal, $58 per ton; linseed meal, $56 per ton; corn gluten meal, $56 per ton; bonemeal, $60 per ton.

TABLE IV

PROTEIN SUPPLEMENTS FOR FATTENING LAMBS—SECOND TRIAL

FEBRUARY 21, 1928 TO APRIL 27, 1928 (66 DAYS)

Thirty Lambs per Lot

Lot No.	I	II	III	IV	V	VI	VII
Rations	Ear corn Alfalfa hay	Ear corn Alfalfa hay	Ear corn Alfalfa hay Linseed meal Cottonseed meal Gluten meal	Ear corn Alfalfa hay Linseed meal Cottonseed meal Gluten meal	Ear corn Alfalfa hay Linseed meal	Ear corn Alfalfa hay Cottonseed meal	Ear corn Alfalfa hay Gluten meal
Initial weight, lb.	65.2	64.9	65.2	65.9	65.7	65.5	65.2
Final weight, lb.	87.8	88.3	92.5	93.4	91.4	89.8	90.1
Weight of fleece, lb.	5.53	5.70	5.76	5.46	6.13	6.00	5.30
Final weight of lamb plus fleece, lb.	93.33	94.00	98.36	98.86	97.53	95.80	95.40
Average gain per lamb, lb.	28.13	29.10	33.16	32.96	31.83	30.30	30.20
Average daily gain, lb.	0.426	0.440	0.502	0.499	0.482	0.459	0.457
Average daily ration, lb.							
Ear corn	2.48	2.47	2.50	2.49	2.49	2.42	2.36
Alfalfa hay	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Protein supplement	.....	.....	0.20	0.20	0.20	0.20	0.20
Feed per cwt. of gain, lb.							
Ear corn	583.0	562.4	498.8	499.5	518.1	529.4	518.1
Alfalfa hay	269.5	260.8	229.1	229.7	238.4	250.5	251.9
Protein supplement	.....	.....	39.8	40.0	41.5	43.6	43.8
Cost of feeds per cwt. gain	$6.35	$6.12	$6.54	$6.56	$6.79	$7.05	$6.92
Initial cost per cwt.	12.97	12.97	12.97	12.97	12.97	12.97	12.97
Initial cost per lamb	8.46	8.42	8.46	8.55	8.52	8.50	8.46
Feed cost per lamb	1.79	1.78	2.17	2.16	2.16	2.14	2.08
Cost of shearing	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Total cost per lamb	10.43	10.38	10.81	10.89	10.86	10.82	10.72
Selling price, South St. Paul	16.00	16.00	16.25	16.25	16.15	16.15	16.15
Net selling price, Morris	14.55	14.55	14.80	14.80	14.70	14.70	14.70
Net selling price per lamb, Morris	12.77	12.84	13.69	13.82	13.43	13.20	13.24
Net selling price of wool per lamb at 37 cents per lb.	2.05	2.11	2.13	2.02	2.27	2.22	1.96
Net selling price of lamb plus wool, Morris	14.82	14.95	15.82	15.84	15.70	15.42	15.20
Margin per lamb	4.39	4.57	5.01	4.95	4.84	4.60	4.48

Feed prices charged—Alfalfa hay, $10 per ton; ear corn, 60 cents per bushel; cottonseed meal, $58 per ton; linseed meal, $56 per ton; gluten meal, $56 per ton.

THE SELF-FEEDER FOR FEEDING GRAIN TO FATTENING LAMBS

To compare the self-feeder method of feeding grain with the hand feeding method, two trials were conducted, using four lots of thirty lambs each. In each trial, in addition to alfalfa hay and the triple protein supplement mixture, two lots received whole barley and oats and two lots received ground barley and oats mixed in the proportion of 55 parts of barley and 35 of oats by weight. One lot on each of these feeds was hand fed throughout the trial, the other hand fed until on a full feed of grain, then self-fed the remainder of the feeding period. In the first trial the lambs were put on the self-feeders at the end of 16 days; in the second trial at the end of 16 days for the lot given ground grain and 22 days for that given whole grain. The average of the two trials is given in Table V.

With whole barley and oats the results of the two methods of feeding were very close. In the first trial the self-fed lot made a little more rapid gain at a lower cost for feed and returned 19 cents more per lamb than the hand-fed lot. In the second trial both lots made practically the same daily gain, but in this trial the hand-fed lot the cost for feed was lower and the return was 26 cents more per lamb than the self-fed lot. In both trials the lots received the same valuation, indicating that they were equally well finished by either method of feeding. The average of the two trials shows the results to be so close for the two methods that neither can be said to have any particular advantage over the other in feeding the whole barley and oats mixture.

The comparison of the two methods when ground barley and oats were used showed a decided advantage in both trials in favor of the self-fed method. It will be noticed from Table V, giving the average of the two trials, that the self-fed lot gained more rapidly, had a lower cost per hundredweight of gain, were valued at a higher price per pound, and returned a net profit of $1.15 per lamb more than the hand-fed lot.

Why the self-fed method proved so much more advantageous when used in feeding ground grain than with whole grain is possibly explained by the fact that ground grain is less palatable than whole grain and the lambs do not eat as much daily; while with the self-feeder, where they can help themselves at any time, the daily grain consumption is increased, producing more rapid gains and a better finish. Lambs should be put on a self-feeder only after they have been brought to a full feed by hand feeding. They may then be turned to the self-feeder any morning immediately after they have had their regular feed.

TABLE V

THE SELF-FEEDER FOR FEEDING GRAIN TO FATTENING LAMBS

Average of Two Trials

OCTOBER 18, 1928 TO JANUARY 3, 1929 (77 DAYS)
FEBRUARY 14, 1929 TO MAY 1, 1929 (76 DAYS)
Thirty Lambs per Lot Each Trial

Lot No.	I	II	III	IV
Rations	Alfalfa hay Protein supplement Whole barley and oats Hand-fed	Alfalfa hay Protein supplement Ground barley and oats Hand-fed	Alfalfa hay Protein supplement Whole barley and oats Self-fed	Alfalfa hay Protein supplement Ground barley and oats Self-fed
Initial weight, lb.	63.59	63.60	63.55	63.29
Weight of fleece, lb. (2nd trial only)	6.55	6.56	6.11	6.11
Final weight of lamb and fleece, lb.	93.59	88.30	94.34	91.87
Average daily gain, lb.	0.392	0.323	0.402	0.373
Average gain per lamb, lb.	29.50	24.70	30.79	28.57
Average daily ration, lb.				
Alfalfa hay	0.92	1.07	0.70	0.81
Grain (including 10 per cent protein supplement)	1.99	1.72	2.21	1.99
Feed per cwt. gain, lb.				
Alfalfa hay	241.0	309.3	179.6	230.1
Grain (including 10 per cent protein supplement)	519.8	542.6	554.7	535.7
Cost of feed per cwt. of gain	$7.97	$9.07	$8.02	$8.49
Initial cost per cwt.	12.50	12.50	12.50	12.50
Initial cost per lamb	7.96	7.96	7.95	7.92
Feed cost per lamb	2.32	2.20	2.43	2.33
Cost of shearing	0.18	0.18	0.18	0.18
Total cost per lamb	10.37	10.25	10.47	10.35
Selling price per cwt., So. St. Paul	14.75	13.75	14.75	14.63
Selling price per cwt., Morris	13.75	12.75	13.75	13.63
Value per lamb, Morris	12.40	10.83	12.53	12.07
Value of wool per lamb	1.97	1.97	1.83	1.83
Net value per lamb plus wool, Morris	13.36	11.82	13.45	12.99
Margin per lamb	3.01	1.56	2.97	2.64

Feed prices charged—Alfalfa hay, $12 per ton; protein supplement, $55 per ton; barley, 57 cents per bushel; oats, 34 cents per bushel; grinding feed, 8 cents per hundredweight.

Protein supplement was a mixture of equal parts linseed meal, cottonseed meal, and corn gluten meal, and made up 10 per cent of the grain ration.

IS WHOLE GRAIN BETTER THAN GROUND GRAIN FOR FATTENING LAMBS?

In two trials whole grain was fed in comparison with ground grain to determine which is the better method of feeding the grain. In addition to the grain, all lots received alfalfa hay and a triple protein supplement made up of equal parts of linseed meal, cottonseed meal, and corn gluten meal, fed as 10 per cent of the grain ration. The comparisons made were, ear corn vs. corn-and-cob meal; whole barley vs. ground barley; and a mixture of whole barley and oats vs. a mixture of ground barley and oats. The barley and oats were mixed in the proportion of 55 pounds of barley and 35 pounds of oats. The average of the two trials is given in Table VI.

TABLE VI

WHOLE VERSUS GROUND GRAIN FOR FATTENING LAMBS

Average of Two Trials

OCTOBER 18, 1928 TO JANUARY 3, 1929 (77 DAYS)

FEBRUARY 14, 1929 TO MAY 1, 1929 (76 DAYS)

Thirty Lambs per Lot Each Trial

Lot No.	I	II	III	IV	V	VI	VII	VIII
Rations	Alfalfa hay Protein supplement Ear corn	Alfalfa hay Protein supplement Corn and cob meal	Alfalfa hay Protein supplement Whole barley	Alfalfa hay Protein supplement Ground barley	Alfalfa hay Protein supplement Whole barley Oats	Alfalfa hay Protein supplement Ground barley Oats	Alfalfa hay Protein supplement Whole barley Oats self-fed	Alfalfa hay Protein supplement Ground barley Oats self-fed
Initial weight, lb.	62.78	62.73	63.08	63.41	63.59	63.60	63.55	63.29
Weight of fleece (second trial only), lb.	6.21	6.30	5.93	6.41	6.55	6.56	6.11	6.11
Final weight of lamb and fleece, lb.	95.03	94.88	94.96	90.63	93.59	88.30	94.34	91.87
Average daily gain, lb.	0.422	0.420	0.417	0.356	0.392	0.323	0.402	0.373
Average gain per lamb, lb.	32.25	32.14	31.88	27.22	29.50	24.70	30.79	28.57
Average daily ration—alfalfa hay, lb.	1.09	1.04	0.96	1.03	0.92	1.07	0.70	0.81
Grain (including 10 per cent protein supplement), lb.	2.45	2.24	2.01	1.77	1.99	1.72	2.21	1.99
Feed per cwt. of gain—alfalfa hay	266.8	257.0	238.7	292.4	241.0	309.3	179.6	230.1
Grain (including 10 per cent protein supplement), lb.	596.5	551.9	494.6	507.8	519.8	542.6	554.7	535.7
Cost of feeds per cwt. gain	$7.60	$7.48	$8.08	$8.94	$7.97	$9.07	$8.02	$8.49
Initial cost per cwt.	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50
Initial cost per lamb	7.86	7.85	7.90	7.94	7.96	7.96	7.95	7.92
Feed cost per lamb	2.40	2.32	2.52	2.40	2.32	2.20	2.43	2.33
Cost of shearing	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Total cost per lamb	10.36	10.27	10.51	10.43	10.37	10.25	10.47	10.35
Selling price per cwt., South St. Paul	15.12	15.00	15.00	14.12	14.75	13.75	14.75	14.63
Selling price per cwt., Morris	14.12	14.00	14.00	13.12	13.75	12.75	13.75	13.63
Value per lamb, Morris	12.95	12.80	12.84	11.46	12.40	10.83	12.53	12.07
Value of wool per lamb	1.86	1.89	1.78	1.92	1.97	1.97	1.83	1.83
Net value per lamb plus wool, Morris	13.88	13.74	13.73	12.42	13.36	11.82	13.45	12.99
Margin per lamb	3.52	3.47	3.22	1.99	3.01	1.56	2.97	2.64

Feed prices charged—Alfalfa hay, $12 per ton; protein supplement, $55 per ton; ear corn, 60 cents per bushel; barley, 57 cents per bushel; oats, 34 cents per bushel; grinding feed, 8 cents per hundredweight.

Protein supplement used was a mixture of equal parts of linseed meal, cottonseed meal, and corn gluten meal and made up 10 per cent of the grain ration.

In both trials the grinding of barley or of barley and oats proved decidedly unprofitable, decreasing the rate of gain and increasing the feed consumption and cost per hundredweight of gain. In both trials the lambs fed whole grain became fatter and sold for a higher price than those receiving ground grain. Grinding the grain lowered the daily consumption, especially during the latter part of the feeding period. This probably accounts for the slower rate of gain and the lack of finish.

Grinding ear corn into corn-and-cob meal showed no advantage over ear corn. The rate of gain was practically the same with the cost of gains slightly higher in the lot fed ground ear corn, owing to the added cost of grinding. From the standpoint of the feeder, corn-and-cob meal is objectionable because of its tendency to heat in the bin, necessitating grinding at short intervals and in small quantities.

The conclusion may be drawn from the two trials that the grinding of grain for fattening lambs is unnecessary and undesirable in that it slows up the gains and increases the cost of gains. It also lowers the keeping qualities of the grains and considerably increases the labor required in the preparation and feeding of this part of the ration.

CAN SWEET CLOVER BE SUBSTITUTED FOR ALFALFA?

Sweet clover has become a very common and popular roughage on the farms of northwestern Minnesota, for both pasture and hay. Being a legume, it adds nitrogen to the soil; and because of the cheap seed and the ease with which it is grown, many farmers are growing it in their crop rotations. It produces well, and while somewhat coarse, if it is cut early and put up well it makes excellent hay for all classes of livestock.

To compare sweet clover with alfalfa hay for fattening lambs, four lots of 30 lambs each were fed during the winter of 1926-27. Two lots received alfalfa hay and two sweet clover. Ground barley was fed to all four lots and in addition one lot on alfalfa hay and one on sweet clover hay received linseed meal at the rate of 0.2 pound per lamb per day. The sweet clover hay was green and leafy and was of excellent quality, having been cut with a binder and tied in bundles. The alfalfa contained a slight mixture of native grasses, but was good in color and average in quality. Table VII gives the results of the trial.

The lambs fed sweet clover hay gained slightly faster with a little lower feed consumption per hundredweight of gain and had a lower cost of gain than the lambs fed alfalfa hay. Had the sweet clover hay been charged at $15 per ton instead of $10 per ton, the same as the alfalfa hay, the advantage held by the lots given sweet clover in the

profit per lamb would have been materially cut down tho not entirely eliminated. The conclusion may be drawn from this trial that high quality sweet clover hay is fully equal to alfalfa for fattening lambs.

TABLE VII

A COMPARISON OF ALFALFA AND SWEET CLOVER HAY
OCTOBER 26 TO DECEMBER 28, 1926 (63 DAYS)
Thirty Lambs per Lot

Lot No.	V	VI	VII	VIII
Rations	Ground barley Alfalfa hay	Ground barley Alfalfa hay Linseed meal	Ground barley Sweet clover hay	Ground barley Sweet clover hay Linseed meal
Initial weight, lb.	70.6	70.8	70.8	70.5
Final weight, lb.	89.5	92.3	90.7	92.8
Total gain per lamb, lb.	18.9	21.5	19.9	22.3
Average daily gain, lb.	0.300	0.341	0.315	0.353
Feed per cwt. gain, lb.				
Ground barley	546.8	467.9	521.5	440.3
Alfalfa hay	460.6	400.9	.....	.....
Linseed meal*	.....	58.5	.....	56.4
Sweet clover hay	.....	.....	455.6	405.5
Cost of feed per cwt. gain	$9.59	$9.72	$8.13	$8.38
Initial cost of lamb per cwt.				
Morris	11.25	11.25	11.25	11.25
Initial cost of lamb	7.94	7.96	7.96	7.93
Feed cost of each lamb	1.81	2.08	1.61	1.86
Total cost per lamb	9.75	10.04	9.57	9.79
Selling price per cwt.,				
South St. Paul	11.80	11.80	11.80	11.80
Net selling price per cwt.,				
Morris	10.80	10.80	10.80	10.80
Net selling price per lamb,				
Morris	9.66	9.96	9.79	10.02
Margin per lamb	0.09	0.08	0.22	0.23

Feed prices—Average Morris quotation during the period of feeding: Barley, 50 cents per bushel; alfalfa hay, $15 per ton; sweet clover, $10 per ton; cost of grinding, 8 cents per hundredweight; linseed meal, $50 per ton.

* Linseed meal—All lots receiving linseed meal were fed 0.2 pound per head daily.

SHELLED CORN VS. EAR CORN FOR FATTENING LAMBS

About October first is the usual time for shipment of feeder lambs from the range to the feed lot for fattening. At that time the corn grown in Minnesota, usually, is too green to shell well and contains too much moisture to store in large quantities.

From a practical standpoint, ear corn is the form in which corn is most easily secured and stored in the early fall months. Whether or not corn on the cob could be as successfully fed to fattening lambs as shelled corn and if so, how it compares with shelled corn, is one of the questions that was studied.

Four lots of 30 lambs each were fed from October 26 to December 28, 1926, a period of 63 days. Two lots received ear corn and alfalfa

hay, two lots shelled corn and alfalfa hay. In addition, one lot on ear corn and one on shelled corn received 0.2 pound of linseed meal per head per day. The results of this comparison are given in Table VIII.

Table VIII shows that the lots fed shelled corn made more rapid gains with lower feed consumption and cost per hundredweight of gain and returned a larger net profit per lamb than the lots fed ear corn. However, the lambs receiving ear corn made very satisfactory gains. They soon learned to get the corn off the cob and could clean up their full feed in a surprisingly short time. It was necessary to remove the cobs from the feed bunks after each feed, adding to the labor of feeding.

In conclusion, it may be stated that while in this trial shelled corn was a little more efficient than ear corn for fattening lambs, ear corn was fed successfully. This method solves the feeder's problem of not having corn dry enough to shell and store in the early fall months.

TABLE VIII

EAR CORN VS. SHELLED CORN FOR FATTENING LAMBS

OCTOBER 26 TO DECEMBER 28, 1926 (63 DAYS)

Thirty Lambs per Lot

Lot No.	I	II	III	IV
Rations	Ear corn Alfalfa hay	Ear corn Alfalfa hay Linseed meal	Shelled corn Alfalfa hay	Shelled corn Alfalfa hay Linseed meal
Initial weight, lb.	71.4	70.6	70.7	71.0
Final weight, lb.	92.1	95.2	93.3	97.5
Total gain per lamb, lb.	20.7	24.6	22.6	26.5
Average daily gain, lb.	0.328	0.390	0.358	0.420
Feed per cwt. of gain, lb.				
Ear corn*	480.5	402.8	.....	.....
Shelled corn	.....	.....	434.5	378.6
Linseed meal	.....	51.4	.....	47.4
Alfalfa hay	421.2	355.7	367.2	320.2
Cost of feed per cwt. gain	$8.73	$8.62	$8.18	$8.31
Initial cost of lamb per cwt., Morris	11.25	11.25	11.25	11.25
Initial cost of lamb	8.03	7.94	7.95	7.99
Feed cost per lamb	1.80	2.12	1.85	2.15
Total cost per lamb	9.83	10.06	9.80	10.14
Selling price per cwt., South St. Paul	11.80	11.80	11.80	11.80
Net selling price per cwt., Morris	10.80	10.80	10.80	10.80
Net selling price per lamb, Morris	9.94	10.28	10.07	10.53
Net profit per lamb	0.11	0.22	0.27	0.39

Feed prices—Average Morris quotation during the period of feeding: Ear corn, 65 cents per bushel; shelled corn, 70 cents per bushel; alfalfa hay, $15 per ton; linseed meal, $50 per ton.

* Ear corn weight was figured on shelled corn basis. Both ear corn and shelled corn was of the preceeding year's crop.

Linseed meal—All lots receiving linseed meal were fed 0.2 pound per head daily.

WHOLE BARLEY VS. CORN

Whenever the question of a fattening ration comes up, corn is immediately suggested for that purpose. Most of the fattening of livestock has been done, and is being done, in the corn belt on a ration largely made up of corn. Its efficiency for this purpose has long held it in high esteem by farmers and feeders, so long, in fact, that in the minds of many it is thought that corn is essential in order economically to finish livestock for the market. Unfortunately, corn can not be produced to the best advantage in all climates, as it requires a comparatively long warm season for best results. In much of the territory north of the good corn growing areas, barley grows at its best. Barley also has long been known as a fattening grain and a good deal of it is used annually in the fattening of cattle, hogs, and sheep. For the farmer living in the northern two-thirds of Minnesota, or north of latitude 46 degrees, grains other than corn must be used by the livestock feeder if they are to be home grown. Just how successfully barley can be substituted for corn for fattening lambs, therefore, becomes a question of importance in lamb feeding in Minnesota. To furnish definite information on this question, trials were conducted comparing whole barley with ear corn and with shelled corn for fattening lambs.

Whole barley vs. ear corn.—Two trials were conducted during the winter of 1928-29 comparing whole barley with ear corn. Two lots of twenty lambs each were fattened. Lot I was fed ear corn, alfalfa hay, and a protein supplement; Lot II was fed whole barley, alfalfa hay, and a protein supplement. The protein supplement consisted of equal parts of linseed meal, cottonseed meal, and corn gluten meal. This mixture was used because of its greater efficiency over a single-protein supplement, as discussed under the subject of protein supplements.

The average of the two trials is shown in Table IX. It will be noted that the daily gain made by the two lots is practically the same. Reducing the ear corn to a shelled-corn basis, the barley lot ate 28.1 pounds less alfalfa hay and 23.8 more grain per hundredweight of gain than did the ear-corn lot. With barley charged at 57 cents and ear corn at 60 cents a bushel the cost per 100-pounds gain was 48 cents lower in favor of the ear corn. Little difference was noted in the finish on the lambs. In the first trial the two lots were valued the same; in the second trial the ear-corn lot was valued 25 cents per hundredweight higher, leaving a little greater profit on the lambs fed ear corn.

Whole barley vs. shelled corn.—In two trials whole barley was fed in competition with shelled corn to determine the comparative value of these two grains for fattening lambs. In addition to the grain, the lambs received alfalfa hay and linseed meal. White-faced lambs direct

from the Montana range were used in the first trial and a mixed lot of native and western lambs bought on the market at South St. Paul, in the second trial. The results are given in Table X.

In each of the two trials the lambs fed shelled corn made larger daily gains, required less feed per 100 pounds gain and had a lower feed cost per hundredweight of gain than those fed whole barley. In both trials the lambs fed shelled corn became somewhat fatter and sold for a higher price per hundredweight. Barley proved a very good feed, producing rapid gains and a good finish. Shelled corn at 65 cents per bushel proved a more economical feed than barley at 54 cents per bushel.

TABLE IX

BARLEY VS. EAR CORN
Average of Two Trials
OCTOBER 18, 1928 TO JANUARY 3, 1929 (77 DAYS)
FEBRUARY 14, 1929 TO MAY 1, 1929 (76 DAYS)
Thirty Lambs per Lot Each Trial

Lot No.	I	II
Rations	Alfalfa hay Protein supplement Ear corn	Alfalfa hay Protein supplement Whole barley
Initial weight, lb.	62.78	63.08
Weight of fleece, lb.	6.21	5.93
Final weight of lamb and fleece, lb.	95.03	94.96
Average daily gain, lb.	0.422	0.417
Average gain per lamb, lb.	32.25	31.88
Average daily ration, lb.		
Alfalfa hay	1.09	0.96
Grain, lb. (including 10 per cent protein supplement)	2.45	2.01
Feed per cwt. of gain, lb.		
Alfalfa hay	266.8	238.7
Grain (including 10 per cent protein supplement)	596.5	494.6
Cost of feeds per cwt. of gain	$7.60	$8.08
Initial cost per cwt.	12.50	12.50
Initial cost per lamb	7.86	7.90
Feed cost per lamb	2.40	2.52
Cost of shearing	0.18	0.18
Total cost per lamb	10.36	10.51
Selling price per cwt., South St. Paul	15.12	15.00
Selling price per cwt., Morris	14.12	14.00
Value per lamb, Morris	12.95	12.84
Value of wool per lamb	1.86	1.78
Net value per lamb plus wool, Morris	13.88	13.73
Net profit per lamb	3.52	3.22

Feed prices charged—Alfalfa hay, $12 per ton; protein supplement, $55 per ton; ear corn, 60 cents per bushel; barley, 57 cents per bushel.

Protein supplement used was a mixture of equal parts linseed meal, cottonseed meal, and corn gluten meal, made up 10 per cent of the grain ration.

TABLE X

WHOLE BARLEY VS. SHELLED CORN

Average of Two Trials

FIRST TRIAL—OCTOBER 30, 1929 TO JANUARY 14, 1930 (76 DAYS)

SECOND TRIAL—FEBRUARY 18, 1930 TO APRIL 28, 1930 (69 DAYS)

Thirty Lambs per Lot Each Trial

Lot No.	First trial		Second trial		Average	
Rations	Whole barley	Shelled corn	Whole barley	Shelled corn	Whole barley	Shelled corn
Initial weight, lb.	60.08	60.30	69.17	68.15	64.62	64.22
Final weight, lb.	.....	.....	99.51	102.84		
Weight of fleece, lb.	.....	.....	7.03	6.60		
Final weight of lamb and fleece, lb.	90.33	92.62	106.54	109.44	98.43	101.03
Average daily gain, lb.	0.398	0.425	0.542	0.591	0.470	0.508
Average gain per lamb, lb.	30.25	32.32	37.37	41.29	33.81	36.80
Average daily ration, lb.						
Grain	1.80	1.81	2.13	2.04	1.96	1.92
Linseed meal	0.20	0.20	0.20	0.20	0.20	0.20
Alfalfa hay	1.00	1.00	1.15	1.18	1.07	1.09
Feed per cwt. gain, lb.						
Grain	452.4	425.9	393.7	370.8	423.0	398.3
Linseed meal	50.2	47.0	36.9	36.2	43.5	41.6
Alfalfa hay	252.5	236.6	214.2	214.6	233.3	225.6
Cost of feeds per cwt. gain	$8.23	$7.89	$6.91	$6.77	$7.57	$7.33
Initial cost per cwt.	12.94	12.94	11.45	11.45	12.19	12.19
Initial cost per lamb	7.77	7.80	7.92	7.80	7.84	7.80
Feed cost per lamb	2.49	2.55	2.58	2.79	2.53	2.67
Cost of shearing	.....	.....	0.16	0.16	0.16	0.16
Total cost per lamb	10.26	10.35	10.66	10.75	10.46	10.55
Selling price per cwt., South St. Paul	13.50	13.75	9.20	9.40	11.35	11.57
Selling price per cwt., Morris	12.50	12.75	8.20	8.40	10.35	10.57
Value per lamb, Morris	.....	.....	8.16	8.64		
Value of wool per lamb	.....	.....	1.27	1.27		
Net value per lamb plus wool, Morris	11.29	11.81	9.43	9.91	10.36	10.86
Margin per lamb	1.03	1.46	—1.23	—0.84	—0.10	0.31

Feed prices charged—Alfalfa hay, $12 per ton; linseed meal, $65 per ton; barley, 54 cents per bushel; shelled corn, 65 cents per bushel.

OATS IN THE FATTENING RATION

The two trials conducted during the winter of 1929-30 were devoted to a study of the use of oats as a part or all of the grain fed, along with alfalfa hay and a protein supplement in the ration. Two complete trials were conducted, the first during the fall months of 1929, with a carload of white-faced western feeder lambs shipped direct from Montana to Morris; the second with a carload of native lambs bought on the market at South St. Paul early in February. Seven lots of 30 lambs each were fed in each of the trials, the rations being exact duplicates.

The rations fed appear in Tables XI, XII, and XIII, which also set forth the results secured. In each lot an attempt was made to get the lambs up to a full feed of grain as soon as possible. For the first several weeks in each trial, as much alfalfa hay was fed as the lambs would clean up in two feeds per day. In order to get a maximum consumption of grain as the lambs approached a full feed of grain, the amount of hay fed was limited to not more than 1 pound of hay per lamb per day. Linseed meal was fed at the rate of 0.2 pound per lamb per day to all lots throughout each trial.

As shown by the results for the first trial, as set forth in Table XI, the ration of shelled corn, alfalfa hay, and linseed meal led all others in rate of gain produced, smallest feed requirement per 100 pounds of gain, lowest feed cost per 100 pounds gain, highest selling price per 100 pounds, and largest margin over feed cost. Of the seven different rations fed in the first trial, that of whole barley, alfalfa hay, and linseed meal ranked closest to the shelled corn in most of the important factors affecting the profit from lamb fattening. The lot of lambs receiving whole oats as the only grain in this trial, along with alfalfa hay and linseed meal, resulted in a slightly lower rate of gain, larger feed requirement per hundredweight of gain, lower selling price, and lower margin over feed cost than the corresponding figures for either the corn-fed or the barley-fed lots. This points toward a conclusion that when corn, barley, and oats of about equal grade are available at about the same price per pound, if a single grain is to be used in fattening lambs, corn must be given first choice, with barley a fairly close second and oats a rather poor third.

The results secured in the second trial with the three lots of lambs fed rations duplicating those of the first trial, namely, corn alone, barley alone, and oats alone, checked with the results of the first trial except that the lambs fed oats were practically equal to those fed barley in every important factor.

TABLE XI

OATS IN THE FATTENING RATION

FIRST TRIAL—OCTOBER 30, 1929 TO JANUARY 14, 1930 (76 DAYS)

Thirty Lambs per Lot

Lot No.	II	III	IV	V	VI*	VII	VIII
Rations	Barley Alfalfa hay Linseed meal	Shelled corn Alfalfa hay Linseed meal	Oats Alfalfa hay Linseed meal	Oats 35 days* Alfalfa hay Linseed meal Corn 41 days*	Barley 35 days† Alfalfa hay Linseed meal Corn 41 days*	Shelled corn 60 per cent Oats 40 per cent Alfalfa hay Linseed meal	Barley 60 per cent Oats 40 per cent Alfalfa hay Linseed meal
Initial weight, lb.	60.08	60.30	59.77	59.75	60.70	60.31	60.20
Final weight of lamb, lb.	90.33	92.62	88.33	87.48	88.31	90.46	88.37
Average daily gain, lb.	0.398	0.425	0.375	0.364	0.363	0.396	0.370
Average gain per lamb, lb.	30.25	32.32	28.56	27.73	27.61	30.15	28.17
Average daily ration, lb.							
Grain	1.80	1.81	1.80	1.65	1.60	1.80	1.80
Linseed meal	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Alfalfa hay	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Feed per cwt. of gain, lb.							
Grain	452.4	425.9	479.8	451.5	440.4	452.7	484.1
Linseed meal	50.2	47.0	53.2	54.8	55.0	50.3	53.9
Alfalfa hay	252.5	236.6	267.3	274.1	277.2	253.3	269.0
Feed cost per cwt. gain	$8.23	$7.89	$9.17	$8.78	$8.49	$8.52	$8.99
Initial cost per cwt.	12.94	12.94	12.94	12.94	12.94	12.94	12.94
Initial cost per lamb	7.77	7.80	7.73	7.73	7.85	7.80	7.79
Feed cost per lamb	2.49	2.55	2.61	2.43	2.34	2.57	2.53
Total cost per lamb	10.26	10.35	10.34	10.16	10.19	10.37	10.32
Selling price per cwt., South St. Paul	13.50	13.75	13.00	13.25	13.25	13.40	13.40
Selling price per cwt., Morris	12.50	12.75	12.00	12.25	12.25	12.40	12.40
Net value per lamb, Morris	11.29	11.81	10.60	10.72	10.82	11.22	10.96
Margin per lamb	1.03	1.46	0.26	0.56	0.63	0.85	0.64

Feed prices charged—Alfalfa hay, $12 per ton; linseed meal, $65 per ton; oats, 39 cents per bushel; barley 54 cents per bushel; shelled corn, 65 cents per bushel. All grains were fed whole. Linseed meal fed at rate of 0.2 pound per lamb per day.

* Lot V—Received oats for first 35 days, then changed to shelled corn.

† Lot VI—Received barley first 35 days, then changed to shelled corn.

TABLE XII

OATS IN THE FATTENING RATION

SECOND TRIAL—FEBRUARY 18, 1930 TO APRIL 28, 1930 (69 DAYS)

Thirty Lambs per Lot

Lot No.	II	III	IV	V	VI	VII	VIII
Rations	Barley Alfalfa hay Linseed meal	Shelled corn Alfalfa hay Linseed meal	Oats Alfalfa hay Linseed meal	Oats 35 days* Alfalfa hay Linseed meal Corn 34 days*	Barley 35 days† Alfalfa hay Linseed meal Corn 34 days*	Shelled corn 60 per cent Oats 40 per cent Alfalfa hay Linseed meal	Barley 60 per cent Oats 40 per cent Alfalfa hay Linseed meal
Initial weight, lb.	69.17	68.15	69.33	68.88	68.80	68.17	69.02
Final weight of lamb, lb.	99.51	102.84	100.82	99.14	100.91	101.08	99.51
Weight of fleece, lb.	7.03	6.60	6.43	6.45	5.90	5.74	5.83
Final weight of lamb and fleece, lb.	106.54	109.44	107.25	105.59	106.81	106.82	105.34
Average gain per lamb, lb.	37.37	41.29	37.92	36.71	38.01	38.65	36.32
Average daily gain, lb.	0.542	0.591	0.549	0.531	0.550	0.559	0.526
Average daily ration, lb.							
Grain	2.13	2.04	2.15	1.85	1.94	2.09	2.14
Alfalfa hay	1.15	1.18	1.13	1.14	1.16	1.14	1.13
Linseed meal	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Feed per cwt. of gain, lb.							
Grain	393.7	370.8	392.0	348.9	353.9	372.9	406.8
Alfalfa hay	214.2	214.6	207.3	215.0	211.8	204.8	216.2
Linseed meal	36.9	36.2	36.4	37.6	36.3	37.7	38.0
Feed cost per cwt. gain	$6.91	$6.77	$7.57	$6.65	$6.51	$6.87	$7.27
Initial cost per cwt.	11.45	11.45	11.45	11.45	11.45	11.45	11.45
Initial cost per lamb	7.92	7.80	7.94	7.89	7.88	7.80	7.90
Feed cost per lamb	2.58	2.79	2.87	2.44	2.47	2.65	2.64
Cost of shearing	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Total cost per lamb	10.66	10.75	10.97	10.49	10.51	10.61	10.70
Selling price per cwt., South St. Paul	9.20	9.40	9.20	9.30	9.30	9.40	9.30
Selling price per cwt., Morris	8.20	8.40	8.20	8.30	8.30	8.40	8.30
Net value per lamb, Morris	8.16	8.64	8.27	8.23	8.37	8.49	8.26
Value of wool per lamb at 20 cents per lb.	1.27	1.27	1.27	1.27	1.27	1.27	1.27
Net value per lamb plus wool, Morris	9.43	9.91	9.54	9.50	9.64	9.76	9.53
Margin per lamb	—1.23	—0.84	—1.43	—0.99	—0.87	—0.85	—1.17

Feed prices charged—Alfalfa hay, $12 per ton; linseed meal, $65 per ton; oats, 39 cents per bushel; barley, 54 cents per bushel; shelled corn, 65 cents per bushel. All grains were fed whole. Linseed meal fed at rate of 0.2 pound per lamb per day.

* Lot V—Received oats for first 35 days, then changed to shelled corn.

† Lot VI—Received barley first 35 days, then changed to shelled corn.

TABLE XIII

OATS IN THE FATTENING RATION

Average of Two Trials

OCTOBER 30, 1929 TO JANUARY 14, 1930 (76 DAYS)

FEBRUARY 18, 1930 TO APRIL 28, 1930 (69 DAYS)

Rations	II	III	IV	V	VI	VII	VIII
Lot No.	Barley Alfalfa hay Linseed meal	Shelled corn Alfalfa hay Linseed meal	Oats Alfalfa hay Linseed meal	Oats 35 days* Alfalfa hay Linseed meal Corn 34 days†	Barley 35 days* Alfalfa hay Linseed meal Corn 34 days†	Shelled corn 60 per cent Oats 40 per cent Alfalfa hay Linseed meal	Barley 60 per cent Oats 40 per cent Alfalfa hay Linseed meal
Initial weight, lb.	64.62	64.22	64.55	64.31	64.75	64.24	64.61
Final weight of lamb and fleece, lb.	98.43	101.03	97.79	96.54	97.56	98.64	96.86
Average gain per lamb, lb.	33.81	36.80	33.24	32.22	32.81	34.40	32.24
Average daily gain per lamb, lb.	0.470	0.508	0.462	0.447	0.456	0.477	0.448
Average daily ration, lb.							
Grain	1.96	1.92	1.97	1.75	1.77	1.94	1.97
Linseed meal	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Alfalfa hay	1.07	1.09	1.06	1.07	1.08	1.07	1.06
Feed per cwt. of gain, lb.	423.0	398.3	435.9	400.2	397.1	412.8	445.4
Grain	43.5	41.6	44.8	46.2	45.6	44.0	45.9
Linseed meal	233.3	225.6	237.3	244.5	244.5	229.0	243.0
Alfalfa hay	$7.57	$7.33	$8.37	$7.71	$7.50	$7.69	$8.13
Feed cost per cwt. gain	12.19	12.19	12.19	12.19	12.19	12.19	12.19
Initial cost per cwt.	7.84	7.80	7.83	7.81	7.86	7.80	7.84
Initial cost per lamb	2.53	2.67	2.74	2.43	2.40	2.61	2.58
Feed cost per lamb	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Cost of shearing	10.46	10.55	10.65	10.32	10.35	10.49	10.51
Total cost per lamb	11.35	11.57	11.10	11.27	11.27	11.40	11.35
Selling price per cwt., South St. Paul	10.35	10.57	10.10	10.27	10.27	10.40	10.35
Selling price per cwt., Morris	9.72	10.22	9.43	9.47	9.59	9.85	9.61
Net value per lamb, Morris	1.27	1.27	1.27	1.27	1.27	1.27	1.27
Value of wool per lamb at 20 cents per lb.	10.36	10.86	10.07	10.11	10.23	10.49	10.24
Net value per lamb plus wool, Morris	10.36	10.86	10.07	10.11	10.23	10.49	10.24
Margin per lamb	—0.10	0.31	—0.58	—0.21	—0.12	0.00	—0.26

Feed prices charged—Alfalfa hay, $12 per ton; linseed meal, $65 per ton; oats, 39 cents per bushel; barley, 54 cents per bushel. All grains were fed whole. Linseed meal fed at the rate of 0.2 pound per lamb per day.

* Lot V—Received oats first 35 days, finished on corn.

† Lot VI—Received barley first 35 days, finished on shelled corn.

Two plans were followed to determine whether there might be an advantage in adding some oats to the ration of corn as the grain for fattening lambs. In one plan, oats alone was fed as the only grain for about the first half of the feeding period and shelled corn during the last half to one lot (Lot V), and barley alone during the first half and corn during the last half to another lot (Lot VI).

These two lots were fed in this way so that they might be compared with Lots III and II (fed corn and barley respectively throughout the feeding period). In the use of oats during the first part of the feeding period to be replaced by corn later, the supposition was that lambs would start out on the lighter weight, less highly concentrated grain (oats) with less digestive disturbance, could be brought to a full feed more quickly and then by changing to corn for the finishing period a larger total gain and a larger margin over feed cost might be secured. To check against this plan of feeding oats, one lot was fed barley during the first half of the feeding period and then changed to corn. Basing a decision on the results secured as listed for Lots II, III, V, and VI, in each of the trials, it can be seen that there was no apparent advantage in feeding oats during the first half of the feeding period to be followed by corn during the last half, nor was there any advantage in feeding barley during the first half and then changing to corn. The lots receiving corn or barley during the entire feeding period resulted in a noticeably larger margin of profit over feed cost than was secured from those starting on oats and finishing on corn. In the first trial (Table XI) the lot starting on barley and finishing on corn did not show up quite as well as either the lots fed straight corn or barley; while in the second trial (Table XII) the lot starting on barley and finishing on corn excelled the straight barley and practically equaled the lot on straight corn.

The second plan followed to determine any possible advantage of using oats in the ration was that followed in the feeding of Lots VII and VIII in each trial. To these lots was fed a ration of shelled corn 60 per cent, oats 40 per cent (Lot VII); and barley 60 per cent, oats 40 per cent (Lot VIII) throughout the trial. When all the factors are carefully studied in the tables, it is found that no significant differences were secured from feeding the mixtures of corn and oats or barley and oats throughout the feeding period as contrasted to the feeding of oats for the early part of the feeding period and corn or barley the latter part. When the results secured from the feeding of the mixtures of corn or barley and oats throughout the feeding period are compared to feeding corn or barley alone throughout the feeding period, the exclusive use of the heavier grain, corn, retains an advantage over both of the plans followed in adding some oats to the ration, while barley alone gave about the same result as the mixtures.

It may be concluded from the two trials conducted that oats fed alone as the only grain to fattening lambs along with alfalfa hay and linseed meal is not as satisfactory as corn or barley fed alone. Likewise, there seems to be no advantage to be gained by feeding part oats along with shelled corn.

In this trial, the mixtures of barley and oats approximately equaled the barley alone.

The results justify the conclusion that in fattening lambs, where corn or barley are available there would be no necessity of adding any oats to the ration and no advantage to be gained unless oats were about 18 per cent lower in price pound for pound than barley and 25 per cent lower in price pound for pound than corn.

LIGHT FEEDING LAMBS VS. HEAVY FEEDING LAMBS

The matter of weight of feeding lambs has always been a subject for more or less argument between feeders and between the buyer and the seller of feeder lambs. Buying contracts usually call for a minimum weight, which varies with different contracts. Probably the most usual weight is 50 pounds. Two trials were conducted to determine whether the lambs of lighter weight would feed out as profitably as the heavier. In the first trial, conducted in the fall of the year, white-faced western lambs, direct from the range, were used, and in the second trial, conducted in the spring, the lambs were purchased in the yards at South St. Paul and consisted of a mixture of native and white-faced western lambs.

The light lambs, while lacking in weight, were thrifty and active but small, and were probably younger than the heavier lambs, which accounted mostly for the difference in weight. To compare the lighter with the heavier lambs, thirty lambs were used in each lot and both lots were fed the same ration, consisting of whole barley, alfalfa hay, and linseed meal. The results are given in Table XIV.

In both trials the heavier lambs made a slightly greater daily gain, the lighter lambs required less feed per hundredweight of gain and had a lower feed cost per hundredweight of gain. In the first trial both lots were about equally well finished and were appraised at the same figure; in the second trial the heavier lambs were appraised at 10 cents per hundredweight over the lighter. In both trials, however, the lighter lambs, owing to the lower feed cost per hundredweight of gain, returned the greatest profit.

It appears that feeder lambs, ten or fifteen pounds under weight, for the season of the year, if thrifty and healthy, will make just as satisfactory feeders and return as large or a larger margin over feed cost, than the heavier lambs. Frequently the lightweight lambs can be purchased at a discount.

TABLE XIV

LIGHT FEEDING LAMBS VS. HEAVY FEEDING LAMBS
OCTOBER 30, 1929 TO JANUARY 14, 1930 (76 DAYS)
FEBRUARY 18, 1930 TO APRIL 28, 1930 (69 DAYS)
Thirty Lambs per Lot Each Trial

Lot No.	First trial		Second trial		Average	
Rations	Light lambs	Heavy lambs	Light lambs	Heavy lambs	Light lambs	Heavy lambs
Initial weight, lb.	46.60	60.08	56.80	69.17	51.70	64.62
Final weight, lb.	76.20	90.33	87.93	99.51		
Weight of fleece, lb.	.....	.....	5.12	7.03		
Final weight of lamb and fleece, lb.	.....	.....	93.05	106.54	84.63	98.43
Average daily gain. lb.	0.389	0.398	0.524	0.452	0.456	0.470
Average gain per lamb, lb.	29.60	30.25	36.25	37.37	32.92	33.81
Average daily ration, lb.						
Grain	1.56	1.80	1.95	2.13	1.75	1.96
Linseed meal	0.20	0.20	0.20	0.20	0.20	0.20
Alfalfa hay	0.94	1.00	1.06	1.15	1.00	1.07
Feed per cwt. of gain, lb.						
Grain	401.1	452.4	372.9	393.7	387.0	423.0
Linseed meal	51.3	50.2	38.1	36.9	44.7	43.5
Alfalfa hay	241.4	252.5	202.5	214.2	221.9	233.3
Cost of feeds per cwt. gain	$7.63	$8.23	$6.66	$6.91	$7.14	$7.57
Initial cost per cwt.	12.94	12.94	11.45	11.45	12.19	12.19
Initial cost per lamb	6.03	7.77	6.50	7.92	6.26	7.84
Feed cost per lamb	2.26	2.49	2.41	2.58	2.33	2.53
Cost of shearing	.....	.....	0.16	0.16	0.16	0.16
Total cost per lamb	8.29	10.26	9.07	10.66	8.68	10.46
Selling price per cwt., South St. Paul	13.50	13.50	9.10	9.20	11.30	11.35
Selling price per cwt., Morris	12.50	12.50	8.10	8.20	10.30	10.35
Value per lamb, Morris	9.52	11.29	7.12	8.16	8.32	9.72
Value of wool per lamb	.....	.....	1.02	1.27	1.02	1.27
Net value per lamb plus wool, Morris	.....	.....	8.14	9.43	8.83	10.36
Margin per lamb	1.23	1.03	—0.93	—1.23	0.15	—0.10

Feed prices charged—Alfalfa hay, $12 per ton: linseed meal, $65 per ton; oats, 39 cents per bushel; barley, 54 cents per bushel. All grains were fed whole Linseed meal fed at the rate of 0.2 pound per lamb per day.