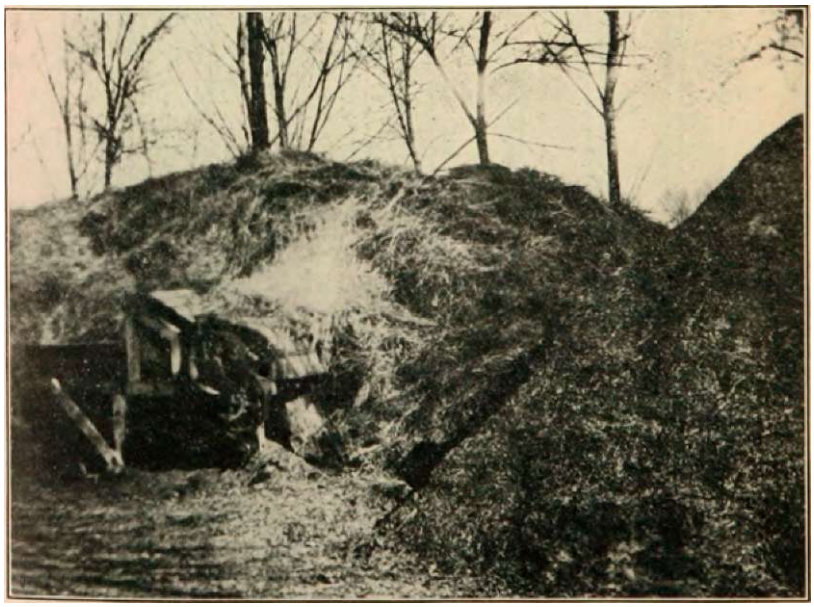
The Agricultural Experiment Station
of the
Colorado Agricultural College

Feeding Experiments with Lambs

1908-9, 1909-10, 1910-11

G. E. MORTON

Alfalfa Meal for Feeding Lambs
Ration Experiments with Lambs
Loss Caused by Dogs among Lambs



WHOLE HAY, CUT HAY. AND ALFALFA CUTTER USED.

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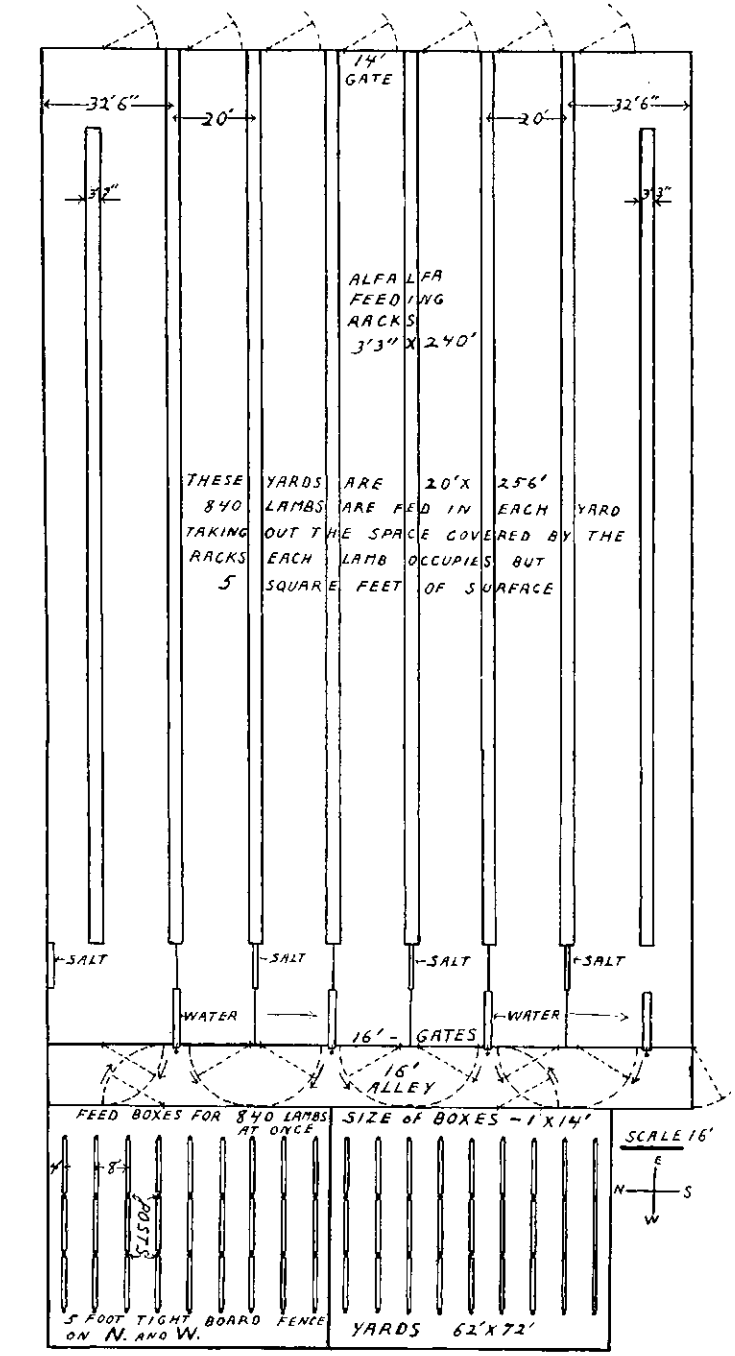

MODEL SHEEP FEEDING YARDS

FOR FURTHER INFORMATION WRITE THE ANIMAL HUSBANDRY DEPT. FT. COLLINS COLO.

C.A.C.

Feeding Experiments with Lambs

1908-09, 1909-10, 1910-11.

G. E. Morton[1]

INTRODUCTION

This bulletin includes three winters' work with lambs, covering the following points:

1. Alfalfa hay, whole, compared with alfalfa hay, cut, using corn as the grain ration.
2. Scotch (hulled or brewing) barley compared with corn, using alfalfa as the hay ration.
3. The self-feeder for alfalfa hay compared with the panel method of feeding, using alfalfa hay and corn for the ration.
4. Scotch barley, California feed barley, and corn compared, using alfalfa as the hay ration.
5. Cut alfalfa hay, and fine alfalfa meal compared with each other and with whole hay, using corn as the grain ration.
6. Loss caused by dogs gaining entrance to corrals and worrying fattening lambs.

ALFALFA HAY OR REDUCED HAY

In Bulletin 151 of this Station, I reported two trials of cut alfalfa hay in comparison with whole alfalfa hay. The term "cut hay" is used in these bulletins to designate hay run through a fodder cutter but not reduced to the fineness of typical commercial alfalfa meal. In our experiments we used a three-quarter inch cut. Much of the alfalfa meal on the market has the stems reduced to about one-half inch in length, and usually they are somewhat shredded. There are a number of mills on the market especially designed for the reduction of alfalfa hay to a so-called meal, but there is only one, so far as I know, that reduces the hay to a meal comparable with fine corn meal or reground bran. Most mills produce a shredded alfalfa, which has earned the well-established commercial term, "alfalfa meal."

Reducing alfalfa to three-quarter inch lengths, secures, according to the observation of the writer, practically all advantages to be obtained from the use of reduced hay or alfalfa meal for fattening animals, cost considered. The finer the reduction is made, the greater the cost of reduction becomes, as a rule. Consequently we used the cut hay in all experiments here reported. In the 1910-1911 experiment we also tried the finest grade of meal produced in a commercial way. Consequently, these experiments give data as to the value of reduced hay, both fine and coarse.

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[1] With the assistance of G. A. Gilbert and H. E. Dvorachek in working up data.

The question of the feeding value of alfalfa meal is one of much importance to farmer feeders, both those located close to established alfalfa mills and those contemplating the installment of reducing machinery upon their own farms or the use of portable mills, some being manufactured which are capable of doing custom work from farm to farm in the same way as a threshing outfit. As a result, inquiries have come, both from farmers and from manufacturers, as to the merit of reducing alfalfa for use in feeding operations upon the farm where grown. The problem resolves itself into two questions: First, does the reduction of the hay result in a greater gain in live weight per ton of hay fed? Second, if so, does the extra gain more than offset the cost of reduction? Both of these questions should be kept clearly in mind in scrutinizing the experimental data.

LAMBS USED

All lambs used in these experiments were range bred. In the 1908-09 experiments, they were Hampshire-cross, Wyoming lambs. Lambs from the same flock were used in 1910-11. In 1909-10, southern lambs (Mexicans) from New Mexico were used.

METHODS

The experimental work was started within a few days of the arrival of the lambs both the first and second winters. The third winter the lambs were brought up to one pound of grain per head per day before being divided up for experiment. In all three seasons the lambs were kept on feed until finished, giving data for a sufficient length of time to gauge the merits of the rations used.

The lambs were weighed every second week. The grain was fed whole and was weighed at every feeding, being fed twice a day. The hay was fed in self feeders, except where specified as fed on the ground. When a lamb died, one of approximately equal weight was put in to take its place, if available. Otherwise the weight and gain were figured on the basis of one less lamb. The character of the hay used will be noted under each experiment.

FIRST SERIES, 1908-09.

LOSS CAUSED BY DOGS.

The lambs in this experiment were started November 14th. During the seventh week of the experiment, dogs dug under the supposedly dog-proof fence and worried the lambs. The dogs were discovered at daylight and were then worrying the lambs in Lot II. Some of the lambs in Lot I were torn about the thighs and ears and a smaller number in Lot II were in the same condition. The lambs in Lot III were frightened but none were torn. This showed that the dogs attacked Lot I first and then passed into Lot II, and it is interesting to note in the following tables the loss in weight caused in the various lots. Observe the loss in weight for Lots I and II at the end of the eighth week

LOT I.—BI-WEEKLY DATA. ALFALFA HAY (WHOLE), SCOTCH BARLEY.
November 14, 1908—February 20, 1909. (90 Lambs in Lot)

Period	Weight	Gain	Average Gain Per head	FEED	
				Alfalfa Whole	Barley (Scotch)
Beginning	6370				
2nd week	6915	545	6.06		581
4th "	7140	225	2.50		1132
6th "	7380	240	2.67		1260
8th "	7036	—344	—3.82		1260
10th "	7633	597	6.63		1260
12th "	8210	577	6.41		1500
14th "	8460	250	2.78		1869
		2090	23.22	23234	8862

LOT II.—BI-WEEKLY DATA ALFALFA HAY (WHOLE), CORN
November 14, 1908—February 20, 1909. (90 Lambs in Lot)

Period	Weight	Gain	Average Gain Per head	FEED	
				Alfalfa Hay	Corn
Beginning	6345				
2nd week	6970	625	6.94		581
4th "	7315	345	3.83		1132
6th "	7740	425	4.72		1260
3th "	7160	—580	—6.44		1260
10th "	7840	680	7.56		1260
12th "	8545	705	7.83		1500
14th "	8900	355	3.94		1823
		2555	28.38	22982	8816

LOT III.—BI-WEEKLY DATA. ALFALFA HAY (CUT), CORN
November 14, 1908—February 20, 1909. (90 Lambs in Lot)

Period	Weight	Gain	Average Gain Per head	FEED	
				Chopped Alfalfa Hay	Corn
Beginning	6295				
2nd week	6860	565	6.28		581
4th "	7073	213	2.37		1132
6th "	7230	157	1.74		1260
8th "	7530	300	3.33		1260
10th "	7980	450	5.00		1260
12th "	8620	640	7.11		1500
14th "	8860	240	2.67		1822
		2565	28.50	20120	8815

TOTAL WEIGHTS AND GAINS—14 WEEKS
November 14, 1908—February 20, 1909. (90 Lambs in Each Lot)

Lot No.	Ration	Weight at Beginning	Weight at Close	Gain in Weight	Total Feed Consumed (lbs.)		
					Corn	Barley (Scotch)	Alfalfa Hay
I	Barley, Alfalfa Hay (whole)	6370	8460	2090		8862	23234
II	Corn, Alfalfa Hay (whole)	6345	8900	2555	8816		22982
III	Corn, Alfalfa Hay (chopped)	6295	8860	2565	8815		20120

Lot III showed no loss in weight. The others showed a very heavy loss in weight especially in view of the fact that they had several days in which to make up the shrink before weighing time came. The lambs in these two lots made a loss of 924 pounds when they should have made a gain of about 720 pounds thus losing 1644 pounds of gain on 180 lambs, or a trifle over 9 pounds per head. Some of this shrink undoubtedly was made up later as the bi-weekly gains for Lots I and II are larger during the succeeding weeks than the gains for Lot III, in spite of the fact that at the end of the experiment Lot III had the greatest average gain per head.

CUT HAY VS. WHOLE HAY.

The entrance of the dogs of course invalidated the results of the ration experiments, but at least one interesting point can be gained, so the final result for these three lots are given here.

FEED FOR GAIN AND COST OF GAIN 1908-09

(90 Lambs in Lot)

	Ration	Average Gain per head 14 weeks (lbs.)	Lbs. feed for 100 lbs. gain			Cost of feed per 100 lbs. gain	
			Alfalfa hay	Corn	Barley	A	B
Lot I	Barley, Alfalfa Hay (chopped)	*23.22	1112		424	$7.02	$8.13
Lot II	Corn, Alfalfa Hay (whole)	*28.38	866	345		5.70	6.60
Lot III	Corn, Alfalfa Hay (chopped)	28.50	784	347		5.82	6.60

A.—Grain at 1c per lb.; Alfalfa Hay (whole) $5.00 per ton; Alfalfa Hay (cut) $6.00 per ton.

B.—Grain at 1c per lb.; Alfalfa Hay (whole) $7.00 per ton; Alfalfa Hay (cut) $8.00 per ton.

*—Dogs entered pen causing loss in weight.

You will note in the table given above that Lot II made practically the same average gain per head that Lot III made, in spite of the fact that the dogs caused a loss in weight for Lot II and did not cause a loss in Lot III. 113 pounds more hay were required to produce each 100 pounds of gain in Lot II, the whole hay lot, but this is offset by the extra cost of the cut hay for Lot III at $1 per ton additional, making the cost of 100 pounds gain in live weight stand at $5.70 for the whole hay lot and $5.83 for the cut hay lot.

Figuring hay at $7 per ton, instead of $5, brings the whole hay and cut hay lots together at $6.60 and $6.61. And it should be note<l that the higher the price of hay, the greater the benefit secured from cutting the hay. It costs no more to cut a high priced ton of hay than a low priced ton, but the saving is correspondingly greater.

SECOND SERIES, 1909-10

The following table gives the necessary data:

FEED FOR GAIN AND COST OF GAIN. 1909-10
(125 Lambs in Lot)

	Ration	Average Gain per head 14 weeks (lbs.)	Lbs. feed for 100 lbs. gain			Cost of feed per 100 lbs. gain	
			Alfalfa hay	Corn	Barley	A	B
Lot I	Barley, Alfalfa Hay (whole in self feeder)	29.32	859		307	$5.22	$6.08
Lot II	Corn, Alfalfa Hay (cut in self feeder)	30.12	908	299		5.71	6.62
Lot III	Corn, Alfalfa Hay (whole in self feeder)	30.80	905	293		5.19	6.10
Lot IV	Corn, Alfalfa Hay (whole on ground)	30.96	955	291		5.30	6.25

A.—Grain 1c per lb.; Alfalfa Hay (whole) $5.00 per ton; Alfalfa Hay (cut) $6.00 per ton.
B.—Grain 1c per lb.; Alfalfa Hay (whole) $7.00 per ton; Alfalfa Hay (cut) $8.00 per ton.

CUT HAY vs. WHOLE HAY

This experimental series gives a clean cut comparison of the merits of reduced hay. In this trial as in the previous winter's trial, the openings of the self feeders were narrowed so that there was no unnecessary waste of the alfalfa meal. The hay used throughout the experiment was first and second cutting, fairly typical of hay as cured in this section from season to season. The hay was bought from fanners near Fort Collins.

Comparing Lots II and III, we see that the average gain per head was 30.1 lbs. for the cut hay lot, and 30.8 lbs. for the whole hay lot. The amount of hay used per hundred pounds gain in live weight produced was 908 lbs. for the cut hay and 905 lbs. for the whole hay. The amount of corn used on the same basis was 299 lbs. for the cut hay lot and 293 lbs. for the whole hay lot. In every item, the advantage, though slight, is in favor of the whole hay. This of course results in a higher cost of production for the cut hay lot, $5.71 as against $5.19 for the whole hay lot.

The question at once arises whether there is no benefit at all in reducing hay. Such benefit has been found in other cases and why not here? The answer probably is found in the fact that good alfalfa hay was used. Alfalfa hay of good quality is very palatable to live stock, and when fed in properly constructed self-feeder racks, not a great deal of waste occurs. If the hay is coarse stemmed, over ripe, or weathered, a much greater proportion of the stems will be rejected.

SELF FEEDERS FOR HAY

Comparing lots III and IV, we find, as in our previous experiments reported in Bulletin 151, a saving in hay resulting from the use

of the self feeder,—in this case 50 pounds of hay for each hundred pounds gain. With hay at $5.00 per ton, the saving on one hundred pounds of gain is shown to be 11 cents, or about 3½ cents per lamb. With four lambs per running foot this amounts to 14 cents saving in hay each season per running foot of rack. As stated in Bulletin 151, the cost of material for the rack is $1 per running foot. In the former experiment a saving of 56 cents per running foot was secured. The combined evidence of the two experiments gives an average saving of 35 cents per running foot of rack each season when hay is at $5.00, a sufficient return to warrant the use of the racks. Of course as hay goes higher in price the saving is greater. The neatness of the feeding premises is an argument in itself for the self feeder, regardless of the saving in hay.

SCOTCH BARLEY COMPARED WITH CORN

Aside from the fact that barley is a large yielding crop in Colorado, it is a crop that ripens early in the season, and it can often be bought for a lower price than old corn, prior to the appearance of a good quality new-crop corn on the market. During this last season (Fall 1912) new corn made a late appearance and was of poor quality because of early fall snows in the western section of the corn belt. As a result more barley was used for sheep feeding in the eastern Colorado feeding districts than ever before. Many feeders seem to have a prejudice against barley as a stock feed. Possibly this is because most experimental data with regard to the feeding of barley to hogs and to cattle shows a feeding value for barley of about one-tenth less than corn. My own observations with regard to barley for sheep indicated that barley was equally as good a feed as corn. This led to the experiments; and comparing Lots I and III in the last table above, we see that a trifle less hay and more grain was used by the barley lot than by the corn lot, resulting in a cost of $5.22 per hundred pounds gain for the barley-fed lot and $519 for the corn-fed lot, when hay is $5.00 per ton and both barley and corn $1 per cwt. This gives it an equal value with corn when fed with alfalfa hay.

THIRD SERIES, 1910-11

This series included barley experiments as follows:

FEED FOR GAIN AND COST OF GAIN. 1910-11.
(100 lambs in lot)

	Ration	Average Gain per head 14 weeks (lbs.)	Lbs. feed for 100 lbs. gain				Cost of feed per 100 lbs. gain	
			Alfalfa	Calif, feed barley	Scotch barley	Corn	A	B
Lot II	Alfalfa Hay and California Feed Barley	30.14	670	377			$5.45	$6.12
Lot III	Alfalfa Hay and Scotch Barley	33.52	647		339		5.01	5.65
Lot IV	Alfalfa Hay, whole, and Corn	31.86	579			357	5.02	5.60

A.—Grain 1c per lb.; Alfalfa Hay (whole) $5.00 per ton.
B.—Grain 1c per lb.; Alfalfa Hay (whole) $7.00 per ton.

SCOTCH BARLEY, CALIFORNIA FEED BARLEY, AND CORN COMPARED

California feed barley was included in this trial because it is a heavy yielding barley, and is extensively grown in this state. It is a six-row barley, and the kernels are much lighter and have more hull than a good, Scotch brewing barley, California feed barley can be brewed, but is not taken for that purpose in this state unless there is a scarcity of barley. As a result there is little competition between brewer and feeder for this variety.

Comparing Lots II and III, we find that the California feed barley lot made an average gain of 30.1 pounds per head while the Scotch barley lot made a gain of 33.5 pounds per head. The feed barley lot required 24 pounds more of alfalfa hay and 28 pounds more of grain for each hundred pounds gain in live weight. This throws the cost of 100 pounds gain to $545 for the feed barley lot and $5.01 for the Scotch barley lot,—a material difference in favor of the Scotch barley.

Comparing lots III and IV, we find that the Scotch barley lot made an average gain per head of 1.6 pounds more than the corn lot, and required 68 pounds more hay and eighteen pounds less grain than the corn lot, resulting in a cost of $5.01 for each hundred pounds gain in live weight made by the Scotch barley lot, and $5.02 for the corn lot,—an immaterial difference. Figuring hav at $7.00 per ton, it makes a difference of only 5 cents in cost of gain against the barley fed lot.

FINE ALFALFA MEAL COMPARED WITH CUT HAY

FEED FOR GAIN AND COST OF GAIN. 1910-11.
(100 lambs in lot)

	Ration	Average Gain per head 10 weeks , Lbs.	Lbs. feed for 100 lbs. gain.			Cost of feed for 100 lbs. gain.	
			Alfalfa Meal	Alfalfa Cut	Corn	A	B
Lot V	Alfalfa Meal and Corn	28.54	406		300	$5.03	$5.44
Lot VI	Alfalfa, cut, and Corn	23.93		552	358	5.24	5.79

A.—Corn at 1c per pound; Alfalfa Hay, cut, at $6.00 per ton; Alfalfa Meal $10.00 per ton.
B.—Corn at 1c per pound; Alfalfa Hay, cut. at $8.00 per ton; Alfalfa Meal $12.00 per ton.

The cost of reducing alfalfa hay to a fine meal is rather heavy and the prices taken in the above table are none too high.

We find here a marked saving in the amount of hay used per hundred pounds gain in live weight, the fine meal lot using 46 pounds less hay than the cut hay lot. The fine meal lot also used 12 pounds less corn per hundred pounds gain in live weight.

The meal used was as fine as a finely ground corn meal. Its cost was high because the capacity of the machine producing it was very low. To produce two

tons of this meal per day required two men and a team besides the power cost, and if the hay were in the slightest degree damp two tons a day could not be put through.

The alfalfa cutter used for producing the cut hay would run through two tons per hour. Figuring the cost of cut hay at $1 per ton greater than whole hay, and of fine meal at $5 per ton greater than whole hay, with whole hay at $5 per ton, we have a cost for producing 100 pounds gain in live weight of $5.24 for cut hay and $5.03 for fine meal.

We may also compare Lot VI, the cut hay lot, with Lot IV of the previous table. The lambs used in Lots II to IV inclusive were all divided up for experiment at the same time, were put into the feed lot at the same time, and were all on a pound of grain per head per day at the time of starting the experiment. Lots V and VI were re-divided a month later because of an accident, and so the data for them covers only ten weeks instead of fourteen weeks as in the case of Lot IV. The lots may fairly be compared, however, on the basis of feed required for gain in live weight, as all lots had passed the preliminary period during which grain feed was being increased to one pound.

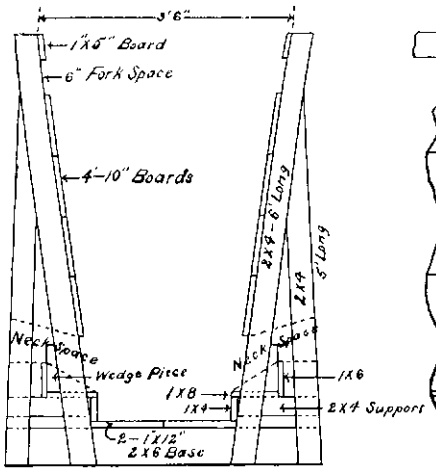
Comparing Lots IV and VI, we find that the whole hay lot required 27 pounds more hay and 1 pound less corn for each hundred pounds gain in live weight produced, resulting in a cost for the whole hay lot of $5.02, while the cut hay lot cost $5.24. We see here no saving in cost of gain, but with lot V, the alfalfa meal lot, we see a slight saving when whole hay is $7 per ton, but none when whole hay is $5 per ton. The hay used was poor quality chiefly because grasshoppers had worked upon it in the field. Good alfalfa hay is eaten quite closely without being cut or ground, so that cutting or grinding good hay does not cause closer consumption in the same degree as with poor hay. Even a good quality hay has more or less poor hay mixed with it because stack tops and bottoms are necessarily of poor quality, so that cutting the hay usually results in closer consumption of these parts. When all the hay is poor quality, the cutting apparently results in much closer eating of the stems, and a correspondingly greater saving.

CONCLUSIONS

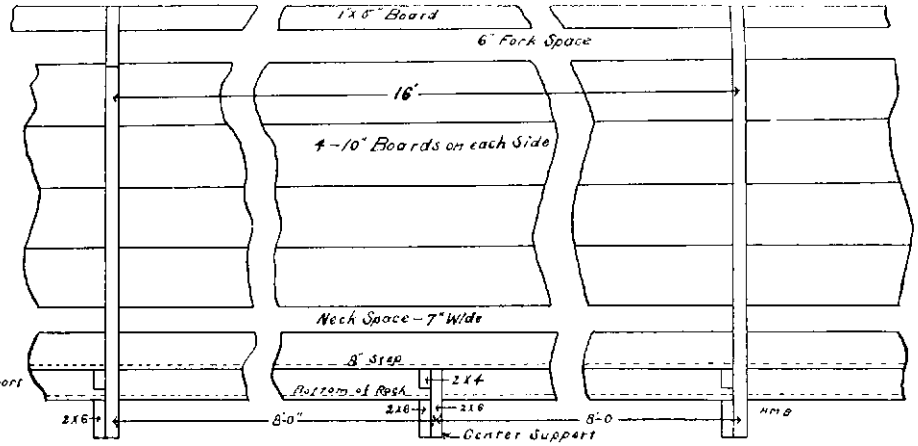
SELF FEEDERS FOR HAY

We may safely conclude as the result of two years' work that there is a material saving in cost of production where self feeders are used. The figures for these two years show a saving of 35 cents per running foot, which would repay the cost of the racks in three seasons.

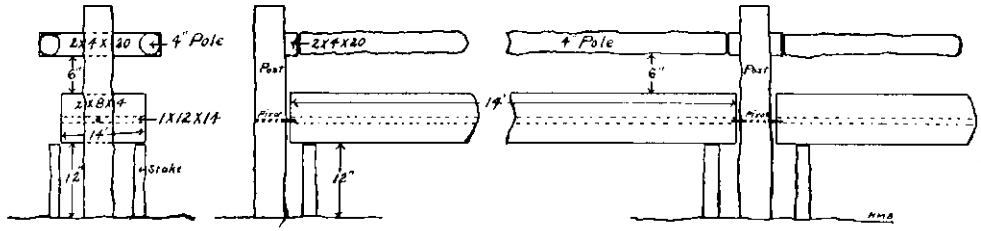
There are a number of facts to be noted concerning the self feeders, which have been observed in the course of their use. The distance between rack openings on opposite sides of the rack must not be too great, or a pillar of uneaten hay will remain, preventing the main body of hay in the rack from slipping down to where the sheep can reach it-



End View



Side View of Self Feeding Hay Rack for Sheep



End View

Side View of Invertible Sheep Feeding Trough

THESE PLANS ARE TAKEN FROM RACKS AND TROUGHS NOW IN USE ON THE STATE AGRICULTURAL COLLEGE FARM FOR FURTHER INFORMATION WAITE THE ANIMAL HUSBANDRY DEPT. C.A.C.

FORT COLLINS
COLO.

SCALE 1 FOOT

AGJ

The slope of sides must not be too great or the hay will jam in the narrowest part at the bottom.

If alfalfa meal is fed in self feeders, covers should be provided, as snow incorporates itself so thoroughly with the meal that much waste will result. On the preceding page is given a plan of the self feeder. When alfalfa meal is used, put a 1x4 piece on each side below the lowest 10 inch board, thus reducing the neck space. Also put in a false floor made by two 12 inch boards in the shape of an inverted V-shaped hog trough. This directs the meal to each opening and the sheep are not forced to stretch in order to get at the meal. The use of the self feeder has become general in the Fort Collins lamb-feeding district, and its use will be found advantageous in all Colorado feeding districts.

BARLEY FOR FATTENING LAMBS

A plump, full kerneled barley is as good as corn, pound for pound, for fattening lambs, when it is used with alfalfa hay as a roughage. A light kerneled, heavy hulled barley such as California feed barley (a six rowed barley) is not as valuable as the two or four rowed barleys, although it yields somewhat more per acre than the two or four rowed barleys. The one trial thus far made indicates a feeding value about ten per cent less than the heavier barleys.

ALFALFA MEAL

Most of our experiments were with a coarse meal, or cut hay. Four years' work shows that a saving results from the use of cut hay, but that with good hay the saving is fully offset by the cost of cutting the hay where the cost of such cutting amounted to $1 per ton. In one instance, where poor quality of hay was used, a money saving was effected by its use when the cost of cutting was $1 per ton. I believe we may safely sum up the situation as follows: In any section where one or more cuttings of hay are usually badly weathered because of rains, it will pay the feeder to reduce his hay, provided the cost of the meal delivered at his farm, in excess of the cost of whole hay, is not more than $1 per ton for the coarser grades, or $3 to $4 for the finely floured meal. We as yet have no evidence that it will pay to reduce a good quality of hay.

Where one is installing his own machinery, he should figure power cost, depreciation and interest, as well as labor cost; and he should also realize that having the machine upon the place will enable him to secure much closer consumption of coarse, poor quality products, such as straw, corn stalks, and tops and bottoms of alfalfa stacks especially if he is in a position to mix a more palatable feed, such as beet syrup, with the cut product- Where one hauls his hay to a mill to be cut, he should figure the cost of such hauling as well as the price for cutting the hay.

The fodder cutter and alfalfa mill have a legitimate place upon many farms, and the publication of our experimental results is not meant to

discourage their use where needed. But statements to the effect that there is a 50% greater feeding value in alfalfa meal than in the hay from which the meal was made are not well founded. Experiments at this Station in 1902 (Bulletin 75, p. 9) show that 28 per cent of alfalfa hay fed to lambs was uneaten. This means that if the rejected stems were of the same value as the rest of the hay, not more than one third greater feeding value could be secured by their consumption; while because of the large amount of crude fiber in the coarser stems, they do not possess nearly the feeding value of the rest of the hay. In addition to the closer consumption of the coarse parts of hay, something is gained in saving the energy used in mastication of uncut hay. Reducing the hay undoubtedly adds to its value, the increased value: being somewhat proportionate to the fineness of reduction; but the greatest possible increase in value, with finest reduction probably is not over 40 per cent of the value of the whole hay. With ordinary grades of hay, and typical fineness of reduction, the feeder may ordinarily figure on 15 to 25 percent increase in value.

APPENDIX

BI-WEEKLY DATA. ALFALFA HAY (WHOLE), SCOTCH BARLEY
December 18, 1909—March 26, 1910
LOT I. (125 Lambs in Lot)

Period	Weight	Gain	Average gain per head	FEED	
				Alfalfa Hay (whole)	Barley
Beginning	8765				
2nd Week	8970	205	1.64		880
4th	8890	—80	—.64		980
6th	9750	860	6.88		1568
8th	10355	605	4.84		1960
10th	11015	660	5.28		1960
12th	11605	590	4.72		1960
14th	12430	825	6.60		1960
Total		3665	29.32	31498	11268

BI-WEEKLY DATA. ALFALFA HAY (CHOPPED). CORN
December 18, 1909—March 26, 1910
LOT II. (125 Lambs in Lot)

Period	Weight	Gain	Average Gain per head	FEED	
				Alfalfa Hay (chopped)	Corn
Beginning	8765				
2nd Week	9260	495	3.96		880
4th	9395	135	1.08		980
6th	10015	620	4.96		1568
8th	10655	640	5.12		1960
10th	11275	620	4.96		1960
12th	12175	900	7.20		1960
14th	12530	355	2.84		1960
Total		3765	30.12	34175	11268

BI-WEEKLY DATA, ALFALFA HAY (WHOLE), CORN
December 18, 1909—March 26, 1910
LOT III. (125 Lambs in Lot)

Period	Weight	Gain	Average Gain per head	FEED	
				Alfalfa Hay (whole)	Corn
Beginning	8890				
2nd Week	6365	505	4.04		880
4th "	6375	—20	—.16		980
6th "	10110	735	5.88		1568
8th "	10690	580	4.64		1960
10th "	11425	735	5.88		1960
12th "	12045	620	4.96		1960
14th "	12740	695	5.56		1960
Total		3850	30.80	34857	11268

BI-WEEKLY DATA, ALFALFA HAY (WHOLE ON GROUND), CORN
December 18, 1909—March 26, 1910
LOT IV. (125 Lambs in Lot)

Period	Weight	Gain	Average Gain per head	FEED	
				Alfalfa Hay (on ground)	Corn
Beginning	8910				
2nd week	9425	515	4.12		880
4th	9125	—300	—2.40		980
6th	10000	875	7.00		1568
8th	10725	725	5.80		1960
10th	11440	715	5.72		1960
12th	12200	760	6.08		1960
14th	12780	580	4.64		1960
Total		3870	30.96	36977	11268

TOTAL WEIGHTS AND GAINS.—14 WEEKS
December 18, 1909—March 26, 1910
(125 Lambs in Lot)

Lot	Ration	Weight at Beginning	Weight at Close	Gain in Weight	TOTAL FEED CONSUMED (lbs.)				
					Corn	Barley	Whole Hay on Ground	Whole Hay	Chopped Hay
1	Barley and Whole Alfalfa	8765	12430	3665		11268		31498	
2	Corn and Chopped Alfalfa	8765	12530	3765	11268				34175
3	Corn and Whole Alfalfa	8890	12740	3850	11268			34857	
4	Corn and whole Alfalfa on Ground	8910	12780	3870	11268		36977		

BI-WEEKLY DATA, ALFALFA HAY (WHOLE), CALIFORNIA FEED BARLEY
December 17, 1910—March 25, 1911—14 Weeks
LOT II. (100 Head in Lot)

Period	Weight	Gain	Average Gain per head (lbs.)	FEED	
				Alfalfa	Barley
December 17, 1910	7113				
December 31, 1910	7220	107	1.07		1400
January 14, 1911	7775	567*	5.67		1400
January 28, 1911	8101	326	3.26		1400
February 11, 1911	8660	559	5.59		1400
February 25, 1911	8940	280	2.80		1575
March 11, 1911	9695	755	7.55		2100
March 25, 1911	10115	420	4.20		2100
Total		3014	30.14	20199	11375

* One died, weight 70 pounds. One put in, weight 58 pounds.

BI-WEEKLY DATA, ALFALFA HAY (WHOLE), SCOTCH BARLEY
December 17, 1910—March 25, 1911,-14 Weeks
LOT III. (100 Head in Lot)

Period	Weight	Gain	Average Gain per head (lbs.)	FEED	
				Alfalfa	Barley
December 17, 1910	7103				
December 31, 1910	7520	417	4.17		1400
January 14, 1911	7847	327	3.72		1400
January 28, 1911	8330	483	4.83		1400
February 11, 1911	8890	560	5.60		1400
February, 25 1911	9175	285	2.85		1575
March 11, 1911	9710	535	5.35		2100
March 25, 1911	10455	745	7.45		2100
Total		3352	33.52	21678	11375

BI-WEEKLY DATA, ALFALFA HAY (WHOLE). CORN
December 17, 1910—March 25, 1911.—14 Weeks
LOT IV. (100 Lambs in Lot)

Period	Weight	Gain	Average Gain per head (lbs.)	FEED	
				Alfalfa	Corn
December 17, 1910	7183				
December 31, 1910	7365	201*	2.01		1400
January 14, 1911	7667	302	3.02		1400
January 28, 1911	8140	473	4.73		1400
February 11, 1911	8645	505	5.05		1400
February 25, 1911	9150	505	5.05		1575
March 11, 1911	9875	725	7.25		2100
March 25, 1911	10350	475	4.75		2100
Total		3186	31.86	18462	11375

* One died, weight 75 pounds. One put in, weight 56 pounds.

BI-WEEKLY DATA. FINE ALFALFA MEAL. CORN
January 14, 1911—March 25, 1911—10 Weeks
LOT V. (100 Lambs in Lot)

Period	Weight	Gain	Average Gain per head (lbs.)	FEED	
				Alfalfa	Corn
January 14, 1911	7893				
January 28, 1911	8474	599*	5.99		14110
February 11, 1911	8910	460**	4.60		1400
February 25, 1911	9500	590	5.90		1575
March 11, 1911	9945	445	4.45		2100
March 25, 1911	10705	760	7.60		2100
Total		2854	28.54	11580	8575

* One missing, average weight 85 pounds. One put in, weight 67 pounds.
** One missing, average weight 89 pounds. One put in, weight 65 pounds.

BI-WEEKLY DATA. ALFALFA HAY (CUT), CORN
January 14. 1911—March 25. 1911—10 Weeks
LOT VI. (100 Lambs in Lot)

Period	Weight	Gain	Average Gain per head (lbs.)	FEED	
				Alfalfa	Corn
January 14, 1911	7897				
January 28, 1911	8115	228*	2.28	5759	1400
February 11, 1911	8585	470	4.70	860	1400
February 25, 1911	9055	470	4.70	2248	1575
March 11, 1911	9760	705	7.05	3590	2100
March 25, 1911	10280	520	5.20	750	2100
Total		2393	23.93	13207	8575

* One died, weight 75 pounds. One put in, weight 65 pounds.

TOTAL WEIGHTS AND GAINS—14 WEEKS
December 17, 1910—March 25, 1911
(100 Lambs in Lot)

Lot No	Ration	Weight at Beginning	Weight at close	Gain in Weight (lbs.)	TOTAL FEED CONSUMED			
					Calif Feed Barley	Scotch Barley	Corn	Alfalfa Hay (whole)
II	Alfalfa Hay and California Feed Barley	7113	10115	3014	11375			20199
III	Alfalfa Hay and Scotch Barley	7103	10455	3352		11375		21678
IV	Alfalfa Hay, whole, and Corn	7183	10350	3186			11375	18462

TOTAL WEIGHTS AND GAINS—10 WEEKS
January 14, 1911 to March 25, 1911
(100 Lambs in Lot)

Lot No.	Ration	Weight at Beginning	Weight at Close	Gain in Weight (lbs.)	TOTAL FEED CONSUMED		
					Alfalfa Meal	Alfalfa Hay (cut)	Corn
V.	Alfalfa Meal and Corn	7893	10705	2854	11580		8575
VI.	Alfalfa Hay(cut) and Corn	7897	10280	2393		13207	8575