

THE COLORADO EXPERIMENT STATION

FORT COLLINS

PROGRESS REPORT OF LIVESTOCK FEEDING EXPERIMENT—1928

I. Feedlot Fattening Rations for Lambs

By E. J. Maynard

Summary

1. Barley fed with alfalfa hay produced lighter gains and less finish than corn.
2. In this test Trebi barley, an improved strain, showed 83.4 percent the value of corn while Coast (California Feed) barley showed only 73.4 percent corn value when fed alone with alfalfa hay.
3. Whole barley produced practically the same results as steam-rolled barley.
4. Cottonseed meal increased gain but also increased the cost of unit gain. It proved economical when fed in rations containing corn fodder, corn silage, beet molasses or wet beet pulp.
5. Corn silage had 34.9 percent the feeding value of cut corn fodder, pound for pound. An average of three years shows corn silage worth 38 percent the value of cut corn fodder, pound for pound.
6. Two rations were outstanding in gains produced: (1) The ration including wet beet pulp and (2) the self-fed mixture of ground feeds and beet molasses. Lambs in these two lots were finished and went to market three weeks sooner than the rest. The cost of grinding and mixing feed made the self-fed ration more costly than the wet-pulp ration.
7. Light "cully" lambs fed separately made lighter but more economical gains than medium-weight lambs.
8. Narrow panels proved more efficient for feeding hay than hay self feeders in this test.

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Objects of the Experiment

1. To compare shelled corn and home-grown Trebi and Coast (California Feed) barley for fattening lambs.
2. To compare whole barley and steam-rolled barley.
3. To determine the value of cottonseed meal fed with barley and alfalfa hay.
4. To compare cut corn fodder, corn silage and pressed beet pulp fed with barley, cottonseed meal and alfalfa for fattening lambs.
5. To determine the value of different supplementary feeds and by-products in cheapening and improving a barley-and-alfalfa ration for fattening lambs.
6. To compare gains and cost of gain on light and medium-weight lambs.
7. A comparison of methods of feeding alfalfa.

Lambs Used

Grade range lambs (Lincoln-Rambouillet cross) were used. They were in good condition, vigorous and thrifty when started on the test. They were sorted into 11 pens of 25 lambs each. The different pens were uniform in size, weight, type and condition except for the lighter weight of lambs in lot 3 when the experiment started.

Rations Fed

- Lot
1. Shelled corn (whole hay in self-feeder), alfalfa
 2. Trebi barley (whole), alfalfa
 3. Shelled corn (light lambs), alfalfa
 4. Trebi barley (steam rolled), alfalfa
 5. Coast barley (whole), alfalfa
 6. Trebi barley (whole), cottonseed meal, alfalfa
 7. Trebi barley (whole), cut corn fodder, cottonseed meal, alfalfa
 8. Trebi barley (whole), pressed pulp, cottonseed meal, alfalfa
 9. Trebi barley (whole), corn silage, cottonseed meal, alfalfa
 10. Trebi barley (ground), beet molasses, cottonseed meal, alfalfa (cut mixture self-fed)
 11. Shelled corn (hay panels), alfalfa

Feeds Used

Shelled Corn No. 3 yellow (recleaned), 13.9 percent moisture, was secured from the local elevator. This shipped-in corn was compared with home-grown uncleaned barley.

Trebi Barley (uncleaned), 11.4 percent moisture, was grown at a nearby ranch and represented a typical improved strain of barley as it might be fed on the average ranch.

Coast (California Feed) Barley (uncleaned), 12.08 percent moisture, was secured from the local elevator. Altho it was a fair sample of barley it contained a greater percentage of dockage and foreign grain than the Trebi used.

Physical Analysis of Barley (uncleaned)

		Damaged		Weed	Wild			Weight
		% Dockage	Kernels	Seed	Oats	Wheat	Oats	per Bushel
Whole Trebi	barley	.076	.74	.10	.90			46.5
Whole Coast	barley	.390	1.52		1.00	1.52	2.24	44.5

Corn for Cut Fodder and Silage was raised on the college farm. Cut corn fodder, 9.57 percent moisture, yielded 4.6 tons dry feed per acre. Corn silage, 71.9 percent moisture, yielded 13.1 tons per acre.

Pressed Beet Pulp, 87.5 percent moisture, was siloed at the college. As the silo had not been emptied when the experiment was completed, an 80 percent return on weight stored was estimated.

Beet Molasses, 45.5 percent moisture, came from the local Steffens plant of the sugar company.

Cottonseed Meal, 7.91 percent moisture, had a guaranteed analysis of 43 percent protein.

Alfalfa Hay was secured from a nearby ranch. All three cuttings were fed, being uniformly distributed between the different lots in the experiment. The hay was bright, leafy and of good quality thruout the test.

Discussion

Method of Feeding.—All feeds were fed twice daily, one-half the amount in the morning and one-half in the afternoon. Grain was gradually increased from 1/10 pound to 1 pound per head daily at 40 days and to 8/10 pound per head at 40 days for light lambs. Maximum daily feed of grain was 1½ pounds and 1 pound for light lambs. Maximum feed of cottonseed meal was ¼ pound in all lots fed. Cut corn fodder was fed at the rate of 1 pound daily. Two pounds of corn silage were a maximum feed. Pressed beet pulp was full fed, the lambs consuming 6 pounds per head daily on full feed. Alfalfa hay was self-fed as indicated. Ground feeds mixed with beet molasses were self-fed to lambs in Lot 10.

Compositions of the mixed feed in percentages were as follows:

	Ground	Beet	Cottonseed	Alfalfa
	Barley	Molasses	Meal	Meal
At Start	4.5	4.5	2.0	89
At 7th Day	15.0	7.5	2.5	75
At 16th Day	20.0	12.0	5.0	63
At 29th Day	25.0	15.0	7.0	53
From 44th Day to End of Test	30.0	17.0	8.0	45

An estimated grinding and mixing charge of \$2.50 per ton was used.

Financial Statement.—Lambs were shipped to Denver and sold separately by lot. Actual cost of lamb, feed cost and shipping and selling expense is reported. An estimate of fixed costs including interest charges, equipment and labor cost, based on unpublished studies from the Economics Department, C. A. C., is included.

The Comparative Feeding Value of Shelled Corn and Home-Grown Barley Fed with Alfalfa Hay to Lambs.—Increased yields from improved strains of barley have revived interest in barley as a fattening feed for

LAMB FEEDING EXPERIMENT—COLORADO STATE EXPERIMENT STATION

25 Lambs per Lot fed 127 days (November 3, 1927, to March 9, 1928)

(Table based on one average Lamb)

Lot Number	1	2	3	4	5	6	7	8	9	10	11
Ration Fed	Whole Corn	Trebi Barley	Whole Corn	Trebi Barley	Coast Barley	Trebi Barley	Trebi Barley	Trebi Barley	Trebi Barley	Trebi Barley	Whole Corn
Alfalfa hay in all lots	Hay	(whole)	(Light Lambs)	(Steam Rolled)	(whole)	(whole) C.S.	Corn Fodder	Corn Pulp	Corn Silage	Molas's C.S.	(Hay Panels)
Ground alfalfa in Lot 10	Self Feeder					Meal	C.S. Meal	C.S. Meal	C.S. Meal	Meal ground	
Number of days on feed	127	127	127	127	127	127	127	106	127	106	127
Weight at start, lbs.	57.8	58.8	41.0	57.9	58.5	58.2	58.4	58.9	58.8	58.2	58.3
Final weight (Denver) lbs.	94.4	89.6	76.0	92.0	89.2	94.4	95.6	99.2	95.2	98.4	100.8
Gain at market	36.6	30.8	35.0	34.1	30.8	36.2	37.2	40.2	36.4	40.2	42.5
Average daily gain	.29	.24	.28	.27	.24	.28	.29	.38	.29	.38	.33
Shipping shrinkage (percent)	4.8	8.1	3.8	5.3	5.8	2.7	3.3	5.3	3.9	3.4	2.8
Average daily feed lbs.											
Whole corn	.97		.75								1.00
Barley (whole, rolled or ground)		1.00		1.00	1.00	.78	.74	.73	.77	.94	
Beet Molasses										.54	
Cut corn fodder							.95				
Corn silage									1.99		
Pressed beet pulp								5.48			
Cottonseed meal						.23	.22	.22	.23	.25	
Alfalfa hay (whole or ground)	2.49	2.50	2.15	2.54	2.45	2.56	1.25	1.65	1.49	1.87	2.47
Feed required per 100 lbs gain (at market)											
Shelled corn	297.6		248.9								281.4
Barley (whole, rolled or ground)		328.0		323.0	350.2	254.7	233.6	167.7	242.1	228.3	
Beet molasses										131.0	
Cut corn fodder							298.6				
Corn silage									627.7		
Pressed beet pulp								1266.3			
Cottonseed meal						74.1	68.3	50.9	71.1	60.1	
Alfalfa hay (whole or ground)	765.0	820.7	719.1	823.0	858.5	837.5	392.3	382.3	470.0	455.7	691.7
Feed cost per 100 lbs. gain (at market)	9.43	9.92	8.40	10.20	10.31	10.69	9.60	7.56	9.93	9.58*	8.72

*Includes grinding and mixing charge of \$2.50 per ton.

FINANCIAL STATEMENT BASED ON AVERAGE FEED PRICES AND SALE OF LAMBS

Lot Number	1	2	3	4	5	6	7	8	9	10	11
Ration Fed	Whole Corn	Trebi Barley	Whole Corn	Trebi Barley (Steam Rolled)	Coast Barley (whole)	Trebi Barley (whole) C.S. Meal	Trebi Barley (whole) Corn Fodder C.S. Meal	Trebi Barley (whole) Pressed C.S. Meal	Trebi Barley (whole) Corn Silage C.S. Meal	Trebi Barley Beet Molas's C.S. Meal ground	Whole Corn (Hay Panels)
Alfalfa hay in all lots	Hay	Barley (whole)	(Light Lambs)								
Ground alfalfa in Lot 10	Self Feeder										
Cost per lamb @ \$13.00 cwt.	7.51	7.64		7.53	7.61	7.57	7.59	7.66	7.64	7.57	7.58
Cost per lamb Lot 3 @ \$12.00 cwt.			4.92								
Feed cost per lamb	3.91	3.84	3.20	3.99	3.74	4.14	3.88	3.47	3.99	4.18	3.95
Estimated fixed costs including interest, equipment and labor	.95	.95	.90	.95	.95	.95	.95	.79*	.95	.64*	.95
Shipping and selling expense	.40	.40	.37	.40	.40	.40	.41	.40	.40	.40	.41
Total cost at market (Denver)	12.77	12.83	9.39	12.87	12.70	13.06	12.83	12.32	12.98	12.79	12.89
Selling weight (Denver)	94.4	89.6	76.0	92.0	89.2	94.4	95.6	99.2	95.2	98.4	100.8
Selling price per hundred weight	14.50	14.25	14.25	14.25	14.25	14.00	14.50	14.50	14.25	14.50	14.50
Gross receipts per lamb	13.69	12.77	10.83	13.11	12.71	13.22	13.86	14.38	13.57	14.27	14.62
Profit per lamb	.92	— .06	1.44	.24	.01	.16	1.03	2.06	.59	1.48	1.73
Dressing percent	48.7	47.1	45.8	49.1	45.4	45.6	46.8	47.7	45.5	47.9	47.8
Grade of carcass in cooler											
Premium							1	7		3	
Good	10	10	17	9	23	14	10	2	15	4	9
Strong	7	9		10	2	8	9	14	6	13	9
Heavy	7			4			2	2	2	4	7
Medium	1	6	7	2		3	3		2	1	

*Expense less account three weeks shorter feeding period.

Cost of feeds used:

Shelled corn	\$30.00 per ton	Cut Corn Fodder	\$15.00 per ton
Whole Trebi Barley	\$28.00 per ton	Corn Silage	\$ 6.00 per ton
Whole Coast Barley	\$27.00 per ton	Pressed Beet Pulp.....	\$ 2.49 per ton
Steam rolled Trebi Barley....	\$30.00 per ton	Cottonseed meal	\$45.00 per ton
Alfalfa hay	\$13.00 per ton	Cost of cutting	\$ 2.50 per ton

lambs. Early tests at this station* based on present-day prices of grain and alfalfa show that while a two-rowed brewing barley was practically equal to corn in feeding value, a six-rowed feeding barley (Coast or California Feed) showed 16 percent lower value than corn when fed with alfalfa hay alone. Trebi, an improved strain, and Coast were compared to corn in this test. One ton of corn replaced 2204.4 pounds of Trebi barley and 374.3 pounds of alfalfa. One ton of corn replaced 2354.3 pounds of Coast barley and 628.6 pounds of alfalfa. With present prices of corn and alfalfa, Trebi barley showed 83.4 percent the value of corn while Coast barley was just 10 percent less valuable than Trebi. With shelled corn at \$30 per ton and alfalfa at \$13.00 per ton, Trebi barley was worth \$25.01 per ton and Coast barley was worth \$22.01 per ton fed alone with alfalfa.

Whole vs. Steam-Rolled Barley.—Trebi barley was fed with alfalfa in two lots. Whole barley was fed in Lot 2 and steam-rolled barley was fed in Lot 4. The lambs consumed practically equal amounts of barley in each lot and slightly more hay in Lot 4. One ton of corn replaced 2170.7 pounds of steam-rolled barley and 389.8 pounds of alfalfa. With whole barley worth 83.4 percent the value of corn, steam-rolled barley was worth 84.4 percent as much as corn or only one percent more than whole barley. With whole barley at \$25.01 per ton, steam-rolled barley was only worth \$25.31 per ton in putting on gain.

The Value of Cottonseed Meal Fed With Barley and Alfalfa.—Altho the addition of cottonseed meal increased the average gain per lamb 5.4 pounds, it increased the unit-gain cost and proved unprofitable when fed with barley and alfalfa hay alone in this test. Each ton of cottonseed meal fed in Lot 6 actually replaced only 1978 pounds of corn and the lambs required 453.4 pounds more alfalfa for this replacement. With corn at present prices the cottonseed meal in this ration showed a value of only \$26.73 per ton. Altho the addition of cottonseed meal was not practical in a straight barley-and-alfalfa ration it gave good results when cut corn fodder, corn silage, or wet beet pulp were used with the same basal ration.

Corn Silage vs. Cut Corn Fodder.—With cut corn fodder costing 2½ times as much as corn silage, the fodder fed with barley, cottonseed meal and alfalfa replaced 4204.3 pounds of corn silage, 56.9 pounds of barley, 18.8 pounds of cottonseed meal and 520.4 pounds of alfalfa. With present feed prices and corn silage at \$6.00 per ton, dried cut corn fodder had a feed replacement value of \$17.17. In this test corn silage had 34.9 percent the feeding value of cut corn fodder, pound for pound. An average of three years' work comparing cut corn fodder and corn silage in a grain, protein concentrate, and alfalfa ration showed the silage worth 38 percent the value of the dried fodder, pound for pound.

Pressed beet pulp fed with barley, cottonseed meal and alfalfa proved easily the best fattening ration used. Lambs fattened on this combination made much quicker gains than any, but the self-fed Lot 10, and produced the cheapest gains in the experiment. The lambs in this lot and in the self-fed Lot 10 were ready for market three weeks earlier than any of the other lots in the test. In this test the pressed beet pulp showed 38 percent

*Colorado Experiment Station Bulletin 187.

the feeding value of cut dried corn fodder, pound for pound. The ground feeds mixed with beet molasses and fed in a self-feeder to Lot 10 produced the same quick gain as the pressed-beet-pulp ration. Altho the cost of grinding made this ration more costly than the pulp ration, the quick finish secured produced greater than ordinary profits.

Comparison of Gains and Cost of Gains on Light and Medium-Weight Lambs.—When the lambs were secured for the test, 25 light-weight “cully” lambs were sorted from the 1300 available and were fed in a separate lot during the experiment. They made more economical gains than the medium-weight lambs fed the same ration in the test, their gains costing only 89.1 percent as much. The good results secured with these light lambs indicate the value of sorting and sizing up lambs. Had they been included with the heavier lambs they would probably not have shown such good results.

A Comparison of Narrow Panels and Self-Feeders for Long Alfalfa Hay.—Hay fed thru panels gave better results than when fed thru alfalfa-hay self-feeders. Reverse results were secured in a similar test last year. The average of the two tests indicates a higher cost of gain with self-feeders, cost of feeders included. This test will be duplicated next year.