

THE COLORADO EXPERIMENT STATION FORT COLLINS

FEEDLOT FATTENING RATIONS FOR LAMBS

Report of 1929 Test and Summary of 1928 and 1929 Results

Progress Report of Livestock Feeding Experiment—1929

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Summary of Two Tests—1928 and 1929

1. Barley fed with alfalfa hay produced more growth but less finish than corn. It proved a much more satisfactory fattening feed when other carbonaceous feeds were used with it.
2. A No. 2 grade whole barley was worth 89.4 percent the value of shelled corn.
3. A No. 3 grade whole barley was worth 83.5 percent the value of shelled corn.
4. Steam-rolled No. 2 grade barley was worth only 86.7 percent the value of shelled corn.



5. One-fourth pound of cottonseed meal fed with barley and alfalfa increased the gain per lamb $5\frac{1}{4}$ pounds. Each ton of cottonseed meal fed replaced 1842.9 pounds of barley and 1667.6 pounds of alfalfa.
6. Each ton of cut corn fodder replaced 162.5 pounds of barley, 2275.2 pounds of alfalfa and 9.8 pounds of cottonseed meal, worth \$18.76.
7. Corn silage showed a feed replacement value of \$7.45 per ton. Corn silage showed 39.7 percent the feeding value of cut corn fodder.
8. Each ton of pressed beet pulp, fed at the rate of 4.7 pounds daily, replaced 106 pounds of barley, 25.9 pounds of cottonseed meal and 690.1 pounds of alfalfa. The pressed pulp, costing \$2.49 per ton laid in, showed a feed replacement value of \$6.94.
9. Forty-one-pound lambs put on gains at a feed cost of only 87.5 percent the feed cost of 60-pound lambs. Light lambs however would have had to be purchased for 50 cents per cwt. less than medium-weight lambs to return the same profit.
10. Alfalfa-hay self-feeders proved more economical than panels for hay feeding.

Objects of the Experiment

1. To compare shelled corn, No. 2 and No. 3 grade 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 for feeding alfalfa.

Lambs Used

Grade range lambs 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. No. 2 barley (whole), alfalfa
 3. Shelled corn (light lambs), alfalfa
 4. No. 2 barley (steam rolled), alfalfa
 5. No. 3 barley (whole), alfalfa
 6. No. 2 barley (whole), cottonseed meal, alfalfa
 7. No. 2 barley (whole), cut corn fodder, cottonseed meal, alfalfa
 8. No. 2 barley (whole), pressed pulp, cottonseed meal, alfalfa

9. No. 2 barley (whole), corn silage, cottonseed meal, alfalfa
10. No. 2 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.

No. 2 Barley (uncleaned), 10.64 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. The weight per bushel was 48.5 pounds.

No. 3 Barley (uncleaned), 11.59 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 No. 2 barley used. Weight per bushel was 44.0 pounds.

Corn for Cut Fodder and Silage was raised on the college farm. Cut corn fodder, 10.96 percent moisture, yielded 2.8 tons dry feed per acre. Corn silage, 71.4 percent moisture, yielded 12.4 tons per acre.

Pressed beet pulp 83.67 percent moisture, was siloed at the college and fed during the test. It was charged at a factory price of \$1.50 per ton plus 50 cents per ton for hauling.

Of the 304.5 tons siloed at the college, 219 tons were weighed to live-stock showing a loss of 28.1 percent in the silo. The range in moisture during the entire period of storage or to May 24 ran from 86.7 percent to 79.7 percent. The pressed pulp with 28.1 percent loss actually weighed to live-stock was charged at \$2.78 per ton.

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

Cottonseed Meal, 7.35 percent moisture, had a guaranteed analysis of 43 percent protein.

Alfalfa Hay was secured from a nearby ranch. First and second 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 91 days and to 8/10 pound per head at 73 days for light lambs. Maximum daily feed of grain was 1 pound and 0.88 pounds for light lambs. Maximum feed of cottonseed meal was 1/4 pound in all lots fed. Cut corn fodder was fed at the rate of 2 pounds daily. Three 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.

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 Alfalfa hay in all lots Ground alfalfa in Lot 10 | Whole Corn (Hay Self Feeder) | No. 2 Barley (whole) | Whole Corn (Light Lambs) | No. 2 Barley (Steam Rolled) | No. 3 Barley (whole) | No. 2 Barley (whole) C. S. Meal | No. 2 Barley (whole) Corn Fodder C. S. Meal | No. 2 Barley (whole) Pressed Pulp C. S. Meal | No. 2 Barley (whole) Corn Silage C. S. Meal | No. 2 Barley Molas's C. S. Meal ground mixt're | Whole Corn (Hay Panels) |
| Cost per lamb @ \$13.75 cwt. | 8.59 | 8.54 | | 8.63 | 8.60 | 8.65 | 8.60 | 8.63 | 8.58 | 8.62 | 8.60 |
| Cost per lamb Lot 3 @ \$12.75 cwt. | | | 5.28 | | | | | | | | |
| Feed cost per lamb | 3.98 | 3.51 | 3.30 | 3.79 | 3.53 | 4.10 | 4.20 | 3.71 | 3.90 | 4.65 | 4.04 |
| Estimated fixed costs including interest, equipment and labor | .95 | .95 | .90 | .95 | .95 | .95 | .95 | .95 | .95 | .95 | .95 |
| Shipping and selling expense | .53 | .52 | .41 | .53 | .53 | .56 | .55 | .58 | .54 | .57 | .52 |
| Total cost at market (Denver) | 14.05 | 13.52 | 9.89 | 13.90 | 13.61 | 14.26 | 14.30 | 13.87 | 13.97 | 14.79 | 14.11 |
| Selling weight (Denver) | 93.8 | 92.2 | 71.6 | 93.6 | 93.2 | 98.1 | 97.1 | 102.0 | 95.2 | 100.8 | 91.2 |
| Selling price per cwt. | 16.25 | 16.25 | 15.34 | 16.25 | 16.25 | 16.25 | 16.25 | 16.25 | 16.25 | 16.25 | 16.25 |
| Gross receipts per lamb | 15.24 | 14.98 | 10.98 | 15.21 | 15.15 | 15.95 | 15.78 | 16.57 | 15.47 | 16.38 | 14.82 |
| Profit per lamb | 1.19 | 1.46 | 1.09 | 1.31 | 1.54 | 1.69 | 1.48 | 2.70 | 1.50 | .59 | .71 |
| Dressing percentage | 48.6 | 43.7 | 44.1 | 45.1 | 47.5 | 46.5 | 49.7 | 49.3 | 48.8 | 49.3 | 46.0 |
| Grade of carcass in cooler | | | | | | | | | | | |
| Choice | 6 | 6 | 3 | 8 | 10 | 10 | 12 | 5 | 3 | 8 | 6 |
| Good | 7 | 6 | 19 | 6 | 7 | 2 | 1 | | 2 | | 8 |
| Medium | | | 2 | 1 | 1 | | | | | | 2 |
| Common | | | 1 | | 1 | | | | | | |
| Choice Heavies | 12 | 13 | | 10 | 6 | 11 | 8 | 18 | 20 | 17 | 9 |
| Good Heavies | | | | | | 1 | 3 | | | | |

Cost of feeds used:

Shelled corn\$30.00 per ton
 No. 2 Barley\$22.00 per ton
 No. 3 Barley\$21.00 per ton
 No. 2 Barley (steam rolled)...\$24.00 per ton
 Alfalfa hay\$16.00 per ton
 Coarse salt was self-fed in all lots.

Cut Corn Fodder\$18.75 per ton
 Corn Silage\$ 7.50 per ton
 Pressed Beet Pulp\$ 2.78 per ton
 Cottonseed meal\$50.00 per ton
 Cost of cutting\$ 2.50 per ton

LAMB-FEEDING EXPERIMENT—COLORADO EXPERIMENT STATION

25 Lambs per Lot fed 122 days (November 27, 1928, to March 26, 1929)

(Table based on one average Lamb)

| Lot Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---------------|-----------------|---------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------|
| Ration Fed | Whole Corn | No. 2 Barley | Whole Corn | No. 2 Barley | No. 3 Barley | No. 2 Barley | No. 2 Barley | No. 2 Barley | No. 2 Barley | No. 2 Barley | Whole Corn |
| Alfalfa hay in all lots | (Hay Self | (whole) | (Light | (Steam | (whole) | (whole) | (whole) | (whole) | (whole) | Beet | (Hay |
| Ground alfalfa in Lot 10 | Feeder) | | Lambs) | Rolled) | | C. S. Meal | Corn Fodder | Pressed Pulp | Corn Silage | C. S. Meal | ground mixt're |
| Number of days on feed | 122 | 122 | 122 | 122 | 122 | 122 | 122 | 122 | 122 | 122 | 122 |
| Weight at start, lbs. | 62.5 | 62.1 | 41.5 | 62.8 | 62.6 | 62.9 | 62.5 | 62.8 | 62.4 | 62.7 | 62.5 |
| Final weight (Denver) lbs. | 93.8 | 92.2 | 71.6 | 93.6 | 93.2 | 98.1 | 97.1 | 102.0 | 95.2 | 100.8 | 91.2 |
| Gain at market | 31.4 | 30.1 | 30.2 | 30.8 | 30.6 | 35.2 | 34.6 | 39.2 | 32.8 | 38.1 | 28.7 |
| Average daily gain (market weight) | .26 | .25 | .25 | .26 | .26 | .30 | .29 | .33 | .28 | .32 | .24 |
| Shipping shrinkage (percent) | 4.2 | 3.3 | 3.5 | 3.1 | 2.2 | 2.7 | 5.6 | 5.3 | 6.1 | 7.4 | 3.4 |
| Average daily feed lbs. | | | | | | | | | | | |
| Shelled corn | .70 | | .59 | | | | | | | | .70 |
| Barley (whole, rolled or ground) | | .70 | | .70 | .71 | .65 | .50 | .58 | .64 | .87 | |
| Beet Molasses | | | | | | | | | | .50 | |
| Cut corn fodder | | | | | | | 1.60 | | | | |
| Corn silage | | | | | | | | | 2.58 | | |
| Pressed beet pulp | | | | | | | | 3.89 | | | |
| Cottonseed meal | | | | | | .20 | .20 | .19 | .20 | .23 | |
| Alfalfa hay (whole or ground) | 2.77 | 2.64 | 2.28 | 2.84 | 2.69 | 2.69 | 1.12 | 1.72 | 1.29 | 1.84 | 2.82 |
| Feed required per 100 lbs. gain (at market) | | | | | | | | | | | |
| Shelled corn | 272.0 | | 239.3 | | | | | | | | 297.4 |
| Barley (whole, rolled or ground) | | 283.4 | | 276.3 | 281.6 | 225.3 | 176.2 | 181.0 | 239.2 | 279.5 | |
| Beet Molasses | | | | | | | | | | 161.2 | |
| Cut corn fodder | | | | | | | 566.3 | | | | |
| Corn silage | | | | | | | | | 959.7 | | |
| Pressed beet pulp | | | | | | | | 1210.6 | | | |
| Cottonseed meal | | | | | | 68.5 | 70.1 | 59.6 | 72.9 | 72.6 | |
| Alfalfa hay (whole or ground) | 1077.5 | 1069.6 | 921.4 | 1122.9 | 1070.4 | 933.9 | 395.2 | 534.5 | 478.5 | 590.5 | 1202.0 |
| Feed cost per 100 lbs. gain (at market) | 12.70 | 11.68 | 10.96 | 12.30 | 11.52 | 11.66 | 12.16 | 9.46 | 11.88 | 12.20* | 14.08 |

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

The percentage composition of the mixed feed was as follows:

| | Ground Barley | Beet Molasses | Cottonseed Meal | Alfalfa 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.

Results of Experiment

Results are reported for the current test and on an average of two tests including the first test of this series completed last year.

Feed-cost figures for the 2-year average of results are based on an average cost of feeds used in the 2 tests as follows:

Average Cost of Feeds During the 2 Tests

| | | | |
|--------------------------------------|-----------------|----------------------|-----------------|
| Shelled Corn ----- | \$30.00 per ton | Alfalfa Hay ----- | \$14.50 per ton |
| No. 2 Barley ----- | \$25.00 per ton | Cut Corn Fodder----- | \$16.88 per ton |
| No. 3 Barley ----- | \$24.00 per ton | Corn Silage ----- | \$ 6.75 per ton |
| No. 2 Barley (steam rolled) ----- | \$27.00 per ton | Pressed Beet Pulp -- | \$ 2.78 per ton |
| | | Cottonseed Meal ---- | \$47.50 per ton |

Shelled Corn vs. Barley.—In this test lambs required more whole barley than shelled corn per unit gain and less alfalfa where barley was fed. Alfalfa hay fed in this test was of excellent quality and the lambs consumed proportionately more hay and less grain per unit gain than in the previous test.

Barley-fed lambs showed noticeably more growth and less finish than corn-fed lambs.

Sold on a strong rising market, there was no price discrimination on account of the lack of finish on the barley fed lambs.

Average results for the two feeding tests indicate that each ton of shelled corn fed with alfalfa hay replaced 2146.8 pounds of a No. 2 grade of barley plus 167.8 pounds of alfalfa hay, or the barley showed 89.4 percent the feeding value of corn.

No. 2 Grade vs. No. 3 Grade Barley.—In this test a No. 2 and No. 3 grade of barley showed practically equal feeding value. Average results for the two feeding tests show that each ton of shelled corn fed with alfalfa hay replaced 2218.4 pounds of a No. 3 grade barley plus 303.4 pounds of alfalfa or the No. 3 grade barley showed 83.5 percent the feeding value of corn.

Whole vs. Steam-rolled No. 2 Grade Barley.—Lambs fattened on steam-rolled, No. 2 grade barley, required 7.1 pounds less barley but ate 53.3 pounds more alfalfa for each 100 pounds of gain in this test. Average results for the two tests show each ton of shelled corn fed replaced 2104.3 pounds of steam-rolled No. 2 grade barley and 363.1 pounds of alfalfa, or

the steam-rolled barley showed only 86.7 percent the feeding value of the shelled corn.

The Value of Cottonseed Meal Fed with Barley and Alfalfa.—In this test $\frac{1}{4}$ pound of cottonseed meal fed daily with barley and alfalfa increased the gain per lamb 5.1 pounds, decreased the feed cost 2 cents per 100 pounds gain and increased the net profit 23 cents per head.

Each ton of cottonseed meal fed replaced 1696.4 pounds of a No. 2 grade barley and 3962 pounds of alfalfa or showed a feed replacement value of \$50.36 per ton.

Average results for the two tests show each ton of cottonseed meal fed replacing 1842.9 pounds of a No. 2 grade barley and 1667.6 pounds of alfalfa.

Cottonseed meal increased the gain per lamb $5\frac{1}{4}$ pounds on the average.

Cut Corn Fodder vs. Corn Silage.—Each ton of cut corn fodder fed in this test replaced 173.4 pounds of barley and 1902.5 pounds of alfalfa hay but required 5.7 pounds more cottonseed meal. The cut corn fodder showed a feed replacement value of \$16.99 per ton.

Average results for the two tests show each ton of cut fodder replaced 162.5 pounds of barley, 2275.2 pounds of alfalfa and 9.8 pounds of cottonseed meal and a feed replacement value of \$18.76 per ton.

Each ton of corn silage fed in this test replaced 949 pounds of alfalfa but required 29 pounds more barley and 9.2 pounds more cottonseed meal than a straight barley, cottonseed meal, alfalfa ration. The corn silage showed a feed replacement value of \$7.04 per ton.

Average results for the two tests show each ton of corn silage fed replacing 1036.7 pounds of alfalfa but requiring 1.6 pounds more barley and 1.8 pounds more cottonseed meal, or with a feed replacement value of \$7.45 per ton.

In this test corn silage showed 41.2 percent the feeding value of cut corn fodder, pound for pound. Average results for the two tests show corn silage with 39.7 percent the feeding value of the cut dried corn fodder, pound for pound.

The Value of Pressed Beet Pulp.—Each ton of pressed beet pulp in this test replaced 73.2 pounds of a No. 2 grade of barley, 14.7 pounds of cottonseed meal and 659.8 pounds of alfalfa, or had a feeding value of \$6.45 per ton.

An average of 2 years' work shows each ton of pressed beet pulp replacing 106 pounds of barley, 25.9 pounds of cottonseed meal and 690.1 pounds of alfalfa hay, or worth \$6.94.

Comparison of Gains and Cost of Gains on Light and Medium-weight Lambs.—Feed cost of gains on 41.5-pound lambs amounted to only 86.3 percent the cost of gains on 62.5-pound lambs of equal grade in this test. An average of 2 years' work shows the feed cost of gains on 41.25-pound lambs amounting to 87.5 percent the cost of gains on 60.2-pound lambs. The lower feed cost per unit of gain secured with these light lambs was due to their younger age.

It could not have been secured unless the lambs had been of uniform size. Sorting and sizing up the lambs pays with the present cafeteria method of feeding grain.

Altho the feed cost per unit gain was noticeably less on the light lambs, they did not bring as high a price per cwt. when sold. The average profit on light lambs however, for the 2 years ran \$1.27 against \$1.06 for the medium weights.

The average purchase price for the light lambs was \$1.00 per cwt. less than the price paid for medium weights.. According to the average results of the two tests, light lambs purchased at 50c per cwt. less than medium weights would have returned the same profit.

A Comparison of Narrow Panels and Self-Feeders for Long Alfalfa Hay.
—In this test lambs fed alfalfa hay thru self-feeders put on gains at a feed cost of \$12.70 per cwt. while lambs fed alfalfa hay thru panels required \$14.08 worth of feed per 100 pounds gain.

The cost of a 16-foot self-feeder is estimated at \$18.00 for lumber, \$1.26 for nails and \$4.80 for labor, or a total of \$24.06 to accommodate 64 lambs. This is at a cost of \$376 per thousand lambs. The relative cost for panels at the rate of one lamb per running foot is \$216 per thousand lambs.

A 3-year average shows a feed requirement of 300.6 pounds of shelled corn and 844.3 pounds of alfalfa per cwt. gain with hay self-feeders and 312.3 pounds of shelled corn and 898.4 pounds of alfalfa per cwt. gain with panels. With shelled corn at \$30.00 per ton and alfalfa at \$13.00 per ton (3-year average cost), the cost of gain was \$10.00 per cwt. with self-feeders and \$10.52 per cwt. with panels.

At this rate, a 30-pound gain on 1000 lambs would cost \$3000 with self-feeders or \$3156 with panels. A yearly saving of \$156 would nearly pay for the difference in 1 year.