

THE COLORADO EXPERIMENT STATION

FORT COLLINS

PROGRESS REPORT OF LIVESTOCK FEEDING EXPERIMENT—1928

Feedlot Rations for Fattening Calves

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Summary

1. a. Wet beet pulp materially reduced feed costs on beef calves fattened on standard beet by-product rations.
- b. Siloed beet pulp proved more economical, all costs considered, than pressed beet pulp fed in this test.
2. Corn silage fed with wet beet pulp reduced the amount of pulp necessary to fatten a calf by 42.6 percent. The addition of corn silage proved practical where only a limited amount of pulp was available.
3. Sugar-beet tops produced too narrow a ration for maximum gain or selling price when fed with barley, cotton cake and alfalfa.
4. Steer calves outgained heifer calves 44.9 pounds or 13.8 percent in 187 days on feed and at a feed cost of 80 cents or 8.7 percent less per cwt. gain.

Objects of the Experiment

1. a. To determine the feeding value of wet beet pulp.
- b. To compare siloed beet pulp and pressed beet pulp in a standard beet by-product ration for fattening calves.
2. To determine the value of adding corn silage to a standard beet by-product fattening ration for calves.
3. To determine the fattening value of sugar-beet tops.
4. To compare gains and cost of gains secured on steer and open-heifer calves fattened in separate pens on the same beet by-product ration.

Calves Used

Grade Hereford calves averaging 376 pounds in weight were used in this test.

These calves were sorted into five pens of 10 steers each and one pen of 10 heifers. The greatest uniformity possible was maintained between the different lots of cattle by balancing all known factors involved.

The steers averaged 379 pounds in weight and the heifers only 365 pounds at the beginning of the experiment. This difference in weight between steers and heifers born at the same time in the spring may ordinarily be expected in the fall of the year.

Rations Fed

- Lot 1 (steers) Siloed beet pulp, barley, cottoncake, alfalfa.
- Lot 2 (heifers) Siloed beet pulp, barley, cottoncake, alfalfa.
- Lot 3 (steers) Siloed beet pulp, corn silage, barley, cottoncake, alfalfa.
- Lot 4 (steers) Sugar-beet tops, barley, cottoncake, alfalfa.
- Lot 5 (steers) Barley, cottoncake, alfalfa.
- Lot 6 (steers) Pressed beet pulp, barley, cottoncake, alfalfa.

Feeds Used and Methods of Feeding

Ground Trebi barley, 11.5 percent moisture, 46.5 pounds per bushel (whole) was grown locally. A full feed for the calves was 11 pounds daily for lot 5 and eight pounds daily for the other lots.

Siloed beet pulp was hauled from the Fort Collins sugar factory and stored in a small wooden silo adjacent to the feedlots. Each load of from 3 to 4 tons lasted from 6 to 8 days. The average moisture content during the feeding period was 87.5 percent. The range in moisture content was from 90 percent to 85.9 percent. The siloed pulp has been charged at the factory price of \$1.10 plus a 50-cent handling charge per ton. There was a 26.4 percent loss between factory weights and feeding weights from the silo, which increases the price to \$2.17 per ton weighed to the cattle.

Pressed beet pulp was shipped from the Loveland factory but for the purpose of comparison it was charged at the factory price of \$1.50 plus a 50-cent handling charge per ton. Of 242 tons siloed at the college there were only 137.84 tons available and weighed to livestock as feed. In other words, there was an actual loss thru fermentation and other causes of 43.04 percent. The pressed pulp fed had an average moisture content thru the feeding period of 86.79 percent. The range in moisture content thru the feeding season ran from 88.8 percent to 84.1 percent. There was considerable drainage noticeable from the pulp stored in the silo during the feeding period. On this basis of the cost of pressed pulp delivered to the cattle, it is charged at \$3.51 per ton.

Sugar-beet tops were piled in small piles and fed from 2.25 acres of beets that averaged 13.25 tons per acre. The tops averaged 65.1 percent moisture when hauled and weighed 6.54 tons per acre. The average moisture content as fed was 45.4 percent. The tops were charged at 50 cents per ton of beets produced or \$6.63 per acre. The cattle actually consumed 6.05 tons of tops costing \$2.47 per ton.

Corn silage fed had an average moisture content of 72.5 percent. It was of good quality with well-matured grain. It was charged at \$7.00 per ton.

Cottonseed cake, 43.9 percent protein, was of good quality and ran 7.2 percent moisture. The maximum feed allowed was 1.25 pounds daily in all lots.

Alfalfa hay was of good quality.

Hay was fed from the first and second cuttings only.

Salt—All lots were self-fed block salt.

CALF-FEEDING EXPERIMENT—COLORADO AGRICULTURAL EXPERIMENT STATION

10 calves per lot fed 187 days, November 22, 1927, to May 28, 1928
(Table based on one average calf)

Lot Number	1	2	3	4	5	6
Ration Fed	Siloed Beet Pulp Bar'l'y C. S. Cake	Siloed Beet Pulp Bar'l'y C. S. Cake heif'rs	Siloed Beet Pulp Corn silage Bar'l'y C. S. Cake	Beet Tops Bar'l'y C. S. Cake	Bar'l'y C. S. Cake	Press'd Beet Pulp Bar'l'y C. S. Cake
Alfalfa hay self-fed in all lots						
Feedlot weight at start	378.9	364.8	375.2	375.8	382.2	381.3
Market weight at Denver	750.0	691.0	723.0	685.0	744.0	751.1
Shipping shrinkage percent	3.43	2.81	3.21	3.32	3.17	4.05
Gain at market	371.1	326.2	347.8	309.2	362.2	369.8
Daily gain market weight	1.98	1.74	1.86	1.65	1.94	1.98
Daily feed fed (pounds)						
Ground barley	5.0	5.0	5.0	5.1	7.1	5.0
Siloed beet pulp	28.0	22.6	16.0			
Pressed beet pulp						22.0
Corn silage			6.1			
Sugar-beet tops				6.7		
Cottonseed cake	1.1	1.1	1.1	1.1	1.1	1.1
Alfalfa hay	5.8	5.7	4.7	7.1	9.6	7.3
Feed required per 100 pounds gain (at market)						
Ground barley	251.9	287.4	269.5	305.3	367.9	253.0
Siloed beet pulp	1411.1	1293.7	860.8			
Pressed beet pulp						1113.80
Corn silage			329.4			
Sugar-beet tops				405.6		
Cottonseed cake	53.7	61.2	57.3	64.4	54.9	53.7
Alfalfa hay	290.9	325.9	253.6	428.9	495.4	368.4
Feed cost per 100 pounds gain at market	8.41	9.21	9.06	9.32	9.98	9.35

Cost of feeds used:

Ground barley	\$30.00 per ton
Siloed beet pulp	2.17 per ton
Pressed beet pulp	3.51 per ton
Corn silage	7.00 per ton
Sugar-beet tops	2.47 per ton
Cottonseed cake	45.00 per ton
Alfalfa	13.00 per ton

**FINANCIAL STATEMENT BASED ON AVERAGE FEED PRICES AND SALE
OF CALVES**

Lot Number	1	2	3	4	5	6
Number of Calves in Lot	9a	10	10	10	9b	9c
Ration Fed	Siloed Beet Pulp Barl'y C. S. Cake	Siloed Beet Pulp Barl'y C. S. Cake heif'rs	Siloed Beet Pulp Corn silage Barl'y C. S. Cake	Beet Tops Barl'y C. S. Cake	Barl'y C. S. Cake	Press'd Beet Pulp Barl'y C. S. Cake
Alfalfa hay self-fed in all lots						
Cost per calf at feedlot						
Steers \$11.00 per cwt.	41.68		41.27	41.34	42.04	41.94
Heifers \$9.50 per cwt.		34.66				
Feed cost per calf	31.21	30.04	31.51	28.81	36.15	34.58
Estimated fixed costs including interest, equipment and labor*	7.28	6.99	7.28	7.19	7.48	7.41
Shipping and selling expense	2.56	2.36	2.47	2.34	2.53	2.56
Total cost at market (Denver)	82.73	74.05	82.53	79.68	88.19	86.49
Selling weight (Denver) pounds	750.0	691.0	723.0	685.0	744.0	751.1
Result of market sale **						
Number of calves at \$13.40 cwt.	8		9	8	9	9
Number of calves at \$13.35 cwt.		10				
Number of calves at \$12.50 cwt.	1		1	2		
Selling price per cwt.	13.30	13.35	13.33	13.21	13.40	13.40
Gross receipts per calf	99.75	92.25	96.38	90.49	99.70	100.65
Profit per calf	17.02	18.20	13.85	10.81	11.51	14.16
Dressing percentage (based on 1.8 percent shrinkage in cooler)	58.6	61.0	61.2	58.1	58.7	60.5
Selling price per cwt. needed to break even	11.03	11.72	11.41	11.63	11.85	11.52
Margin over purchase price per cwt. needed to break even	.03	1.22	.41	.63	.85	.52

* Developed from studies of Economics Department, C. A. C.

** Steer calves were sold together at market with 4 culls out. Heifers were sold separately.

a 1 steer died 12-16-27, cause: coccidiosis

b 1 steer died 1-3-28, cause: alfalfa bloat

c 1 steer died 4-20-28, cause: enteritis



Typical fat steer calf. Born May 3, 1927. Weight in feedlot November 22, 1927, 391.7 pounds; weight at Denver, May 28, 1928, after 187 days on feed, 790 pounds, gain 398.3 pounds or 2.12 pounds per day. Chilled weight of carcass 482.2 pounds. Dressing percentage, 61.04 pounds.

Discussion

The Feeding Value of Siloed Beet Pulp.—Wet beet pulp siloed at the factory under present conditions is available in only limited quantities to the average beet grower. An average allotment of only 75 to 125 tons makes it necessary to feed smaller amounts in the fattening ration than formerly. Each ton of wet beet pulp hauled from the silo and fed in this test replaced 164.4 pounds of ground barley, 1.7 pounds of cotton cake and 289.8 pounds of alfalfa hay. At present feed prices the wet beet pulp hauled from the factory silo and stored for a short time until fed at the college and costing \$2.17 per ton, had a feed replacement value of \$4.39 per ton.

Pressed Beet Pulp.—Presses have been installed at some sugar factories to press the free moisture from the wet beet pulp. This process is claimed to reduce moisture content of pulp from 95 percent to 85 percent. There should be no drainage from the pulp containing only 85 percent moisture. Beet growers must haul or ship this pressed beet pulp when they deliver their beets in the fall and must silo it at their feedlots until it is fed. In this test 242 tons of pressed beet pulp from the Loveland factory, stored above ground in a wire enclosure 20-feet wide, showed a 43.04 percent loss in weight between pulp stored and pulp available for feed.

The Feeding Value of Pressed Beet Pulp.—Each ton of pressed beet pulp siloed at the college and fed in this test replaced 206.0 pounds of ground barley, 2.2 pounds of cotton cake and 228.0 pounds of alfalfa hay. At present feed prices the pressed beet pulp, estimated as costing \$3.51 per ton, had a feed replacement value of \$4.62 per ton.



Typical fat heifer calf. Born May 12, 1927. Weight in feedlot November 22, 1927, 365 pounds; weight at Denver, May 28, 1928, after 187 days on feed, 750 pounds; gain 385 pounds or 2.1 pounds daily. Chilled weight of carcass 438.0 pounds. Dressing percentage 58.4 pounds.

Siloed Beet Pulp vs. Pressed Beet Pulp.—In both cases wet beet pulp proved an economical feed. Each ton of siloed beet pulp fed showed a feed replacement value of \$2.22 per ton more than it cost, while each ton of pressed beet pulp fed showed a feed replacement value of only \$1.11 per ton more than it cost delivered to the cattle.

The Value of Adding Corn Silage to a Standard Beet By-Product Ration.—Corn silage is not as cheap or efficient a feed at present prices as wet beet pulp. The chief value of corn silage lies in its ability to reduce the wet pulp requirement for fattening cattle and thereby to increase the number of cattle it is possible to finish on a limited allotment of wet beet pulp. Seventy-five tons of siloed beet pulp fed in a standard beet by-product ration with ground barley, cotton cake and alfalfa hay, according to this test, will finish out only 29 calves; (the 29 head of cattle fed on this ration requiring, according to this test, 75 tons of wet beet pulp, 13.6 tons of barley, 2.9 tons of cotton cake and 15.7 tons of alfalfa hay) while the same amount of siloed beet pulp with the addition of 28.7 tons of corn silage, 9.9 tons of barley, 2.1 tons of cotton cake, and 6.4 tons of alfalfa will finish 50 calves.

Because the wet beet pulp is only available in limited quantities the true value of corn silage for cheapening fattening costs is seen in a comparison of Lot 3 fed the wet beet pulp and silage combination and Lot 5 the straight grain-fed pen. This comparison shows a decided lowering of the feed cost of gain with the use of only a limited amount of wet beet pulp.



Steer calves fattened for 6 months on pressed beet pulp, barley, cotton cake and alfalfa hay.

The Fattening Value of Sugar-Beet Tops.—Altho the tops fed with a basal ration containing both cotton cake and alfalfa produced too narrow a ration for optimum gain or selling price the feeding value of the tops was high.

Tops fed in the experiment showed a feed replacement value of \$5.71 per ton of beet tops fed, or \$1.16 for the tops from each ton of beets produced.

Comparing Gains and Cost of Gains on Steer and Open-Heifer Calves Fed the Same Ration.—Results of this and previous tests indicate that steers make quicker, cheaper and consequently heavier gains than heifers in the same length of time. The heifers put on a quicker finish and are usually ready for market sooner than the steers, but the steers outgain them, putting on more growth tho less finish.

COMPARISON OF FEEDLOT GAINS FROM START ON STEER AND OPEN-HEIFER CALVES

Number of Days on Feed	Steer Calves (Lot 1)		Heifer Calves (Lot 2)	
	Average Gain Lbs.	Average Daily Gain	Average Gain Lbs.	Average Daily Gain
30	43.9	1.46	38.7	1.29
60	99.4	1.66	92.7	1.55
90	168.9	1.88	155.7	1.73
120	250.0	2.08	222.7	1.86
150	310.0	2.07	284.2	1.90
181	387.8	2.14	350.4	1.94

On the basis of final market weights, the steers put on 44.9 pounds or 13.8 percent more gain than the heifers at a feed cost of 80 cents less per hundred pounds gain. With the steer calves at \$11.00 per cwt., the heifer calves purchased at \$9.82 per cwt. would have given the same results.