

The Agricultural Experiment Station  
OF THE  
Colorado Agricultural College

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COST OF BEEF PRODUCTION UNDER  
SEMI-RANGE CONDITIONS

BY

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The tables below show the selling price per cwt., at feeding pens, needed to break even on cost of feed, when feeders cost \$4, \$4.50, and \$5 per cwt.; provided gains are made as in this experiment; viz. 100 lbs. gain on 5.1 cwt. barley and .349 ton alfalfa hay.

**SELLING PRICE PER CWT., AT FEEDING PENS, NEEDED TO BREAK EVEN ON COST OF FEED, WHEN FEEDERS COST \$4 PER CWT.\***

Alfalfa per ton	California Feed Barley Per Cwt.						
	\$.90	\$1.00	\$1.10	\$1.20	\$1.30	\$1.40	\$1.50
\$4.00	4.72	4.91	5.09	5.28	5.46	5.65	5.83
5.00	4.85	5.04	5.22	5.41	5.59	5.78	5.96
6.00	4.97	5.16	5.34	5.53	5.71	5.90	6.08
7.00	5.10	5.29	5.47	5.66	5.84	6.03	6.21
8.00	5.22	5.41	5.59	5.78	5.96	6.15	6.33
9.00	5.35	5.54	5.72	5.91	6.09	6.28	6.46
10.00	5.48	5.67	5.85	6.04	6.22	6.41	6.59
11.00	5.60	5.79	5.97	6.16	6.34	6.53	6.71
12.00	5.73	5.92	6.10	6.29	6.47	6.66	6.84
13.00	5.85	6.04	6.22	6.41	6.59	6.78	6.96
14.00	5.98	6.17	6.35	6.54	6.72	6.91	7.09
15.00	6.11	6.30	6.48	6.67	6.85	7.04	7.22

\*Table made by adding cost of 658 lb. steer at 4c per lb. to cost of 373 lbs. gain in live weight, and dividing by 1031 lbs., selling weight.

**SELLING PRICE PER CWT., AT FEEDING PENS, NEEDED TO BREAK EVEN ON COST OF FEED, WHEN FEEDERS COST \$4.50 PER CWT.\***

Alfalfa Hay per ton	Barley Per Cwt.						
	\$.90	\$1.00	\$1.10	\$1.20	\$1.30	\$1.40	\$1.50
\$4.00	5.04	5.23	5.41	5.60	5.78	5.97	6.15
5.00	5.17	5.36	5.54	5.73	5.91	6.10	6.28
6.00	5.29	5.48	5.66	5.85	6.03	6.22	6.40
7.00	5.42	5.61	5.79	5.98	6.16	6.35	6.53
8.00	5.54	5.73	5.91	6.10	6.28	6.41	6.65
9.00	5.67	5.86	6.04	6.23	6.41	6.60	6.78
10.00	5.80	5.99	6.17	6.36	6.54	6.73	6.91
11.00	5.92	6.11	6.29	6.48	6.66	6.85	7.03
12.00	6.05	6.24	6.42	6.61	6.79	6.98	7.16
13.00	6.17	6.36	6.54	6.73	6.91	7.10	7.28
14.00	6.30	6.49	6.67	6.86	7.04	7.23	7.41
15.00	6.43	6.62	6.80	6.99	7.17	7.36	7.54

\*Table made by adding cost of 658 lb. steer at 4½c per lb. to cost of 373 lbs. gain in live weight, and dividing by 1031 lbs., selling weight.

**SELLING PRICE PER CWT. AT FEEDING PENS, NEEDED TO BREAK EVEN ON COST OF FEED WHEN FEEDERS COST \$5 PER CWT.\***

Alfalfa Hay per cwt	Barley Per Cwt.						
	\$.90	\$1.00	\$1.10	\$1.20	\$1.30	\$1.40	\$1.50
\$4.00	5.35	5.54	5.72	5.91	6.09	6.28	6.46
5.00	5.48	5.67	5.85	6.04	6.22	6.41	6.59
6.00	5.60	5.79	5.97	6.16	6.34	6.53	6.71
7.00	5.73	5.92	6.10	6.29	6.47	6.66	6.84
8.00	5.85	6.04	6.22	6.41	6.59	6.78	6.96
9.00	5.98	6.17	6.35	6.54	6.72	6.91	7.09
10.00	6.11	6.30	6.48	6.67	6.85	7.04	7.22
11.00	6.23	6.42	6.60	6.79	6.97	7.16	7.34
12.00	6.36	6.55	6.73	6.92	7.10	7.29	7.47
13.00	6.48	6.67	6.85	7.04	7.22	7.41	7.59
14.00	6.61	6.80	6.98	7.17	7.35	7.54	7.72
15.00	6.74	6.93	7.11	7.30	7.48	7.67	7.85

\*Table made by adding cost of 658 lb. steer at 5c per lb. to cost of 373 lbs. gain in live weight, and dividing by 1031 lbs., selling weight.

## COST OF BEEF PRODUCTION UNDER SEMI-RANGE CONDITIONS.

G. E. MORTON\*

Yearling range-bred steers can be put on the market the spring that they are coming two years old, at a weight of from 1000 to 1150 pounds. The object of this experiment was to secure some information concerning the cost of producing fat cattle of that age and weight, under modified range conditions, the cattle to be run on native grass within fences in summer, and to be winter fed. The writer realizes fully the difficulty of securing typical conditions for such an experiment, and does not claim that in this instance either the conditions of summer range or the results are typical, but they do furnish actual figures showing the cost of winter feeding calves and fattening yearlings, and showing weights and gains made by calves and yearlings both summer and winter during two years that were very hard on stock because of lack of rainfall.

The inclosed range, or native grass, upon which the cattle in this experiment were run, lies just east of the first range of foothills west of Fort Collins, and is occupied mostly by buffalo and gamma grasses. These grasses make quite a luxuriant growth in some sections, but on this range are very short. In the spring they take a much longer time than western wheat grass (blue-stem) to get to a length that furnishes grazing for cattle, and they dry up very quickly in mid-summer under adverse weather conditions.

On this range about 20 acres per head is needed, with ordinary weather conditions, for the summer ranging from May 15th to October 15th, and if grass is late in the spring, or the summer is unusually dry, the stock cannot be run five months on it. As the amount of open range needed for cattle in different parts of Colorado varies from 10 acres to 50 acres per head for all-year grazing, with hay feeding on most ranges in case of winter storms, it will be seen that the range on which these cattle were run is considerably below the average in beef carrying capacity.

The experiment was carried out as follows: Fifteen head of range bred, 3 year old, Hereford cows, showing some Shorthorn blood, were purchased from Schaefer Bros., of Orchard, Colorado, in April, 1910, and were put out upon inclosed range on May 6, 1910. All the cows were with calf to a Hereford bull, and the bulk of the calves were dropped from May to July, a few late ones being born in July.

September 1st, the bull calves were castrated.

October 20th, the cows and calves were brought in, the calves to be winter fed, and the cows to be fattened and sold. This experiment does not follow the cows further. The weight of the calves on October 20th was 4320 pounds for fifteen head, or an average of 288 pounds per head, a very light weight. October 20th is about a month earlier than the time at which stock is brought in from most summer ranges, except high mountain ranges; but the dry season resulted in such scant feed, that heavy loss would have resulted from leaving them out longer.

\* Assisted in preparation of data by J. B. McNulty and G. A. Gilbert.

Address	Nature of Range	OPINIONS FURNISHED BY ME					
		Cost per head for ranging from Apr. 1st to Nov. 1st			Cost per head for Ranging from Nov. 1st to Apr. 1st		
		Cows and calves	Year-lings	2-yr. olds	Cows and calves	Year-lings	2-yr. olds
E. L. M., Longm't	Inclosed	\$5.25	\$2.80	\$4.20	\$7.50	\$5.00	\$6.25
A. A. N., Montrose	Open forest (with drift fences)	1.00	1.46	1.46	...	...	...
J. H. D., Spicer..	Open	1.75	1.75	1.75	11.00	5.50	8.00
— — — Walden..	Open	3.50	2.00	3.00	8.00	6.00	7.00
J. E. W., Gill.....	Open	2.00	1.00	1.00	3.00	2.00	2.00
H. H., Romeo.....	Open	1.00	1.00	1.00	...	...	...
— — Calhan....	Open and Inclosed	5.00	4.00	5.00	8.00	6.00	7.00
C. L. G., Sheephorn	Open	2.00	2.00	2.00	8.00	8.00	8.00

The following table shows the precipitation for the months March to August during the two years of the experiment, and compares it with the normal precipitation:

MONTHLY PRECIPITATION IN INCHES AT THE COLORADO EXPERIMENT

STATION, FORT COLLINS\*

Date	Mar.	Apr.	May	June	July	Aug.
1910	0.06	0.42	4.75	1.04	0.87	1.92
1911	0.05	1.89	0.72	1.78	1.47	0.59
Normal	0.99	2.14	2.96	1.60	1.83	1.20

From this bulletin it will be seen how much below normal the precipitation was during the growing season both years, except for very heavy rains during May, 1910, from which there was necessarily a heavy run off.

The lateness of calving contributed to the lack of weight in the calves when brought in.

November 5th the calves were separated from the cows, after having become accustomed to hay, and were fed hay and a small amount of barley until June 3, 1911. The following summary shows results.

SUMMARY OF COST OF WINTERING CALVES

Average weight per head, November 5, 1910	288	lbs.
Average weight per head, June 3, 1911	632	lbs.
Average gain in weight per head,	339**	lbs.
Average daily gain per head,	1.63	lbs.
Amount of feed consumed per head:		
Alfalfa hay,	2200	lbs.
Feed barley,	788	lbs.
Value of feed consumed per head:		
Alfalfa hay, at \$5 per ton,	\$ 5.50	
Feed barley at \$1.00 per cwt.,	7.88	
Total	\$13.38	
Feed consumed for 100 pounds gain in live weight:		
Alfalfa hay,	632	lbs.
Feed barley,	227	lbs.
Cost of 100 pounds gain in live weight,	\$ 3.85	
Average amount of feed consumed daily:		
Alfalfa hay,	10.47	lbs.
Feed barley,	3.77	lbs.

\* Bulletin 182, Colo. Exp. Sta.

\*\*Gain of 15 head for 16 weeks, and 14 head for 14 weeks.

IN VARIOUS PARTS OF THE STATE.

Years of usefulness in a cow range	Percentage of calves secured	Market price of			Average price secured for feeders in the neighborhood			Weight November 1st		
		Alfalfa hay stack \$ 5.00	Native hay stack \$10.00	Barley in per cwt \$1.10	Calves \$18.00	Yearlings \$25.00	Two's \$40.00	Calves	Yearlings	Two's
14 yrs.	80	6.00	9.00	...	22.00	35 to 38	45 to 55	550 ...	780 ...	1000
8 yrs.	80	...	4 to 6	...	20 to 22	28 to 32	42 to 50	450 ...	650 ...	900
8 yrs.	75	...	5.00	...	20.00	30.00	40.00	450 ...	675 ...	850
6 yrs.	60	10.00	16.00	1.40	Seldom sold at these ages			300-400	400-600	600-800
10 yrs.	80	...	8.00	1.50	12 to 18	15 to 20	15 to 25	200 ...	300-500	500-1000
8 yrs.	...	...	12.00	...	12.00	20.00	28.00	200-300	400-600	600-800
10 yrs.	60	...	8.00	1.50	20.00	30.00	42.50	450 ...	750 ...	1000

The weight of the calves, June 3d, was 632 pounds per head, which is good, as only 3¾ pounds of barley per head were fed. The average daily gain was 1.6 lbs., and the cost of 100 pounds gain was \$3.85 with alfalfa hay @ \$5 per ton and barley @ \$1 per cwt. This encourages the liberal winter feeding of range calves.

The usual winter feed for calves in a good range section is from November 15th or December 1st to March 15th or April 1st, a period of four months, with a consumption of 20 pounds of hay per head per day, or 1¼ tons in the four months. The consumption of hay with our calves was 10.47 lbs. per head per day, and in addition they ate 3.77 lbs. barley per day.

The calves, now one year old, were run on the range during the summer of 1911 from June 3d to September 18th. This summer's grazing season was even shorter than the last, as there was less precipitation than in 1910, and grass suffered more in proportion because of its being the second dry year. The disastrous result in the growth of the yearlings is seen in their gain as shown by the following table.

Twenty-six pounds gain in three and one-half months is so little as hardly to be counted. The steers of course gained in frame, but lost their baby flesh in corresponding degree.

SUMMARY OF COST OF FATTENING YEARLINGS

Average weight per head June 3, 1911	632 lbs.
Average gain per head, June 3 to September 18, on range	26 lbs.
Average weight per head, Sept. 18, 1911,	658 lbs.
Average weight per head, April 6, 1912, (Out of feed lot)	1031 lbs.
Average gain in weight per head (30 weeks)	373 lbs.
Average daily gain per head,	1.78 lbs.
Amount of feed consumed per head:	
Alfalfa hay	2605 lbs.
Feed Barley,	1903 lbs.
Value of feed consumed per head:	
Alfalfa hay at \$5 per ton,	\$ 6.51
Feed barley at \$1 per cwt.,	19.03
Total	\$25.54
Feed consumed for 100 lbs. gain in weight:	
Alfalfa hay	698 lbs.
Feed barley	510 lbs.
Cost of 100 lbs. gain in live weight:	
(Alfalfa hay at \$5 per ton, barley at \$1 per cwt.)	\$ 6.85
Average amount of feed consumed daily:	
Alfalfa hay	16.1 lbs.
Feed Barley	11.8 lbs.

The table above gives also the summary of the second winter's feeding, which finished the steers and heifers for market. They were fed from September 18, 1911, to April 6, 1912, going in at 658 pounds, and coming out at 1031 pounds, a gain of 373 pounds per head in seven months,—an average gain of 1.78 pounds per day. They were fed 16.1 pounds of alfalfa hay and 11.8 pounds of California feed barley per day on the average, and the cost of gain was \$6.85 per hundred pounds; a figure at which a very good profit can be made.

The following summary gives a complete statement of the entire experiment:

#### SUMMARY OF BEEF PRODUCTION COST

Cost of cows per head .....	\$ 35.00
Cost of pasturing cows and calves, first summer, per head (Equivalent to 5 per cent. interest on 10 a. of \$10 fenced land).....	5.00
Depreciation in value of cows from spring to fall .....	5.00
<b>Net cost of calves per head at beginning of first winter, average weight 288 lbs.</b>	<b>10.00</b>
Cost of feeding calves first winter per head, average gain in weight 346.5 lbs., (Alfalfa hay at \$5 per ton, barley at \$1 per cwt.).....	13.38
Cost of pasturing yearlings per head .....	5.00
Net cost of feeder yearlings per head in fall, average weight 658 lbs.....	28.38
Market value of yearlings as feeders at 4½c per lb.....	29.61
Cost of fattening yearlings, per head, average gain in weight 373 pounds without shrink (Hay at \$5 per ton, barley at \$1 per cwt.).....	25.54
<b>Total cost of fat steers and heifers, at two years, per head, (Average weight 1031 lbs., out of feed lot).....</b>	<b>53.92</b>
Sales, (net in Denver) per head, average weight 967 lbs., to packers, (5 steers at \$7.50, and 8 heifers at \$7) .....	67.39
<b>Profit per head, over cost of feed and shrink .....</b>	<b>13.47</b>

These figures do not include the cost of labor in winter feeding.

The figures given above are open to many exceptions, as conditions vary greatly with regard to the cost of summer pasturage, depreciation of cows and so on. This summary aims to give a typical cost for the production of beef *with the weights and gains actually obtained in this experiment during the two unusually dry years.* (1911 was the driest year since 1893, 18 years). Taking these weights as indicative of about the worst to be expected, the summary shows what profit, if any, may be expected from the production of beef under such conditions. The best that we can do is to admit that, from the standpoint of showing a typical cost of production, the experiment is a failure, and we can use the figures of summer gains only as a basis around which to group other facts.

In the table I have shown the cost of pasturing cows and calves at \$5 per head for the cows. On free range, or on forest reserve, where the charge for grazing is 25 cents per head, the summer cost, including round up and branding, is probably not over \$1 per head. There are extensive sections in the eastern part of the State where the range is like that these cattle were run on, and 20 acres per cow is needed for summer pasture. When this land is held at \$10 per acre, the cost of pasturing would be \$10 for the summer.

While I have given \$5 per head to cover depreciation in value of cows, and interest on investment, some cattlemen do not figure depreciation on cows, as they expect to sell their cows for beef in the fall when their usefulness is nearly over, and realize as much for them as they cost as two-year-olds.

I have not figured loss of mature cattle in the summary, nor charged the extra cost due to a percentage of calves less than 100%.

On various ranges the percentage of calves raised runs from 50% to 80%, the average for Colorado ranges probably being 65%.

The cost of feeder yearlings as shown by the table is \$28.38, which is only \$1.23 less than their value delivered at a market. There was evidently no profit in raising them to this point, and the profit of \$13.47 finally shown is practically all to be credited to the fattening of the steers as yearlings. The results of the winter feeding both of the calves and yearlings may be taken as reasonably typical, and it is evident that the winter feeding of the calves was a paying proposition. This bears out the results published in Bulletin 149 of this Station. It is also evident that the fattening of the steers as yearlings was a profitable operation, and with reasonable growth on range there is every encouragement for the production of beef in valleys of the State where alfalfa and barley can be grown, and there is outside range for the cattle. In this way steers can be put on the market as yearlings at a weight which makes for the grower all the profit that can be made out of them. The grower who feeds out his own stuff is in shape to transfer his steers from range to feed lot without shrinkage, and he is also in a position to take advantage of the high market usually found from June to September. In sections a considerable distance from the railroad, when specialized crops cannot be grown because of impracticability of transportation, there is not quite the rush of spring work which occurs in our developed feeding sections, and fattening steers can be held in the feed lot well into the summer without seriously disorganizing the farm work. And because of cool weather well into the summer, practically all sections of the State will find little trouble from flies until well into July. From July to September, there is a dearth of fat cattle on the market, most feed lots being empty and the main supply of the killers being found in Texas grassers.

This experiment, and the other experiments reported in this bulletin, show the possibility of feeding at a profit in any section of the State with the feeds that can be grown there. Undoubtedly there may be rations which would secure better results than straight alfalfa and barley, but the knowledge that these will fatten stock profitably should encourage a beginning of the industry, and by the use of roots or silage in connection with alfalfa and barley, we should see the fattening of cattle carried on in every section of the State, instead of being confined to the localities where there are sugar factories furnishing a cheap feed in beet pulp.

I give in the following table \* information gathered from a selected lot of men running range cattle in different sections of the State. The figures given by them will serve to show normal cost of ranging cattle, and this data together with that given in the foregoing tables should enable one to work out within reasonable limits the variable cost of producing beef from range cattle. No set of figures worked out in any one locality and season can possibly give one a figure that may be used under other conditions. All that can be shown is what may be accomplished under similar conditions.

\*Table on top of pages 4 and 5.

## COST OF FEEDING UNDER OTHER CONDITIONS

The market price of barley, or the cost of growing it on the farm, varies with the locality, so the following table is given, showing the cost of gain with alfalfa and barley at a given price *when gain is made at the same rate as made by the yearling steers fattened in this experiment,—namely, 1.78 pounds per head per day, and with the same consumption of alfalfa and barley, which was 16.1 pounds alfalfa and 11.8 pounds barley per head per day.*

## COST OF 100 POUNDS GAIN WITH YEARLING STEERS

Alfalfa per ton	California Feed Barley Per Cwt.						
	\$ .90	\$1.00	\$1.10	\$1.20	\$1.30	\$1.40	\$1.50
\$4.00	5.98	6.49	7.00	7.51	8.02	8.53	9.04
5.00	6.38	6.84	7.35	7.86	8.37	8.88	9.39
6.00	6.68	7.19	7.70	8.21	8.72	9.23	9.74
7.00	7.03	7.54	8.05	8.56	9.07	9.58	10.09
8.00	7.38	7.89	8.40	8.91	9.42	9.93	10.44
9.00	7.73	8.24	8.75	9.26	9.77	10.28	10.79
10.00	8.08	8.59	9.10	9.61	10.12	10.63	11.14
11.00	8.43	8.94	9.45	9.96	10.47	10.98	11.49
12.00	8.78	9.29	9.80	10.31	10.82	11.33	11.84
13.00	9.13	9.64	10.15	10.66	11.17	11.68	12.19
14.00	9.48	9.99	10.50	11.01	11.52	12.03	12.54
15.00	9.83	10.34	10.85	11.36	11.87	12.38	12.89

Feed for 100 lbs. Gain, 5.1 cwt. barley, and .349 ton alfalfa, 51c increase in the cost of 100 lbs. gain, for each 10c increase in price of barley.

35c increase in cost of 100 lbs. gain for each \$1 increase in price of hay.

## BI-WEEKLY RECORD OF FATTENING YEARLINGS

13 head, (5 steers and 8 heifers), from Oct. 21, 1911, to April 6, 1912.

Period	Total weight	Average weight per head	Average gain in weight per head	Average gain in weight per head per day	Total Feed Eaten		Average daily Consumption of Barley lbs.
					Alfalfa hay	Barley	
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
Beginning *							
Sep. 18, 1911	8,557	658	..	....	.....	.....	.....
6th Week	9,370	721	63	1.49	.....	.....	.....
8th "	9,960	766	45	3.24	.....	455	2.5
10th "	10,425	802	34	2.55	.....	819	4.5
12th "	10,650	819	17	1.23	.....	1092	6.0
14th "	10,890	838	19	1.31	.....	1397	7.6
16th "	11,060	851	13	.93	.....	2054	11.2
18th "	11,240	865	14	.98	.....	2457	13.5
20th "	11,605	893	28	2.00	.....	2639	14.5
22nd "	12,145	934	41	2.96	.....	2730	15.0
24th "	12,550	966	32	2.22	.....	2821	15.5
26th "	12,825	987	21	1.51	.....	2863	15.7
28th "	13,100	1008	21	1.51	.....	2814	15.4
30th "	13,410	1031	24	1.70	.....	2603	14.3
			373	1.78	33,865	24,744	

\* Cattle were dchorned during first period.

(See other tables on Page 2.)