

SEPTEMBER, 1925

CIRCULAR 117

AGRICULTURAL EXPERIMENT STATION

KANSAS STATE AGRICULTURAL COLLEGE
MANHATTAN, KANSAS

DEPARTMENT OF ANIMAL HUSBANDRY



THE CALVES IN LOT 2 NEAR THE CLOSE OF THE EXPERIMENT

CATTLE FEEDING INVESTIGATIONS, 1923-'24¹

C. W. McCAMPBELL, B. M. ANDERSON, and H. W. MARSTON

PART I

THE EFFICIENCY OF VARYING AMOUNTS OF COTTONSEED MEAL WHEN FED AS A SUPPLEMENT TO A FULL FEED OF CORN, ALFALFA HAY, AND SILAGE

Since the opinion has been expressed occasionally that results probably would not be the same if a given test were repeated, the major portion of the cattle-feeding test conducted during the year 1922-'23, for the purpose of finding out how much cottonseed meal can be profitably fed to baby beeves² was repeated during the year 1923-'24.

Four lots of spring calves were started on full feed in the late fall.

1. Contribution No. 76 from the Department of Animal Husbandry.

2. McCampbell, C. W., and Horlacher, W. R. Cattle feeding investigations, 1922-'23. Kan. Agr. Expt. Cir. 105:1-10. 1924.

The animals in each lot received 2 pounds of alfalfa hay per head per day and all the cane silage and shelled corn they would consume. Lot 1 received no cottonseed meal in addition to this ration, but lot 2 received 1 pound of cottonseed meal per head per day in addition to the ration mentioned above and lot 3 received 2 pounds of cottonseed meal per head per day. Lot 4 received 1 pound of linseed oilmeal per head per day to furnish a comparison with lot 2 which received 1 pound of cottonseed meal per head per day.

RESULTS

The results in detail are given in Table I.

TABLE I.—Results of a 165-day feeding experiment showing the comparative efficiency of varying amounts of cottonseed meal when fed as a supplement to a full feed of corn alfalfa, hay, and silage.

(December 7, 1923, to May 20, 1924.)

Lot No.	1	2	3	4
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Average initial weight per calf.	414.80	414.67	414.80	414.93
Average final weight per calf.	725.40	765.03	761.07	761.93
Average total gain per calf.	310.80	350.36	346.27	347.00
Average daily gain per calf.	1.88	2.12	2.10	2.10
Average daily ration per calf:				
Linseed oilmeal. ....				.90
Cottonseed meal. ....		.90	1.69	
Shelled corn.	8.94	8.95	8.67	9.03
Alfalfa hay.	2.00	2.00	2.00	2.00
Cane silage.	10.80	10.80	10.80	10.80
Feed required for 100 pounds gain:				
Linseed oilmeal.				42.86
Cottonseed meal.		42.45	80.43	
Shelled corn.	475.53	422.17	412.86	430.00
Alfalfa hay.	106.33	94.34	95.24	95.24
Cane silage.	574.47	509.43	514.29	514.29
Cost of feed per 100 pounds gain.	\$8.18	\$8.32	\$9.17	\$5.55
Average cost per calf at \$7 per cwt.	\$29.02	\$29.03	\$29.04	\$29.05
Feed cost per head.	25.42	29.15	31.75	29.67
Calf cost plus feed cost.	54.44	58.18	60.79	58.72
Value per head at feedlot at end of test.	58.03	63.11	63.55	64.76
Margin per head, not including hog gains, to cover labor and interest.	3.59	4.93	2.86	6.04
Hog profits per calf. ....	.99	1.12	1.17	1.31
Margin per head, including hog gains, to cover labor and interest.	4.58	6.05	4.03	7.35
Necessary value per cwt. at feedlot to break even, not including hog gains.	7.50	7.60	7.99	7.71
Necessary value per cwt. at feedlot to break even, including hog gains.	7.37	7.46	7.83	7.53
Value per cwt. at feedlot.	8.00	8.25	8.35	8.50
Margin per cwt. to cover labor and interest, including hog profits. ....	.63	.79	.42	.97

Feed prices: Linseed oilmeal, \$55 per ton; cottonseed meal, \$50 per ton; shelled corn, 70 cents per bushel; alfalfa hay, \$15 per ton; cane silage, \$5 per ton.

DISCUSSION OF RESULTS AND COMPARISON WITH RESULTS SECURED THE PREVIOUS YEAR

The results secured in this experiment by the addition of varying amounts of cottonseed meal to a ration consisting of silage, alfalfa hay, and corn, are practically the same as those secured in 1922-'23. In both years, adding 1 pound of cottonseed meal per head per day was more profitable than adding 2 pounds of cottonseed meal. The profits derived from the lots receiving no cottonseed meal, 1 pound of cottonseed meal per head per day, and 2 pounds per head per day, respectively, for each year, and the average profits each for the two years are as follows:

	Profits per head		
	1922-'23	1923-'24	Average
No cottonseed meal	\$7.10	\$4.58	\$5.84
1 pound cottonseed meal	9.17	6.05	7.61
2 pounds cottonseed meal	6.28	4.03	5.15

These results are also shown graphically in figure 1.

The ratio of the profits derived from the use of no cottonseed meal, 1 pound of cottonseed meal per head per day, and 2 pounds per head per day for the first year was 100:141:88; the second year 100:123:88; and the average 100:130:88.

These two separate tests resulting in practically the same ratios indicate that 1 pound of cottonseed meal per head per day is the most economical amount of cottonseed meal to add to a ration consisting of corn, alfalfa hay, and silage for baby beef feeding when cottonseed meal and other feed price ratios approximate those prevailing the past two years. They also indicate that results of this nature secured by the Agricultural Experiment Station do not just happen to come out a certain way but rather that they come out in very much the same manner under similar conditions year after year, and that the farmer may expect his results to duplicate closely those of the Agricultural Experiment Station when the conditions under which he works are similar to those under which station results have been secured.

These results also emphasize the fact that cost of gains alone does not determine the profit in feeding cattle. Cattle fed the cheaper of two rations may or may not make the greater profit. In this test the gains of the cattle in lot 2, fed 1 pound of cottonseed meal in addition to corn, alfalfa, and silage, cost more than did the gains of the cattle in lot 1, fed only corn, alfalfa, and silage; yet the cattle in lot 2 made a greater profit than the cattle in lot 1 because they developed more finish and sold for enough more per hundred pounds

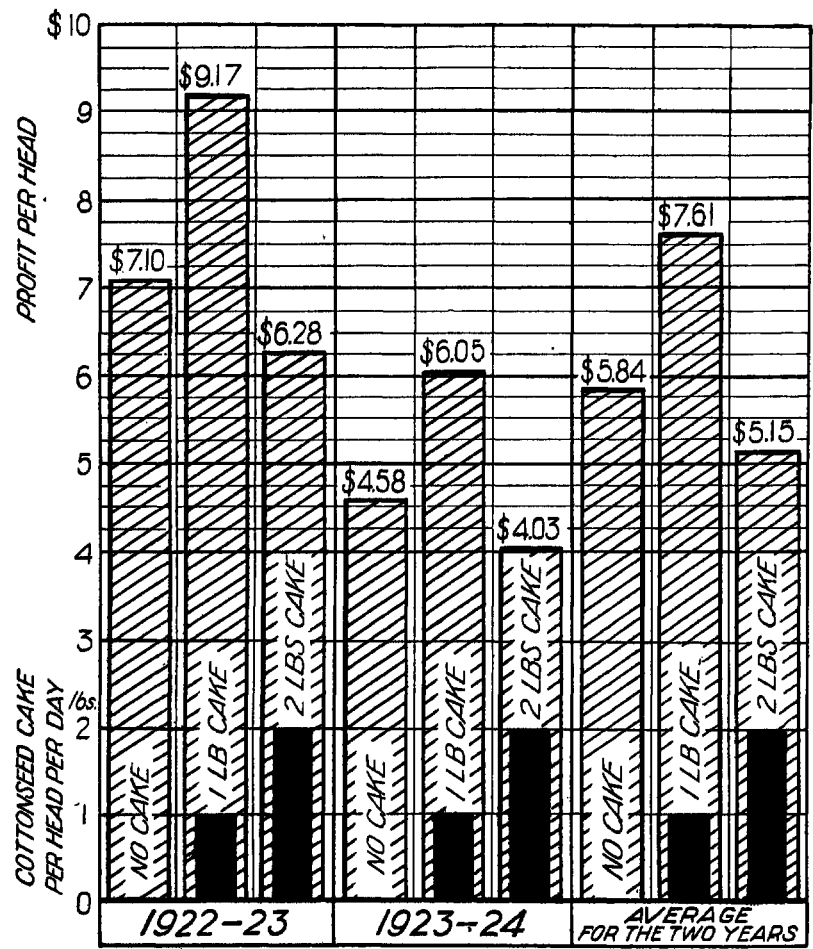


FIG. 1.—Graphical representation of the profits secured by feeding varying amounts of cottonseed meal as a supplement to a full feed of corn, alfalfa hay, and silage in a 231-day feeding experiment in 1922-'23 and again in a 165-day feeding experiment in 1923-'24.

to pay extra feed cost and still leave a margin of 16 cents per hundred pounds. On the other hand the gains of the cattle in lot 3, fed 2 pounds of cottonseed meal in addition to corn, alfalfa, and silage, cost more than the gains of the cattle in lot 1 fed corn, alfalfa, and silage. They also sold for more per hundred pounds, due to a greater degree of finish, but the extra finish of this lot while greater than in lot 2 was not enough greater to command the premium necessary to pay the extra cost and leave a margin of profit over either lot 1 or lot 2. In fact the margin was less in lot 3 than in either lot 1 or lot 2 in spite of the fact that it sold for more per hundred than either lot 1 or lot 2. These facts show how important it is that the feeder know as definitely as possible the relative feeding value of different feeds, the part that different feeds play in a ration, and the proper amounts of each feed to use.

RESULTS SECURED BY THE USE OF LINSEED OILMEAL

The lot fed 1 pound of linseed oilmeal per head per day made more profit than the lot fed 1 pound of cottonseed meal per head per day even though the linseed oilmeal cost \$5 a ton more than cottonseed meal. This is in accordance with previous tests with baby beef. It has, however, been found that the difference is not so great in favor of linseed oilmeal in the case of older cattle.

PART II

FULL-FEEDING ON GRASS VERSUS FULL-FEEDING IN A DRY LOT DURING THE SUMMER

Feeding cattle on grass, particularly yearling cattle, is a practice that is followed only to a limited extent in Kansas. Most yearlings that are fed during the summer are fed in dry lots. Furthermore most yearlings that are fed during the summer have been roughed throughout the winter. In view of these facts a test was planned for the purpose of comparing the gains and profits from full-feeding on grass and full-feeding in a dry lot on yearlings that had been roughed throughout the previous winter.

In the fall of 1922, 20 calves were purchased and on November 20 they were divided into two lots of 10 each. They were fed until April 1, 1923, as follows: Lot 1, a ration consisting of cane silage and alfalfa hay; lot 2, a ration consisting of cane silage and cottonseed meal.

On April 1, 1923, one-half of lot 1 and one-half of lot 2 were

placed in a group designated as lot 1A. The other half of the two lots were placed together in another group designated as lot 2A. From April 1 to May 1, 1923, lots 1A and 2A each received a ration consisting of cane silage, alfalfa hay, corn, and cottonseed meal. On May 1, 1923, lot 2A was placed on bluestem pasture and fed ground corn and cottonseed meal—the cane silage and alfalfa hay being discontinued on this date. Lot 1A remained in a dry lot all summer. From May 1, 1923, to June 20, 1923, the ration of lot 1A consisted of corn, cottonseed meal, alfalfa hay, and cane silage; after June 20, corn, cottonseed meal, and alfalfa hay—the cane silage being discontinued. These two lots were sold on the Kansas City market October 30, 1923.

RESULTS

The results in detail of the winter period of this test are given in Table II.

TABLE II.—Results of roughing through the winter calves that are to be full-fed during the summer.

(November 20, 1922, to April 1, 1923—132 days.)

Lot No.	1	2
	<i>Pounds.</i>	<i>Pounds.</i>
Average weight per calf at beginning of winter period, November 20, 1922,	396.70	391.53
Average weight per calf at end of winter period, April 1, 1923.....	462.00	476.13
Average total gain per calf	65.30	84.60
Average daily gain per calf .....	.49	.64
Average daily ration per calf:		
Silage.....	22.83	22.84
Alfalfa.....	3.5	.....
Cottonseed meal.....	.....	1.00
Cost per head per day during the winter period.....	\$0.084	\$0.083
Total cost of wintering per head.....	11.00	10.84
Initial cost per head.....	33.72	33.28
Total calf and feed cost at the end of winter period.....	44.72	44.12
Initial cost per cwt., November 20, 1922.....	8.50	8.50
Cost per cwt. at end of winter period, April 1, 1923.....	9.68	9.26

Feed prices: Corn, 70 cents per bushel; cottonseed meal, \$50 per ton; alfalfa hay, \$15 per ton; cane silage, \$5 per ton; bluestem pasture, \$8 per head.

During the winter both lots lost their calf fat but made considerable growth and came through the winter in a strong thrifty condition. Lot 2, fed cane silage and 1 pound of cottonseed meal per head per day during the winter, made 19.3 pounds per head more gain than did lot 1, fed cane silage and 3½ pounds of alfalfa hay per

CATTLE FEEDING INVESTIGATIONS, 1923-'24

head per day. These results indicate that 1 pound of cottonseed meal had a value equivalent to approximately 4 pounds of alfalfa hay as a supplement to silage for wintering calves. Particular attention is directed to the fact that the cost per each hundredweight of these calves roughed through the winter was 97 cents greater in the spring than the cost of each hundredweight when started on the experiment in the fall.

The results in detail of the fattening period of the test are given in Table III.

TABLE III.—Results secured by full-feeding on grass compared with those secured by full-feeding in dry lot during the summer.

(April 1 to October 30, 1923—212 days.)

Lot No. (a).....	1A.	2A.
Where fed.....	Dry lot.	Dry lot, Apr. 1 to May 1; pasture May 1 to Oct. 30.
Approximate age of calves when grain feeding was begun.....	12 months.	12 months.
	<i>Pounds.</i>	<i>Pounds.</i>
Average weight per head when grain feeding was begun, April 1, 1923,	470.46	469.17
Average selling weight per head.....	843.75	910.00
Average gain per calf based on selling weights.....	373.29	440.83
Average daily gain per calf based on selling weights.....	1.76	2.10
Average daily ration per calf:		
Corn.....	11.45	13.01
Cottonseed meal.....	.97	.98
Alfalfa hay (b).....	2.67	.28
Cane silage (b).....	4.77	2.66
Feed required for 100 pounds gain based on selling weights:		
Corn.....	650.57	619.52
Cottonseed meal.....	55.11	46.67
Alfalfa hay (b).....	151.70	13.33
Cane silage (b).....	271.02	126.67
Cost of feed per 100 pounds gain.....	\$11.24	\$10.44
Cost of calves per head at time grain feeding was begun.....	\$44.55	\$44.44
Feed cost per head.....	41.97	48.99
Calf cost plus feed cost.....	86.52	93.43
Selling price per head.....	90.70	102.87
Margin between selling price per head and calf cost plus feed cost...	4.18	8.94
Selling price per cwt.....	10.75	11.25

(a) Lots 1A and 2A are each composed of one-half of lot 1 and one-half of lot 2.

(b) Silage in lot 1A (dry lot) was discontinued June 20, 1923, and in lot 2A (lot on pasture) May 1, 1923. Alfalfa was discontinued in lot 2A (lot on pasture) May 1, 1923. The daily portion of silage and alfalfa given above under "Average daily ration per calf" is what the quantities actually fed would have amounted to had they been distributed throughout the entire feeding period.

Feed prices: Corn, 70 cents per bushel; cottonseed meal, \$50 per ton; alfalfa hay, \$15 per ton; cane silage, \$5 per ton; bluestem pasture, \$8 per head.

OBSERVATIONS

The yearlings in lot 2A roughed through the winter and full-fed on grass during the summer cost the same price per hundred when the full-feeding started; required less grain to make 100 pounds of gain; produced 100 pounds of gain for 80 cents less; sold for 50 cents a hundred more; and made a profit of \$4.76 per head more than did the yearlings in lot 1A which were roughed through the winter and full-fed in a dry lot during the same summer. It was also much easier to keep the cattle on pasture on a full-feed of grain than to keep the cattle in a dry lot on full feed.

PART III

**A LONG FEED ON GRASS COMPARED WITH A SHORT
FEED ON GRASS DURING THE SUMMER**

In the fall of 1923, a group of calves were purchased for the purpose of comparing the results secured the previous year by roughing through the winter and full-feeding on grass all summer, with half-feeding through the winter and full-feeding on grass all summer; also for the further purpose of comparing results that might be secured from half-feeding through the winter and full-feeding on grass all summer, with half-feeding through the winter, grazing on grass without additional feed from May 1 to August 1 and the full-feeding on grass from August 1 to November 1.

RESULTS

The results of this test in detail are given in Table IV.

CATTLE FEEDING INVESTIGATIONS, 1923-'24

TABLE IV.—Results secured by a long feed on grass compared with those secured by a short feed on grass.

(Winter period, December 7, 1923, to May 5, 1924—150 days; pasture period, May 5 to November 1, 1924—180 days.)

Lot No.	5	6
Plan of feeding	Half-fed during winter; full-fed on grass, May 5 to Nov. 1.	Half-fed during winter; full-fed on grass, Aug. 1 to Nov. 1.
	<i>Pounds.</i>	<i>Pounds.</i>
Average weight per calf at beginning of winter period, December 7, 1923	452.60	451.73
Average weight per calf at end of winter period, May 5, 1924	780.40	766.00
Average gain per calf during winter period	327.80	314.27
Average daily gain per calf during winter period	2.19	2.10
Average daily ration per calf during winter period, 1923-'24:		
Cane silage	24.38	24.38
Alfalfa hay	2.00	2.00
Cottonseed meal .....	.91	.91
Corn	4.69	4.69
Cost per head per day during the winter period	\$0.158	\$0.158
Total cost of wintering per head	23.70	23.70
Initial cost per head at \$8.50 per cwt., fall, 1923	38.47	38.40
Total calf and feed cost up to May 5, 1924	62.17	62.10
Cost per cwt. at end of winter period, May 5, 1924	7.97	8.11
Cost of feed, including pasture, on grass, summer, 1924	60.02	34.26
Total cost of calf and feed from fall as calves until marketed the following fall as yearlings (December 7, 1923, to November 1, 1924)	122.19	96.36
	<i>Pounds.</i>	<i>Pounds.</i>
Average selling weight per steer after feeding on grass during the summer of 1924	1,117	1,073
Average gain per steer fed on grass during pasture period, based on selling weight	336.6	307.0
Average daily gain per steer during pasture period, based on selling weight	1.87	1.71
Selling price per steer at Kansas City less shipping expense	\$122.41	\$117.46
Profit per steer .....	.22	21.10
Necessary selling price per cwt. to break even at Kansas City	11.23	9.28
Selling price per cwt. at Kansas City	11.25	11.25
Daily ration per steer on grass (a):		
Corn	14.69	14.81
Cottonseed meal .....	.98	.95

(a) It must be borne in mind that lot 5 were fed grain from May 5 to November 1, and lot 6 only from August 1 to November 1.
Feed prices: Corn, 70 cents per bushel to May 1, \$1 per bushel after May 1; cottonseed meal, \$50 per ton; alfalfa hay, \$15 per ton; cane silage, \$5 per ton; pasture, \$8 per head (2½ acres per head).

OBSERVATIONS ON PARTS II AND III

A comparison of lots 5 and 6 in Table IV with slots 1 and 2 in Table II shows a very significant difference in the cost per hundred pounds in the spring in the case of the calves that had been half-full-fed through the winter and in the case of calves that had been roughed through the winter. Feed prices were the same, yet the calves that had been half-full-fed during the winter, costing \$8.50 per hundredweight in the fall, cost \$8.04 per hundredweight in the spring, a reduction in cost of 46 cents per hundredweight. On the other hand the calves that had been roughed through the winter, costing \$8.50 per hundredweight in the fall, cost \$9.47 per hundredweight in the spring, an increase in cost of 97 cents per hundredweight.

A comparison of returns from calves roughed through the winter and full-fed on bluestem grass during the summer (1922-'23) with returns from calves half-full-fed during the winter and full-fed on bluestem grass during the summer (1923-'24), when figured on the basis of the same feed costs, shows a profit of \$5.44 per head greater in the case of the calves half-full-fed during the winter and full-fed on bluestem grass during the summer.

But more significant is the fact that the calves half-full-fed during the winter, grazed on bluestem grass from May 5 to August 1, and full-fed on bluestem grass from August 1 to November 1, returned a net profit \$20.88 per head greater than the calves half-full-fed during the winter and full-fed on bluestem grass from May 5 to November 1. This test demonstrates the possibility of using calves to utilize roughage and grass and produce high-class, well-finished, light-weight beef which the market now demands.

It is interesting to note that the group half-full-fed during the winter and full-fed on bluestem grass from May 5 to November 1 and the group half-full-fed during the winter, grazed on bluestem grass from May 5 to August 1, and full-fed on bluestem grass from August 1 to November 1, sold at the same price per hundredweight. The packer that bought these cattle explained this by saying that the short-fed yearlings were fat enough to meet the general demands of the trade for good, light-weight beef, whereas the long-fed yearlings would require a special order to command a price that would enable the packer to pay a premium for them.

In this connection it should be mentioned that the long-fed cattle did not carry decidedly more finish. They weighed only 29.6 pounds per head more than the short-fed cattle yet the summer feed bill for

the long-fed yearlings was \$25.76 per head more than for the short-fed yearlings. The yearlings full-fed from August 1 to November 1 made better use of grass during the entire summer than did the yearlings full-fed all season.

Thrifty, growthy, rugged, stretchy calves of good quality are essential to success in feeding calves for the fat cattle market.

