

at a rate sufficient to more than offset the added cost of feed preparation. Steer calves receiving 2.5 lb. cottonseed meal per head daily showed increased gain and feed efficiency as compared to calves receiving only 1.5 lb. Adding a low level of antibiotic (Ilotycin) or two tranquilizers to the daily ration gave only small increases in gain. Heifer calves previously implanted with stilbestrol as suckling calves out-gained their controls during the fattening period, while steer calves gained slightly less. Both groups showed greater net return than their controls.

Fattening Steers and Heifers on Rations Containing Different Levels of Concentrate

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The number of cattle being fattened in large commercial feed-lots in the southwest has increased greatly in the last ten years. The problems of feed preparation and ration formulation are unique for this enterprise. For one thing, the amount or percent of concentrate in the rations used may vary considerably from one feedlot to another, with apparent equal success.

Generally, ground or rolled milo is the principle grain used in self-fed mixtures, with cottonseed hulls, alfalfa hay or chopped bundle feed as the roughage. Molasses is frequently added to improve palatability.

Opinions vary as to how much concentrate a fattening ration should contain in order to obtain maximum feed intake, rapid gains, and to reach market grade as quickly as possible. This report deals with the third trial in a project designed to study the performance of beef calves self-fed mixed rations in which the amount of concentrate was varied 35 to 80 percent. The performance of steers vs. heifers was also compared. The results of two previous trials may be found in Okla. Agri. Exp. Sta. Misc. Pub. MP-45 (1956) and MP-48 (1957).

Procedure

Ninety-six, choice, Hereford calves were obtained in early September from the Lazy S Ranch near Springer, Oklahoma. They were fall and early winter calves and had not been creep-fed. The drove consisted of an equal number of steers and heifers, selected to be as nearly alike in age and quality as possible. Upon arrival at the Fort Reno station, the calves were supplemented on native grass for approximately three weeks until the start of the feeding trial. The cattle were contracted in mid-summer at a price of \$24.00 per cwt. for the steers and \$22.00 per cwt. for the heifers.

The calves were started on feed in late September. Within each sex, allotment was based on shrunk weight and feeder grade. Each lot con-

sisted of triplicate pens of four calves each within each sex. The calves were fed in small pens, with concrete exercise slabs and an open shed to the north under which the self-feeders were located. A watering device and mineral box (2 parts salt, 1 part bone meal) were available in each pen.

The mixtures fed by lots are shown in Table 1, together with the chemical composition and cost of each of the mixed rations. The concentrate portion of the ration consisted of ground milo, cottonseed meal and molasses; while the roughage was one-half cottonseed hulls and one-half chopped alfalfa hay. Small amounts of ground limestone were added as necessary to provide approximately the same calcium and phosphorus levels in all rations. All calves were started directly on their respective rations with the exception of those fed the 80:20 concentrate to roughage ratio. These calves were fed the 65:35 ration for 10 days and then placed on the 80:20 mix.

The cattle were weighed off the test and shipped to Oklahoma City when it was estimated that they had reached a slaughter grade of High Good to Low Choice. On-foot grades were estimated by a committee from the Animal Husbandry department and a Commission firm. In all, three shipments were made during the trial and the calves were selected individually for each shipment. Marketing and slaughter data included dressing percentage, carcass grade, marbling score and current value for each carcass. Carcass grades were established by a representative of the Animal Husbandry department. The live or "on foot" value of the cattle was obtained from the actual carcass value and based on the final weight off test at Fort Reno.

Table 1.—Composition and cost of self-fed mixtures

Lot number Conc.: Roughage ratio	1 & 2 35:65	3 & 4 50:50	5 & 6 65:35	7 & 8 80:20
Feeds used (%)				
Ground milo	17.0	33.2	49.7	65.1
Cottonseed meal	11.0	9.5	7.7	7.0
Molasses	7.0	7.0	7.0	7.0
Chopped alfalfa	32.5	25.0	17.5	10.0
Cottonseed hulls	32.5	25.0	17.5	10.0
Ground limestone	0.0	0.3	0.6	0.9
	100.0	100.0	100.0	100.0
Ration composition (%)				
Dry matter	90.25	89.57	88.89	88.25
Ash	4.71	5.16	4.71	4.30
Crude protein	12.16	12.13	12.01	12.26
Ether extract	2.15	2.30	2.44	2.59
Crude fiber	31.73	17.30	12.83	8.47
N-free extract	42.96	47.82	52.80	57.34
Estimated T.D.N. content (%)	56.60	61.35	66.10	70.83
Cost per cwt. (\$)	1.59	1.72	1.85	2.00

Results

Average daily gains, feed consumption, and feed required per hundred pounds gain are shown in Table 2. On-foot value, carcass data, and financial returns are given in Table 3. In Table 4, an over-all comparison is made of steers vs. heifers.

Average daily gains, within sex, showed little difference among the lots despite the wide variation in concentration of the rations fed. Although the self-fed mixtures varied from 57 to 71 percent TDN, actual TDN intake was not greatly affected. This was due to marked differences in total feed intake, as shown in Table 2. This has been a consistent observation during the three trials that have been conducted to date. Although a rather wide difference can be seen in the amount of concentrate or roughage required to produce 100 lb. gain, when expressed on the basis of TDN per 100 lb. gain, little difference due to the rations fed can be seen. These data would indicate that the TDN of the concentrates and roughages fed in this trial have about the same value for fattening calves, which is contrary to the views of many authorities who consider that for fattening purposes, the TDN measurement overestimates the productive energy value of roughages.

Considering steers and heifers (within treatment) together, the feed cost per cwt. gain was \$17.77, \$17.85, \$19.04 and \$18.32 for calves fed 35, 50, 65 or 80 percent concentrate mixtures, respectively. It must be borne in mind that these cost figures are subject to fluctuations in the price of concentrates and roughage, hence could vary from year to year. Steer calves fed the 65 percent concentrate ration, and heifers fed the 50 percent mixture, required less time to reach market grade, with little difference among the other lots.

Dressing percent (yield) based on final Ft. Reno weights indicates that calves fed the 35 percent concentrate ration (Lots 1 and 2) and those fed the 80 percent mixture (Lots 7 and 8) had lower yields than those fed either 50 or 65 percent rations. The reason for this lowering at the extremes of the ratios tested is not apparent since all lots, within sex, appeared to grade about the same. With the exception of the slightly higher marbling score for heifers on the 50:50 ration (Lot 4), there was no apparent effect of ration on marbling. On-foot values, as calculated here, tended to reflect differences in dressing percentage and thus are not as meaningful as they may appear at first glance. There were only small differences in net return, both sexes considered, among the treatments—with the 50:50 ratio giving the greatest net return and the 65:35 the least. The feed costs used in computing net returns did not include the added costs of handling feed for lots fed the 35:65 or 50:50 rations, nor the increased costs of chopping roughage for these cattle. Depending on the circumstances, these costs could be a disadvantage if more total feed, or mixtures with a greater percentage of roughage, were required.

Steers vs. Heifers

From the results given in Table 4, it is apparent that steer calves outgained heifers by 0.26 lb. per head daily. This corresponds closely to

Table 2.—Performance of steers and heifers self-fed rations varying in concentrate-to-roughage ratios (12 calves/lot)

Conc: Roughage Ratio Lot number Sex	35:65		50:50		65:35		80:20	
	1 Steers	2 Heifers	3 Steers	4 Heifers	5 Steers	6 Heifers	7 Steers	8 Heifers
Av. days on feed	177	169	174	158	166	170	179	171
Av. weights (lb.)								
Initial 9-26-57	555	527	558	527	560	530	560	528
Gain to 144 days ¹	323	287	317	303	313	280	321	271
Total gain	406	345	394	332	375	336	413	328
Av. daily gain	2.30	2.05	2.27	2.11	2.23	2.00	2.32	1.93
Av. daily feed consumption (lb.) ²								
Concentrate	8.57	7.98	11.29	11.30	14.42	13.81	16.16	14.72
Roughage	15.92	14.82	11.29	11.30	7.76	7.44	4.04	3.68
Total	24.49	22.80	22.58	22.60	22.18	21.25	20.20	18.40
Av. daily T.D.N. intake (lb.)	13.66	12.90	13.85	13.87	14.66	14.05	14.31	13.03
Feed per cwt. gain (lb.)								
Concentrates	373	409	499	539	647	690	700	766
Roughage	693	760	499	539	349	372	175	191
Total	1066	1169	998	1078	996	1062	875	957
T.D.N. per cwt. gain (lb.)	603	662	612	661	658	702	620	678
Feed cost per cwt. gain (\$)	16.95	18.59	17.17	18.54	18.43	19.65	17.50	19.14

¹ First shipment of cattle made after 144 days on feed.

² Computed from records of feed consumed and composition of rations.

Table 3.—Carcass data and financial results

Conc: Roughage Ratio Lot number Sex	35:65		50:50		65:35		80:20	
	1 Steers	2 Heifers	3 Steers	4 Heifers	5 Steers	6 Heifers	7 Steers	8 Heifers
Carcass yield (%) ¹	57.40	57.86	63.00	59.44	60.00	58.53	57.86	58.69
Av. U. S. carcass grade Numerical score ²	Gd. + 6.1	Ch.— 5.1	Gd. + 5.7	Ch.— 5.1	Gd. + 6.0	Ch.— 5.3	Gd. + 6.0	Ch.— 5.0
Marbling score ³	3—	3+	3—	2—	3—	3+	3—	3+
Financial results (\$)								
On-foot value/cwt. ⁴	25.83	26.34	28.43	27.01	26.32	26.57	26.06	26.72
Market value/calf (\$)	247.95	229.41	250.51	231.77	243.46	230.66	253.52	228.97
Feed cost/calf (\$)	68.93	61.26	67.58	61.42	68.12	66.84	72.32	62.92
Total steer and feed cost ⁵ (\$)	202.13	177.20	201.50	177.36	202.52	183.44	206.72	179.08
Net return/calf	45.82	52.21	49.01	54.41	40.94	47.22	46.80	49.89

¹ Hot carcass weights shrunk 2½%, based on final Ft. Reno weights.

² Numerical score: 1=prime, 4=choice, 7=good, 10=standard.

³ Marbling score: 1=abundant, 3=moderate, 5=slight to none.

⁴ On-foot value computed from carcass value according to grade and yield, and based on final live weight at Ft. Reno.

⁵ Steers charged into feedlots at \$24.00/cwt., heifers at \$22.00.

Table 4.—Comparison of steers and heifers based on lot averages¹

	Steers Lots 1,3,5 & 7	Heifers Lots 2,4,6 & 8
Av. days on feed	174	167
Av. weights (lbs.)		
Initial	558	528
Gain to marketing	397	335
Av. daily gain	2.28	2.02
Total feed consumed/calf/day (lbs.)	22.36	21.26
Feed per cwt. gain (lbs.)		
Concentrates	555	601
Roughage	429	466
Feed cost/cwt. gain	17.51	18.98
Marketing data:		
Yield (%)	59.57	58.63
Av. carcass grade	Gd.+(6.0)	Ch.—(5.1)
On-foot value/cwt. (\$)	26.66	26.66
Net return/calf (\$)	45.64	50.93

¹ Individual lot data shown in Tables 2 and 3.

results of previous trials. Heifers required about 8-9 percent more concentrate and roughage than steers, and feed costs per cwt. gain were \$1.47 per cwt. less for the steers. Dressing percent also favored the steers. Despite more rapid and efficient gains, heifers proved most profitable in these trials due to the fact that the heifers' carcasses were 1/3 of a grade higher, making them equal to the steers in on-foot value, and initial cost was \$2.00 per cwt. less. Again, similar results have been obtained in previous trials. Under Oklahoma conditions, depending of course on the demand for female replacements, and whether or not they can be purchased open, heifers appear to be a better buy than steers for feedlot purposes.

Summary

The third in a series of trials with long-aged steer and heifer calves was conducted to study the effect of self-fed mixtures varying from 35 to 80 percent concentrate on gains, feed efficiency, and carcass merit. Only small differences were observed among the lots due to the rations fed. Although the mixtures containing higher levels of concentrate supplied more TDN per lb. of ration, feed intake among the lots was such that actual TDN intake was similar. Thus there were relatively small differences in rate of gain, TDN per cwt. gain, days on feed required to reach a slaughter grade, or carcass grades of the cattle. A lowering of dressing percentage was noted on the two extreme mixtures (35 and 80 percent concentrate). Steers outgained heifers and converted feed more efficiently, but were less profitable due to lower carcass grade and higher initial cost.