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HEIFERS

VS.

STEERS

IN THE FEEDLOT

T. B. Keith, J. J. Dahmen,
L. E. Orme, T. Donald Bell



UNIVERSITY OF IDAHO
College of Agriculture

Summary

This publication summarizes two series of studies comparing the feedlot performance of heifer and steer calves. A total of 80 head—40 heifers and 40 steers—were fed in individual stalls in each of two different years. Four protein levels, three ratios of concentrate to roughage and four different rations were fed in the two years.

In the 1964-65 series, the steers gained 10 percent faster than the heifers on approximately the same amount of feed per 100 pounds gain. They cost \$3.06 per 100 more and sold for \$1.50 per 100 pounds more than the heifers on a choice carcass basis. The heifers produced 16 more choice grade carcasses. Overall, return was 7 cents per head in favor of the heifers.

In 1965-66, the steers gained 8.3 percent faster on approximately the same amount of feed per 100 pounds gain. They cost \$2 per 100 pounds more and sold for \$2 premium on a choice carcass basis. The steers yielded six more choice carcasses than the heifers. The steers produced an average net return of \$3.97 above initial cost and feed cost while the heifers averaged a net loss of \$0.97 per head.

The Authors

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AGRICULTURAL EXPERIMENT STATION
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HEIFERS vs. STEERS IN THE FEEDLOT

T. B. Keith, J. J. Dahmen, L. E. Orme and T. Donald Bell

Limited information is available on the performance of heifers in the feedlot. This study compares the rate and economy of gains of heifers and steers fed different rations and different concentrate-to-roughage ratios. All calves were fed in individual stalls at the University of Idaho Branch Experiment Station, Caldwell, Idaho. Two series of studies are reported herein involving a total of 160 calves—80 heifers and 80 steers.

Effects of Different Protein And Concentrate Levels

In the 1964-65 study, 40 heifers and 40 steers were purchased from one herd of Hereford cattle. The heifers were assigned to four pens of 10 each on the basis of weight, the steers to four other pens of 10 each on the basis of weight. Twenty calves—10 heifers and 10 steers—were fed each protein level of 12, 14, 16 and 18 percent. Each protein group was further divided so 5 heifers and 5 steers were fed a 1:1 ratio of concentrate to roughage and the other half was fed a 3:1 ratio. The feeding plan is outlined in Table 1.

The roughage mixture included six parts corn silage and one part chopped alfalfa hay—a 2:1 ratio on a dry matter basis. Concentrate mixtures are shown in Table 2 and cost of the feeds in Table 3.

The heifers were fed 210 days, from November 17, 1964, to June 15, 1965. The steers were fed 245 days, from November 17, 1964, to July 20, 1965.

Experimental Results

Average initial and final weights, average daily intake of feed and rate and economy of gains for each 5-head lot are summarized in Table 4. Table 5 shows the comparative effects of protein levels and the concentrate-to-roughage ratios and indicates the interrelationship of protein and concentrate level.

Calves fed the 14, 16 and 18 percent protein rations had significantly higher rates of gain than those on the 12 percent protein. However, the cost of 100 pounds gain was less in the 12 percent protein group.

TABLE 1. Outline of the individual feeding schedule for heifers and steers, 1964-65.

Protein level	No. calves	Sex	No. calves	Ratio concentrate to roughage	
					No. calves
12	20	H	10	1:1	5
				3:1	5
		S	10	1:1	5
				3:1	5
14	20	H	10	1:1	5
				3:1	5
		S	10	1:1	5
				3:1	5
16	20	H	10	1:1	5
				3:1	5
		S	10	1:1	5
				3:1	5
18	20	H	10	1:1	5
				3:1	5
		S	10	1:1	5
				3:1	5

TABLE 2. Percentage composition of concentrate mixtures, 1964-65.¹

Feeds	Protein level of ration (percent)			
	12	14	16	18
Barley, steam rolled	49	45	41	37
Oats, steam rolled	24	21	18	15
Dried molasses beet pulp	24	21	18	15
Soybean oil meal .....	....	10	20	30
Salt	2	2	2	2
Bonemeal	1	1	1	1

¹ All animals received 10 mg of diethylstilbestrol per day.

TABLE 3. Feed prices per ton, 1964-65.

Feed	Cost (\$)
Barley	53.00
Wheat	53.00
Oats	51.00
Dried molasses beet pulp	40.00
Soybean oil meal	112.00
Alfalfa hay (chopped)	27.50
Corn silage	9.00
Bonemeal	100.00
Salt	33.20

The calves fed the 3:1 ratio of concentrate to roughage gained three percent faster than those fed the 1:1 ratio during the first 210 days. Calves fed the 1:1 ratio made cheaper gains through the same period (Table 6).

Steers outgained the heifers by 16 percent during the first 210 days, but they also required an extra 35 days on feed to finish. Gain and feed consumption data for steers during this overall 245-day period are listed in Table 7. Table 8 has the comparative figures for heifers fed 210 days and steers fed 245 days.

Table 9 summarizes the carcass data for both sexes. Carcass grades were highest for heifers fed the 16 and 18 percent levels of protein. With steers, there were no significant differences attributable to protein. The degree of marbling was not significantly influenced by the protein level, especially in steer carcasses where those fed the highest level of

TABLE 4. Average weights, daily gains and feed consumption of heifers and steers fed 210 days, 1964-65.

Pen	Sex	Weights		Average daily		Feed per 100 lb. gain
		Initial	Final	Gain ¹	Ration	
		lb.	lb.	lb.	lb.	lb.
7	H	420	819	1.90a	18.6	978
8	S	484	920	2.10ab	20.8	1010
9	H	421	838	1.99a	20.0	1007
10	S	468	993	2.50b	22.4	901
11	H	421	853	2.06ab	20.5	998
12	S	476	951	2.30ab	21.5	955
13	H	418	839	2.01ab	20.0	997
14	S	493	1009	2.50b	22.4	912
All heifers				1.99a	19.81	996
All steers				2.32b	21.80	944

¹ Means with the same suffix are not significantly different; those with different suffixes differ significantly ($P \leq .05$).

TABLE 5. A summary of the performance of steers and heifers fed four levels of protein and two levels of concentrate mixture for 210 days, 1964-65.

	Protein level	C:R ratio	No. Animals	Weight		Average daily		Feed per 100 lb. gain	Cost per 100 lb. gain
				Initial	Final	Gain*	Ration		
	%			lb.	lb.	lb.	lb.	lb.	\$
Pen 7									
Heifers	12	1:1	5	430	823	1.87c	20.8	1108	12.73
Heifers	12	3:1	5	410	815	1.93c	16.4	851	12.70
Pen 8									
Steers	12	1:1	5	489	917	2.04cd	23.0	1133	12.98
Steers	12	3:1	5	480	924	1.85cd	16.3	887	16.16
Pen 9									
Heifers	14	1:1	5	420	823	1.92c	22.0	1151	13.30
Heifers	14	3:1	5	421	853	2.06cd	18.0	877	16.00
Pen 10									
Steers	14	1:1	5	467	992	2.50ab	25.0	999	12.19
Steers	14	3:1	5	470	994	2.50ab	20.0	803	14.63
Pen 11									
Heifers	16	1:1	5	388	798	1.95c	22.1	1129	15.17
Heifers	16	3:1	5	453	907	2.16cd	19.3	894	15.59
Pen 12									
Steers	16	1:1	5	459	908	2.14c	22.8	1066	14.32
Steers	16	3:1	5	493	995	2.39ba	20.1	843	16.85
Pen 13									
Heifers	18	1:1	5	417	852	2.07c	22.9	1113	15.87
Heifers	18	3:1	5	418	826	1.95cd	17.0	889	19.10
Pen 14									
Steers	18	1:1	3**	503	1031	2.52ab	25.4	1011	13.52
Steers	18	3:1	5	483	987	2.40ba	19.5	813	17.65

*Means with the same suffix are not significantly different; those with different letter suffixes differ significantly ($P \leq .05$).

**Two steers in this group died.

TABLE 6. A comparison of average daily gains and feed requirements of cattle fed four different levels of protein and two ratios of concentrate to roughage for 210 days, 1964-65.

	Protein level				C:R ratio	
	12	14	16	18	1:1	3:1
No. calves	20	20	20	18	38	40
Avg daily gain*	2.00a	2.24b	2.20b	2.23b	2.13a	2.20b
Avg daily ration, lb.	19.7	21.2	21.1	21.2	23.0	18.6
Feed/100 lb. gain, lb.	995	958	983	957	1089	857
Cost/100 lb. gain, \$	13.64	14.03	14.40	16.53	13.76	16.08

*Means with the same suffix are not significantly different; those with different letter suffixes differ significantly ($P \leq .05$).

TABLE 7. A summary of the performance of steers fed four levels of protein and two levels of concentrate mixture for 245 days, 1964-65.

Pen	Protein level	C:R ratio	No. steers	Average daily		Feed per 100 lb. gain
				Gain*	Ration	
				lb.	lb.	lb.
8	12	1:1	5	1.94a	23.2	1200
	12	3:1	5	1.86a	17.2	916
10	14	1:1	5	2.41b	25.7	1066
	14	3:1	5	2.34b	20.4	868
12	16	1:1	5	2.04ac	23.2	1132
	16	3:1	5	2.23bc	20.2	907
14	18	1:1	3	2.35b	25.3	1084
	18	3:1	5	2.21bc	19.3	890

*Means with the same suffix are not significantly different; those with different suffixes differ significantly ($P \leq .05$).

TABLE 8. Average weights, daily gains and feed consumption of heifers fed 210 days and steers fed 245 days, 1964-65.

Pen	Weight		Average daily		Feed per 100 lb. gain	Cost per 100 lb. gain
	Initial	Final	Gain	Ration		
	lb.	lb.	lb.	lb.	lb.	\$
7	420	819	1.90	18.6	978	13.37
8	485	991	2.07	21.7	1052	14.45
9	421	838	1.99	20.0	1007	15.16
10	469	1052	2.38	23.0	966	14.49
11	421	853	2.06	20.5	998	16.47
12	476	999	2.13	21.7	1017	16.77
13	418	839	2.01	20.0	997	17.48
14	491	1050	2.28	22.3	978	18.04
Heifers	420	837	1.99	19.8	996	15.67
Steers	480	1023	2.21	22.2	1003	15.80

protein had the largest loin eye areas. Thickness of subcutaneous fat generally increased with the level of protein fed and the percent of trimmed retail cuts (cutability grade) tended to show the same pattern.

Significant differences were found between heifer and steer carcasses for slaughter grade, carcass grade, rib-eye area, cutability grade and cooler shrinkage. The heifer carcasses excelled in carcass grade, cutability grade and percent cooler shrinkage. The steers had higher slaughter grade scores and their carcasses had larger rib-eye areas. Had the heifers been slaughtered at a comparable live weight, the carcasses would probably have had greater thickness of subcutaneous fat and a lower yield of choice trimmed retail cuts (cutability) than steers.

Monetary Results

Tables 10 and 11 have the cost and return data per animal and the comparative costs and returns for heifers and steers. Overall, net return was \$0.07 per head more for heifers than for steers. The steers weighed 60 pounds more than the heifers at the beginning of the experiment and cost \$3.06 more per 100 pounds. They gained 0.22 pound more per day and required 35 more days to finish than the heifers. The heifers had 16 more choice carcasses than the steers.

TABLE 9. Average carcass data of heifers and steers fed four levels of protein, 1964-65.¹

	Heifers				Steers				Avg all Heifers	Avg all Steers
	Protein level				Protein level					
	12	14	16	18	12	14	16	18		
Number	10	10	10	10	10	10	10	8	40	38
Feeder grade	10.9a	10.8a	10.9a	10.8a	11.4b	10.7a	10.8a	10.8a	10.9	10.9
Slaughter grade	8.4	9.2	9.5	9.6	9.8	10.2	9.5	10.1	9.2a	9.9b
USDA carcass grade	9.4a	9.6ab	10.1b	10.2b	9.2a	9.0a	8.9a	9.3a	9.8b	9.1a
Degree of marbling	4.8a	4.9a	5.4a	5.6a	4.9a	4.7a	4.5a	4.9a	5.2a	4.8a
Conformation score	10.0a	10.3a	11.0b	10.2a	10.3a	10.3a	10.4a	10.9a	10.4a	10.5a
Rib-eye area, sq. in.	9.82a	10.08a	10.83b	10.36ab	10.75ab	10.91b	10.99bc	11.36c	10.3a	11.0b
Fat depth, mm	14.4	15.7	17.0	17.0	13.6	17.7	14.1	14.5	16.0a	15.7a
Cutability grade	2.58a	2.65a	2.56a	2.74a	2.67a	2.84b	2.66a	2.92b	2.63a	2.77b
Cooler shrinkage, % .....	.97a	.86b	.84b	.85b	1.50c	1.47c	1.44c	1.52c	.88a	1.48b

¹Means within each group with the same suffix are not significantly different; those with different letter suffixes differ significantly ($P \leq .05$).

TABLE 10. Average costs and returns per animal in 1964-65.

Pen	Initial cost	Feed cost	Total cost	Gross return	Net return
	\$	\$	\$	\$	\$
7	79.72	53.36	133.08	190.57	57.49
8	106.89	73.13	180.02	237.94	57.92
9	79.91	63.24	143.15	197.56	54.41
10	103.37	84.49	187.86	253.38	65.52
11	79.91	71.15	151.06	206.57	55.51
12	104.91	87.70	192.61	242.61	50.00
13	79.34	73.60	152.94	202.47	49.53
14	108.22	100.85	209.07	252.26	43.19
Heifers	79.72	65.34	145.06	199.29	54.23
Steers	105.85	86.54	192.39	246.55	54.16

TABLE 11. Comparative costs and returns per animal in 1964-65.

	Heifers	Steers	Difference in favor of steers
Number of animals	40	38	
Initial weights, lb.	420	480	+60
Initial cost per 100 lb., \$	18.98	22.04	+ 3.06
Average daily gain, lb.	1.99	2.21	+ 0.22
Days on feed	210	245	+35
USDA carcass grades—Choice	29	13	-16
USDA carcass grades—Good	11	25	+14
Feed per 100 lb. gain, lb	996	1003	+ 7
Feed cost per 100 lb. gain, \$	15.67	15.80	+ 0.13
Price of choice grade on rail, \$	42.00	43.50	+ 1.50
Net return per animal, \$	54.23	54.16	- 0.07

Effects of Different Rations And Concentrate Levels

In 1965-66, Angus and Angus-Hereford crossbred calves of uniform age and genetic source were purchased from one herd. The calves were divided by sex and assigned to pens by weight as in the previous year. Twenty calves—10 heifers and 10 steers—were assigned to each of four rations. One-half of each group—5 heifers and 5 steers—was fed a 1:1 concentrate-to-roughage ratio, and the other half of the group was fed a 2:1 ratio. The feeding plan is outlined in Table 12.

Concentrate mixtures fed are shown in Table 13, with prices of the feedstuffs in Table 14. The roughage mixture was six parts corn silage and one part chopped alfalfa hay, the equivalent of a 2:1 mixture on a dry matter basis. The heifers were fed 210 days, from November 23, 1965, to June 21, 1966; the steers 239 days, from November 23, 1965, to July 20, 1966.

TABLE 12. Outline of the individual feeding schedule for heifers and steers, 1965-66.

Ration no.	No. calves	Sex	No. calves	Ratio concentrate to roughage	No. calves
1	20	H	10	1:1	5
				2:1	5
		S	10	1:1	5
				2:1	5
2	20	H	10	1:1	5
				2:1	5
		S	10	1:1	5
				2:1	5
3	20	H	10	1:1	5
				2:1	5
		S	10	1:1	5
				2:1	5
4	20	H	10	1:1	5
				2:1	5
		S	10	1:1	5
				2:1	5

TABLE 13. Percentage composition of concentrate mixtures, 1965-66.¹

Feeds	Ration Number			
	1	2	3	4
Barley, steam rolled	49	67		33
Oats, steam rolled	24			
Wheat, steam rolled			67	32
Dried molasses beet pulp	24	30	30	32
Steam bonemeal	1	1	1	1
Salt	2	2	2	2

¹ All animals received 10 mg of diethylstilbestrol per day.

TABLE 14. Feed prices per ton, 1965-66.

Feed	Cost (\$)
Barley	48.00
Wheat	45.00
Oats	47.00
Dried molasses beet pulp (pelleted bulk)	41.00
Steam bonemeal	100.00
Salt (iodized)	36.70
Alfalfa hay (chopped)	27.50
Corn silage	9.00
Steam rolling	4.00

Experimental Results

Tables 15 through 18 summarize the 210-day data on average weights, gains and feed intake, the comparative rate and economy of gains of the two sexes, the effect of the concentrate-to-roughage ratios and the growth promoting values of the rations. Data relating to the 239-day performance of the steers are shown in Tables 19, 20, and 21.

The steers gained 7.5 percent faster than the heifers during the first 210 days and required approximately the same feed for each 100 pounds gain. They consumed 1.3 pounds more feed per day than the heifers. Steers fed the 2:1 ratio of concentrate to roughage gained significantly faster than those steers fed the 1:1 ratio, but heifers fed the 2:1 ratio did not gain more rapidly than the heifers fed the 1:1 ratio.

Combined data of heifers and steers (Table 22) show significantly more rapid gains for calves fed the barley, oats and dried molasses beet pulp mixture (ration 1) and the barley, wheat and dried molasses beet pulp mixture (ration 4) than those fed the barley and dried molasses beet pulp (ration 2) or wheat and dried molasses beet pulp mixture (ration 3).

Neither the concentrate-to-roughage ratios nor the different rations had a significant effect on carcass value (Table 23). The steer carcasses

had a significantly deeper fat, 16.6 mm as compared to 13.9 mm for the heifer carcasses. The loin eye area was not significantly different between the heifer and steer carcasses, although the steer carcasses averaged 1.2 square inches more. This would explain the similarity of cutability grade for the two sexes (2.2 and 2.1) which would normally be expected to be different.

The average slaughter weight for the heifers was 845 pounds compared with 915 pounds for the steers or a difference of 70 pounds. Had the heifers been fed to the same live weight as the steers, they would probably have had a greater amount of subcutaneous fat and a lower cutability grade or a greater amount of trimmed fat. This partially explains why it is advisable to market heifers at lighter slaughter weights than steers. It should be noted that the heifer carcasses had a lower conformation score than the steer carcasses, and that the steer carcasses had slightly more marbling (5.1) than the heifer carcasses (4.8).

TABLE 15.—A summary of the performance of steers and heifers fed four rations and two ratios of concentrate to roughage for 215 days, 1965-66.

	Ration	C:R ratio	No. animals	Weight		Average daily		Feed per
				Initial	Final	Gain	Ration	100 lb. gain
				lb.	lb.	lb.	lb.	lb.
Pen 7								
Heifers	1	1:1	5	465	840	1.79	22.3	1254
Heifers	1	2:1	5	427	838	1.96	20.2	1033
Pen 8								
Steers	1	1:1	5	501	926	2.02	24.5	1210
Steers	1	2:1	5	492	968	2.26	22.6	1007
Pen 9								
Heifers	2	1:1	5	444	838	1.88	21.4	1139
Heifers	2	2:1	5	458	836	1.80	21.7	1041
Pen 10								
Steers	2	1:1	5	505	899	1.88	21.3	1140
Steers	2	2:1	5	490	885	1.88	21.2	1134
Pen 11								
Heifers	3	1:1	5	473	868	1.88	22.5	1198
Heifers	3	2:1	5	434	806	1.77	17.9	1017
Pen 12								
Steers	3	1:1	5	503	862	1.71	21.8	1277
Steers	3	2:1	5	478	914	2.07	19.4	938
Pen 13								
Heifers	4	1:1	5	450	878	2.04	22.8	1124
Heifers	4	2:1	5	463	854	1.86	19.7	1057
Pen 14								
Steers	4	1:1	5	484	919	2.07	23.8	1157
Steers	4	2:1	5	494	948	2.16	21.1	983

TABLE 16. Average daily gains and feed requirements of heifers and steers fed four rations for 210 days, 1965-66.

Pen	Ration	No. animals	Weight		Average daily		Feed per
			Initial	Final	Gains	Ration	100 lb. gain
			lb.	lb.	lb.	lb.	lb.
7	1	10	446	842	1.89a	21.6	1143
8	1	10	496	947	2.14b	23.6	1108
9	2	10	451	837	1.84a	21.4	1109
10	2	10	498	892	1.88a	21.2	1137
11	3	10	454	829	1.79a	20.5	1147
12	3	10	490	888	1.89a	20.6	1107
13	4	10	456	866	1.95a	21.5	1103
14	4	10	489	934	2.11b	22.4	1070

TABLE 17. Average daily gains and feed requirements of heifers and steers fed two ratios of concentrate to roughage for 210 days, 1965-66.

Sex	C:R ratio	Average daily		Feed per
		Gain	Ration	100 lb. gain
		lb.	lb.	lb.
Heifers	1:1	1.90a	22.2	1178
Heifers	2:1	1.85a	19.1	1037
Steers	1:1	1.92a	22.8	1196
Steers	2:1	2.10b	21.1	1015

TABLE 18. Average daily gains and feed requirements of heifers and steers fed four rations with two ratios of concentrate to roughage for 210 days, 1965-66.¹

Ration	C:R ratio	Average Daily		Feed per
		Gain	Ration	100 lb. gain
		lb.	lb.	lb.
1	1:1	1.90a	23.4	1232
1	2:1	2.11b	21.4	1020
2	1:1	1.88a	21.3	1140
2	2:1	1.84a	20.0	1088
3	1:1	1.80a	22.1	1238
3	2:1	1.92a	18.6	977
4	1:1	2.06b	23.3	1141
4	2:1	2.01b	20.4	1020

¹Means with the same suffix are not significantly different; those with different letter suffixes differ significantly ($P \leq .05$).

TABLE 19. Average daily gains and feed requirements of steers fed four rations and two ratios of concentrate to roughage for 239 days, 1965-66.

Pen	Ration	C:R ratio	No. animals	Weight		Average daily		Feed per
				Initial	Final	Gain	Ration	100 lb. Gain
				lb.	lb.	lb.	lb.	lb.
8	1	1:1	5	501	983	2.02a	25.1	1245
	1	2:1	5	492	1047	2.30b	23.6	1033
10	2	1:1	5	505	957	1.89a	22.0	1168
	2	2:1	5	490	956	1.95a	21.9	1136
12	3	1:1	5	503	923	1.78c	22.3	1272
	3	2:1	5	478	984	2.12a	19.9	942
14	4	1:1	5	484	987	2.11a	24.5	1173
	4	2:1	5	494	1014	2.17a	21.7	1007

TABLE 20. Average daily gains and feed requirements of steers fed four rations for 239 days, 1965-66.¹

Pen	Ration	No. animals	Weight		Average daily		Feed per
			Initial	Final	Gains	Ration	100 lb. gain
			lb.	lb.	lb.	lb.	lb.
8	1	10	496	947	2.16a	24.3	1139a
10	2	10	498	892	1.92b	22.0	1152a
12	3	10	490	888	1.94b	21.1	1107b
14	4	10	489	934	2.14a	23.1	1090b

TABLE 21. Average daily gains and feed requirements of steers fed two ratios of concentrate to roughage for 239 days, 1965-66.¹

C:R ratio	Average daily		Feed per
	Gains	Ration	100 lb. gain
	lb.	lb.	lb.
1:1	1.94a	23.5a	1214a
2:1	2.14b	21.8b	1030b

¹ Means within each group with the same suffix are not significantly different; those with different suffixes differ significantly ($P \leq .05$).

TABLE 22. Average weights, daily gains and feed consumption of heifers fed 210 days and steers fed 239 days, 1965-66.

Pen	Weight		Total gain	Average daily		Feed per 100 lb. gain	Cost per 100 lb. gain
	Initial	Final		Gain	Ration		
	lb.	lb.	lb.	lb.	lb.	lb.	\$
7	446	842	396	1.89	21.6	1143	20.66
8	497	1012	516	2.16	24.5	1135	20.56
9	451	837	386	1.84	20.4	1109	19.52
10	498	957	459	1.92	22.3	1159	20.56
11	454	829	375	1.79	20.5	1147	19.64
12	491	949	458	1.92	21.4	1118	19.28
13	457	866	410	1.95	21.5	1103	18.97
14	489	1001	512	2.14	23.4	1094	18.84
Heifers	452	843	392	1.86	21.0	1125	19.70
Steers	493	979	486	2.03	22.9	1127	19.81

TABLE 23. Carcass data of heifers fed 210 days and steers fed 239 days on four different rations and two ratios of concentrate to roughage, 1965-66.¹

	Rations				Avg all heifers	Avg all steers	C:R ratio	
	1	2	3	4			1:1	2:1
Number of animals	20	20	20	20	40	40	40	40
Feeder grades	11.3a	11.2a	11.2a	11.4a	11.4a	11.1a	11.1a	11.4a
Slaughter grades	9.4a	8.9ab	9.8ab	10.2b	9.9a	9.3b	9.6a	9.6a
USDA carcass grades	9.7a	9.6a	9.4a	9.6a	9.5a	9.6a	9.3a	9.8a
Conformation score	11.0a	10.8a	10.8a	11.2a	10.6a	11.4a	10.8a	11.1a
Rib-eye area, sq. in.	12.0a	11.6a	11.3a	12.0a	11.1a	12.3a	11.8a	11.7a
Fat depth, mm	16.3a	13.9a	14.6a	16.3a	13.9a	16.6b	14.6a	15.9a
Quality score	5.0a	5.0a	4.8a	5.1a	4.8a	5.1a	4.8a	5.1a
Cutability score	2.2a	2.0a	2.2a	2.2a	2.2a	2.1a	2.1a	2.2a

¹ Means within each group with the same suffix are not significantly different; those with different suffixes differ significantly ($P \leq .05$).

Monetary Results

Tables 24 and 25 summarize the cost and return data per animal and the comparative costs and returns for heifers and steers. The steers weighed 41 pounds more than the heifers initially and cost \$2 per 100 pounds more. They gained 0.17 pound per day more and were fed 29 days longer than the heifers. The steers also sold for \$2 more per 100 pounds on a choice carcass basis to produce a net return of \$4.84 per head greater than the heifers.

TABLE 24. Average costs and returns per animal in 1965-66.

Pen	Initial cost	Feed cost	Total cost	Gross return*	Net return
	\$	\$	\$	\$	\$
7	108.54	81.81	190.35	183.63	-6.72
8	128.39	106.08	234.47	239.91	5.44
9	110.25	75.34	185.59	182.98	-2.61
10	126.94	94.36	221.30	220.07	-1.23
11	109.03	73.64	182.67	182.64	-.03
12	126.54	88.29	214.83	215.35	.52
13	108.54	77.79	186.33	191.80	5.47
14	125.74	96.44	222.18	232.90	10.72
Heifers	109.09	77.14	186.23	185.26	-.97
Steers	126.90	96.29	223.19	227.06	3.87

*Based on carcass grades, under 700 lbs.: Steers, Choice \$40; Good \$38.50; Standard \$37 per cwt. Heifers: Choice \$38; Good \$37 per cwt.

TABLE 25. Comparative costs and returns per animal in 1965-66.

	Heifers	Steers	Difference in favor of steers
Number of animals	40	40	
Initial weights, lb.	452	493	+41
Initial cost per 100 lb.	24.50	26.50	+ 2.00
Average daily gain, lb.	1.86	2.03	+ 0.17
Days on feed	210	239	+29
USDA carcass grades—Prime	2	....	- 2
USDA carcass grades—Choice	23	29	+ 6
USDA carcass grades—Good	15	8	- 7
USDA carcass grades—Standard .....	....	3	+ 3
Feed per 100 lb. gain, lb.	1125	1127	+ 2
Feed cost of 100 lb. gain, \$	19.70	19.81	+ 0.11
Price of choice grade on rail, \$.....	38.00	40.00	+ 2
Net return per animal, \$.....	- 0.97	3.87	+ 4.84