

Effect of
LEVEL OF WINTERING
On the Production of
TWO- and THREE-YEAR-OLD STEERS

by

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Effect of LEVEL OF WINTERING On the Production of TWO- and THREE-YEAR-OLD STEERS

by

A. B. Nelson, Glen Bratcher, and O. B. Ross*

Systems of beef production in the native grass areas include the marketing of two- and three-year-old steers. Winter rations represent one of the major cost items in this type of program. The most desirable level of wintering depends upon the age of steers and management system to be used during the following summer. This bulletin reports results of a study to determine: (1) the most desirable level of wintering steers considering economy of winter gains as well as the subsequent grazing performance of steers on summer pasture, (2) the effect of feeding grain on grass to two- and three-year-old steers which are to be sold for slaughter in late summer.

The study was divided into two experiments. Experiment I was concerned with starting steers as calves and managing them during the winter months and subsequent summer grazing seasons and selling them as either two- or three-year-olds. Experiment II was concerned with feeding and managing the steers for sale as two-year-olds.

The relative values of various protein and mineral supplements for wintering steers on native grass have been studied and the need for proper protein and mineral supplementation has been recognized (3) **.

Studies of the effect of feeding various supplements to steers being fattened on native grass have indicated that feeding $3\frac{1}{2}$ lbs. of either corn or cottonseed cake daily to two- and three-year-old steers will increase gains and improve the market grade and selling price of the

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**The numbers in parentheses refer to literature cited.

Others associated with the work at various times: W. D. Campbell, A. E. Darlow, J. C. Emch, V. G. Heller, R. W. MacVicar, R. A. Long, E. R. Peo, and G. R. Waller.

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cattle (1). Also, feeding a concentrate throughout the grazing season gave slightly greater gain, but the practice was less profitable than feeding only after July 1.

In later studies (2), the feeding of corn, 20 percent protein pellets, or cottonseed meal increased gain of grazing steers and resulted in more net profit than not feeding supplement. Corn proved to be the most efficient and economical supplement, and the 20 percent protein pellets were intermediate; therefore, the energy was a more important factor than protein in limiting gains.

Experiment I

The objectives of Experiment I were to:

- (1) Determine the effect of level of wintering for two successive winters upon the performance of two-year-old steers fed a limited amount of corn on grass during the second summer grazing season.
- (2) Determine the effect of level of wintering for three successive winters upon the performance of steers during the summer grazing seasons.

Procedure

Eighty choice-quality grade Hereford steer calves were divided into eight lots of 10 head each on November 18, 1948, and were fed various wintering rations. The steers in Lots 1, 2, 3 and 4 were wintered in two-acre pens at the Lake Carl Blackwell experimental range. Lots 5, 6, 7 and 8 were wintered in 100-acre native grass pastures. The feeding program the first winter was as follows:

Lots 1 and 2—Fed prairie hay *ad lib*, plus 1.25 lbs. of cottonseed meal pellets per head daily.

Lots 3 and 4—Same as Lots 1 and 2, plus 3 lbs. of whole oats per head daily.

Lots 5 and 6—Grazed dry native grass and fed 2 lbs. of cottonseed meal pellets daily during the winter.

Lots 7 and 8—Same as Lots 5 and 6, plus 3 lbs. of whole oats per head daily.

Steers in all lots were allowed to graze native grass pastures during the summer of 1949.

The second winter feeding program was the same as the first, except that the quantity of supplemental cottonseed meal pellets fed to Lots 5, 6, 7 and 8 was increased to 2.25 lbs.

During the summer of 1950 (second summer), the cattle of Lots 1, 3, 5, and 7 were fed approximately 3.5 lbs. of ground shelled corn per head daily while on grass and were sold as two-year-old slaughter steers in August. The steers of Lots 2, 4, 6, and 8 were allowed to graze in the native grass pastures during the summer of 1950 without additional feed. During the winter as two-year-olds they were fed the same as the winter before except that the quantity of cottonseed meal pellets fed to steers in Lots 6 and 8 was increased to 2.5 lbs. per head daily. The steers grazed in the pastures during the summer of 1951 and were sold in August as grass-fat three-year-olds.

A repetition of this experiment was started on November 3, 1950 and the three-year-old steers were marketed on August 10, 1953. During the summer of 1952 the two-year-old steers were fed approximately 3 lbs. of ground shelled corn per head daily while on grass instead of the 3.5 lbs. of corn as fed in 1950.

Samples of the four predominant species of grass (big bluestem, little bluestem, switch and Indian) were collected at intervals for proximate analyses.

Results

Gain data (average of two trials) and certain financial and feed data are summarized in Appendix Table I. The chemical composition of certain samples of grass and other feeds is given in Table I. The gains of the steers by winter and summer periods are summarized in Table II. Feed consumption data are given in Table III.

Addition of Oats to Prairie Hay and Cottonseed Meal Pellets.

Adding oats to a winter ration of prairie hay and cottonseed meal pellets increased gains and produced fatter steers than rations without oats. Steers which gained the most during the winter gained the least the following summer, consequently increased winter gains resulted in less economical summer gains. The net result was decreased profits from feeding oats.

Table I.—Average Chemical Composition of Feeds.

	Percent Dry Matter	Percent Composition of Dry Matter							
		Crude Protein	Ether Extract	N-free Extract	Crude Fiber	Ash	Ca	Carotene P p.p.m.	
Native Grasses¹									
November		2.53	1.74	50.40	40.02	5.01	.25	.05	14
January		2.57	1.57	48.74	40.86	5.92	.31	.04	Trace
May		9.68	2.40	49.08	32.02	6.39	.31	.13	407
August		5.06	2.23	50.66	35.02	6.21	.35	.08	112
October		3.23	1.62	52.24	37.24	5.18	.25	.05	16
Hay and Supplements²									
Prairie hay	93.97	4.80	2.49	50.93	33.67	7.27	.43	.06	
Cottonseed cake	93.04	43.77	6.41	31.01	10.63	6.95	.20	1.00	
Oats	88.22	14.16	3.00	64.89	11.20	4.21	.10	.35	
Corn	89.00	10.63	4.82	80.39	2.33	1.68	.05	.29	

¹ Four-year average (1947-50), by species, of the four predominant grasses: Big bluestem, little bluestem, switch and Indian.

² Seven-year average for prairie hay and cottonseed cake, five years for corn and four years for oats.

Steer calves fed prairie hay and cottonseed meal pellets gained an average of 0.63 lb. per head daily in the first wintering period (158 days). The addition of 3 lbs. of oats to the daily ration increased the gain an average of 38 lbs. in the period or 0.25 lb. per day. (Lots 1 and 2 vs. 3 and 4). However, as yearlings these steers gained an average of 10 lbs. less during the subsequent summer grazing period. Those fed oats were fatter at the end of the winter and in these tests the fatter cattle were appraised at \$1.75 per 100 lbs. less than the thinner cattle which were not fed oats. This decreased selling price plus the cost of the 474 lbs. of oats resulted in approximately a \$10.00 decrease in return above steer and feed cost per head for the winter when oats were fed. At the end of the summer, all groups of yearlings were in nearly the same condition and were appraised at approximately the same price per 100 lbs. The appraised value of cattle differs according to supply and demand factors and current prices for cattle and feeds should be used in evaluating these feeding programs.

The addition of oats to prairie hay and cottonseed meal pellets increased gains 73 lbs. (47 vs. 120) during the winter as yearlings. Those fed oats were considerably fatter and were appraised at a higher price.

The steers in Lots 1 and 3 were sold as two-year-olds after feeding a small amount of corn on grass. During the summer, those which had been fed oats during the winter gained 216 lbs. as compared to 272 lbs. for those not fed oats. As would be expected steers which gained more during the winter gained less the following summer.

Table II.—Weight Gains of Beef Steers from Weanling Calves to Selling as Two- or Three-Year-Olds (Average of 2 trials).

	(pounds)							
	Lot 1 Prairie hay C.S.C.	Lot 3 Prairie hay C.S.C. Oats	Lot 5 Prairie C.S.C.	Lot 7 Range C.S.C. Oats	Lot 2 Prairie hay C.S.C.	Lot 4 Prairie hay C.S.C. Oats	Lot 6 Range C.S.C.	Lot 8 Range C.S.C. Oats
	Fed on grass during second summer							
Winter as calves (158 days)	108	148	47	106	91	128	42	92
Summer as yearlings (190 days)	186	171	209	190	195	189	220	202
Winter as yearlings (174 days)	38	131	14	57	56	109	10	52
Summer as two-year-olds to August 26 (131 days)	272	216	290	262				
to October 26 (192 days)	---	---	---	---	267	242	324	283
Winter as two-year-olds (171 days)	---	---	---	---	43	66	— 65	17
Summer as three-yr-olds (120 days)	---	---	---	---	172	158	255	220
Total gain	604	666	560	615	824	892	786	866

Level of Wintering Steers

Table III.—Feed Consumption by Beef Steers from Weanling Calves to Selling as Two- or Three-Year-Olds
(Average of 2 Trials).

	(pounds)							
	Lot 1 Prairie hay C.S.C.	Lot 3 Prairie hay C.S.C. Oats	Lot 5 Prairie C.S.C.	Lot 7 Range C.S.C. Oats	Lot 2 Prairie hay C.S.C.	Lot 4 Prairie hay C.S.C. Oats	Lot 6 Range C.S.C.	Lot 8 Range C.S.C. Oats
Fed on grass during second summer								
Prairie hay								
Winter as calves	1,795	1,577	--	--	1,795	1,577	--	--
Winter as yearlings	2,866	2,756	--	--	2,866	2,756	--	--
Winter as 2-yr-olds	--	--	--	--	3,337	3,042	--	--
Total	4,661	4,333	--	--	7,998	7,375	--	--
Cottonseed cake								
Winter as calves	198	198	316	316	198	198	316	316
Winter as yearlings	218	218	392	392	218	218	392	392
Winter as 2-yr-olds	--	--	--	--	214	214	428	428
Summer as 2-yr-olds ¹	21	21	21	21	--	--	--	--
Total	437	437	729	729	630	630	1136	1136
Whole oats								
Winter as calves	--	474	--	474	--	474	--	474
Winter as yearlings	--	522	--	522	--	522	--	522
Winter as 2-yr-olds	--	--	--	--	--	513	--	513
Total	--	996	--	996	--	1509	--	1509
Ground yellow corn								
Summer as 2-yr-olds	425	425	425	425	--	--	--	--
Mineral mixture								
Total	58	61	72	75	65	67	77	81

¹ One lb. per head daily for 42 days in one trial.

The steers fed oats during the winter made a total gain of 666 lbs. from the time they were started on experiment until they were sold as two-year-olds. Fifty-eight percent (387 lbs.) of this gain was made during the summer season. Steers not receiving oats averaged 604 lbs. of gain, of which 76 percent or 458 lbs. was made during the summers. Although the steers fed oats during the winter were fatter and therefore dressed and graded slightly higher, the selling price at the end of the summer was nearly the same. Using prices prevailing during the years these tests were conducted, the addition of oats to the winter ration was not profitable. The steers fed oats outgained the other group by 62 lbs. per head but they had an increased feed cost of approximately \$26.00.

The steers in Lots 2 and 4 were allowed to graze as two-year-olds, **wintered on** their respective rations and sold as grass-fat three-year-olds. At the end of the third summer, the Lot 4 steers (fed oats) were heavier, fatter, and sold at a higher price than the steers which did not receive the oats. However, the feeding of 1509 lbs. of oats reduced profits.

The total gain was 892 lbs. for steers receiving oats and 824 lbs. for those not fed oats. Steers receiving oats gained 589 lbs. or 66 percent of their total during the summers. The Lot 2 steers gained 634 lbs. or 77 percent of the total during the summer months.

Addition of Oats to Range and Cottonseed Meal Pellets.

Feeding oats in addition to cottonseed meal on native range was not profitable under conditions of this test. Although oats helped increase winter gain, the fatter steers in this group did not gain as well on grass during the summer as steers not fed oats.

Winter gains of calves were increased approximately 55 lbs. by the addition of 3 lbs. of oats per head daily. Without oats the daily gain of steer calves grazing dry range and fed 2 lbs. of cottonseed meal pellets was 0.18 lb. The addition of oats increased the daily gain to 0.62 lb. As was true with the steers fed prairie hay, those fed oats were fatter and were appraised at a lower price per 100 lbs. at the end of the winter. Subsequent summer gains as yearlings were inversely related to winter gains. At the end of the summer the steers in all lots were in approximately the same condition and were appraised at nearly the same price per 100 lbs. The total yearly gain was 36 lbs. greater for those fed oats during the winter but the cost of the oats was greater than the increased value of the steers. Therefore, the feeding of oats decreased profits.

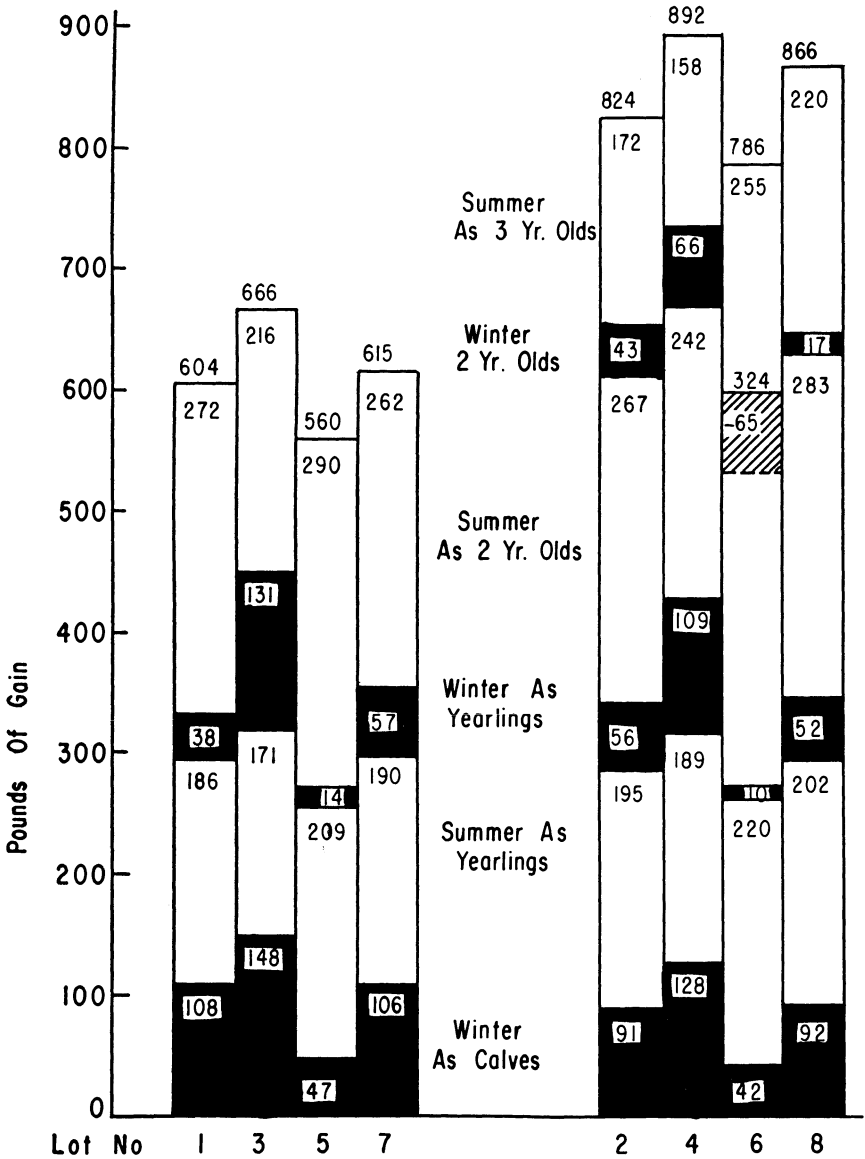


Figure 1.—Gain by winter and summer periods and accumulative gain for the entire experiment (Experiment I).

As yearlings, the winter feeding of oats increased gains 42 lbs. The thinner steers which were not fed oats were appraised at a higher price per 100 lbs. and resulted in a higher net return.

As two-year-olds fed corn on grass, those steers which had previously been fed oats (Lot 7) gained 262 lbs. which was 28 lbs. less than those not fed oats during the previous winter. This is another example of the effect of gain during the winter on subsequent summer gains. At the end of the summer, the steers which were fed oats as part of the winter ration were considerably fatter than the other steers as indicated by increased selling price, dressing percentage and grade. Consideration of the 55 lbs. increase in total gain and the increased selling price of the Lot 7 calves resulted in an increased selling value per head, approximately equal to the cost of the oats fed during the winters. Therefore, the return per steer was decreased only slightly when oats were fed. When similar steers were grazed for the entire summer without added corn, the previous feeding of oats increased profits slightly for the summer but the return for the experiment was reduced nearly \$13.00. Summer gains of the two-year-olds which were fed oats were 283 lbs. as compared to 324 lbs. for those not fed oats.

The steers in Lot 6 (range plus cottonseed meal pellets) lost 65 lbs. per head during the winter as two-year-olds. Steers of this age are in relatively high condition at the end of the summer and a considerable quantity of supplemental feed is required to prevent weight losses during the following winter. In this test steers fed cottonseed meal pellets and oats gained 17 lbs. in the 171-day wintering period. Appraised values were essentially the same for steers in both lots at the end of the winter and the value of the increased gain was approximately equal to the cost of the oats fed.

The summer the steers were three-year-olds, gains were 220 and 255 lbs. for those previously fed and not fed oats, respectively. Although steers receiving oats had a higher dressing percentage and carcass grade, they sold for a slightly lower price per 100 lbs. The feeding of oats increased total feed costs approximately \$45.00 but the selling value per steer was increased only slightly more than \$30.00.

Steers grazing native grass year-long made a high percentage of their total gain during the summer grazing seasons. Of the 615 lbs. gained by the steers sold as two-year-olds and fed oats during the winter, 73 percent was gained during the summers. Similarly, 89 percent of the 560 lbs. gained by those not fed oats was gained during the summers. Of the steers sold as three-year-olds, those fed oats made 81 percent of

their total gain on summer pasture. Those not fed oats gained 799 lbs. during the summer but the gain for the entire trial was only 786 lbs. The winter gains were a net loss of 13 lbs., therefore the percent of the total gain made during the summer was in excess of 100.

Prairie Hay vs. Range.

When only costs of cattle and feed are considered (no labor) the return per steer was \$38.48 for those fed prairie hay during the winter and \$36.00 for those grazing year-long.

Steer calves fed prairie hay and 1.25 lbs. of cottonseed meal pellets gained 0.62 lb. per head daily. The addition of 3 lbs. of oats increased gains 0.26 lb. Calves grazing dry range supplemented with 2 lbs. of cottonseed meal pellets gained only 0.28 lb. per day. In this case the increase in gain from feeding oats was 0.34 lb. The feeding of prairie hay plus 1.25 lbs. of cottonseed meal pellets resulted in the same gain as dry native grass range plus 2 lbs. of cottonseed meal pellets and 3 lbs. of oats. This is an indication of the relative value of the two roughages.

Feeding a Limited Amount of Corn on Grass to Two-year-olds.

Two-year-old steers fed a limited amount of corn (3 to 3.5 lbs.) during the summer grazing season were no more desirable as slaughter animals in August than similar steers not fed corn and sold about 60 days later. The net return per steer was greater (an average of \$6.79) for two-year-olds sold in the fall (October) without supplemental corn on grass. Steers were evaluated on the basis of dressing percentage, carcass grade and appraised market price per 100 lbs.

The steers fed grain on grass apparently were not fat enough to be out of competition with the grass-fat cattle. Nearly all of the two-year-olds could have been classed as feeders, although some of the steers which received corn on grass were sold for slaughter. Additional tests on this phase of the experiment, that is, the production of desirable two-year-old slaughter steers, are reported under Experiment II.

Selling Two-Year-Olds vs. Three-Year-Olds.

Two-year-old steers gained an average of 611 lbs. per head during the 653 days on the experiment. Of this total, 449 lbs. (73 percent) was gained on grass during the summer seasons in-

cluding the summer as two-year-olds when a limited amount of corn was fed. Three-year-old steers gained 842 lbs. in 1005 days. Of this total, 682 lbs. or 81 percent was gained during the summers. Apparently all cattle made relatively efficient use of the native grass.

Net return figures vary considerably with the prices of cattle and feed. Using prices prevailing when the tests were conducted the net return was greater for marketing as three-year-olds. The average difference was \$7.79. The average increase in return from selling at the end of the winter as two-year-olds until the end of the summer as three-year-olds was only \$1.25; therefore a comparison of selling as two-year-olds off grass in August after feeding a limited amount of corn with selling as three-year-olds off grass is essentially a comparison of selling two-year-old steers, one group in August after corn on grass and a second group off grass in late October. This comparison has already been reviewed.

Experiment II

In Experiment I, the two-year-old steers which were sold in August after having been fed a limited amount of corn on grass were no more desirable as slaughter cattle than grass-fed cattle. Since the system did not produce the desired end-product, it was not possible to evaluate the effect of level of wintering upon subsequent performance. Therefore, the experiment was revised to include the production of two-year-old steers that would grade approximately U. S. Choice when slaughtered.

Objectives

1. To determine the effect of level of wintering for two successive winters upon the performance of two-year-old steers fed corn on grass the second summer grazing season.
2. To determine the effect of feeding corn on grass to two-year-old steers which have been wintered at the same level of nutrition.

Procedure

Fifty choice-quality grade Hereford steer calves were divided into two groups on November 3, 1952 (30 head in one group and 20 in the

other). The steers in both groups were confined to two-acre pens during the winter months. The groups were fed as follows:

Group 1 — Fed prairie hay *ad lib*, plus 1.25 lbs. of cottonseed meal pellets daily.

Group 2 — Same as Group 1 plus 3 lbs. of ground yellow corn daily.

The ration containing corn was designated as the high level of wintering and the other ration was designated as the low level. At the end of the wintering period the calves in both groups were allowed to graze native grass pastures at the Lake Carl Blackwell experimental range area. A mineral mixture composed of 2 lbs. of ground rock salt and 1 lb. of steamed bone meal was available in all lots.

At the end of the first summer grazing period, the 30 yearling steers which were in the low level group were divided into three lots (Lots 1, 2, and 3) of 10 head each on the basis of initial weight and yearly gain. Also, the 20 head fed on the high level were divided into two lots of 10 head each (Lots 4 and 5). The steers were divided after having been on experiment for one year instead of at the beginning of the test in order that gains for the first year within the two levels of wintering would be approximately equal.

During the second winter, the yearling steers were returned to small pens for feeding as follows:

Lots 1 and 2—These steers were a part of Group 1 the previous winter and were maintained on the same ration as before. (Prairie hay *ad lib*, plus 1.25 lbs. of cottonseed meal daily.)

Lot 3— These steers were also a part of group 1 the previous winter. They were changed to a high level of feeding the second winter. (Fed same as lots 1 and 2 plus 3 lbs. ground yellow corn daily.)

Lots 4 and 5—These steers were fed the high level both winters. (Prairie hay *ad lib*, plus 1.25 lbs. cottonseed meal and 3 lbs. ground yellow corn daily.)

All steers were allowed to graze native grass pastures as two-year-olds the following summer. Steers in Lot 1 received grass only. They were sold off grass on August 8, which was thought to be the most desirable time for selling two-year-old steers that particular season.

The steers in the other four lots were fed 3 lbs. of ground yellow corn per head daily while on grass until mid-June, at which time the amount of corn fed to the steers in Lots 2, 3, and 4 was gradually increased until they were on a full feed of corn. The steers of Lot 5 continued to receive 3 lbs. of corn per head daily until they were sold. Those in Lots 2, 3, and 4 were sold when it was estimated that their carcasses would grade approximately U. S. Choice when slaughtered. Lot 5 steers were sold at the same time as Lot 2.

This trial was conducted three times with steer calves starting in 1952, 1953, and 1954. Two-year-old steers were sold in 1954, 1955, and 1956. The feeder steers of Lot 1 were sold in late August of each year. In 1954 and 1955, Lots 2 and 5 were sold in mid-October, but in 1956, they were sold in late August when they appeared to be of desired slaughter grade.

Results

Results of Experiment II are summarized in Appendix Table II. Weight gains are summarized in Table IV. Feed consumption data are given in Table V.

Level of Wintering as Calves and Yearlings (Lots 1 and 2 vs. 4 and 5).

Winter gains of calves and yearlings were increased by adding 3 lbs. of corn to the ration. However, this practice reduced summer gains, as winter gains and subsequent summer gains were inversely related. The feed costs and cattle values were such that it was not profitable to feed corn to steers and market them in the spring or summer as yearlings or in the spring as two-year-olds.

The steers in Lots 1 and 2 gained an average of 132 lbs. during the 169-day wintering period as calves, 221 lbs. during the summer, and 100 lbs. during the winter as yearlings. The steers in Lot 3 were treated the same and gained the same as Lots 1 and 2 through the first winter and summer. During the second winter, the Lot 3 steers were changed to the high level of feeding and gained 29 lbs. more per head than those in the other lots. If the steers had been sold at the end of the second winter the return per head would have favored Lots 1 and 2 slightly.

Table IV.—Weight Gains of Beef Steers from Weanling Calves to Selling as Two-Year-Old Steers (Average of 3 trials).

	(pounds)				
Lot number	1	2	3	4	5
Level of feeding, Winter I	Low	Low	Low	High	High
Level of feeding, Winter II	Low	Low	High	High	High
Level of supplemental feeding, Summer II —	None	High	High	High	Low
Winter as calves (169 days)	133	130	131	178	179
Summer as yearlings (194 days)	223	219	221	199	197
Winter as yearlings (171 days)	104	95	129	128	128
Summer as two-year-olds					
109 days	206	227	223	205	195
128 days	--	269	252	251	217
158 days	--	323	--	--	227
Total gain	666	767	733	756	731

Table V.—Feed Consumption by Beef Steers from Weanling Calves to Selling as Two-Year-Old Steers (Average of 3 Trials).

(pounds)

Lot number	1	2	3	4	5
Level of feeding, Winter I	Low	Low	Low	High	High
Level of feeding, Winter II	Low	Low	High	High	High
Level of supplemental feeding, Summer II —	None	High	high	High	Low
Prairie hay					
Winter as calves	2003	2003	2003	1867	1867
Winter as yearlings	3439	3439	3132	3132	3132
Total	5442	5442	5135	4999	4999
Cottonseed meal					
Winter as calves	211	211	211	211	211
Winter as yearlings	214	214	214	214	214
Total	425	425	425	425	425
Ground yellow corn					
Winter as calves	--	--	--	507	507
Winter as yearlings	--	--	513	513	513
Summer as two-year-olds	--	1825	1242	1242	473
Total	--	1825	1755	2262	1493

Level of Wintering Steers

Feeding corn during both winters (Lots 4 and 5) increased gains but decreased profits approximately \$10 per head as compared to steers on the low feeding level.

Grazing only vs. Grazing Plus Corn for Two-Year-Old Steers (Lot 1 vs. 2).

The feeding of corn on grass resulted in a difference of \$54.20 in summer feed cost between Lots 1 and 2. The steers which were fed corn were heavier and commanded a higher selling price, but the increased selling price was not equal to the increased feed cost.

The two-year-olds grazing native grass without supplemental corn were sold in early August. They had gained an average of 206 lbs. during the summer. The steers fed corn were sold in mid-October in 1954 and 1955, but in 1956 they were believed to be fatter at an earlier date and were sold in mid-August. The average selling date for the corn-fed steers was September 24 at which time their summer gain was 323 lbs.

In individual years, feeding on grass was not profitable in the first two years but was profitable in the third year. If the Lot 2 steers had been sold in early August, their increased summer gain resulting from the feeding of corn would have been only 21 lbs. and the profit for the summer would have been decreased \$9.03.

In the entire trial, the Lot 1 steers gained 666 lbs. in 643 days. Those in Lot 2, which were fed 1825 lbs. of corn, gained 767 lbs. in 692 days.

Level of Wintering with Full-Feeding on Grass (Lots 2, 3, and 4).

A comparison of the results in Lots 2, 3, and 4 allows an evaluation of the effect of three levels of wintering upon the production of two-year-old slaughter steers which were full-fed corn on grass. The return per steer for the summer was approximately the same for all lots. Therefore, return per steer for the complete experiment was related to level of wintering. Steers fed corn both winters lost more dollars per head than those not fed corn or fed corn only one winter.

The weights as two-year-olds in April reflected the level of wintering. The total gain in Lots 2, 3 and 4 to selling was 767, 733, and 756 lbs., respectively. Those in Lots 3 and 4 were in the experiment 662

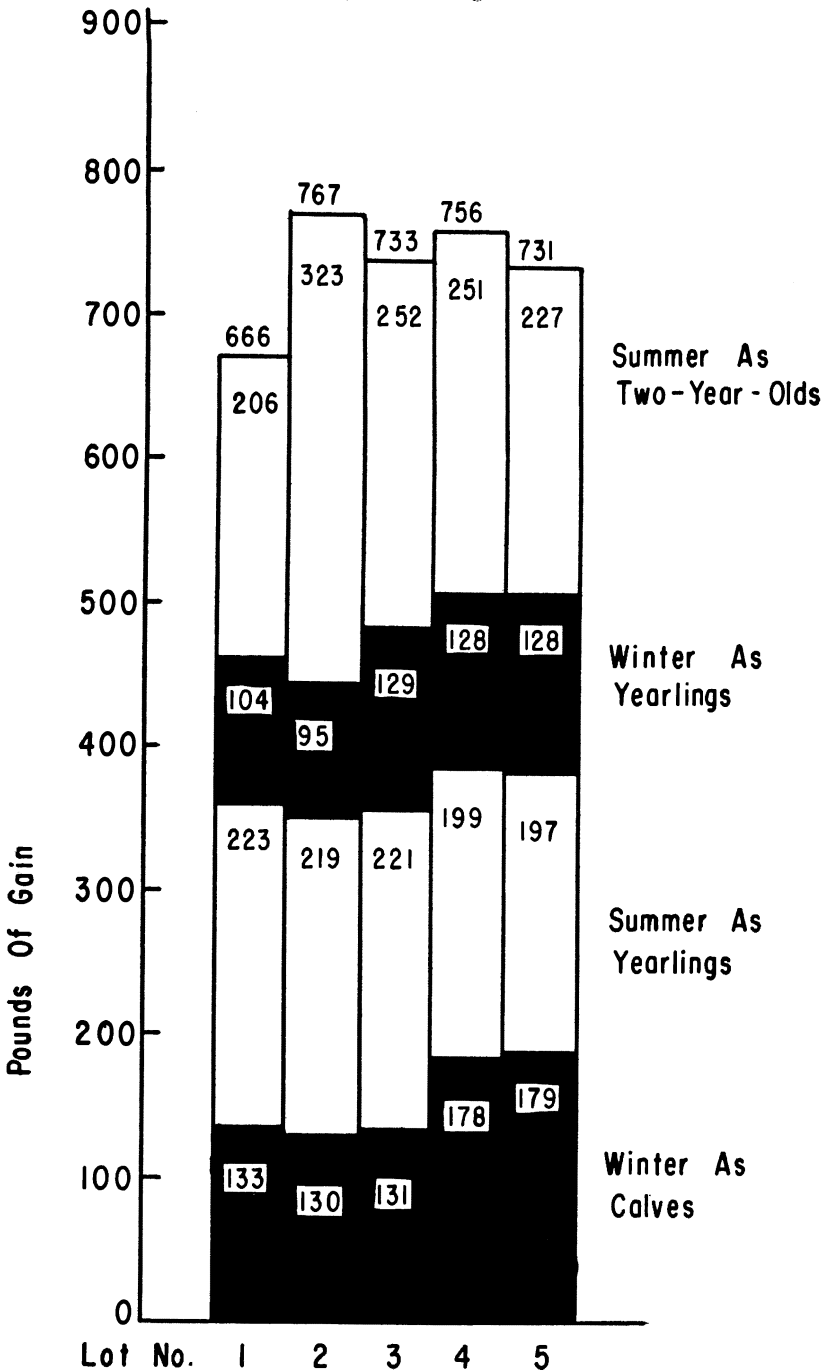


Figure 2.—Gain by winter and summer periods and accumulative gain for the entire experiment (Experiment II).

days but those in Lot 2 were continued an average of 692 days. The average selling date was August 25 in Lots 3 and 4 and September 24 in Lot 2, although, as previously explained, the Lot 2 steers were sold in October two years and in August the third year. However, the grades were over-estimated the third year and the average carcass grade was in the upper portion of U. S. Good rather than in U. S. Choice.

In two of the years, the amount of corn consumed by Lot 2 in the additional 45 days of feeding was nearly the same as that consumed in Lot 4 in two winters. In this case the comparison relates to the time of feeding the additional corn. The two-year average return was only slightly different, being in favor on one lot in one year and the other lot in the second year. In the third year the corn consumption in Lot 2 was considerably less and the net return per steer was increased.

Full-Feeding vs. 3 lbs. of Corn on Grass (Lot 4 vs. 5).

Limited feeding on grass (3 lbs. corn per head daily) after wintering at a high level was slightly more profitable (less loss) than full-feeding similar cattle on grass. The steers on limited feed graded lower and sold at a lower price per 100 lbs., but they had also consumed less corn than the other group.

Steers in Lot 4 (full-fed) gained 251 lbs. from the beginning of the summer until sold. The steers in Lot 5 gained an average of 217 lbs. per steer for the same period. The Lot 5 steers were sold in October two years and in August the third year, with an average additional gain of only 10 lbs. in 30 days. The Lot 5 cattle were thinner in each of the years, as indicated by the lower selling price and carcass grade. The carcass grades after being fed 3 lbs. of corn on grass were essentially the same as the grades of those sold in early August without supplemental feed (Lot 1).

Summary

Experiment I

A high level of wintering steers was not profitable under conditions of this experiment. Although the high feeding level increased gains, the gain was not economical. Summer gain on grass was inversely related to winter gain.

When only costs of cattle and feed were considered, it was more

profitable to graze steers year-long on native grass than to graze native grass only during the summer and feed prairie hay during the winter.

Two-year-old steers fed a limited amount of corn while grazing native grass during the summer were not fat enough in the fall to be out of competition with grass-fat cattle.

Experiment II

Winter gains of calves and yearlings were increased by adding three pounds of corn to the ration. Winter gains and subsequent summer gains were inversely related.

Feeding corn on grass to two-year-old steers during the summer resulted in increased gains and increased selling price, but the additional feed cost reduced profits. Limited feeding of corn on grass was more profitable than full feeding on grass.

Steers not fed supplemental corn during either of the winters or during the summer as two-year-olds were sold in early August as "two-way" cattle. This system of management was most profitable.

Literature Cited

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3. Ross, O. B., R. W. MacVicar and D. F. Stephens. 1950. *Feeding trials with mineral and protein supplements for two- and three-year-old steers wintering on dry grass*. Okla. Agr. Exp. Sta. Bul. B-359.

Reports of the individual phases of the experiments summarized in this bulletin may be found in annual Feeders' Day Reports for the years 1949-56. They have been published as Okla. Agr. Exp. Sta. Misc. Pub. MP-15, 17, 22, 27, 31, 34, 43, and 45.

	Lot 1 Prairie hay C.S.C.	Lot 3 Prairie hay C.S.C. Oats	Lot 5 Range C.S.C.	Lot 7 Range C.S.C. Oats	Lot 2 Prairie hay C.S.C.	Lot 4 Prairie hay C.S.C. Oats	Lot 6 Range C.S.C.	Lot 8 Range C.S.C. Oats
Fed on grass during second summer								
Number of steers per lot ¹	10	9.5	10	10	9	10	9	10
Winter as calves (158 days)								
Initial weight Nov. 10 (lb)	466	472	474	472	472	472	476	472
Final weight April 17 (lb)	574	620	521	578	563	600	518	564
Gain (lb)	108	148	47	106	91	128	42	92
Daily gain (lb)	0.68	0.94	0.30	0.67	0.58	0.81	0.27	0.58
Financial (dollars)								
Feed cost ²	17.28	30.01	15.08	28.71	17.28	30.01	15.08	28.71
Steer cost ²	148.67	150.71	151.14	150.37	150.46	150.37	151.90	150.54
Appraised price per cwt. ⁴	32.57	30.91	33.79	33.05	32.89	31.06	33.79	32.99
Value per steer, 3% shrink	181.40	185.75	170.63	185.42	179.60	180.75	169.61	180.48
Return per steer ⁵	15.45	5.03	4.41	6.34	11.86	0.37	2.63	1.23
Summer as yearlings (190 days)								
Initial weight April 17 (lb)	574	620	521	578	563	600	518	564
Final weight Oct. 25 (lb)	760	791	730	768	758	789	738	766
Gain (lb)	186	171	209	190	195	189	220	202
Daily gain (lb)	0.98	0.90	1.10	1.00	1.03	0.99	1.16	1.06
Gain to date (lb) ⁶	294	319	256	296	286	317	262	294
Financial (dollars)								
Feed cost ²	13.66	13.66	13.66	13.66	13.66	13.66	13.66	13.66
Appraised price per cwt.	26.64	26.52	26.68	26.52	26.74	26.56	26.76	26.45
Value per steer, 3% shrink	196.36	203.42	188.86	197.60	196.56	203.22	191.58	196.50
Return per steer ⁵	1.30	4.01	4.57	-1.48	3.30	8.81	8.31	2.36
Return per steer to date ⁷	16.75	9.04	8.98	4.86	15.16	9.18	10.94	3.59
Winter as yearlings (174 days)								
Initial weight Oct. 25 (lb)	760	791	730	768	758	789	738	766
Final weight April 17 (lb)	798	922	744	825	814	898	748	818
Gain (lb)	38	131	14	57	56	109	10	52
Daily gain (lb)	0.22	0.75	0.08	0.34	0.33	0.64	0.06	0.31
Gain to date (lb) ⁸	332	450	270	353	342	426	272	346

¹ During the first trial one steer was removed from each of Lots 2 and 3. During the second trial one steer was removed from Lot 2 and 2 steers from Lot 6. Reasons for removal apparently was not related to experimental rations.

² Prices used were those current at the time the tests were conducted.

³ Initial weight times an appraised price per cwt. which was the same for all lots.

⁴ Appraised price at the end of the winter feeding season.

Appendix Table I—Continued

	Lot 1 Prairie hay C.S.C.	Lot 3 Prairie hay C.S.C. Oats	Lot 5 Range C.S.C.	Lot 7 Range C.S.C. Oats	Lot 2 Prairie hay C.S.C.	Lot 4 Prairie hay C.S.C. Oats	Lot 6 Range C.S.C.	Lot 8 Range C.S.C. Oats
Fed on grass during second summer								
Financial (dollars)								
Feed cost ²	29.88	43.38	20.82	36.54	29.87	43.38	20.82	36.54
Appraised price per cwt.	28.25	27.54	29.00	28.48	28.38	27.59	29.05	28.36
Value per steer, 3% shrink	218.65	246.25	209.40	227.82	224.22	240.33	210.92	224.92
Return per steer ⁵	-7.59	-0.55	-0.28	-6.32	-2.21	-6.27	-1.48	-8.12
Return per steer to date ⁷	9.16	8.49	8.70	-1.46	12.95	2.91	9.46	-4.53
Summer as two-year-olds								
Initial weight, April 17 (lb.)	798	922	744	825	814	898	748	818
Final weight (lb.)								
August 26 (131 days)	1070	1138	1034	1087	---	---	---	---
October 26 (192 days)	---	---	---	---	1081	1140	1072	1101
Gain (lb.)	272	216	290	262	267	242	324	283
Daily gain (lb.)	2.06	1.64	2.20	1.98	1.38	1.25	1.68	1.47
Gain to date (lb.) ⁶	604	666	560	615	609	668	596	629
Financial (dollars)								
Feed cost ²	28.03	28.03	28.14	28.13	15.16	15.16	15.16	15.16
Selling price per cwt.	27.03	26.87	25.90	27.14	25.97	25.97	25.30	26.04
Value per steer, 3% shrink	280.58	296.60	259.73	286.01	272.38	287.24	263.07	278.08
Return per steer ⁵	33.90	22.32	22.19	30.06	33.00	31.75	36.99	38.00
Return per steer to date ⁷	43.06	30.81	30.89	28.60	45.95	34.66	46.45	33.47
Winter as two-year-olds (171 days)								
Initial weight, Oct. 26 (lb.)					1081	1140	1072	1101
Final weight, April 15 (lb.)					1124	1206	1007	1118
Gain (lb.)					43	66	-65	17
Daily gain (lb.)					0.25	0.39	0.38	0.10
Gain to date (lb.) ⁶					652	734	531	646
Financial (dollars)								
Feed cost ²					37.40	50.16	25.54	41.17
Appraised price per cwt.					26.57	26.87	26.72	26.79
Value per steer, 3% shrink					289.64	314.36	260.71	290.45
Return per steer ⁵					-20.14	-23.04	-27.90	-28.80
Return per steer to date ⁷					25.81	11.62	18.55	4.67

Level of Wintering Steers

⁵ Value per steer at the end of the season minus initial steer cost and feed cost.

⁶ Gain since the beginning of the test.

⁷ Return per steer from the beginning of the test when only steer cost and feed cost are considered.

Appendix Table I—Continued

Summer as three-year-olds (120 days)									
Initial weight, April 15 (lb.)					1124	1206	1007	1118	
Final weight, Aug. 13 (lb.)					1296	1364	1262	1338	
Gain (lb.)					172	158	255	220	
Daily gain (lb.)					1.43	1.32	2.12	1.83	
Gain to date (lb.) ⁶					824	892	786	866	
Financial (dollars)									
Feed cost ²					16.98	16.98	16.98	16.98	
Selling price per cwt.					25.79	26.94	25.17	24.93	
Value per steer, 3% shrink					324.14	356.42	308.12	338.28	
Return per steer ⁵					17.52	25.08	30.43	30.85	
Return per steer to date ⁷					43.33	36.70	48.98	35.52	
SUMMARY									
Initial weight, Nov. 10 (lb.)	466	472	474	472	472	472	476	472	
Final weight (lb.)									
August 26 (2-yr-olds)	1070	1138	1034	1087					
August 13 (3-yr-olds)					1296	1364	1262	1338	
Gain (lb.)									
August 26 (2-yr-olds)	604	666	560	615					
August 13 (3-yr-olds)					824	892	786	866	
Financial (dollars)									
Initial cost	148.67	150.71	151.14	150.37	150.46	150.37	151.90	150.54	
Feed cost ²	88.85	115.08	77.70	107.04	130.33	169.35	107.24	152.22	
Initial + feed cost	237.52	265.79	228.84	267.41	280.81	319.72	259.14	302.76	
Selling price per cwt.	27.03	26.87	25.90	27.14	25.79	26.94	25.17	24.93	
Value per steer, 3% shrink	280.58	296.60	259.73	286.01	324.14	356.42	308.12	338.28	
Return per steer ⁷	43.06	30.81	30.89	28.60	43.33	36.70	48.98	35.52	
Feed consumption (lb.)									
Prairie hay	4661	4333	--	--	7998	7375	---	--	
Cottonseed cake	437	437	729	729	630	630	1136	1136	
Whole oats	--	996	--	996	--	1509	--	1509	
Ground corn	425	425	425	425	--	--	--	--	
Mineral mixture	58	61	72	75	65	67	77	81	
Dressing percentage ⁸	56.0	56.5	54.5	55.8	59.2	60.4	57.2	59.0	
Carcass grade ⁹	8.2	6.8	8.1	6.8	4.4	4.8	3.2	4.3	

⁸ Based on market weights and hot carcass weight shrunk 2.5 per cent. The values for Lots 1 and 5 are for only one trial because the cattle were sold as feeders in the other trial.

⁹ An average based on the following scale: Low Commercial, 1; Ave. Commercial, 2; High Commercial, 3; Low Good, 4; Ave. Good, 5; High Good, 6; Low Choice, 7; Ave. Choice, 8; and High Choice, 9. Grades for Lots 1 and 5 represent only one trial. These two values were 0.2 of a grade lower than Lots 3 and 7 in the one trial in which grades were available for cattle in all four lots.

Appendix Table II
The Effect of Level of Wintering on the Production of Two-Year-Old Steers
(Average of 3 Trials)

Lot number	1	2	3	4	5
Level of feeding, Winter I	Low	Low	Low	High	High
Level of feeding, Winter II	Low	Low	High	High	High
Level of supplemental feeding, Summer II	None	High	High	High	Low
Number of steers per lot ¹	10	10	10	10	10 ¹
Winter as calves (169 days)					
Initial weight, Nov. 1 (lb.)	469	474	473	472	471
Final weight, April 19 (lb.)	602	604	604	650	650
Gain (lb.)	133	130	131	178	179
Daily gain (lb.)	0.79	0.77	0.78	1.06	1.07
Financial (dollars)					
Feed Cost ²	29.15	29.15	29.15	43.02	43.01
Steer cost ³	104.08	105.03	104.78	104.66	104.49
Appraised price per cwt. ⁴	21.65	21.63	21.62	21.82	21.82
Value per steer, 3% shrink	126.40	126.72	126.66	137.55	137.55
Return per steer ⁵	-6.83	-7.46	-7.27	-10.13	-9.95
Summer as yearlings (194 days)					
Initial weight, April 19 (lb.)	602	604	604	650	650
Final weight, Oct. 30 (lb.)	825	823	825	849	847
Gain (lb.)	223	219	221	199	197
Daily gain (lb.)	1.15	1.13	1.14	1.03	1.02
Gain to date (lb.) ⁶	356	349	352	377	376
Financial (dollars)					
Feed cost ²	14.19	14.19	14.19	14.19	14.19
Appraised price per cwt.	18.52	18.52	18.51	18.67	18.66
Value per steer, 3% shrink	148.22	147.85	148.10	153.76	153.33
Return per steer ⁵	7.63	6.94	7.25	2.02	1.59
Return per steer to date ⁷	0.80	-0.52	-0.02	-8.11	-8.36
Winter as yearlings (171 days)					
Initial weight, Oct. 30 (lb.)	825	823	825	849	847
Final weight, April 19 (lb.)	929	918	954	977	975
Gain (lb.)	104	95	129	128	128
Daily gain (lb.)	0.61	0.56	0.75	0.75	0.75
Gain to date (lb.) ⁶	460	444	481	505	504

Level of Wintering Steers

Appendix Table II.—Continued

Lot number	1	2	3	4	5
Level of feeding, Winter I	Low	Low	Low	High	High
Level of feeding, Winter II	Low	Low	High	High	High
Level of supplemental feeding, Summer II	None	High	High	High	Low
Financial (dollars)					
Feed cost ²	41.83	41.83	53.60	53.60	53.60
Appraised price per cwt.	18.97	18.97	19.32	19.35	19.34
Value per steer, 3% shrink	170.97	168.96	178.78	183.41	182.95
Return per steer ⁵	-19.08	-20.72	-22.92	-23.95	-23.98
Return per steer to date ⁷	-18.28	-21.24	-22.94	-32.06	-32.34
Summer as two-year-olds					
Initial weight, April 19 (lb.)	929	918	954	977	975
Final weight, (lb.)					
August 6 (109 days) ⁸	1135	1145	1177	1182	1170
August 25 (128 days) ⁸	--	1187	1206	1228	1192
September 24 (158 days) ⁸	--	1241	--	--	1202
Gain (lb.)					
August 6	206	227	223	205	195
August 25	--	269	252	251	217
Selling	206	323	252	251	227
Daily gain to selling (lb.)	1.89	2.04	1.97	1.96	1.44
Financial (dollars)					
Feed cost ²					
August 6	16.74	43.46	43.47	43.53	25.94
August 25	--	52.61	52.73	52.85	27.99
September 24	--	70.94	--	--	31.51
Value per cwt.					
August 6	19.04	20.29	20.76	20.76	20.24
August 25	--	21.32	21.70	21.72	20.76
September 24	--	21.68	--	--	20.49
Value per steer, 5% shrink					
August 6	209.65	225.33	236.99	237.96	229.75
August 25	--	245.47	253.87	258.70	240.07
Selling	209.65	260.97	253.87	258.70	238.94
Return per steer ⁵					
August 6	21.94	12.91	14.74	11.02	20.86
August 25	--	23.90	22.36	22.44	29.13
Selling	21.94	21.07	22.36	22.44	24.48
Return per steer to date ⁷					
August 6	3.66	-8.33	-8.20	-21.04	-11.48
August 25	--	2.66	-0.58	-9.62	-3.21
Selling	3.66	-0.17	-0.58	-9.62	-7.86

Appendix Table II.—Continued

Lot number	1	2	3	4	5
Level of feeding, Winter I	Low	Low	Low	High	High
Level of feeding, Winter II	Low	Low	High	High	High
Level of supplemental feeding, Summer II	None	High	High	High	Low
SUMMARY					
Initial weight (lb.)	469	474	473	472	471
Final weight (lb.)	1135	1241	1206	1228	1202
Gain (lb.) ⁶	666	767	733	756	731
Financial (dollars)					
Feed cost ²	101.91	156.11	149.67	163.66	142.31
Selling price per cwt.	19.04	21.68	21.70	21.72	20.49
Value per steer, 3% shrink	209.65	260.97	253.87	258.70	238.94
Return per steer ⁷	3.66	—0.17	—0.58	—9.62	—7.86
Dressing percentage ⁹	59.2	62.0	60.2	60.3	60.7
Carcass grade ¹⁰	4.0	5.6	5.7	5.3	4.9
Feed consumption					
Prairie hay (lb.)	5442	5442	5135	4999	4999
Cottonseed meal (lb.)	425	425	425	425	425
Corn (lb.)	0	1825	1755	2262	1493
Pasture (summer)	ad lib	ad lib	ad lib	ad lib	ad lib

¹ One steer died in Lot 5 in the early part of the second trial.

² Prices used were those current at the time the tests were conducted.

³ Initial weight times an appraised price per cwt. which was the same for all lots.

⁴ Appraised price at the end of the winter feeding season.

⁵ Value per steer at the end of the season minus initial steer cost and feed cost.

⁶ Gain since the beginning of the test.

⁷ Return per steer from the beginning of the test when only steer cost and feed cost are considered.

⁸ The average selling dates were: Lot 1, August 6; Lots 3 and 4, August 25; and Lots 2 and 5, September 24.

⁹ Based on market weights and hot carcass weight shrunk 2.5 per cent.

¹⁰ An average based on the following scale: Low Commercial, 1; Ave. Commercial, 2; High Commercial, 3; Low Good, 4; Ave. Good, 5; High Good, 6; Low Choice, 7; Ave. Choice, 8; and High Choice, 9. Values for Lot 1 represent the average of the first and third tests. In the second test the steers of Lot 1 were sold as feeders.

