

Furthermore, the pelleting process apparently affects high-roughage rations and high-concentrate rations differently. Thus, it appears that calves of this age can produce satisfactory gains on a high percentage of roughage, especially if the ration is pelleted. When average daily gains of calves on each ratio are combined there is very little difference between the two. However, from visual observation, the cattle receiving the 4:1 ratio appear fatter than those on the 1:4 mixture at this time.

In an attempt to determine the reason for some of the unexplained differences described above, a digestion trial is currently being conducted to measure the differences in digestibility of rations differing widely in the ratio of concentrate-to-roughage, when they are fed in either the meal or pelleted form.

Summary

Two feeding trials involving 48 beef steers and heifers were conducted to study the effects of pelleting rations for beef calves on rate of gain, feed intake, efficiency of feed conversion, and carcass merit.

In the first trial, pelleting a 4:1 concentrate-to-roughage ratio depressed gains, feed intake, carcass grade, dressing percent, and net return per calf. Feed efficiency was improved, however.

In the second trial, a study of the effects of pelleting rations containing 1:4 and 4:1 ratios of concentrate-to-roughage revealed that pelleting the 1:4 ratio increased gains, feed consumption, and feed efficiency. However, pelleting the 4:1 ratio resulted in decreased gains and feed intake with a slight improvement in feed efficiency. Calves fed the pelleted 1:4 ration made more rapid gains than those fed the 4:1 mixture in either meal or pelleted form. Feed cost per cwt gain on both ratios was increased by pelleting.

Effect of Different Levels of Wintering On the Performance of Spring-Calving Beef Cows

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Studies have been underway at this station since 1948 to determine the effects of low, medium, and high levels of supplemental winter feed on beef cows grazing native grass pastures year-long. The necessity of determining the proper amount of winter supplement is obvious, considering the fact that the cost of supplemental feed is usually the biggest cash out-lay in the cow-calf enterprise.

Effects of different winter feeding levels can only be determined by such items as percent calf crop or regularity of reproduction, longevity, calving date, and weaning weight of the calf. These all demand long-time studies to measure the effects of feed level.

To investigate the problem with beef cows under practical range conditions, a continuous study was established at this station in the fall of 1948 with weaner heifer calves. Results of the 10th consecutive year of this study are reported herein, together with data from another herd at a different location. Also given is a summary of results from 1948 to 1958.*

Procedure

In October, 1948, 120 grade, weanling heifer calves were started on test. Ninety of the calves were divided as equally as possible into three groups and fed three levels of supplement to weathered native grass pasture: Low (1.0 pound cottonseed meal pellets per head daily), medium (2.5 pounds of cottonseed meal) or high (2.5 pounds of cottonseed meal plus 3.0 pounds of oats). The low level was believed to furnish only 60 to 70 percent of the protein required by beef females, whereas the high level was believed to be excessive in both protein and energy.

The remaining 30 females were wintered at the medium level and used to study the effects of summer feeding in an attempt to improve calf weaning weights. The effect of two- versus three-year-old calving could be determined within each level of wintering, as half of the females in each level calved at two years and the remainder at three years.

Production data are now available on 8 and 9 calf crops from the original cows, ninety of which remained on test at end of the summer grazing season in the fall of 1958. Cows have been removed from test only for failure to calve or raise a calf for two successive years, death loss, or disease conditions which would affect performance in such a way that the data would not be useful. No other culling has been practiced in this herd.

All cows have grazed similar native grass pastures at the Fort Reno station (principally little bluestem, side oats grama, and less desirable annual grasses and weeds) during the winter. They are rotated frequently among the pastures to minimize pasture differences. The cows have had approximately 8 acres of pasture per head, year-long. None of the calves were creep-fed.

During the summer, the cows (plus other young cows in repetitions of this project discussed in an accompanying article) have been divided into several breeding groups according to level of winter feeding and productivity, and used to test purebred bulls from the Fort Reno

* Results of previous trials can be found in Okla. Agri. Exp. Sta. Misc. Pub. MP-19, 22, 27, 31, 34, 43, 45, 48, and 51 for years 1949 to 1958, inclusive.

breeding herd. The cows have been exposed to bulls from May 1 to August 15 each year; calves are weaned in early October.

To gain supporting evidence on the effect of low (1.0 pound cottonseed meal pellets) vs. moderate (2.5 pounds of cottonseed meal) levels of feeding at another and less desirable pasture location, a group of 46 grade Hereford cows, varying from 5 to 9 years in age, were allotted to two groups on the basis of age, weight, and previous records of performance.

In November, 1957, they were started on test at the Lake Blackwell range, west of Stillwater. Although ample grass was available (approximately 8 acres per cow), the pastures were predominately little bluestem, Indian, and switch grass, with only small amounts of grama and early spring annuals present. First calves were dropped in early February.

In both studies, the cows had access to a mineral mixture of two parts salt and one part bone meal throughout the year. Other management details with the Blackwell cows were similar to those described for the Fort Reno herd. Data is given on the production of these cows in 1957-58. At present, they are continuing on test.

Results

The 1957-58 performance of the Fort Reno herd on the long-time level of wintering project is given in Table 1. The winter period proved to be exceptionally mild with considerable early spring grazing. The summer grazing season was very favorable in terms of rainfall and abundant pasture was available by late April.

Average weight gain to calving was least for cows on the low level of supplemental feed, while losses after calving were heaviest for this group. Cows fed at the medium level gained more weight to calving, but lost more from calving to the end of the wintering period than high level cows. Averaging both groups that calved first as two or three-year-olds, total winter losses were 214, 92, and 115 pounds per head for cows on the low, medium, and high levels, respectively.

Summer gains for cows at each level were 225, 189, and 151 pounds, being greatest for low level cows and least for those wintered at the high level. Winter feed costs were 58 percent greater for the medium level than for the low level, and 149 percent greater for the high than for the low level.

Calf production records in 1958 show that all low and high level cows calved, whereas only 16 out of 23 medium level cows calved. Poorest calving performance was in Lot 4 (medium level cows which had calved first as three-year-olds) for unknown reasons. Average calving dates showed little difference, although high level cows tended to calve a few days earlier, a trend which has been noted in past records of these cows. Birth weights were apparently not affected by level of supplement fed.

TABLE 1. Average data on Fort Reno cows wintered at low, medium, and high levels of supplemental feed (1957-58).

Age at first calving	Two-year-olds			Three-year-olds		
	1 Low	3 Med.	5 High	2 Low	4 Med.	6 High
Lot number						
Level of winter supplement						
Winter Phase (161 Days)						
No. of cows/lot 1957 ¹	14	13	9	13	10	12
Average cow weights (lbs.)						
Fall 11/1/57	1132	1133	1164	1193	1102	1199
Gain to calving	+27	+48	+63	+26	+31	+76
Loss from calving to 4/11/58	-250	-158	-179	-230	-105	-190
Spring 4/11/58	909	1023	1058	989	1028	1085
Cost of winter feed/cow (\$)	12.60	19.90	31.38	12.60	19.90	31.38
Summer Phase (203 Days)						
Average cow weights (lbs.)						
Spring 4/11/58	909	1023	1058	989	1028	1085
Fall 10/31/58	1139	1190	1217	1209	1238	1228
Summer gain	+230	+167	+159	+220	+210	+143
Summer feed cost/cow (\$)	17.79	17.79	17.79	17.79	17.79	17.79
Total yearly feed cost/cow (\$)	30.39	37.69	49.17	30.39	37.69	49.17
Calf Production Records						
Number of calves born	14	11	9	13	5	12
Number of calves weaned ²	14	10	8	13	5	11
Average calving date	3/11	3/6	3/4	3/4	3/20	3/7
Average calf weights (lbs.)						
At birth (corrected for sex)	82.0	80.6	83.8	84.5	82.0	83.1
At weaning (corrected for age and sex)	490	511	470	519	487	482

¹ Of the original 15 females per lot, a total of 19 cows had been removed by the fall of 1958. During 1957-58 one cow was removed from each of Lots 3, 4, and 5, and two cows were removed from Lot 6.

² One calf in each of Lots 3 and 6 was stillborn. One calf in Lot 5 was born during a snow-storm and was found dead soon after birth.

Weaning weights of calves, with both calving groups averaged at each level, were 505, 499, and 476 pounds for low, medium and high levels, respectively. Thus, high level cows weaned the lightest calves when corrected for sex and age.

Summary of 10 year's Performance

Of more importance than a single year's data are results covering the total production of the cows to date. Shown in Table 2 are results obtained since the cows were started on test in 1948 up to the fall of 1958. Several items are of particular significance.

TABLE 2. Summary of 10 1/2 years' results in long-time study with beef cows wintered at different levels (1948-1958).

Age at first calving Lot number Level of winter supplement	Two-year-olds			Three-year-olds		
	1 Low	3 Med.	5 High	2 Low	4 Med.	6 High
No. of cows at start of experiment	15	15	15	15	15	15
No. remaining on test Nov. 1958	14	12	8	13	9	10
Ave. wt. changes of cows on test (lbs.)						
Initial weight 10/29/48	473	471	476	476	461	470
Ave. winter wt. loss	-111	-108	-68	-111	-96	-76
Ave. summer gain	178	180	144	184	174	151
Final wt. 10/31/58	1139	1133	1217	1209	1238	1228
Calf production records at 10½ yrs. of age						
Heifers assisted at 1st calving	6	8	4	--	--	1
Calves lost at 1st calving	1	1	2	--	--	2
Total no. of calves weaned	118	116	93	108	86	95
% calf crop weaned ¹	92.2	92.1	87.7	96.4	82.7	85.6
Total no. of calves weaned/cow	8.30	8.29	7.90	7.71	6.62	6.85
Average calving date	3/15	3/8	3/8	3/16	3/8	3/5
Average calf weights (lbs.)						
At birth (corrected for sex)	77.4	76.9	78.9	77.9	77.2	78.8
At weaning (corrected for age and sex)	481	479	471	498	475	491
Total feed, pasture & mineral cost/cow (\$)	284.94	375.23	503.01	284.94	375.23	503.01
Cow cost per cwt. calf weaned (\$)	7.14	9.45	13.52	7.42	11.94	14.97

¹ Based on the total number of cows bred to calve each year.

1. Survival rate has been inversely related to winter feeding level. Of 30 females which started the project at each level, there were 27, 21, and 18 left on the low, medium, and high levels, respectively, at the completion of the summer grazing season in 1958.

2. Greater winter weight loss of low and medium level cows have been recovered during the summer, so that average fall weights in 1958 were essentially the same for all lots, except for cows of Lots 1 and 3 on the low and medium levels (two-year-old calving group). Level of winter feeding, practiced over a 10 year period, has had little effect on cow weights at 10½ years of age, except for Lots 1 and 3.

3. Despite more difficulty at first calving for females which calved first as two-year-olds, these cows have apparently been more regular producers. At 10½ years of age, after weaning their 8th or 9th calves, these cows had weaned 1.23 more calves than those that calved first as three's (see Table 3). Average weaning weight of calves has been slightly less for the two-year-old group due to the light weight of the

TABLE 3. Production records at 10 1/2 years for cows that calved first as two- and three-year-olds.

Age at first calving	Two-Year-Olds	Three-Year-Olds
Number of cows at start of experiment	60	60
Number of cows remaining Oct. 31, 1958	46	46
Number of possible calvings ¹	486	437
Number of calves weaned	443	381
Percent calf crop weaned	91.2	87.2
Number of calves weaned per cow	8.20	6.97
Average weaning weights (corrected for age and sex)	478	488
Average calving date	3/11	3/9
Cow cost/cwt. calf weaned (\$)	9.80	13.05

¹ Considers the total number of times the cows should have calved. Percent calf crop is based on this figure.

first calf weaned. However, cow cost per 100-pound calf weaned has been \$3.25 less because of the earlier production and more persistent reproductive performance.

4. Average calving date for low level cows has been about 7 to 11 days later than for medium and high level cows, presumably a reflection of lowered condition at the start of the breeding season.

5. Level of wintering as practiced in this study has had little effect on birth weights. Weaning weights of calves corrected for age and sex (to obtain a better indication of mothering ability of the cow) has been slightly higher for the low level. When age of calving groups are averaged together, there is very little difference between medium and high level groups. Percent calf crop weaned has favored the low and medium levels.

6. Total feed, pasture, and mineral costs per cow since the start of the project have been about 32 percent greater for medium level cows, and 77 percent greater for the highs, than for the low level cows. Cow-costs per cwt calf weaned have shown remarkable differences.

Results of Lake Blackwell Test

Results as shown with cows at Fort Reno need verification in tests with different cows under other conditions. In the fall of 1957, it was possible to compare the performance of mature cows at the Lake Blackwell range west of Stillwater where climatic and pasture conditions were less desirable than at Fort Reno. Results of the first year's test are shown in Table 4. Here only the low and medium levels were compared. All calves were creep-fed.

TABLE 4. The effect of level of winter feeding upon the performance of spring-calving beef cows at Lake Blackwell (1957-58).

	Lot 1 Low level	Lot 2 Medium level
Number of cows	23	22
Average weights (lbs) .		
Initial 11/4/57	1099	1105
Gain to calving 1/24/58	-22	32
Total winter gain	-212	-171
Spring 4/12/58	887	934
Fall 10/11/58	1090	1101
Yearly gain	-9	-4
Average weight per calf (lbs)		
Birth ¹	80	81
Weaning ²	526	524
Average birth date of calves, Feb.	25	25
Supplemental winter feed		
C.S. meal per cow per day, lbs.	1.0	2.5
Cost per cow (dollars)	4.52	11.30
Creep feed per calf ³		
Pounds	488	488
Dollars	12.69	12.69
Number of open cows 10-11-58	3	1

¹ Corrected for sex by the addition of 5 lbs. to the birth weight of each heifer.

² Corrected for sex by the addition of 25 lbs. to the weaning weight of each heifer.

³ Mixture was 55% rolled milo, 30% whole oats, 10% cottonseed meal and 5% cane molasses. Cost was \$2.60 per cwt. The calves in each lot were sub-divided into three summer groups and the average consumption of creep-feed is recorded here.

Low level cows lost 22 pounds per head to calving, while medium level cows gained 32 pounds. Total winter weight loss was 212 pounds and 171 pounds per head for the low and medium level cows, respectively. Birth weights were essentially the same and the amount of winter weight loss of the cow had no apparent effect on weaning weight of the calves the following fall. Three cows on the low level failed to conceive the following summer, whereas, only one cow on the medium level was found open upon pregnancy examination.

Results, for the most part, parallel those obtained in the long-time studies at Fort Reno. This indicates that for mature beef cows, calving in late winter or early spring on predominately bluestem pastures, 1 pound of cottonseed meal pellets per head daily appears sufficient to meet their needs for optimum performance.

Summary

Data from a 10-year test at Fort Reno indicate that low levels of supplemental feed have not adversely affected reproductive performance or weaning weight of calves. Low level cows have shown a greater survival rate under the conditions of this test. They have matured into as large cows as those fed more liberally, with the exception of cows which calved first as two-year-olds. At 10½ years of age, cows that calved first as two-year-olds had weaned 1.23 more calves than those that calved first as three's.

Total feed, pasture, and mineral costs for medium and high level cows have been 32 percent and 77 percent greater than for cows wintered each year at the low level. Results of a wintering trial with mature cows at the Lake Blackwell range have also shown that low level feeding was equal to medium levels in terms of weaning weight of calves, despite greater winter weight loss of low level groups.

Thus, it appears that small amounts of winter supplement, as practiced under conditions of this study, were adequate. Of considerable importance is the apparent trend for a shorter productive life span and lowered reproductive performance when beef cows are fed relatively large amounts of supplemental winter feed.

Carcass Studies With Steers, Bulls, and Stilbestrol-Implanted Bulls Sold as Slaughter Calves

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With an increasing demand for lighter, leaner beef cuts, many farmers in Oklahoma have found a "fat slaughter calf" program profitable. These calves are fall-dropped from dams generally of mixed breeding, and sired by beef bulls. The calves are creep-fed and allowed to run with their dams on winter and early spring pastures until they are marketed at approximately 550 pounds and 8 to 9 months of age off the cow.

In this program, the male calves are castrated. The question has been raised as to the carcass merit of bull calves, slaughtered at this young age, particularly since the bull calf gains at a faster rate than the steer. The effect of implanting bull calves with stilbestrol at a young age was not known and, thus, was also studied.

A preliminary trial was designed to (1) compare the carcass characteristics of bull and steer calves, and (2) study the effects of stilbestrol implantation on the growth and carcass characteristics of intact male calves.