Drenching lambs, either with phenothiazine or ruelene had no effect on rate of gain. Apparently, these lambs at this time of year were relatively free of internal parasites.

Effect of Different Amounts of Winter Supplement 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 pasture year-long. The necessity of determining the proper amount of winter supplement is of practical economic importance as it is often the biggest cash out-lay in the cow-calf enterprise.

Effects of different levels of winter feeding can be determined only by such items as percent calf crop, regularity of reproduction, longevity, time of conception, and weaning weight of the calf. These items require long-term studies to accurately evaluate the effects of different winter feed levels.

To investigate the problem with beef cows under practical conditions, a long-term study was established at this station in the fall of 1948 with weanling heifer calves. Results of the eleventh consecutive year of this study at Ft. Reno are reported herein. The results of 1948 to 1959 are summarized.[1] Also, 1958 data from another herd at a different location, Lake Blackwell, are included.

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 during the winter while grazing weathered, native grass pasture. These supplements were (per head daily): low (1.0 pound cottonseed meal pellets), medium (2.5 pounds cottonseed meal pellets), and high (2.5 pounds cottonseed meal pellets plus 3.0 pounds oats). The low level of supplement plus the nutrients obtained from the grass 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- vs. three-year-old calving within

[1] Detailed data obtained in previous trials can be found in Okla. Agr. Exp. Sta. Misc. Pub. MP-19, 22, 27, 31, 34, 43, 45, 48, 51, & 55 for years 1949 to 1959, inclusive.

each treatment could be studied since one-half the females in each group were bred to calve at two years of age, and the remainder at three years.

Production data are now available on the 9 and 10 calf crops from the original cows, 83 of which remained on test at the end of the summer grazing season in the fall of 1959. Cows have been removed from test only for failure to raise or wean 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.

All cows have grazed similar native grass pastures at the Ft. 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 to 10 acres of pasture per head, year-long. None of the calves have been 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 Ft. Reno breeding herd. The cows have been exposed to bulls from May 1 to August 15 each year. The calves were weaned in early October.

Another study has been conducted at Lake Carl Blackwell. To gain additional evidence on the effects of low (no winter supplement), medium (2.0 pounds of cottonseed pellets), and high (2.4 pounds cottonseed meal and 3.5 pounds ground milo) levels of feeding, a group of 68 grade Hereford cows, varying from 5 to 10 years in age, were allotted to three groups on the basis of age, weight, and previous records of performance. Nearly half of the cows were 5-year-old cows from Ft. Reno, and were the first repetition of the level of wintering study at that location, where they received approximately the same treatment as described above.

In November, 1958, these females were started on test at the Lake Blackwell range area west of Stillwater. 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. Data are given on the performance of these cows in 1958-59. At present, all are continuing on test.

Results

The 1958-59 performance of the Ft. Reno herd on the long-time level of wintering project is given in Table 1. The 1958-59 winter period proved to be rather severe for this area, whereas the summer grazing season provided lush pasture due to heavy rainfall.

Average weight gain to calving was least for cows on the low level, while losses after calving differed little between levels. Cows fed at the medium level gained more weight to calving than high level cows. Averaging both groups that calved first at two-year-olds and three-year-olds, total winter losses were 258, 186, and 202 pounds per head for cows on the low, medium, and high levels, respectively.

In the same order, summer gains for cows at each level were 186, 122, and 99 pounds. This trend has been typical of past results, with

Table 1.—Average Data on Ft. Reno Cows Wintered at Low, Medium, and High Levels of Supplemental Feed (1958-59).

Age at First Calving	Two-Year-Olds			Three-Year-Olds		
Lot Number	1	3	5	2	4	6
Level of Winter Supplement	Low	Med.	High	Low	Med.	High
Winter Phase (161 Days)						
No. of cows/lot 1958[1]	14	12	8	13	9	10
Average cow weights (lbs.)						
Fall 10/31/58	1139	1175	1217	1209	1250	1228
Gain to calving	—94	—24	—51	—87	—16	—18
Loss from calving to 4/10/59	—170	—155	—164	—166	—178	—170
Spring 4/10/59	875	996	1002	956	1056	1040
Cost of winter feed/cow ($)	12.62	20.01	30.84	12.62	20.01	30.84
Summer Phase (200 Days)						
Average cow weights (lbs.)						
Spring 4/10/59	875	996	1002	956	1056	1040
Fall 10/27/59	1066	1149	1099	1118	1146	1141
Summer Gain	+191	+153	+ 97	+162	+ 90	+101
Summer feed cost/cow ($)	17.69	17.69	17.69	17.69	17.69	17.69
Total yearly feed cost/cow ($)	30.31	37.70	48.53	30.31	37.70	48.53
Calf Production Records						
Number of calves born	14	10	8	13	9	10
Number of calves weaned	13	8	8	13	9	9
Average calving date	3/5	3/11	3/11	3/7	3/15	3/16
Average calf weights (lbs.)						
At birth (corrected for sex)	76	77	73	81	79	78
At weaning (corrected for age and sex)	456	470	430	480	463	480

[1] Of the original 15 females per lot, a total of 24 cows had been removed by the fall of 1959. During 1958-59 two cows were removed from Lot 1, and three cows were removed from Lot 3.

winter weight loss being greatest for low level cows and least for those wintered at the high level and an inverse relation for summer gains. 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 1959 show that all high and low level cows calved, while 19 of 21 of the medium level cows calved. Average calving date was earliest for the low level cows by about a week, which differs from earlier results. In early years of production, low level cows calved later than mediums or high. Birth weights were apparently not affected by level of supplemental feed in this experiment.

Weaning weights of calves, averaging both age-of-calving groups at each winter feed level, were 468, 466, and 455 pounds for low, medium, and high respectively. Thus, high level cows weaned the lightest calves when corrected for age and sex.

Summary of 10 Years' Performance

Of greater significance than a single year's performance are results obtained from total production to date. Shown in Table 2 are the results obtained since the cows were started on test in 1948 up to the fall of 1959. Several items are of particular significance.

Table 2.—Summary of 11½ Years' Results in Long-Time Study with Beef Cows Wintered at Different Levels (1948-59).

Age at First Calving	Two-Year-Olds			Three-Year-Olds		
Lot Number	1	3	5	2	4	6
Level of Winter Supplement	Low	Med.	High	Low	Med.	High
No. of cows at start of experiment	15	15	15	15	15	15
No. of cows remaining on test November, 1959	14	10	6	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	—125	—115	— 82	—124	—105	— 86
Ave. summer gain	179	177	139	182	166	147
Final wt. 10/27/59	1066	1149	1099	1118	1146	1141
Calf Production Records at 11½ Years of Age						
Heifers assisted at 1st calving	6	8	4	--	--	1
Calves lost at first calving	1	1	2	--	--	2
Total No. of calves weaned	131	124	101	121	95	104
Percent calf crop weaned[1]	92.3	89.2	88.6	96.8	84.1	86.0
Total No. calves weaned/cow	9.23	8.92	8.86	8.71	7.57	7.74
Average calving date	3/14	3/8	3/8	3/15	3/9	3/6
Average calf weights (lbs.)						
At birth (corrected for sex)	77.3	76.9	78.5	78.3	77.4	78.7
At weaning (corrected for age and sex)	479	479	468	496	474	490

Table 2.—Summary of 11½ Years' Results in Long-Time Study with Beef Cows Wintered at Different Levels (1948-59).—(Continued)

Age at First Calving	Two-Year-Olds			Three-Year-Olds		
Lot Number	1	3	5	2	4	6
Level of Winter Supplement	Low	Med.	High	Low	Med.	High
Total feed, pasture, and mineral cost/cow ($)	315.25	412.93	551.54	315.25	412.93	551.54
Cow cost/cwt. calf weaned ($)	7.13	9.66	13.30	7.30	11.51	14.54

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

1. Survival rate has been inversely related to level of winter feeding. Of the original 30 cows started at each winter feed level, 27, 19, and 16 were left on the low, medium, and high levels, respectively, at the completion of the 1959 summer grazing season (11.5 years of age).

2. Greater winter weight losses of low and medium level cows have been recovered during summer grazing so that average fall weights in 1959 were essentially the same for all lots, except for Lot 1 (two-year-old calving group) on the low level, which weighed slightly less than other groups. Level of winter feeding, practiced over an 11 year period, has had little effect on mature cow weights.

3. Despite more difficulty at first calving for females which calved first as two-year-olds, these cows have been more regular producers. At 11½ years of age, cows calving first as two-year-olds have weaned 1.19 more calves per cow than those which calved first as three-year-olds (see Table 3). Average weaning weight has been slightly less for two-year-old calving cows due to the lighter weight of the first calf weaned. However, cow cost per 100 lbs. calf weaned has been $1.22 less for this group because of earlier production and slightly more persistent reproductive performance.

4. Average calving dates have been from 6 to 9 days earlier for medium and high level cows, presumably a reflection of better condition at the start of the breeding season for cows more liberally fed.

5. Different levels of winter feed in this test 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, little difference is seen between medium and high level groups. Percentage calf crop weaned has favored the low level cows.

Table 3.—Production Records at 11½ Year 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. 27, 1959	41	42
Number of possible calvings[1]	532	480
Number of calves weaned	484	422
Percent calf crop weaned	91.0	87.9
Number of calves weaned per cow	9.10	7.91
Average weaning weights (corrected for age and sex)	476	487
Average calving date	3/11	3/9
Cow cost/cwt. calf weaned	9.77	10.90+

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

6. Total feed, pasture and mineral costs per cow since the start of the experiment have been 32 percent greater for the medium level cows, and 75 percent greater for the highs than for the low level cows. Cow costs per cwt. calf weaned have shown significant economical differences in favor of the lower level.

7. While no factual data have been obtained, it has been apparent throughout the project that low level females are better rustlers and more active grazers than high level cows in particular. Thus when dry grass was available, they have tended to reduce differences in the amount of winter supplements fed.

Results of Lake Blackwell Test

It seemed desirable to verify and expand the results of the tests at Ft. Reno by repetitions at a different location. In the fall of 1958, it was possible to compare the performance of mature cows at the Lake Blackwell range area west of Stillwater. Results of the second year's test at this location are shown in Table 4.

Losses from fall weight to calving were 85, 61, and 20 pounds respectively for the low, medium, and high level cows. Also, total winter losses showed the same trend being 358, 247, and 245 pounds for the low, medium, and high level cows, respectively. It should be emphasized that the low level cows received no supplemental feed on dry grass. Thus these cows received much more severe nutritional treatment than the "low level" cows at Ft. Reno. Very little difference is reflected in the weight change for the medium vs. high level cows. Larger weight

Table 4.—The Effect of Level of Winter Feeding upon the Performance of Spring-Calving Beef Cows at Lake Blackwell (1958-59).

Lot Number Supplemental Feed	1 None	2 Medium[1]	3 High[2]
Number of cows that weaned calves[3]	20	23	20
Average Weights (lbs.)			
Initial 11/11/58	1120	1124	1172
Gain to calving 1/30/59	—85	—61	—20
Winter gain 4/23/59	—358	—247	—245
Yearly gain 10/10/59	— 34	— 42	— 53
Average weight per calf (lbs.)[4]			
Birth	66	76	76
Spring	107	139	167
Weaning	408	466	514
Average birth date of calves	3/1	3/3	2/24
Supplemental winter feed			
Pounds per cow			
Cottonseed meal	0	326	391
Milo	0	0	570
Cost per cow ($)	0	10.43	24.48
Total pasture & feed cost per year per cow ($)	25.00	35.43	49.48
Creep-feed cost per calf (426 lbs./calf)[5]	11.42	11.42	11.42
Return per cow over feed cost[6]	77.82	83.63	83.02
Number of open cows 10/10/59	1	2	0

[1] Two pounds pelleted cottonseed meal per head daily.
[2] 2.4 pounds cottonseed meal and 3.5 pounds ground milo per head daily fed as pellet.
[3] In addition to the cows raising calves there were two cows in Lot 1 and one in Lot 2 that failed to calve. One calf in Lot 2 died before weaning, and one calf in Lot 3 was sold before weaning due to loss of dam from prolapsed uterus. The feed costs of these cows were not considered in the return per cow calculations.
[4] Average steer weight plus average heifer weight divided by two.
[5] Three levels of creep-feed fed within cow lots accounts for average weight of feed being the same for all lots.
[6] Calf value ($28 per cwt.) minus pasture and feed cost of cow and calf.

losses for the low level cows, 32 percent of initial fall weight, were compensated for by larger summer gains, so that total yearly gain was of little difference between any of the nutritional levels.

Average birth weights reflected the low nutritional plane of Lot 1 cows, while no difference was noted between the medium and high level cows. Also, nutritional level of the dam was apparent in the spring weights and weaning weights of the calves. The weaning weight of calves from low level cows averaged 106 pounds less than for the high level cows. A small part of this difference was due to a slightly earlier calving date for high and medium cows. All lots received the same average amount of creep feed per calf.

When pounds of calf weaned and its value, minus cow cost and creep feed cost, are considered for this particular year, the medium level

of supplementation was the most profitable, but not greatly different than returns for the high level. Although cost for wintering of the low level cows was small, returns for these cows were low due to greatly decreased weaning weights. It appears that the "low" level under Ft. Reno conditions approximates the medium level in the Lake Blackwell tests.

Summary

Data from the 11-year test at Ft. Reno indicate that low levels of supplemental feed under range conditions at this station have not adversely affected the reproductive performance or longevity of beef cows, nor affected the weaning weights of their 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 at higher levels, with the possible exception of those calving first as two-year-olds. At 11½ years of age, cows that calved first as two-year-olds had weaned 1.19 more calf per cow than those which calved first as three's. Total feed, pasture, and mineral costs for medium and high levels have been 32 percent and 75 percent greater than those cows wintered each year on the low level.

Results of a wintering trial with mature cows at the Lake Blackwell range indicate a marked increase in weaning weight of the calves due to increased supplementation of the cows. Profits have favored the medium level in terms of return for calf above cow cost and creep feed cost. Little difference was noted in yearly weight gains of the cows or in reproductive performance.

Thus it appears that small amounts of winter supplement as practiced under conditions of the Ft. Reno study were adequate. Larger amounts were needed under Lake Blackwell conditions. Of considerable importance is the apparent trend for a shorter productive life span and reduced percent calf crop where beef cows were fed relatively large amounts of supplemental winter feed each winter for 11 consecutive years.

Lactation and Creep Rations for Sows And Pigs Raised on Pasture and in Confinement

J. C. Hillier and J. Martin

One of the very critical periods in the life cycle feeding and management of swine is the period from birth to eight weeks of age. Anemia is common among pigs of this age unless special precautions are taken to prevent it. The trials discussed in this paper dealt with the period from 14 to 56 days of age for the pigs and from farrowing to 42 days post farrowing for the sows. Hampshire, Poland China and Yorkshire