prepared from animals tested at this station and will be studied at a later date, but such data cannot be reported at this time.

The data included in Table 1 were selected to show one of the characteristic responses that appears to differentiate clean and carrier animals in this test. Although these data were obtained with Angus, similar results have been obtained for Herefords that have been tested. No differences have been observed in the response of bulls as compared to cows under insulin stress.

Much of the work to date at this station has been preliminary studies designed to develop skill in counting the cells. In these studies young animals, whose genotype for dwarfism was not known, were used to avoid the bias that might result if the technician was aware of the results he should obtain. It was found that young animals, one to four years of age, gave a very definite response. However, the older animals that have been tested show little or no response at the dosage level that has yielded excellent results with young cattle. This apparent influence of age on the test has prevented an appraisal of the accuracy of the test since most of the available animals of known genotype were older animals. Further work is needed to determine how age influences the test, not only in the case of older animals, but also to determine the earliest age at which the test may be safely conducted.

In general the results that have been obtained on young animals at this station agree very closely with the expected based upon pedigree information. Approximately 90 percent of the animals believed free of the dwarf gene from pedigree information have given the response assumed to be typical of clean animals. Slightly more than one-half of the offspring of a carrier parent have given a reaction typical of known carriers. One would expect slightly more than one-half of these offspring to be carriers since it was probable that in some cases both parents were carriers. Three young animals known to be heterozygotes have been tested and all gave a carrier response.

Although the results that have been obtained at this station, and other stations, indicate that this technique has promise, it is still in the research stage. There are many questions which remain to be answered by additional research. Work is under way at the present time to determine the accuracy of the test, its limitations, and the factors that influence it. Whether this test will be suggested for routine use in the field will depend upon the results of this research.

Levels of Supplemental Winter Feeding of Beef Cows and Creep-Feeding Fall Calves

A. B. NELSON, R. F. HENDRICKSON, and W. D. CAMPBELL

In recent years there has been an increased number of cows calving in the fall. This change in calving season has resulted in a need for additional data on feeding and managing such cattle grazing

native grass yearlong. The cow's requirements for nutrients are markedly increased while she is suckling a calf and supplemental winter feed represents a large portion of the total cost of producing a calf. The amount and kind of supplemental feed needed is determined by the amount and quality of forage available in a pasture. In parts of our state the native grasses furnish practically all of the roughage consumed by a cow herd. Considerations in planning a winter feeding program under such conditions include: What is the effect of level of winter feeding on weaning weights of calves and rebreeding rate of the cows? Should creep-feeding be recommended for fall-dropped calves which are to be marketed as feeders in late summer?

In order to answer the above and other questions, an experiment having the following objectives was initiated in the fall of 1954:

1. To compare two levels of supplemental winter feeding of beef cows suckling calves.
2. To study the value of creep-feeding suckling calves born in the fall and sold as feeder calves.
3. To study the relationship between the level of winter feeding of cows and creep-feeding of their calves.

The results obtained during the 1954-55 season were summarized in Oklahoma Agricultural Experiment Station MP-45 (p. 39). Reported here is a summary of results obtained during the second year of the study and preliminary results obtained during the third winter.

Procedure

In October, 1955, 80 grade Hereford cows were divided into 4 lots of 20 head each. The cattle were allowed to graze in the native grass pastures at the Lake Carl Blackwell experimental range area and during the winter were fed supplemental feed and their calves were fed as follows:

Lot 1. 1½ lbs. pelleted cottonseed meal; calves not creep-fed.
Lot 2. 1½ lbs. pelleted cottonseed meal; calves creep-fed.
Lot 3. 2½ lbs. pelleted cottonseed meal; 3 lbs. ground yellow corn; calves not creep-fed.
Lot 4. 2½ lbs. pelleted cottonseed meal; 3 lbs. ground yellow corn; calves creep-fed.

The supplemental feed was fed in bunks every other day in amounts to furnish the above listed pounds per head daily. A mineral mixture of two parts ground rock salt and one part steamed bone meal was available at all times. The concentrate mixture which was creep-fed contained 55% rolled milo, 30% whole oats, 10% cottonseed meal and 5% cane molasses. The mixture was available in mid-December but only small quantities were consumed until late January.

Purebred Hereford bulls were placed with the cows on December 19, 1955, thus, the first calves were born in late September.

Results

A summary of the data collected in the 1955-56 season is given in Table 1.

The cows on the low level of wintering, Lots 1 and 2, lost 203 and 320 lbs., respectively, during the 192-day winter feeding period. Those cows on the high level lost 198 and 214 lbs. during the same period. The average loss of these two lots was 206 lbs. as compared to an average loss of 262 lbs. in Lots 1 and 2. Thus, the level of supplemental feeding was reflected in weight gains.

The reason for the difference in winter gain of the two groups of cows on the low level is not apparent. The "yearly" gain (beginning

Table 1.—Creep-feeding fall calves and levels of wintering cows suckling calves.

Lot number	1	2	3	4
Level of feeding cow	1½ lbs. CSM	1½ lbs. CSM	2½ lbs. CSM	2½ lbs. CSM
Calf feeding	None	Creep-fed	3 lbs. corn None	3 lbs. corn Creep-fed
Number of cows raising calves[1]	18	18	17	19
Average weight per cow (lbs.)				
Initial 10-8-55	1082	1152	1129	1125
Spring 4-17-56	879	832	931	911
Final 7-9-56	1072	1092	1131	1093
Winter gain	—203	—320	—198	—214
"Yearly" gain	— 10	— 60	2	— 32
Average weight per calf (lbs.)				
Birth[2]	78	80	79	79
Weaning 7-9-56[3]	472	509	512	528
Daily gain	1.56	1.79	1.75	1.86
Average birth date of calves	Oct. 30	Nov. 12	Nov. 4	Nov. 11
Supplemental feed per animal (lbs.)				
Cow				
Cottonseed meal	288	288	480	480
Corn	---	---	576	576
Mineral	30	30	30	30
Calf (creep-feed)[4]	---	744	---	655
Total feed cost per head ($)				
Cow	32.47	32.47	55.26	55.26
Calf	---	19.05	---	16.77
Total	32.47	51.52	55.26	72.03
Selling value minus feed cost ($)	49.83	38.09	34.87	22.21
Per 100 lbs.				
Steers[5]	19.30	19.30	19.30	19.30
Heifers[6]	16.25	17.00	17.00	17.50
Per head[7]	81.40	89.61	90.13	94.24
Selling value minus feed cost ($)	48.93	38.09	34.87	22.21

[1] There were originally 20 cows per lot. Losses in Lot 1 were a crippled calf which died shortly after birth and a dead calf taken by Caesarian section. In Lot 2 one calf was born dead after malpresentation at parturition and one cow died at time of parturition at the Veterinary clinic. Lot 3 losses were one calf died shortly after birth, one calf died of unknown causes when 4 months old and one cow died of unknown causes (apparently lightning) in May 1956. The loss in Lot 4 was death of twin calves shortly after birth.

[2] Corrected for sex by the addition of 5 lbs. to the weight of each heifer calf.

[3] Average weight of steers plus average weight of heifers divided by 2.

[4] Cost of creep-feed was $2.56 per cwt.

[5] All steers except 1 per lot were sold as feeders at $19.50 per cwt. The remaining steers sold at $17.50 per cwt.

[6] The fatter heifers were sold for slaughter at $18 per cwt. This included 1,5,4, and 7 heifers in Lots 1,2,3, and 4, respectively. The remainder of the heifers (9,5,5, and 2 in Lots 1,2,3, and 4, respectively) sold as feeders at $16 per cwt.

[7] Stillwater weights were shrunk 3%.

of winter period until weaning) was —10 and —60 for these low-level cows. The cows of Lot 2 were heavier in the fall, lost more during the winter, and gained more from April to weaning.

Both the winter gain and yearly gain of the cows, (Lot 1 vs. 2, and Lot 3 vs. 4), were in favor of not creep-feeding the calves. This is in contrast to statements that creep-feeding calves results in heavier cows. The importance of such weight differences is not understood completely.

The average birth weights of the calves were only slightly different. The calves were weaned on July 9 and sold at the Oklahoma City livestock market. The weaning weight of the calves in Lot 1 was 472 lbs. which was 37 lbs. less than the weight of calves in Lot 2 (509 lbs.). The calf weights in Lots 3 and 4 were 512 and 528 lbs., respectively. The calves in Lots 2 and 4 were creep-fed and the increased gain resulting from creep-feeding was 37 lbs. for calves from the low-level cows and 16 lbs. for those from the high-level cows.

Nearly all steers were sold as feeders at $19.50 per cwt. The fatter heifers sold for slaughter at $18 per cwt. and the remainder of the heifers sold as feeders at $16 per cwt. Within a level of wintering there were more creep-fed heifers sold at $18 than at $16 per cwt. All the heifers could have been sold as feeders at approximately $17 per cwt. The steers were appraised at $16.50 per cwt. for slaughter.

The calves in Lot 2 consumed an average of 744 lbs. of creep-feed which cost $19.05. In Lot 4 the 655 lbs. of feed per calf cost $16.77. The cost of feeding the cows in Lots 1 and 2 (low-level) was $32.47. When this cow-feed cost and creep-feed cost are subtracted from the selling value per calf, the "net return" is more than $10 per head in favor of not creep-feeding ($48.93 vs. $38.09). In Lots 3 and 4 (high-level) the difference is $12.66 in favor of not creep-feeding ($34.87 vs. $22.21). These results are in agreement with those obtained during the previous year.

Apparently creep-feeding will increase the gain of the calves and the calves will probably be slightly fatter at weaning. However, when these calves were sold in July the feeder value of the steers was $3 per cwt. more than their value for slaughter. High quality creep-fed and non-creep-fed calves ordinarily sell at the same price or within $.50 per cwt. as feeders. Under such conditions creep-feeding the steer calves cannot be recommended. It is possible that steer calves could profitably be creep-fed during the winter months but not creep-fed after green grass is available in the spring. Data on such a system are not available. The creep-feeding of heifer calves is sometimes recommended. The profitableness of this practice would depend upon the relative value of slaughter and feeder cattle when the calves are sold.

There were small differences in average calving date which cannot be explained. One might expect cows wintered on the low-level to calve later than those in the high-level. This was not true in this test. When the cows were examined for pregnancy in mid-summer, there were 3 open cows in Lot 2, and 2 open cows in Lot 4. Since feeding the

low level of supplemental feed during the winter has not delayed the average calving date nor increased the number of open cows but has increased the net return per calf, the present recommendations for winter feeding of cows suckling calves may be too high.

Preliminary Results of 1956-57 Test

All except one of the cows used in the previous test remained in the experiment. One cow was replaced with one of similar breeding; therefore, each lot contained 20 cows. The feeds were the same as those used in the previous test except that milo replaced corn in the high-level ration. The cottonseed meal and milo were mixed and pelleted for convenience in feeding. Data collected to March 1 are summarized in Table 2.

Table 2.—Preliminary 1956-57 results of levels of winter feeding beef cows nursing calves.

Lot number	1	2	3	4
Level of feeding cow	1½ lbs. CSM	1½ lbs. CSM	2½ lbs. CSM	2½ lbs. CSM
Calf feeding	None	Creep-fed	3 lbs. milo None	3 lbs. milo Creep-fed
Number of cows raising calves[1]	19	14	18	17
Average weight per cow (lbs.)				
Initial 9-29-56	1099	1129	1096	1153
Spring 3-1-57	807	761	826	863
Gain, 153 days	—292	—368	—270	—290
Avg. birth weight per calf (lbs.)[2]	81	80	80	79
Average calving date, October[3]	13	27	17	11
Avg. wt. per calf, 3-1-57 (lbs.)[4]	212	206	215	257
Total feed per animal (lbs.)				
Cow[5]				
Cottonseed meal	230	230	382	382
Ground milo	---	---	426	426
Calf	---	188	---	177
Supplemental feed cost per animal ($)				
Cow	7.82	7.82	23.64	23.64
Calf[6]	---	5.79	---	5.45
Total	7.82	13.61	23.64	29.09

[1] There were originally 20 cows per lot. One cow in Lot 1 died of unknown causes. In Lot 2 there were 3 open cows. In addition, 1 calf was born dead and 2 cows died from accidental urea poisoning. Two calves died in Lot 3. In Lot 4 one cow was open, 1 cow drowned and 1 calf died following castration and dehorning.
[2] Corrected for sex by the addition of 5 lbs. to the weight of each heifer calf. Includes all calves born.
[3] Includes all calves born.
[4] No corrections for age or unequal numbers of steers and heifers in each lot.
[5] Feeding of cottonseed meal pellets began 9-29-56. Milo was fed beginning 10-10-57.
[6] Creep-feed cost $3.08 per 100 lbs.

Winter gains of the cows were approximately the same as those recorded during the previous test. The weight loss was particularly great in Lot 2, but the loss in Lot 1 was not much different from the losses in Lots 3 and 4, although the average losses for the cows on the low- and high-levels of wintering were 330 and 280 lbs., respectively.

The average birth weight of calves was nearly the same in all lots. The average birth date varied considerably between lots with no consistent relation between birth date and level of wintering of the cows.

The calves in Lot 4 (high-level of wintering cows and creep-feeding calves) weighed considerably more on March 1 than the other calves. These are the oldest calves and some of the difference may be due to the unusually large number of steers in this lot. There is an unusually large number of heifers in Lot 2 and these calves are the youngest. No weight corrections due to differences in number of each sex and age of calves have been made in these data.

Further evaluation of the feeding method for each of the 4 groups of cattle will be made when the calves are sold in late June or early July.

Supplements to High-Silage Rations for Fattening Two-Year-Old Steers

L. S. POPE, R. D. HUMPHREY, LOWELL WALTERS and GEORGE WALLER

Much attention has been given to the development of complex protein supplements for fattening cattle. Increased use has been made of stilbestrol and other synthetic hormones in an attempt to increase gain and lower the feed requirements. Using the "artificial rumen" technique, it has been possible to show that a wide variety of feeds and other ingredients will improve the medium for rumen bacteria.

As important as these advances are, much remains to be learned as to the practical importance of the many feed additives now being used in beef cattle supplements. Small differences in rate and efficiency of gain may mean the difference between profit or loss to the cattle feeder. Yet it is generally true that the more complex the supplement the greater the cost of the fattening ration. Thus, practical feeding trials are necessary to show the possible beneficial effects of complex supplements as opposed to commonly used oil meals on a protein- and energy-equal basis.

To test certain feed additivies and complex supplements for fattening beef cattle, a project was initiated at the Fort Reno station in 1953. In these tests, long-yearling and two-year-old feeder cattle have been used. They have been fattened on high-silage rations, with limited amounts of ground milo and a protein supplement. This report gives the results of the 4th trial. To date, the tests have included comparisons of 12 supplements vs. soybean meal.

Procedure

Seventy, coming two-year-old steers from the Experiment Station herds at Guthrie and Lake Carl Blackwell were selected in August and September, 1956, for this study. Forty-two steers were obtained from the Guthrie station. These cattle had been purchased the previous fall from the Louis Ham Ranch at Paoli in the southern part of the state, and had been used in grazing trials at the Guthrie station. Twenty-eight of the steers used were from the Lake Blackwell station herd.