LEVELS OF SUPPLEMENTAL WINTER FEEDING OF BEEF CATTLE AND CREEP-FEEDING FALL CALVES

By

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INTRODUCTION

In Oklahoma, the most common method of managing the breeding herd in a cow-calf system of production has been to breed the cows in May, June and July. Thus, the major portion of the calves are dropped in the latter part of the following winter and early spring. In recent years there has been an increased number of cows calving in the fall. The bulls are turned in with the cows in January and may remain for 90 days; therefore, the first calves are born in October.

This change in calving season has resulted in a need for additional data on feeding and managing such cattle grazing native grass pastures yearlong. These pastures are adequate for maintenance and growth of cattle during the late spring and summer months, but the nutritive value steadily declines with approaching maturity of the forage. It is well known that the cost of supplemental winter feed constitutes a large percent of the total cost of producing a calf.

The quantity and quality of supplemental feed needed by a cow during the winter depends to a large extent on the amount and quality of forage available and whether or not the cow is lactating. Many studies have shown that the nutritive requirements of a cow are greatly increased during lactation.

Several production measures are of primary concern in evaluating the optimum level of supplemental feed. Certainly the weight and quality of the calves and rebreeding rate of the cows must be considered. The effect

of cow weight loss on the above measures needs to be determined. The effect of plane of nutrition on the future production of young animals needs to be studied.

Another factor of consequence is whether or not creep-feeding would be economically feasible for fall-dropped calves which are to be marketed as feeders and the relationship between level of wintering and creep-feeding.

In order to provide information on the problems which arise in a fall-calving operation, a study was undertaken at the Oklahoma Agricultural Experiment Station in the fall of 1954. In the original study, mature cows were used whereas in subsequent studies experimental data are being obtained from cattle of several different ages. Reported in this thesis are (1) a four-year summary of results with mature cows, (2) results with two-year-old heifers producing their first calf, (3) preliminary results with these same heifers as three-year-olds, and (4) preliminary results with two-year-old heifers, yearling heifers, and heifer calves.

REVIEW OF LITERATURE

Much information has been and is being collected on the amount of supplemental feed required for wintering mature pregnant cows on dried range grass, and for developing young heifers from weaning to production of their first calf in a spring-calving program. However, there is little information on the supplemental feed requirements of cows and heifers which calve in the fall. Data relative to the value of creep-feeding calves born in the fall are also limited. Because of the limited information available with fall-calving cows, this review will include investigations with both fall- and spring-calving cows.

Level of Wintering

Miller (1958) reported results with 100 Hereford heifers which were fed varying amounts of protein supplement for four consecutive winters while grazing native grass pasture yearlong. As weanling calves the heifers were divided as equally as possible into five lots and each lot was fed the same kind of supplement during the four winters, which included two calving seasons. The protein supplements and the amount of each fed during the first two winters were as follows: Lot 1, 1 pound of 40 percent protein pelleted cottonseed meal; Lot 2, 2 pounds of the same supplement fed in Lot 1; Lot 3, 2 pounds of 20 percent protein combination pellet; Lot 4, 2 pounds of 20 percent protein pellet (cottonseed meal and corn); and Lot 5, 2 pounds of 40 percent protein pellet containing 50 percent of

the nitrogen from urea. During the two remaining winter seasons, the allowance of supplemental feed was increased to 1.5 pounds per head daily in Lot 1 and 3 pounds per head daily in the other lots. The combination pellet contained several feed ingredients (corn, cottonseed meal, linseed meal, soybean oil meal, dehydrated alfalfa meal, molasses and minerals).

Results for the first two winters showed very minor differences in the average gains of heifers. Statistical analysis of the data revealed no significant differences among treatments or between years. However, during the two following winters while suckling calves, cows fed 3 pounds per head daily of pelleted cottonseed meal lost less weight during the winter and produced heavier calves than the other four lots. The cows receiving 1.5 pounds of pelleted cottonseed meal lost the most weight and weaned calves that were considerably lighter than any of the other lots. Very little differences were found in the average birth weights of calves from the various lots. Weaning weights were heaviest for Lot 2 calves and lightest for calves in Lot 1. The calves at weaning weighed an average of 361, 420, 404, 426, and 404 pounds for Lots 1, 2, 3, 4, and 5, respectively.

Pope et al. (1957), in a three-year comparison of methods of wintering cows nursing creep-fed calves, found that the highest gross return was from cows wintered on native grass supplemented with cottonseed meal and silage, but the net profit was highest where cows were wintered on rye and vetch pasture. Intermediate returns were obtained by wintering the cows on native grass plus cottonseed meal and ground ear corn. During the second trial, no winter pasture was available due to drouth conditions;

therefore, the cows wintered on rye and vetch pasture during the previous trial were wintered on native grass, oat hay and alfalfa. Results followed the same trend during this study that was noted in the first and third trials. The average weaning weight of the calves whose dams grazed rye and vetch was 17 pounds less than the other two groups. Decreased creep feed consumption and lower cow feed costs accounted for the higher net returns. The winter weight loss of cows was least for those grazing rye and vetch pasture while the cows receiving native grass, cottonseed meal and ground ear corn lost the greatest amount. Only slight differences were noted in birth dates and weights of calves over the three trials.

In pioneer studies with spring-calving cows, Lantow (1930) fed different quantities of cottonseed cake, varying from one to four pounds per head daily, to cattle wintering on the range. On the average, heavy winter feeding resulted in slower gains the following summer. Birth weights of calves from the heavier-fed lots were generally higher than from the poorer-fed lots. Average weaning weights for all supplemented lots were approximately equal. The practice of supplementing 1 pound per head daily proved more profitable than 2, 3, or 4 pounds of cottonseed cake, in this study.

Stanley (1938) conducted a series of five experiments to compare the relative merit of wintering range cattle with and without cottonseed cake and to study its effects on the calf crop. The four-year average birth weight of the calves from the unsupplemented group was 68 pounds, whereas the calves produced from cows receiving an average of 1.21 pounds of cottonseed cake daily as a winter supplement weighed 72 pounds. The 4 pounds difference was found to be statistically significant. Average

calf weaning weights and final cow weights were slightly in favor of the supplemented group. The author concluded that supplemental feeding of range cows with cottonseed meal did not increase the calf birth weight, weaning weight or the percent calf crop sufficiently to warrant the practice when the natural forage was adequate for the production of a living calf, and for maintenance of health and thrifty conditions in the breeding herd.

Black, Quesenberry and Baker (1938) summarized results obtained in a five-year study with 276 cows wintered on the range with cottonseed cake as a supplement and 266 cows wintered on the range without supplement. Average cow weight losses were greater for the unsupplemented group. Calves from supplemented cows were, on the average, 1.9 pounds heavier at birth and 13.6 pounds heavier at weaning than calves from cows receiving no cottonseed cake. However, the increase in weaning weight of the calves failed to compensate for the increased cost of wintering the cows. It was suggested that, for greatest economy, the use of cottonseed cake should be limited to seasons in which range conditions are severe.

A three-year study was conducted by Foster, Biswell and Hostetler (1945) to determine the effect of different levels of protein supplement fed to beef cows being wintered on native forest range in North Carolina. The same cows were used in all three trials so that the accumulative effects of the rations could be studied. During the last two winters 2, 4 and 6 pounds of protein supplement were fed to animals of different groups while only 2 and 4 pounds were compared during the first trial. Cottonseed meal was used as the protein supplement during the first and third trials and soybean meal was fed in the second trial. In all three

trials the weight changes of cows during the winter were directly related to the amount of supplement furnished. The groups receiving the most supplement either lost less weight or gained more. Most of the differences in gains during the winter were offset the following summer by the greater gains of the cows that had received the least supplement the preceding winter. Calf weaning weights during the first two years were directly proportional to the amount of supplement received by the cows. The calf weaning weights during the third trial were slightly in favor of the low level group. Third year results would probably have been similar to the first two trials if the number of open cows had not been larger in the low level group the previous year.

Johnson et al. (1952) found calf production to be closely related to the weight of spring-calving cows at the end of the winter feeding period. In general, the cows that maintained their weights best during the winter produced more calves and weaned heavier calves in the fall. Accumulative effects of poor and good rations were noted when the cows were subjected to a given ration over a period of years. This was true even though 7 months out of the year all cows received identical treatment.

One hundred and twenty-five mature bred beef cows of Angus and Hereford breeding were divided by Patterson (1953) into 5 uniform groups of 25 cows each and wintered at different levels for six consecutive winters. Four of the five rations provided for body weight maintenance and the average loss for the six winters was only 19 pounds per cow for the poorest ration (pasture clippings). The winter period covered in this study was from about December 1 to March 15, or until pasture was available in the spring. All cows on test were handled in the same manner

during the remaining portion of the year. The weaning weights of the calves were directly related to the winter weight gain or loss of the cows. Cows receiving the poorest ration consistently weaned younger and lighter calves than those produced by the cows on the other treatments. The average calf crop was found to be 10 percent less for this group.

Vinke and Dickson (1933) summarized 11 years' records kept on beef herds which were fed various winter rations and found that the greater the winter gain, the less the summer gain. In contrast to some of the previous results reported, no relationships were found between either winter rations or winter gains and the birth weights of calves immediately following the winter feeding period, or the weaning weights the following fall. The results indicated that winter rations had no effect on the weights of calves produced, if the cows are kept in a thrifty condition. However, these workers stated that the calves would not develop properly unless there was green grass or other feed available to stimulate the milk flow of the cows.

Similar results were reported by Zimmerman (1958), based on a ten-year study on the effect of different levels of wintering upon performance of beef cows grazing native pasture yearlong. No differences found in weaning weights and birth weights of calves were attributed to different levels of supplemental winter feed. Cow weight losses were found to be increased by low levels of wintering whereas the percent calf crop weaned was inversely related to the level of winter supplement.

Eckles (1916) concluded that the weight of a calf at birth is not ordinarily influenced by the ration received by the mother during gestation. He stated that this was especially true when based on the energy

differences of the rations, but that it may not hold true when a ration has been decidely deficient in some constituent for a long period of time.

Hart and Guilbert (1928) studied factors affecting the percentage calf crop in range herds. They found evidence which was indicative that failure to conceive was a more important factor than abortion. Also, failure to conceive was shown to be often due to the existence of a faulty plane of nutrition, resulting in a lack of proper functioning of the ovary and no manifestation of heat periods. They stated that cows which had weaned calves in the fall and were again pregnant must usually gain during the early winter season if they are to be normal weight by calving time.

Hilts (1924) noted considerable variation in the percentage calf crop in different sections of Nevada. He observed that cows turned out in good condition in the spring produced 18 more calves per 100 than were obtained from cows turned out in poor condition.

Knox and Watkins (1958) fed various supplements to range cows during the spring calving seasons from 1946 to 1953. They found that the age of the cow being supplemented appeared to affect the value of this supplemental feed. Feeding tended to increase the production of young cows more than that of mature cows. Little effect was noticed on the birth weights of calves produced in the first three seasons by supplementing young growing cows, but the calf crop was increased by about 14 percent. Protein supplements were superior to grain for young cattle, whereas mature cows responded similarly to both feeds when fed with a suitable mineral supplement.

Nelson et al. (1955) conducted a four-year study using supplements containing approximately 20 and 40 percent protein for wintering bred

yearling heifers on dry range grass. The heifers received an average of 2.24 pounds of supplement per head daily during the first trial. This was increased to 2.5 pounds during the last three trials. Weight data were included only for those cows which successfully raised a calf. The average difference in the winter weight gain prior to calving was 56 pounds in favor of the heifers receiving the 40 percent protein supplement. Only small differences were observed in yearly gain of the heifers but those fed the 20 percent protein supplement appeared less thrifty, especially during the lactating period, than those fed the higher protein supplement. The average birth and weaning weights of the calves produced by cows fed the 40 percent protein supplement were a little greater than those of calves from cows fed the lower protein supplement. Based on feed costs prevailing at the time, the 40 percent protein supplement cost $2.16 more per head per year than the 20 percent protein supplement.

Zimmerman (1959) reported results of three levels of wintering on growth and reproductive performance for four trials involving three lots of 14 or 15 heifers per lot in each trial. No consistent differences were observed in difficulty at calving or percent calf crop attributable to the three levels of wintering studied. Birth weights and weaning weights of calves were directly related to the amount of winter supplement fed. However, the increased weaning weights associated with the higher levels of winter feeding did not offset the increased cost of feed. Summer weight gains of the heifers were found to be inversely related to the amount of winter weight loss.

Creep-Feeding

Trowbridge and Jones (1929) divided fall-born steer calves into three lots. Lot 1 calves ran with their dams on pasture and received no supplemental feed while Lot 2 calves ran with their dams on pasture and received grain and alfalfa hay in a creep. The Lot 3 calves were separated from their dams and placed in a small grass lot, fed grain and alfalfa hay, and allowed to nurse twice daily. The calves fed grain weighed 115 pounds more per head at weaning and showed greater net returns than the calves which received no grain. They were fat enough for slaughter at eight months of age. Gains for the two creep-fed lots were approximately the same. When prices prevailing during this experiment were applied, the calves creep-fed grain and hay while running with the cows returned $65.76 above feed costs for keep of the cow; the calves nursed twice daily, $60.69; and the calves which did not receive any grain, $15.97.

A replication of this trial was conducted by Trowbridge et al. (1930). At weaning, the grain-fed calves outweighed the non-creep calves by 130 pounds per head and were valued at $2.40 more per cwt. They were classed as slaughter cattle whereas those receiving no grain were classed as feeders. After deducting the current feed cost, Lot 2 returned $11.97 more per head, and Lot 3 $6.20 more, than Lot 1.

For a third consecutive year, Trowbridge et al. (1931) studied the value of creep-feeding fall-dropped calves. They divided 25 60-day-old steers from high grade Shorthorn cows and sired by good purebred Shorthorn bulls into three lots. The lots received the same treatments used in the two previous trials. The creep feed mixture consisted of 2 parts corn and 1 part oats until March 20 when the ration was changed to 5 parts corn,

2 parts oats, and 1 part linseed meal. At weaning time (May 15) the calves in Lots 1, 2 and 3 had gained 197, 305 and 345 pounds, respectively. The calves were then placed in the feed lot to study subsequent performance.

Duitsman and Kessler (1956) conducted a study of creep-feeding fall-dropped calves produced from high quality Hereford cows and sired by pure-bred Hereford bulls. Thirty-eight cows which were suckling calves were divided into two groups in mid-November and fed a protein supplement in addition to the native grass pasture. One group of calves started receiving milo in a creep at the time of allotment (November 15) whereas the other group received no supplemental feed. By weaning time the following summer (July 15), the creep-fed calves were consuming 8 pounds of milo per head daily. The 1107 pounds of milo consumed per head increased weaning weights an average of 79 pounds. Average daily gain was 1.89 pounds for creep-fed calves compared to 1.61 pounds for non-creep-fed calves. In a second experiment by the same workers the fall-calving herd was divided into three groups. Lot 1 calves received milo as a supplemental feed and Lot 2 calves were fed a 17 percent protein mixture of milo and cottonseed meal. The Lot 3 calves received no creep feed and thus served as controls. Creep-feed was available from November 2 until July 5 when all calves were weaned and weighed. At this time, the average weights were 555, 617 and 607 pounds for Lots 1, 2 and 3, respectively. Therefore, the only increase in weaning weight attributed to creep-feeding was in Lot 2, which amounted to only 10 pounds. The Lot 1 calves were considerably lighter than either of the other two lots. Lot 1 calves made an average daily gain of 1.70 pounds while consuming a total of 851 pounds of milo; Lot 2 calves gained an average of 1.93 pounds per day and consumed a total of

1064 pounds of the 17 percent protein mixture per head. The Lot 3 calves gained 1.89 pounds per day and appeared to be growthier but were in poorer condition than the creep-fed lots at weaning time. No explanation was given for the low weaning weights obtained in Lot 1.

This study was continued by Duitsman and Kessler (1957) with three lots of calves receiving the same treatments as described in the previous test. Calves started receiving creep feed, after allotment according to birth date and sex, on November 15 and continued receiving supplemental feed until July 5. The data reported were based on 12, 14 and 14 calves in each of Lots 1, 2 and 3, respectively. Lot 1 consumed 1189 pounds of milo per head to weaning and weighed 95 pounds more than Lot 3 (control). They also gained 32 pounds per head more than those fed the combination milo-protein in Lot 2, which ate a total of 1076 pounds of creep feed per head. Creep-feeding had little effect on condition and weight of cows, but the cows in Lot 3 consumed a small additional quantity of silage (100 pounds per head for the winter).

Brethour and Duitsman (1958) reported the results of a fourth test of a series being carried out to determine the value of creep-feeding fall-dropped calves. Treatment was started when the cows suckling calves were divided into three groups in the fall and discontinued the following July at weaning time. Calves in one pasture received rolled sorghum grain while another group received whole oats; the calves in the third pasture were not creep-fed. The creep-fed calves in Lot 1 consumed 718 pounds of sorghum grain, compared to 684 pounds of oats for Lot 2, from birth to weaning. The calves in Lot 1 weaned at an average weight of 576 pounds which was 20 and 67 pounds heavier than Lots 2 and 3, respectively. No advantage was found in substituting oats for sorghum grain.

These same workers (1959) reported fifth year results of creep-feeding fall-dropped calves at the Ft. Hays, Kansas, station. Sorghum grain was fed to the calves from December 1 until weaning July 8, 1958, a total of 220 days. During the creep-feeding period, calves with access to the sorghum grain gained an average of 91 pounds more than those not creep-fed. The creep-fed calves had consumed an average of 639 pounds of grain by the first of May. At weaning time, each calf had eaten an average of 934 pounds of creep feed.

Pope et al. (1955, 1956, 1957) conducted three tests where calves were creep-fed while comparing different methods of wintering cows nursing calves. The average weaning weight was about 530 pounds at approximately 8 months of age. Creep feed consumption varied considerably between lots over the three year period. This was attributed to the different methods of wintering under study, but the average supplemental feed consumed per year by the calves during the three years was 667 pounds. The average carcass grade for the calves was high good, with an average yield of approximately 56 percent. The most profitable system of marketing during the year in which the test was conducted would have been to sell the steers as feeders and heifers as slaughter calves.

Dyer et al. (1955) made a comparison of creep-feeding calves dropped in January-February and March-May while suckling their dams on pasture. The January-February calves were weaned October 2 at approximately 8 months of age and the later spring calves were weaned December 3 at the same age. Average weaning weights for the two groups were 583 and 507 pounds, and average daily gain 2.05 and 1.89 pounds, for the early and late spring calves, respectively. The total creep feed, 8 parts shelled corn and 1

part cottonseed meal (by weight), consumed per head was about the same for both groups with an average of 617 pounds for the early calves and 560 pounds for the later calves.

Black (1930) reported results obtained in three experiments with supplemental feeding of suckling beef calves born in the spring. The dams of the calves used in the experiment received comparable treatment after allotment according to age, weight and breeding of calves. Allotment of the cows was made when their steer calves averaged from 2 to 3 months of age in each experiment. One lot of calves received creep feed whereas the other lot received no supplemental feed. Average weaning weights were approximately 100 pounds in favor of creep-feeding, with an increased average daily gain of 0.65 pound over the non-creep-fed calves. Creep-feeding resulted in calves fat enough to be sold for slaughter whereas the calves receiving no supplemental feed graded from average to high choice as feeders. The author recommended creep-feeding for well-bred early spring calves to be marketed at weaning for beef.

McComas (1938), in a three-year study, found that creep-fed calves were fat enough to be classed as slaughter calves whereas the calves that received no supplement while on similar pasture with their dams were classed as feeders when weaned at approximately the same age. The creep-fed calves had access to a feed mixture of 8 parts shelled yellow corn and 1 part cottonseed meal (by weight) for 168 days, beginning about May 25 of each year. Creep-fed calves consistently showed a distinctly higher degree of finish and an increased average weaning weight of 27 pounds more than the non-creep-fed calves. The former calves consumed an average of 450 pounds of supplement for the 27 pounds of gain with an

average daily consumption of 2.65 pounds per head during the three years. Although weaning weights were increased by creep-feeding, average net returns were slightly in favor of non-creep-fed calves due to a $3.71 marketing charge for the slaughter calves.

Four trials, using forty Hereford cows each year, were conducted by Foster et al. (1946) to study the practicability of creep-feeding spring-dropped calves on native range in the North Carolina coastal plain region. Calves which were creep-fed consumed only 1 pound per head daily of a mixture consisting of four parts shelled corn and one part cottonseed meal. Consequently, no apparent advantage was found for creep-feeding because the quantity of feed required per 100 pounds of gain was more than 1000 pounds. The authors stated that these results could possibly be attributed to the large abundance of green forage available during the trials and the good milk supply of the cows.

Jones and Jones (1932) reported difficulty in getting range calves to consume supplemental feed. The spring-dropped calves were creep-fed from August until January but it was necessary to feed the cows with the calves for a 43-day period before the calves would eat at the creep by themselves. All of the feed was charged to the calves. The consumption was a total of 1144 pounds, or 7.15 pounds per head daily. The initial feed supplied consisted of a mixture (by weight) of 4 parts ground milo heads to 1 part cottonseed meal. During the latter part of the feeding period, ground ear corn replaced the milo heads. The grain-fed calves gained 1.39 pounds per head daily, compared to 0.68 pound for calves with cows on grass alone. At weaning, using prices current to the test, the grain-fed calves were valued at $27.08 per head and the grass calves at

$18.72 each. After deducting the cost of feed the return per head was $2.28 in favor of grain feeding.

Taylor et al. (1942) compared the relative value of creep-feeding heifer calves with non-creep-fed steer calves, where the dams were grazed in adjoining pastures having similar water, shade, and grass. The heifer calves had access to grain in a self-feeder placed in a creep, but the steer calves received no grain while nursing. At weaning time, the heifers (creep-fed) were heavier and returned $0.25 more per hundred weight than the steers. They were sold for slaughter and, after deduction for feed costs, returned about $1.00 more per head than the steers (not creep-fed), which sold as feeders. The heifers gained 270 pounds while consuming 5.23 bushels of corn and 13 pounds of bran.

Kyd (1950) summarized creep-feeding results obtained during the four-year period 1928-1931 with a total of 1780 calves representing 34 counties in Missouri. These calves were creep-fed on bluegrass pasture and made an average daily gain of 2.10 pounds during a 176-day period. The creep-fed calves were sold for slaughter at approximately the time of weaning, after consuming a total of 1374 pounds of supplemental feed per head, or an average of 21.6 bushels of corn, 49 pounds of protein supplement and 117 pounds of hay. These results were compared with 1799 calves that were not supplemented while nursing dams on bluegrass the entire season. The latter calves gained an average of 1.49 pounds per day over a 176-day period. Thus, the creep-fed calves made 107 pounds more gain than calves pastured on bluegrass alone.

Results from a three-year study to determine the relative value of creep-feeding spring-dropped calves was reported by Nelson et al. (1955).

The cattle used in this test were high quality grade Hereford cows which grazed native grass pasture yearlong, where an abundance of forage was available; a total of 197 calves were involved. Creep-feeding increased the average weaning weights of calves by 30 pounds. In another study with calves from 2 year-old-heifers, creep-feeding increased weaning weights an average of 108 pounds. This experiment was conducted during a period of unusually low rainfall, thus the amount of pasture available was considerably less than during years of normal rainfall.

INVESTIGATIONS

The investigations reported herein were conducted at the Oklahoma Agricultural Experiment Station from October, 1954 through May, 1959. The original experiment initiated in the fall of 1954 had the following objectives: (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 the following summer; and (3) to study the relationship between the level of winter feeding of cows and creep-feeding of their calves.

Part I. Levels of Supplemental Winter Feeding of Beef Cows and Creep-feeding Fall Calves (Four-year Summary)

Experimental Procedure

In October, 1954, 68 grade Hereford cows were divided into four lots of 17 head each. Throughout the experiment, the cattle were allowed to graze in the native grass pastures (Bluestem and associated grasses) at the Lake Carl Blackwell experimental range area. During the winter they were fed the following amounts of supplemental feed, and their calves were fed as follows:

Lot 1 - 1.5 pounds of pelleted cottonseed meal; calves not creep-fed.

Lot 2 - 1.5 pounds of pelleted cottonseed meal; calves creep-fed.

Lot 3 - 2.5 pounds of pelleted cottonseed meal and 3 pounds of grain; calves not creep-fed.

Lot 4 - 2.5 pounds of pelleted cottonseed meal and 3 pounds of grain; calves creep-fed.

In all four years the supplemental feed allowances remained the same. The grain fed in Lots 3 and 4 was 3 pounds of yellow corn during the first two winter seasons. In the last two winters ground milo replaced the corn and the mixture of cottonseed meal and milo was pelleted for convenience in feeding. The supplemental feed was fed every other day, twice the daily allowance at each feeding. A mixture of two parts salt and one part bone meal was available at all times. The cattle were weighed and divided into their respective lots in early October each year. The average winter feeding period lasted from mid-October until mid-April. Each lot of cows was moved to a different pasture each year.

The calves in Lots 2 and 4 started receiving creep-feed in mid-December of each year. The creep-feed mixture during the first season was 50 percent coarsely cracked corn, 30 percent whole oats, 10 percent cottonseed meal and 10 percent cane molasses. In later seasons the corn was replaced with 55 percent rolled milo and the molasses was reduced to 5 percent.

The number of cows per lot varied from 17 to 20 in each of the four years. The number of cows weaning calves does not indicate exactly the relative value of the treatments concerning reproductive rate because all open cows were removed from the experiment in the first trial. In the remaining three trials, all open cows were left in the experiment in order that accumulative effects could be noted. Fifty-one of the original 68 cows remained in the test at the end of the fourth year. All cattle added during the experiment were of similar type and breeding as those in the

first trial. The cows used in the study had all produced at least one calf before being placed in the test.

Purebred Hereford bulls were placed with the cows in the latter part of December or early January, consequently the first calves were born in late September or early October.

Throughout the experiment the following data were collected and recorded:

1. Weight changes of cows
2. Birth weight of calves
3. Weaning weight of calves
4. Percentage calf crop
5. Feed consumption
6. Feed cost and marketing data.

The data were analyzed according to the methods of Snedecor (1956).

Results and Discussion

A summary of the results obtained during the four years of this test are given in Table 1. The average birth weights of the calves in the different lots were quite variable over the four trials, with no definite trend established. The calves in Lots 1, 2, and 4 weighed an average of 76 pounds at birth while those in Lot 3 weighed 77 pounds. These results agree with Zimmerman (1958) who found no difference in birth weights of spring calves attributed to different levels of wintering. Miller (1958) reported that the feeding of different levels of protein supplement had little effect on birth weights of fall calves.

Relatively small differences were noted in average winter weight losses of the different lots of cows. The average loss for the high level

Table 1. Levels of Supplemental Winter Feeding of Beef Cows and Creep-Feeding Fall Calves (four-year average)

Lot number	1	2	3	4
Level of feeding cow	1 1/2 lbs. CSM	1 1/2 lbs. CSM	2 1/2 lbs. CSM 3 lbs. grain	2 1/2 lbs. CSM 3 lbs. grain
Creep-feeding (supplemental)	None	Creep-fed	None	Creep-fed
Total no. of cows raising calves[1]	69	62	69	69
Average weight per cow (lbs.)				
Initial	1080	1119	1098	1124
Spring	835	828	873	885
Winter change (198 days)	-245	-291	-225	-239
Weaning	1053	1074	1076	1103
Change to weaning	-27	-45	-22	-21
Fall	1100	1137	1126	1155
Yearly change	20	18	28	31
Average weight per calf (lbs.)				
Birth[2]	76	76	77	76
Spring[3]	261	322	293	344
Weaning[4]	469	556	516	568
Average birth date of calves	Oct. 27	Nov. 6	Oct. 31	Oct. 29
Supplemental feed per head (lbs.)[5]				
Cow				
Cottonseed meal	274	274	457	457
Grain[6]			538	538
Calf (creep-fed)[7]		884		872
Total feed cost per head ($)				
Cow[8]	33.07	33.07	53.21	53.21
Calf[9]		25.10		24.76
Total	33.07	58.17	53.21	77.97

Table 1. (Continued)

Selling value ($)				
Per 100 pounds[10]				
Steers	24.32	24.84	24.66	24.88
Heifers	20.87	21.52	21.35	21.69
Per head[11]	101.48	124.25	114.12	127.59
Selling value minus feed cost ($)	68.41	66.08	60.91	49.62

[1]Pregnancy examination in the summer of 1955 indicated 5 open cows in Lot 1 and 1 cow in each of the other lots. These cows were removed from the experiment and replaced with cows of similar age and breeding. In 1956 there were 3 open cows in Lot 2 and 2 in Lot 4. These cows were left in the experiment in order that accumulative effects could be noted. In 1957 Lots 1, 2, 3, and 4 contained 2, 4, 1, and 2 open cows, respectively. In 1958 there were open cows as follows: Lot 1, 1; Lot 2, 2; Lot 3, 1; and Lot 4, 1. The total number of open cows in the 4 respective lots were 8, 10, 3 and 6 or 18 for the low level vs. 9 for the high level.

[2]Corrected for sex by the addition of 3 lbs. to the birth weight of each heifer.

[3]Corrected for sex by the addition of 18 lbs. to the weight of each heifer after a 170-day age correction by interpolation.

[4]Corrected for age by adjusting all calves to a standard age of 260 days, and for sex by the addition of 43 lbs. to the age-corrected weight of each heifer.

[5]A mineral mixture of 2 parts salt and 1 part steamed bone meal was available at all times.

[6]Corn was fed the first 2 seasons of the trial and milo the 2 remaining seasons.

[7]Creep-feed mixture during the first season was 50 percent coarsely cracked corn, 30 percent whole oats, 10 percent cottonseed meal and 10 percent cane molasses. In later seasons the corn was changed to 55 percent rolled milo and the molasses reduced to 5 percent.

[8]Includes pasture cost and prices of feeds at the time tests were conducted.

[9]Based on prevailing feed cost at the time tests were conducted.

[10]Based on actual selling prices. Prices as feeders were as high or higher (usually) than prices for slaughter.

[11]Based on an equal number of steers and heifers in each lot using the age and sex corrected weaning weights as the steer selling weight and this weight minus 43 lbs. (sex correction factor) as the average weight of heifers.

cows (Lots 3 and 4) was 36 pounds less than those fed on the lower level. Also, the average winter loss was greatest for those cows whose calves were creep-fed. This difference was 30 pounds in favor of not creep-feeding. Duitsman and Kessler (1957) observed that creep-feeding of fall-calves had little effect on condition and weight of the cows, but the feed consumption of the cows was slightly increased. The average percentage of initial weight loss was 23, 26, 20, and 21 for Lots 1, 2, 3, and 4, respectively. The greatest loss in any one lot within a year was 28 percent. The effects of such losses are not well understood at the present time.

There were definite differences in weaning weights of the calves. The high level of feeding increased calf weights an average of 30 pounds. This difference was found to be statistically significant ($P < 0.01$). The difference with non-creep-fed calves (Lots 1 and 3) was 47 pounds; however, with creep-fed calves (Lots 2 and 4), the difference was only 12 pounds. The additional supplement fed to Lots 3 and 4 as compared to Lots 1 and 2 was 183 pounds of cottonseed meal and 538 pounds of grain. Increasing the amount of supplemental winter feed to these high levels increased feed costs approximately $20.00 per cow.

Miller (1958) reported an increase of 59 pounds in the weaning weights of fall-dropped calves whose dams were fed 3 pounds of 40 percent protein supplement when compared to calves weaned from cows which received 1 pound of the same protein supplement.

Creep-feeding increased gains an average of 70 pounds. Statistical significance was at $P < 0.01$ in this case. The difference was 87 pounds on the low level of cow feeding and 52 pounds on the high level. The average amount of creep-feed consumed by weaning was approximately 880

pounds. The average cost of creep-feed was $25.10 per head in Lot 2 and $24.76 in Lot 4.

Since the cows were suckling calves during most of the winter feeding period, any effect of the two levels of supplemental feed on calf weights should have been apparent in the weights of the calves in mid-April when supplemental feeding was stopped. At this time creep-feeding had increased gains by 61 and 51 pounds for the low and high level, respectively. Thus, a large percentage (70 and 98 percent) of the difference in weights resulting from creep-feeding until weaning was present by mid-April. Yet, at this time, only approximately 45 percent of the total creep-feed had been consumed. Whether or not the creep-fed calves would maintain the advantage in weight, if creep-feeding were discontinued, remains to be determined. These results suggest that a satisfactory system of production might be to creep-feed during the winter months but not creep-feed after green grass is available. Current experiments are being conducted to study the value of creep-feeding only until spring.

At weaning all lots of calves were sold at approximately the same price per 100 pounds. Exceptions were in the first year when there were lower values for both steers and heifers in Lot 1 and a higher value for heifers in Lot 4. The steer prices listed are as feeder steers. In most cases the feeder price for heifers was considerably higher than the price for slaughter. However, in some instances the slaughter price of creep-fed heifers was equal to or higher than the feeder price. In either case, the averages of the highest selling values for heifers are listed in the table. All lots of cattle would have sold as choice feeders.

Creep-feeding consistently resulted in the production of fatter calves. However, no live slaughter or carcass grades were obtained since most were sold as feeders.

The average results show that creep-feeding decreased profits at both levels of wintering. This can be attributed to the fact that all lots sold at approximately the same price per 100 pounds, and the value of the increased gain failed to offset the cost of creep-feed. The average decrease in return between Lots 1 and 2 was $2.33, and $11.29 between Lots 3 and 4.

In the four years of the test, there are eight possible comparisons of creep-feeding vs. not creep-feeding. Only in one instance was creep-feeding profitable (low level, 1957-58). The three-year average loss of $12.07 due to creep-feeding on the low level was reduced to an average loss of $2.33 in the fourth year. Therefore, one should consider yearly variation and the many other aspects of creep-feeding before making recommendations as to its use.

The increase in the value of calves due to the high level of wintering cows was not equal to the increased cost of supplemental feed. Thus, the high level of winter feeding proved to be unprofitable. Profits were decreased $7.50 (Lot 1 vs. Lot 3) for the non-creep-fed calves and $16.46 (Lot 2 vs. Lot 4) for the creep-feed calves. Lantow (1930) and Zimmerman (1958) both reported that higher levels of winter feed resulted in decreased profits.

The number of open cows per lot has varied considerably over the four trials. This number has varied from 0 to 5. The total number of open cows in the four respective lots was 8, 10, 3 and 6, or 18 for the low level vs.

9 for the high level. The average calf crop for the four years was 85 percent on the low level of wintering vs. 90 percent on the high level. The trend in this study appears to agree with Johnson et al. (1952) and Patterson (1953) who both reported improved calving percentage with higher levels of winter supplemental feed for spring-calving beef cows. These results are not in agreement with those obtained by Zimmerman (1958) with spring-calving cows. He found the percent calf crop weaned was inversely related to the level of winter supplement.

As stated previously, economics in this current study have favored the low levels of wintering. Additional data need to be collected on this phase of fall-calving before definite conclusions can be made.

Part II. Levels of Supplemental Winter Feeding of Two-Year-Old Heifers, 1957-58

The cows used in the previous study had all produced at least one calf before being placed in the test. It was anticipated that younger animals might respond differently when subjected to the same treatment. Therefore, yearling heifers were selected for this study.

Experimental Procedure

Forty-eight yearling heifers were bred to Hereford bulls during the winter of 1956-57. They started calving in the fall of 1957 when they were approximately 2 1/2 years old. The initial weight was taken on September 28, 1957. Thirty-four of these heifers were suckling calves on October 31, and they were divided into two lots of 17 head per lot. Of the 14 remaining heifers, 6 calved late and the data were not included in the experiment, 2 died while calving (one drowned), 3 calves were born

dead, 1 heifer failed to calve, 1 heifer aborted, and 1 calf became weak and died (apparently from malnutrition).

All heifers were allowed to graze the native grass pastures. Those in Lot 1 were fed an average of 1.5 pounds of pelleted cottonseed meal per head daily. Those in Lot 2 were fed 5.5 pounds of a pelleted mixture made up of 2.5 pounds of cottonseed meal and 3 pounds of ground milo. None of the calves were creep-fed.

Results and Discussion

A summary of the data collected in this test is given in Table 2. The heifers in Lot 1 lost an average of 280 pounds during the winter period. This was an average loss of 29 percent of their body weight. The high level heifers (Lot 2) lost 232 pounds, or 24 percent of their body weight. Thus, the level of supplemental winter feeding was reflected in the winter weight losses. Miller (1958) noted a loss of 227 and 133 pounds for fall-calving two-year-old heifers which received 1 and 3 pounds of pelleted cottonseed meal, respectively.

No differences would be expected in the birth weights of the calves because all calves were born prior to the beginning of supplemental feeding of their dams. The spring weight of the calves was very light with growth apparently retarded. The average weights were 182 pounds and 196 pounds for Lots 1 and 2, respectively. This was a difference of 14 pounds in favor of the high level of wintering. The difference had increased to 27 pounds by weaning with an average weight of 317 pounds for Lot 1 and 344 pounds for Lot 2. These weaning weights are considerably less than those observed by Miller (1958).

Table 2. Levels of Supplemental Winter Feeding of Two-Year-Old Beef Heifers, 1957-58

	Lot 1 1 1/2 lbs. CSM	Lot 2 2 1/2 lbs. CSM 3 lbs. milo
No. cows per lot raising calves[1]	16	16
Average weight per cow (lbs.)		
Initial 9-28-57	980	982
Spring 4-18-58	700	750
Weaning 7-28-58	913	957
Fall 9-20-58	987	1017
Winter gain	-280	-232
Gain to weaning	-67	-25
Yearly gain	7	35
Average weight per calf (lbs.)		
Birth[2]	76	76
Spring[3]	182	196
Weaning[4]	317	344
Average birth date of calves, Oct.	2	4
Supplemental feed per cow (lbs.)[5]		
Cottonseed meal	253.5	422.5
Ground milo		507.0
Total feed cost per cow ($)	32.86	48.75
Selling value ($)		
Per 100 lbs.		
Steers	39.00	39.00
Heifers	36.50	36.50
Per head	111.82	122.01
Selling value minus feed cost ($)	78.96	73.26

[1] Thirty-four heifers which were suckling calves were divided into two lots on October 31. One calf in Lot 1 was lost and 1 in Lot 2 became weak and died.

[2] Corrected for sex by the addition of 3 lbs. to the weight of each heifer calf.

[3] Corrected for sex by the addition of 18 lbs. to the weight of each heifer after a 170-day age correction by interpolation.

[4] Corrected for sex by the addition of 43 lbs. to the weight of each heifer after a 260-day age correction by interpolation.

[5] 169 days of feeding which started 10-31-57.

Several of the calves appeared very unthrifty at weaning. Most of the calves were small in size and light in weight and did not appear to be as old as they actually were. These calves were sold and whether or not their growth may have been permanently retarded is not known. The weaning weights may be compared to 469 pounds and 516 pounds in Lot 1 and 3, respectively, from mature cows as reported in Part I.

Both lots of calves were weaned and sold as feeders on July 7 at the Oklahoma City livestock market. The steers sold for an average of $39.00 per 100 pounds and the heifers sold for $36.50 per 100 pounds. The cost of the increased feed for Lot 2 was greater than the increased value of the calves sold. The selling value minus feed cost was $5.70 in favor of the low level ($78.96 vs. $73.26).

It appears that the production of mature cows may not be greatly affected by losses of 25 to 30 percent of their body weights (Part I) whereas the production of first calf heifers may be reduced unless the weight losses are decreased considerably. In this test, neither level of supplemental feeding resulted in thrifty and heavy calves. Apparently the amount of nutrients consumed by the cows was not adequate for growth and lactation.

Part III. Preliminary Results With Three-Year-Old Cows, 1958-59

Experimental Procedure

The two-year-old heifers used in the previous study were continued on test in 1958-59 in order that accumulative effects could be studied. The initial weight was taken on September 20, 1958. The intention, in this trial, was to produce a wider difference in winter weight loss than

that recorded in previous tests. The cows in Lots 1 and 2 were to be fed to lose approximately 30 to 20 percent of their body weight, respectively. Both lots of cows were allowed to graze the native grass pastures and during the winter were supplemented as follows: Lot 1, 1.1 pounds of cottonseed meal pellets per head daily; Lot 2, 6.25 pounds of pellets consisting of 40 percent cottonseed meal and 60 percent ground milo. Therefore, the high level cows (Lot 2) received 2.5 pounds of cottonseed meal and 3.75 pounds of milo per head daily. Supplemental winter feeding started October 30, 1958, and was discontinued April 23, 1958, a total of 175 days.

Hereford bulls were placed with the cows in mid-December. Thus, the first calves were born in late September. One cow was found to be open upon pregnancy examination in June and was removed from the experiment. Two additional cows failed to calve in Lot 1, therefore 13 of the two-year-olds which raised calves in the previous test were nursing calves. In Lot 2, all 16 cows were suckling calves.

Results and Discussion

The results for the past winter season are summarized in Table 3. The cows in Lot 1 lost an average of 262 pounds or 26 percent of their body weight. The loss in Lot 2 was 209 pounds or 21 percent.

The difference in amount of supplemental feed did not have a major effect on weight losses of the cows. This is in agreement with certain data recorded in Part I with mature cows. The average birth weights were 4 pounds in favor of Lot 2. The calves in Lot 1 were born an average of 12 days earlier than those in Lot 2. Both lots of calves were relatively light, but heavier than last year's calves at approximately the same date.

Table 3. Levels of Supplemental Winter Feeding of Three-Year-Old Beef Cows (Preliminary results, 1958-59)

Lot number Level of feeding	1 Low[1]	2 High[2]
Number of cows per lot raising calves[3]	13	16
Average weight per cow (lbs.)		
Initial 9-20-58	1005	1017
Spring 4-23-59	743	808
Winter change (215 days)	-262	-209
Average birth weight per calf (lbs.)[4]	71	75
Average calving date, October	2	14
Average spring weight per calf (lbs.)[5]	197	221
Supplemental feed per cow (lbs.)[6]		
Cottonseed meal	192	438
Ground milo		656
Supplemental feed cost per cow ($)	5.95	28.01

[1] Fed 1.1 lbs. pelleted cottonseed meal per head daily.

[2] Fed 6.25 lbs. of pellets consisting of 40% cottonseed meal and 60% ground milo. Daily consumption was 2.5 lbs. cottonseed meal and 3.75 lbs. milo per head.

[3] In Lot 1, one cow was found to be open when examined for pregnancy on 6-28-58 and was therefore removed from the experiment. Two additional cows in this lot failed to calve. In Lot 2, one cow was open.

[4] Corrected for sex by the addition of 3 lbs. to the weight of each heifer.

[5] Corrected for sex by the addition of 18 lbs. to the weight of each heifer after a 170-day age correction by interpolation.

[6] 175 days of feeding which started 10-30-58.

The average spring weights were 197 pounds and 221 pounds for those in Lots 1 and 2, respectively. These weights were slightly heavier than those obtained by Miller (1958) with fall-dropped calves of comparable age and breeding. The higher level of wintering cows has increased calf weights 24 pounds. However, the supplemental feed cost for Lot 1 was $5.95 as compared to $28.01 for Lot 2. Further evaluation of the two levels of wintering will be made when the calves are weaned and sold in mid-summer.

Part IV. Preliminary Results With Two-Year-Old Heifers, 1958-59

Experimental Procedure

The first test with two-year-old heifers was conducted in 1957-58 and has been reported in Part II. It appeared from these data that in order to obtain desirable results with younger animals, the winter weight losses should be less than that of mature cows. A second test was initiated in the fall of 1958 to study the effect of 20 and 30 percent body weight losses upon production of fall-calving heifers. These heifers were bred to Hereford bulls the previous winter and were to calve in October when they were approximately 2 1/2 years old. The 53 Hereford heifers used in this test were divided into three lots on September 20, 1958. There were 18, 17, and 18 cows placed in each of Lot 1, 2, and 3, respectively.

The heifers in Lots 1 and 2 were fed to lose approximately 30 percent of their body weight during the winter period. Those in Lot 3 were fed to lose 20 percent. The amount of supplemental feed given to Lots 1 and 2 was 1.39 pounds of pelleted cottonseed meal per head daily. The Lot 3

cows were fed 6.94 pound per head daily of a pelleted mixture consisting of 35 percent cottonseed meal and 65 percent ground milo from November 4, 1958 until February 13, 1959. At this time the daily feed was increased to 7.81 pounds in order to obtain the desired weight differences between lots.

Supplemental winter feeding began November 4, 1958 and was discontinued on April 17, 1959. The winter feed was fed every other day, twice the daily allowance at each feeding. At all times, cattle were in the native grass pastures and had access to a mineral mixture of 2 parts salt and 1 part steamed bone meal. The calves in Lot 1 started receiving creep-feed in mid-January. The calves in Lots 2 and 3 received no supplemental feed.

Results and Discussion

A summary of preliminary results may be found in Table 4. The small difference in birth weight of the calves should not be attributed to the level of winter feeding because all heifers were treated alike prior to November 4, 1958. Two heifers in each of Lots 1 and 3 calved very late and their data were not included in the experiment. In Lot 2, one heifer failed to calve and 1 calf died. One calf was removed from the Lot 3 data because he accidentally had access to the creep-ration for a few weeks.

The cows lost an average of 278, 296, and 134 pounds in Lots 1, 2, and 3, respectively. The percentage of body weight loss for the three respective lots was 28, 30, and 14 percent. Creep-feeding and the high level of wintering were reflected in the average spring calf weights. The average weights, corrected for sex by the addition of 18 pounds to the weight of each heifer after 170-day age correction, were 213, 152, and 201

Table 4. Levels of Supplemental Winter Feeding of Two-Year-Old Beef Heifers (Preliminary results, 1958-59)

Lot number Level of feeding	1 Low[1]	2 Low[2]	3 High[3]
Number of cows per lot[4]	16	15	15
Average weight per cow (lbs.)			
Initial 9-20-58	979	983	960
Spring 4-17-59	701	687	826
Winter change (209 days)	-278	-296	-134
Average birth weight per calf (lbs.)[5]	74	74	73
Average calving date, October	23	22	21
Average spring weight per calf (lbs.)[6]	213	152	201
Supplemental feed per animal (lbs.)			
Cow[7]			
Cottonseed meal	228	228	418
Ground milo			775
Calf (creep-feed)[8]	288		
Supplemental feed cost per cow ($)	7.07	7.07	30.01

[1]Fed 1.39 lbs. of pelleted cottonseed meal per head daily. Creep-feeding was started in mid-January.

[2]Cows fed same as in Lot 1.

[3]Cows fed 6.94 lbs. of pellets consisting of 35 percent cottonseed meal and 65 percent ground milo from 11-4-58 to 2-13-59 at which time the daily feed was increased to 7.81 lbs. per head.

[4]Originally there were 18, 17 and 18 cows in Lots 1, 2 and 3, respectively. In Lots 1, 2 and 3, respectively, 2, 1 and 2 cows calved very late and their data were not included in the experiment. One calf died in Lot 2. One calf in Lot 3 accidentally had access to the creep-ration for a few weeks.

[5]Corrected for sex by the addition of 3 lbs. to the birth weight of each heifer.

[6]Corrected for sex by the addition of 18 lbs. to the weight of each heifer after 170-day age correction.

[7]164 days of feeding which started 11-4-58.

[8]Creep-feed cost $2.68 per cwt. Total cost to 4-17-59 was $7.72 per head.

for Lots 1, 2, and 3, respectively. The increased level of winter feeding of the cows in Lot 3 increased the average calf weight 49 pounds when compared to the other non-creep-fed calves (Lot 2). This difference was considerably larger than that observed in the previous trial with two-year-old heifers. However, this would be expected with the substantial difference obtained in the winter weight loss of the cows in this study. The difference in favor of creep-feeding calves whose mothers were fed at the low level was 61 pounds.

The supplemental feed cost for the low level cows in Lots 1 and 2 was $7.07 and for the high level $30.01. The 288 pounds of creep-feed consumed by calves in Lot 1 cost an average of $7.07 per calf. Additional data as to the value of the different systems will be available when the calves are sold in mid-summer.

Part V. Preliminary Results With Yearling Heifers, 1958-59

The two-year-olds used in the tests reported thus far (Parts II and IV) had been bred before being placed in the test. The heifers were bred during the winter as yearlings, thus calving the following fall at approximately 2 1/2 years of age. In both of the previous tests, the allotment was made at the time winter feeding was started, that is, after most of the heifers had calved. Therefore, it seemed desirable to study the effect of level of wintering as calves and as yearlings upon later production.

Experimental Procedure

Thirty-six yearling heifers were weighed and divided into two lots of 18 head each on October 29, 1958. They were placed in native grass pastures

and fed different amounts of supplemental feed. Those in Lot 1 were fed a mixture of 0.32 pound of cottonseed meal and 0.6 pound of ground milo per head daily in pelleted form until February 14, at which time the feed was changed to 0.92 pound of pelleted cottonseed meal. The heifers in Lot 2 were fed 7 pounds per head daily of pellets consisting of 35 percent cottonseed meal and 65 percent ground milo. This was 2.45 pounds of cottonseed meal and 4.55 pounds of ground milo per head daily. The supplements were fed every other day; twice the daily allowance at each feeding. The heifers were bred to Hereford bulls during the winter of 1958-59 so they will calve during the following fall when 2 1/2 years old.

Results and Discussion

Data obtained during the winter of 1958-59 are summarized in Table 5. The heifers in Lot 1 lost an average of 115 pounds per head. Those on the high level gained only 58 pounds, although they had been fed an average of 7 pounds of supplemental winter feed. The average feed cost per head was $4.25 and $29.75 for Lots 1 and 2, respectively.

These heifers will remain in the test until they have produced two calves in order that accumulative effects of winter weight losses may be studied. Data to be collected will include weight changes of cows; feed consumption, birth weight and vigor of calves, weaning weight of calves, percentage calf crop, calving date, and marketing data.

Part VI. Preliminary Results With Heifer Calves, 1958-59

In previous years, the two levels of winter feeding have been started after the heifers have calved when they were approximately 2 1/2 years old.

Table 5. Levels of Supplemental Winter Feeding of Yearling Beef Heifers (Preliminary Results, 1958-59)

Lot number Level of feeding	1[1]	2[2]
Number of heifers per lot	18	18
Average weight per heifer (lbs.)		
Initial 10-29-58	696	695
Spring 4-16-59	581	753
Gain (169 days)	-115	58
Supplemental feed per heifer (lbs.)[3]		
Cottonseed meal	91	414
Ground milo	65	769
Supplemental feed cost per head ($)	4.25	29.75

[1] Fed 0.92 lb. of pellets consisting of 35% cottonseed meal and 65% milo until February 14, 1959 at which time the supplemental feed was changed to 0.92 lb. pelleted cottonseed meal per head daily. During the early period the daily intake was 0.32 lb. cottonseed meal and 0.6 lb. milo per head.

[2] Fed 7 lbs. of the mixture listed above. Daily intake was 2.45 lbs. cottonseed meal and 4.55 lbs. milo per head.

[3] 169 days of feeding which started 10-29-58.

Needed information includes the effect of level of wintering as calves and as yearlings upon the later performance of the cattle. Therefore, the purpose of this test is to determine what levels of growth during the early life (after weaning) of a heifer will result in the most efficient production of beef in a fall-calving program.

Experimental Procedure

The 72 Hereford heifers used in this test were born in the spring of 1958. All calves were weighed and divided into two groups of 36 each on November 5, 1958. One group was placed on a low level of wintering which was estimated to provide for at least body weight maintenance. Those in the other group (high level) were wintered to gain approximately 1 pound per head daily.

Both groups were wintered in small traps with prairie hay fed as the roughage. The low level heifers received 1 pound of cottonseed meal for the first 100 days. At this time the supplemental feed was reduced to 0.55 pound in an attempt to slightly reduce the gains. Supplemental feeding was discontinued in this lot on March 14, 1959. The high level heifers started receiving 6.25 pounds of pellets consisting of 25 percent cottonseed meal and 75 percent ground milo at the time of allotment. This amount was reduced until they became accustomed to the large every other day feeding. At this time, the heifers again started receiving 6.25 pounds of the pellets.

Results and Discussion

A summary of the data collected is given in Table 6. Those heifers wintered at the low level lost an average of only 2 pounds from November

Table 6. Levels of Supplemental Winter Feeding of Heifer Beef Calves (Preliminary results, 1958-59)

Lot number Level of feeding	1 Low[1]	2 High[2]
Number of heifers on each level	36	36
Average weight per heifer (lbs.)		
Initial 11-5-58	456	457
Spring 5-1-59	454	579
Gain (177 days)	-2	122
Supplemental feed per calf (lbs.)[3]		
Cottonseed meal	114	269
Ground milo		806
Supplemental feed cost per head ($)	3.53	26.07

[1] Fed 1 lb. of pelleted cottonseed meal from 11-5-58 to 2-13-59 at which time the daily feed was reduced to 0.5 lb. per head. Feeding was discontinued on 3-14-59.

[2] Fed an average of approximately 6 lbs. of pellets, consisting of 25 percent cottonseed meal and 75 percent milo, daily from 11-5-58 to 5-1-59.

[3] Pellets were fed as supplements to prairie hay.

5, 1958 until May 1, 1959. The high level resulted in 122 pounds total gain or about 0.7 pounds per head daily. An average difference in the cost of the two levels of wintering, excluding the hay, was $22.54.

The heifers will be fed at different levels and bred during the winter of 1959-60. Therefore, they will calve in the fall of 1960 at approximately 2 1/2 years of age. The heifers will be retained in the experiment until they have produced two calves.

SUMMARY

An experiment was initiated in the fall of 1954 with 68 Hereford cows which were divided into 4 lots and fed different levels of supplemental winter feed while nursing calves. The number of cows per lot varied from 17 to 20 over the 4 consecutive winter periods. All the cows had previously produced at least one calf before being placed in the experiment. A total of 51 of the original 68 cows remained in their respective lots at the end of the 4th trial. All lots grazed native grass pasture yearlong and during the winter were fed 1.5 pounds of pelleted cottonseed meal or 5.5 pounds of a mixture of 2.5 pounds cottonseed meal and 3 pounds of grain. The calves from one group of cows within each level of wintering were creep-fed.

The four-year average weight loss of the cows was 36 pounds less for those fed on the high level. Also, the average loss was 30 pounds in favor of not creep-feeding. The high level of winter feeding of the cow increased calf gains 30 pounds. During the four trials, a total of 18 cows on the low level failed to calve vs. 9 for the high level.

The average increase in gain due to creep-feeding was 87 pounds for the calves produced by the low level cows and 52 pounds for the high level. An average of 70 percent of the 87 pounds increase and 98 percent of the 52 pounds increase at weaning was present in mid-April at the end of the winter feeding period. At this time approximately 45 percent of the total consumption of creep-feed had occurred. Neither creep-feeding until

weaning, nor the high level of wintering was profitable when costs prevailing during the time of the tests were considered.

Results obtained with heifers calving in the fall at approximately 2 1/2 years of age proved to be unsatisfactory when they were subjected to the levels of winter feeding listed above. Increased calf gains at the high level of wintering failed to pay for the extra feed cost. The calves produced at both levels of wintering were unthrifty and light in weight at weaning time. Therefore, from these results, it appears that the production of first calving heifers may be impaired when subjected to the same level of wintering as mature cows. Apparently the amount of nutrients consumed by the young cows was not adequate for both growth and lactation.

Preliminary results are presented with the above cows which are now nursing their second calf. Only a small difference was noted in the spring weights of the calves even though there was a considerable difference in the amount of supplemental feed fed to their dams. The preliminary results with two-year-old heifers show the average spring calf weights to be approximately 50 pounds in favor of the high level of cow feeding. Creep-feeding has increased calf weights an average of 61 pounds when the cows were fed on the low level. Results for the wintering period with yearling heifers and heifer calves indicate that relatively large quantities of supplemental winter feed are necessary to obtain differences in weight gains or losses.

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