

### Summary

Data are presented on growth and reproductive performance for four trials involving three lots of 14 or 15 heifers per lot in each trial. Three levels of winter supplemental feed were studied. No consistent differences have been observed in difficulty at first calving or percent calf crop weaned.

Birth weights have been reduced in the low level lots. Low level heifers have calved an average of about 1 week later than medium level heifers and 2 weeks later than high level heifers. Higher levels of winter supplement have resulted in heavier calves at weaning, but the increased weaning weights have not offset the increased cost of winter supplement. Body measurements taken in the fall and spring indicate that the winter treatment did not greatly affect the skeletal size of the heifers.

## Levels of Supplemental Winter Feeding of Beef Cows And Creep-Feeding Fall Calves

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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 (Bluestem and associated grasses) yearlong. Because of the increase in nutritive requirements of a cow suckling a calf, it is of primary importance to determine the most satisfactory level of supplemental winter feed.

The cost of supplemental feed constitutes a large portion of the total cost of producing a calf. The amount of supplemental winter feed will vary according to the amount and quality of forage available in a pasture. In some areas of our state the native grasses furnish practically all of the roughage consumed by a cow herd.

The effects of feeding level upon the productive life of a cow herd as well as the cost of supplemental winter feed must be considered when determining the optimum level of wintering.

Questions which arise in planning a fall-calving program include: (1) What is the effect of level of winter feeding on weaning weights of calves and re-breeding rate of cows? (2) What percent of her body weight can a cow lose during the winter without affecting percentage calf crop and weaning weights of calves? (3) Should creep-feeding be recommended for fall-dropped calves which are to be marketed as feeders in mid-summer?

In order to provide information on 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; and (3) to study the relationship between the level of winter feeding of cows and creep-feeding of their calves.

Results obtained during the 1954-55, 1955-56, and 1956-57 seasons have been summarized and reported in Oklahoma Agricultural Experiment Station MP-45, 48, and 51, respectively. This article includes (1) the results of the 1957-58 test with the same cows, (2) a 4-year summary, (3) results with two-year-old heifers producing their first calf, (4) preliminary results with these same heifers as three-year-olds, and (5) preliminary results with two-year-old heifers, yearling heifers, and heifer calves.

## Part 1. 1957-58 Experiment with Mature Cows

### Procedure

The 74 grade Hereford cows used in this trial had been used in a similar trial during 1956-57. The cows were weighed and divided into four lots, 18 in each of Lots 1 and 2, and 19 in each of Lots 3 and 4, on September 21, 1957. The cattle were allowed to graze in the native grass pastures 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 cottonseed meal and 3 pounds of ground milo; calves not creep-fed.

Lot 4—2.5 pounds of cottonseed meal and 3 pounds of ground milo; calves creep-fed.

All cows started receiving supplemental feed on October 30. The cottonseed meal and milo were mixed and pelleted for convenience in feeding and were fed in bunks every other day in amounts to furnish the above listed pounds per head daily. Supplemental feeding was discontinued on April 18. A mineral mixture of 2 parts salt and 1 part steamed bone meal was available at all times. The creep-feed mixture consisted of 55 percent rolled milo, 30 percent whole oats, 10 percent cottonseed meal, and 5 percent 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, 1956. Thus, the first calves were born in late September.

## Results

A summary of the data collected in the 1957-58 season is given in Table 1. The cows on the low level of wintering, Lots 1 and 2 lost 231 pounds and 283 pounds, respectively, during the winter period. These losses should be compared to the high level losses of 213 pounds for Lot 3 and 251 pounds for Lot 4. An average difference of only 25

TABLE 1. Creep-feeding fall calves and levels of wintering cows suckling calves (1957-58).

Lot number	1	2	3	4
Level of feeding cow	1½ lbs. CSM	1½ lbs. CSM	2½ lbs. CSM	2½ lbs. CSM
Calf feeding (supplemental)	None	Creep-fed	3 lb. milo None	3 lb. milo Creep-fed
No. of cows raising calves <sup>1</sup>	16	14	17	16
Average weight per cow (lbs.)				
Initial 9-21-57	1105	1160	1129	1179
Spring 4-18-58	874	877	916	928
Weaning 7-7-58	1084	1102	1113	1127
Fall 9-26-58	1167	1218	1198	1193
Winter gain	-231	-283	-213	-251
Gain to weaning	-21	-58	-16	-52
Yearly gain	62	58	69	14
Average weight per calf (lbs.)				
Birth <sup>2</sup>	80	79	78	80
Spring <sup>3</sup>	249	318	289	345
Weaning <sup>4</sup>	428	549	490	570
Average birth date of calves, Oct.	16	18	24	23
Supplemental feed per head (lbs.)				
Cow <sup>5</sup>				
Cottonseed meal	255	255	425	425
Milo			510	510
Calf (creep-feed)		921		1012
Total feed cost per head (\$)				
Cow	32.91	32.91	48.89	48.89
Calf <sup>6</sup>		24.41		26.82
Total	32.91	57.32	48.89	75.71
Selling value (\$)				
Per 100 lbs.				
Steers	34.00	34.00	34.00	34.00
Heifers	30.00	30.00	30.00	30.00
Per head	130.51	169.23	150.35	175.95
Selling value minus feed cost (\$)	97.60	111.92	101.46	100.24

<sup>1</sup>Originally there were 18 cows in Lots 1 and 2, and 19 in each of Lots 3 and 4. Two cows failed to calve in Lot 1. In Lot 2, 4 cows did not calve; 1 cow failed to calve and 1 calf died in Lot 3, and in Lot 4, 2 cows did not calve and 1 calf died.

<sup>2</sup>Corrected for sex by the addition of 3 lbs. to the weight of each heifer calf.

<sup>3</sup>Corrected for sex by the addition of 18 lbs. to the weight of each heifer after a 170-day age correction.

<sup>4</sup>Corrected for sex by the addition of 43 lbs. to the weaning weight of each heifer after correction to 260 days of age.

<sup>5</sup>170 days of feeding.

<sup>6</sup>Creep feed cost \$2.65 per 100 lbs.

pounds resulted from the two levels of wintering, and one group of high level cows (Lot 4) lost more than a low level group (Lot 1). The practical importance of such weight differences is not completely understood.

Only small differences were noted in the average birth weights of the calves. The spring weight (April) of the calves in Lot 1 was 249 pounds as compared to 318 pounds for the creep-fed calves in Lot 2. The calf weights in Lots 3 and 4 were 289 pounds and 345 pounds, respectively. At this time the increased gain resulting from creep-feeding was 69 pounds for calves from the low level cows and 56 pounds for those from the high level cows. The importance of these spring weight differences will be discussed in Part 2.

The calves were weaned on July 7 and sold at the Oklahoma City livestock market. The calves averaged 428, 549, 490, and 570 pounds for Lots 1, 2, 3, and 4, respectively. The increased gain resulting from creep-feeding was 121 pounds for calves from the low level cows and 80 pounds for those from the high level cows. The increases in gain were considerably higher than noted in previous tests. The average increases for the three previous tests were 68 pounds and 48 pounds, respectively.

The non-creep-fed calves in Lot 1 were considerably lighter than in previous years. In three out of the four tests conducted, increased gains were larger for calves from the low level cows.

All calves were sold as feeders; the steers at \$34.00 per 100 pounds and the heifers at \$30.00 per 100 pounds. The appraised slaughter value for the creep-fed calves (Lots 2 and 4) was \$26.00 per 100 pounds for the steers and \$27.50 for the heifers. The non-creep-fed calves were appraised for slaughter at \$24.00 per 100 pounds for the steers and \$26.00 for the heifers.

The calves in Lot 2 consumed an average of 921 pounds of creep feed which cost \$24.41. In Lot 4, the 1,012 pounds of creep-feed cost \$26.82 per calf. The cost of feeding the cows in Lots 1 and 2 (low level) was \$32.91. Subtracting both the cow feed cost and the creep-feed cost from the selling value per calf resulted in increased profits of \$14.32 in favor of creep-feeding for the low level of wintering. Creep-feeding decreased profits slightly at the high level (\$101.46 vs. \$100.24).

In contrast to previous results with cows on the low level, the increased calf value resulting from creep-feeding was greater than the cost of the creep-feed. The increased profit at the low level in this particular year is related to the low cost of feed relative to the high selling price of the calves. Greater decreases in profits due to creep-feeding at the high level have been noted in previous tests.

The high level of supplemental winter feeding for cows in Lot 1 resulted in decreased profits as compared to the low level cows in Lot 2. However, the reverse was true for the non-creep-fed calves of Lots 1 and 3. In this case the 62-pound increase in gain was of greater value than the increased cost of supplemental feed for the cow. This is not in agreement

ment with the results of three previous tests. The 42-pound average increase in weaning weight (Lot 1 and 2 vs. 3 and 4) was not equal in value to the \$15.98 average increase in feed costs.

Rebreeding rate of cows has not been included in these measures and will be discussed in Part 2 of this report.

## **Part 2. Four-Year Summary—Levels of Supplemental Winter Feeding of Beef Cows and Creep-Feeding Fall Calves**

There are many factors which can influence the gains of cows and calves in an individual year. It is usually advisable, therefore, to conduct a test in several years and make recommendations on the basis of average results. Such has been done and a four-year summary has been prepared from the data collected in 1954-55, 1955-56, 1956-57, and 1957-58.

### **Procedure**

The procedure was the same as that outlined in Part 1. This four-year summary includes the 1957-58 results reported in Part 1 of this article. In all four years, the supplemental feed allowances remained the same. The cows in Lots 1 and 2 were fed an average of 1.5 pounds of pelleted cottonseed meal per head daily during the winter feeding period. In Lots 3 and 4, 2.5 pounds of cottonseed meal and 3 pounds of ground yellow corn were fed 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 calves in Lots 2 and 4 were creep-fed. Each lot of cows was moved to a different pasture each year.

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.

### **Results**

The results obtained during the four years of this test have been summarized and are given in Table 2. Relatively small differences were noted in average winter weight losses of the different lots of cows.

The average loss for the high level 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. The average percentage of initial weight lost 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.

**TABLE 2. 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	1½ lbs. CSM	1½ lbs. CSM	2½ lbs. CSM 3 lbs. grain	2½ lbs. CSM 3 lbs. grain
Creep-feeding (supplemental)	None	Creep-fed	None	Creep-fed
Total no. of cows raising calves <sup>1</sup>	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 <sup>2</sup>	76	76	77	76
Spring <sup>3</sup>	261	322	293	344
Weaning <sup>4</sup>	469	556	516	568
Average birth date of calves	Oct. 27	Nov. 6	Oct. 31	Oct. 29
Supplemental feed per head (lbs.) <sup>5</sup>				
Cow				
Cottonseed meal	274	274	457	457
Grain <sup>6</sup>			538	538
Calf (creep-fed) <sup>7</sup>		884		872
Total feed cost per head (\$)				
Cow <sup>8</sup>	33.07	33.07	53.21	53.21
Calf <sup>9</sup>		25.10		24.76
Total	33.07	58.17	53.21	77.97
Selling value (\$)				
Per 100 pounds <sup>10</sup>				
Steers	24.32	24.84	24.66	24.88
Heifers	20.87	21.52	21.35	21.69
Per head <sup>11</sup>	101.48	124.25	114.12	127.59
Selling value minus feed cost (\$)	68.41	66.08	60.91	49.62

<sup>1</sup>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.

<sup>2</sup>Corrected for sex by the addition of 3 lbs. to the birth weight of each heifer.

<sup>3</sup>Corrected for sex by the addition of 18 lbs. to the weight of each heifer after a 170-day age correction by interpolation.

<sup>4</sup>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.

<sup>5</sup>A mineral mixture of 2 parts salt and 1 part steamed bone meal was available at all times.

<sup>6</sup>Corn was fed the first 2 seasons of the trial and milo the 2 remaining seasons.

<sup>7</sup>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 season the corn was changed to 55 percent rolled milo and the molasses reduced to 5 percent.

<sup>8</sup>Includes pasture cost and prices of feeds at the time tests were conducted.

<sup>9</sup>Based on prevailing feed cost at the time tests were conducted.

<sup>10</sup>Based on actual selling prices. Prices as feeders were as high or higher (usually) than price for slaughter.

<sup>11</sup>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.

There were definite differences in weaning weights of the calves. The high level of feeding cows increased calf weights an average of 30 pounds. This difference was statistically significant at the 5 percent level of probability. The difference with non-creep-fed calves (Lots 1 and 3) was 47 pounds, and the difference with creep-fed calves was 12 pounds in favor of the high level of feeding. Creep-feeding increased gains an average of 70 pounds. Statistical significance was at the 1 percent level in this case. The difference was 87 pounds on the low level of cow feeding and 52 pounds on the high level.

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 be apparent in the weights of the calves in mid-April when supplemental feeding was stopped. At this time the creep-feeding had increased gains by 61 pounds 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 one-third 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.

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. Increasing the amount of supplemental winter feed to the cows increased feed costs approximately \$20.00 per head.

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 creep-feeding to decrease 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 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-fed calves.

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 trend appears to be for a larger number of open cows on the low level. However, as stated previously, economics thus far have favored low levels of wintering. Additional data need to be collected on this phase of the test before definite conclusions can be made.

### **Part 3. Results with Two-Year-Old Heifers, 1957-58**

The cows used in the previous studies 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.

#### **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  $2\frac{1}{2}$  years of age. 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 aborted, and 1 calf became weak and died (apparently from insufficient milk).

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**

A summary of the data collected in this test is given in Table 3. The



heifers in Lot 1 lost an average of 263 pounds during the winter period. This was an average loss of 27 percent of their body weight. The high level heifers (Lot 2) lost 205 pounds, or 21 percent of their body weight. Thus, the level of supplemental winter feeding was reflected in the winter weight losses.

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.

**TABLE 3. Levels of supplemental winter feeding of two-year-old beef heifers, 1957-58.**

	Lot 1 1½ lbs. CSM	Lot 2 2½ lbs. CSM 3 lbs. milo
No. of cows per lot raising calves <sup>1</sup>	16	16
Average weight per cow (lbs.)		
Initial 9-28-57	965	955
Spring 4-18-58	702	750
Weaning 7-28-58	921	957
Fall 9-20-58	994	1017
Winter gain	-263	-205
Gain to Weaning	-44	2
Yearly gain	29	62
Average weight per calf (lbs.)		
Birth <sup>2</sup>	76	76
Spring <sup>3</sup>	182	196
Weaning <sup>4</sup>	317	344
Average birth date of calves, Oct.	2	4
Supplemental feed per cow (lbs.) <sup>5</sup>		
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

<sup>1</sup> 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.

<sup>2</sup> Corrected for sex by the addition of 3 lbs. to the weight of each heifer calf.

<sup>3</sup> Corrected for sex by the addition of 18 lbs. to the weight of each heifer after a 170-day age correction by interpolation.

<sup>4</sup> Corrected for sex by the addition of 43 lbs. to the weight of each heifer after a 260-day age correction by interpolation.

<sup>5</sup> 169 days of feeding which started 10-31-57.

At weaning several of the calves appeared unthrifty. 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 Lots 1 and 3, respectively, from mature cows as reported in Part 2.

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 2), 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 4. Preliminary Results with Three-Year-Old Cows, 1957-58**

##### **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. All 34 cows remained in the experiment. The initial weight was taken on September 28, 1958.

In this trial, our intentions were 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 31, 1958, and will be discontinued in April when adequate green grass is available.

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, and one cow was open in Lot 2. Therefore, 14 of the original 17 heifers in Lot 1 are raising calves. In Lot 2, 16 cows are suckling calves.

### Results

The preliminary results for the past winter season are summarized in Table 4. The cows in Lot 1 lost an average of 235 pounds or 23 percent of their body weight. The loss in Lot 2 was 226 pounds or 22 percent. The difference in amount of supplemental feed has had little effect on weight losses of the cows. This is in agreement with certain data recorded in Parts 1 and 2 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 8 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. The average weights on March 17 were 174 pounds and 192 pounds for those in Lots 1 and 2, respectively. The increased level of wintering cows has increased calf weights 18 pounds. Supplemental feed cost for Lot 1 was \$4.71 as compared to \$22.10 for Lot 2.

Further evaluation of the two levels of wintering will be made when the calves are weaned and sold in mid-summer. However, large differences in weaning would not be expected if winter weight losses of the cows were essentially the same. The last weight recorded in this report is March 17, therefore, approximately one month of the winter period remained when this preliminary report was written.

**TABLE 4. Levels of supplemental winter feeding of three-year-old beef cows (preliminary results, 1958-59).**

Lot Number Level of feeding	1 Low <sup>1</sup>	2 High <sup>2</sup>
Number of cows per lot raising calves <sup>3</sup>	14	16
Average weight per cow (lbs.)		
Initial 9-20-58	1009	1017
Spring 3-17-59	778	791
Winter change (178 days)	—235	—226
Average birth weight per calf (lbs.) <sup>4</sup>	71	75
Average calving date, October	1	9
Average weight per calf, 3-17-59 (lbs.) <sup>5</sup>	174	192
Supplemental feed per cow (lbs.) <sup>6</sup>		
Cottonseed meal	152	345
Ground milo		518
Supplemental feed cost per cow (\$)	4.71	22.10

<sup>1</sup> Fed 1.1 lbs. pelleted cottonseed meal per head daily.

<sup>2</sup> 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.

<sup>3</sup> In the original experiment with 2-year-olds in 1957-58 there were 17 cows per lot. 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.

<sup>4</sup> Corrected for sex by the addition of 3 lbs to the weight of each heifer.

<sup>5</sup> No correction for age or unequal number of steers and heifers within a lot.

<sup>6</sup> Supplemental feeding started 10-30-58.

## Part 5. Preliminary Results with Two-Year-Old Heifers, 1958-59

### Procedure

The first test with two-year-old heifers was conducted in 1957-58 and has been reported in Part 3. 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 2½ 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 Lots 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 Lot 1 was 1.47 pounds of pelleted cottonseed meal per head daily. The Lot 2 cows were fed 6.94 pounds per head daily of a pelleted mixture consisting of 35 percent cottonseed meal and 65 percent ground milo. Therefore, these cows consumed an average of 2.43 pounds of cottonseed meal and 4.51 pounds of ground milo per head daily.

Supplemental winter feeding began on November 4, 1958. 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 were offered creep-feed starting in mid-January.

### Results

A summary of preliminary results of this trial may be found in Table 5. There was no difference in average calving date since this fact was considered in allotment. The slight 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.

The cows lost an average of 332, 310, and 193 pounds in Lots 1, 2, and 3, respectively. The percent of body weight loss for the three respective lots is 34, 32, and 20 percent.

The spring calf weights were relatively light. The average weights on March 13 were 156, 136, and 169 pounds for those in Lots 1, 2, and 3, respectively. No correction for unequal numbers of heifers and

**TABLE 5. Levels of supplemental winter feeding of two-year-old beef heifers (preliminary results, 1958-59).**

Lot Number	1	2	3
Level of Feeding	Low <sup>1</sup>	Low <sup>2</sup>	High <sup>3</sup>
Number of cows per lot <sup>4</sup>	16	15	16
Average weight per cow (lbs.)			
Initial 9-20-58	979	983	949
Spring 3-13-59	647	673	756
Winter change (174 days)	-332	-310	-193
Average birth weight per calf (lbs.) <sup>5</sup>	74	74	71
Average calving date, October	23	22	21
Average weight per calf, 3-13-59 (lbs.) <sup>6</sup>	156	136	169
Supplemental feed per animal (lbs.)			
Cow <sup>7</sup>			
Cottonseed meal	66	66	313
Ground milo	124	124	582
Calf (creep-feed) <sup>8</sup>	112		
Supplemental feed cost per cow (\$)	4.78	4.78	22.50

<sup>1</sup> Fed 1.47 lbs. of pelleted cottonseed per head daily. Creep-feeding was started in mid-January but consumption was negligible prior to mid-February.

<sup>2</sup> Cows fed same as in Lot 1.

<sup>3</sup> Cows fed 6.94 lbs. of pellets consisting of 35 percent cottonseed meal and 65% ground milo. Daily feed was 2.43 lbs. cottonseed meal and 4.51 lbs. milo.

<sup>4</sup> 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.

<sup>5</sup> Corrected for sex by the addition of 3 lbs. to the weight of each heifer.

<sup>6</sup> No correction for age or unequal number of steers and heifers within a lot.

<sup>7</sup> Supplemental feeding started 11-4-58.

<sup>8</sup> Creep-feed cost \$2.68 per cwt. Total cost to 3-13-59 was \$3.00 per head.

steers within a lot has been made. The increased level of winter feeding of the cows in Lot 3 increased the average calf weight 33 pounds when compared to the other non-creep-fed calves (Lot 2), and 13 pounds when compared to the creep-fed calves (Lot 1). The difference in favor of creep-feeding calves whose mothers were fed at the low level was 20 pounds.

The supplemental feed cost for the low level cows in Lots 1 and 2 was \$4.78 and for the high level \$22.50. The average cost of creep-feed consumed was \$3.00. Additional data as to the value of the different systems will be available when the calves are sold in mid-summer. The cows have been rebred and additional data will be collected during the 1959-60 season.

### Part 6. Preliminary Results with Yearling Heifers, 1958-59

The two-year-olds used in the tests reported thus far (Parts 3 and 5) had been bred before being placed in the test. The heifers were bred during the winter as yearlings, thus calving the following fall at ap-

proximately 2½ 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.

### 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.

### Results

Data obtained thus far in the experiment are summarized in Table 6. The heifers in Lot 1 have lost an average of 73 pounds per head. Those on the high level have gained only 50 pounds, although they have been fed an average of 7 pounds of supplemental winter feed. The average feed cost per head was \$3.32 and \$23.94 for Lots 1 and 2, respectively.

**TABLE 6. Levels of supplemental winter feeding of yearling beef heifers (preliminary results, 1958-59).**

Lot Number	1 <sup>1</sup>	2 <sup>2</sup>
Level of feeding	Low <sup>1</sup>	High <sup>2</sup>
Number of heifers per lot	18	18
Average weight per heifer (lbs.)		
Initial 10-29-58	696	695
Spring 3-14-59	623	745
Gain (136 days)	-73	50
Supplemental feed per heifer (lbs.) <sup>3</sup>		
Cottonseed meal	61	333
Ground milo	65	619
Supplemental feed cost per head (\$)	3.32	23.94

<sup>1</sup> 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.

<sup>2</sup> Fed 7 lbs. of the mixture listed above. Daily intake was 2.45 lbs. cottonseed meal and 4.55 lbs milo per head.

<sup>3</sup> Supplemental feeding started 10-29-58.

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 7. - 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 2½ years old. 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.

#### **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 1.1 pounds of cottonseed meal per head daily 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. The high level heifers were fed 6.25 pounds of pellets consisting of 25 percent cottonseed meal and 75 percent ground milo. The daily intake of the two feeds was 1.56 pounds and 4.69 pounds respectively.

#### **Results**

A summary of the data collected is given in Table 7. Those heifers wintered at the low level have gained an average of 40 pounds (approximately 0.3 pound per day in 128 days). The high level has resulted in 105 pounds total gain or 0.82 pound per head daily. An average difference in the cost of the two levels of wintering, excluding the hay, was \$15.52. Final data will be summarized after supplemental feeding is discontinued in April. The heifers will be retained in the experiment until they have produced two calves.

This experiment has been revised to include the use of heifers which were born in the fall and will produce their first calf when they are approximately two years of age. There will be only one winter feeding period between weaning and first calving; therefore, level of weight loss during this winter may have a great effect on subsequent development and reproductive performance.

**TABLE 7. Levels of supplemental winter feeding of heifer beef calves (preliminary results, 1958-59).**

Lot Number	1	2
Level of feeding	Low <sup>1</sup>	High <sup>2</sup>
Number of heifers per lot	36	36
Average weight per heifer (lbs.)		
Initial 11-5-58	456	457
Spring 3-13-59	496	562
Gain (128 days)	40	105
Supplemental feed per calf (lbs.) <sup>3</sup>		
Cottonseed meal	125	200
Ground milo		600
Supplemental feed cost per head (\$)	3.88	19.40

<sup>1</sup> Fed 1.1 lbs. pelleted cottonseed meal from 11-5-58 to 2-13-59 at which time the daily feed was reduced to 0.55 lb. per head.

<sup>2</sup> Fed 6.25 lbs. of pellets consisting of 25% cottonseed meal and 75% milo. Daily feed was 1.56 lbs. cottonseed meal and 4.69 lbs. milo per head.

<sup>3</sup> Supplemental feeding started 11-5-58. Pellets were fed as supplements to prairie hay.

### Summary

Cows which had previously produced at least one calf before being placed in the experiment were fed 1.5 pounds of pelleted cottonseed meal or 5.5 pounds of a pelleted mixture of 2.5 pounds cottonseed meal and 3 pounds ground milo. The calves from one group of cows within each level of wintering have been 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. 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 in the case of the low level cows and 52 pounds on 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 one-third 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 2½ 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 costs. Preliminary results with three-year-old cows, two-year-old heifers, yearling heifers, and heifer calves indicate that relatively large quantities of supplemental winter feed are necessary to obtain differences in weight gains or losses.