

## **Some Factors Associated with the Rebreeding of Two-Year-Old Hereford Heifers on High, Moderate and Low Levels of Winter Supplemental Feeding**

*E. J. Turman, L. S. Pope and D. F. Stephens*

Research conducted at the Ft. Reno Station demonstrated that beef heifers can safely be calved at two years of age and suffer no permanent deleterious effect on mature size, longevity or future producing ability. However, even when these heifers are maintained on a fairly liberal plane of nutrition they may be delayed in time of rebreeding following their first calf. When they are carried on low nutritional levels, this delay is quite prolonged and becomes a serious problem.

Probably the most serious criticism producers have leveled at the practice of two year old calving has been this delayed rebreeding. Therefore, it is important that more be learned about the factors associated with it. The purpose of this paper is to report a study of old records at the Ft. Reno Station which was concerned only with the rebreeding performance of two year old heifers maintained on three levels of winter feeding.

### **Materials and Methods**

The data used in this study were taken from the records available on three repetitions of a project at Ft. Reno (projects 650-5, 650-6 and 650-8). Two of these repetitions (650-5 and 6) are described more in detail elsewhere in this Feeders Day bulletin. All of the trials used spring calved Hereford heifers started on trial as weaner calves in the falls of 1957 (650-5), 1958 (650-6), and 1960 (650-8). All heifers calved first at two years of age.

The heifers grazed native grass pastures at Ft. Reno the year-round. They were fed differing amounts of supplemental feed, cottonseed meal and milo, during the wintering period which, in most years, extended from November 15 to April 15. The levels used were based on the amount of supplemental feed necessary to produce certain weight changes in the heifers during the wintering period. For weaner heifer calves the weight changes for the different levels were as follows: *low*, no gain or loss of weight during the winter; *moderate*, an average daily gain of 0.5 lb. per day; and *high*, an average daily gain of 1.0 lb. per day. For bred heifers the weight changes were based on the heifers weight in the fall just preceding the wintering period as follows: *low*, a loss of 20 percent of the fall weight; *moderate*, a loss of 10 percent of the fall weight; and *high*, no loss of weight. In each case the loss included the loss of weight associated with calving (weight of calf, placental tissues, fluids, etc.).

The heifers were pasture mated to Hereford bulls from approximately May 1 to August 1 each year. Each bull was bred to an equal number of

heifers from each level in an effort to minimize the effects of possible differences in fertility of the bulls. Breeding dates were not obtained.

The records utilized in this study were: body weights of the bred yearling heifers taken in the fall (November), and the following June after calving; date of birth of the first calf; date of birth of the second calf from which the approximate date of rebreeding was calculated using a gestation length of 285 days; and the calving difficulty score as determined by the herdsman at time of delivery of the first calf of each heifer. This score ranged from 1 to 5 with the lower score indicating less calving difficulty. Specifically the scoring system was as follows: 1—normal calving with no assistance required; 2—slightly difficult calving, some assistance required; 3—difficult calving, considerable assistance required; 4—a very difficult calving; and 5—caesarean section required.

The data for all trials were combined for this analysis. The objective was not to determine specific values, but rather to look for trends that might explain, in general, differences in the reproductive performance of young heifers.

### Results and Discussion

The data in Table 1 is presented to show the numbers of heifers included in this study and the magnitude of the differences in average calving date of the first and second calves of heifers maintained on the three levels of winter feeding. The differences between the heifers on the various levels in the three trials reported here are remarkably consistent. They agree very closely with the differences observed in other studies involving these same levels at Ft. Reno.

As shown in Table 1, on the average, the high level heifers calved 21½ weeks earlier their first calf and 5 weeks earlier their second calf than did the low level heifers. When the performance of the high level heifers is compared to that of the heifers on the moderate level it is observed that the high level heifers calved approximately 1½ weeks and 3 weeks earlier their first and second calvings respectively.

Table 1. Average Dates of Calving of the First and Second Calves of Hereford Heifers on Three Levels of Winter Supplemental Feeding and Calving First at Two Years of Age.

Project	Item	First Calf			Second Calf		
		Low	Moderate	High	Low	Moderate	High
650-5	Avg. Calving Date	3-23	3-15	3-4	4-4	3-12	3-2
	No. of Heifers	14	15	14	11	14	12
650-6	Avg. Calving Date	3-16	3-10	2-26	4-4	3-16	3-1
	No. of Heifers	13	14	13	10	13	13
650-8	Avg. Calving Date	4-5	3-24	3-17	4-14	4-6	3-2
	No. of Heifers	11	15	13	11	12	9
All	Avg. Calving Date	3-24	3-17	3-6	4-7	3-21	3-1
Projects	No. of Heifers	38	44	40	32	39	34



Table 2 presents the rebreeding performance after calving first at two years of age of heifers on the three levels of winter feeding. In this table the heifers were grouped into rebreeding groups according to which 21 day period of the breeding season the calculated date of rebreeding occurred. Averages were then computed for the heifers within each group as follows: average weight the previous fall as they entered their winter as bred yearlings; average weight in June, which was approximately one month after the start of the breeding season; the average date of calving as two-year-olds; the average date of rebreeding; and the post-partum interval from calving to conception, which is merely the difference between the calving date and the rebreeding date.

The rebreeding pattern of the heifers on the three feed levels is clearly evident in Table 2. It is apparent that approximately the same number of heifers on each level failed to rebreed and were open. The differences in reproductive performance between the levels is in the time

**Table 2. The Rebreeding Performance of Hereford Heifers After Their First Calving at Two Years of Age, With the Heifers Divided Into Groups on the Basis of the Time During the Breeding Season When Conception Occurred Within Each of Three Levels of Supplemental Winter Feeding.**

Time of Rebreeding	No. of Heifers	Wt. of Heifers (lb.)		Avg. Calving Date	Avg. Date of Rebreeding	Post-Partum Interval, Calving to Conception (days)
		Previous Fall	June			
<b>LOW LEVEL</b>						
0- 21 days	1	830	800	2-27	5-18	80
22- 43	9	814	795	3-13	5-30	78
44- 65	10	791	741	3-30	6-23	85
66- 87	7	776	764	4-1	7-16	106
88-109	4	772	699	3-17	8-3	139
Open	6	755	703	4-13	---	---
<b>MODERATE LEVEL</b>						
0- 21 days	12	868	871	3-7	5-15	69
22- 43	13	852	881	3-12	6-1	81
44- 65	7	829	860	3-24	6-22	90
66- 87	3	773	760	4-7	7-17	101
88-109	4	868	889	3-19	8-1	135
Open	4	819	855	4-18	---	---
<b>HIGH LEVEL</b>						
0- 21 days	21	861	927	3-9	5-13	65
22- 43	8	874	908	2-27	5-27	89
44- 65	3	882	955	3-14	6-23	101
66- 87	0	---	---	---	---	---
88-109	0	---	---	---	---	---
Open	6	860	933	3-11	---	---

of rebreeding. Only one low level heifer out of the 31 rebred conceived in the first 21 days of the breeding season. This compares to 12 of 39 moderate level heifers (31 percent), and 21 of 32 high level heifers (66 percent) that conceived in the same period.

By the end of the second 21 day period there were still only 32 percent of the low level heifers settled. By the end of the same period, 64 percent of the heifers on the moderate level and 90 percent of the heifers on the high level had conceived. At the end of the third 21 day period all of the high level heifers that subsequently calved had settled, compared to 82 percent of those on the moderate level and 64 percent of the low level heifers.

One reason for the later rebreeding of the heifers on the low and moderate levels is simply the result of later calving. However, when one considers that the spread between the groups is greater for the second than the first calf, it is evident that some other factor is also involved. This other factor is the longer time that is required by the heifers on the lower levels to recover from calving and rebreed. The relationship between the post-partum interval from calving to conception and feed level that definitely appears to be a factor in this study has also been observed and reported by others.

Since heat dates were not obtained in this study it was not possible to calculate the length of the post-partum interval from calving to first heat. The only post-partum interval that can be calculated is from calving to conception. Thus, the post-partum intervals do not necessarily indicate how quickly heifers on a certain level returned to heat after calving. These data do not permit one to determine whether a heifer conceiving in the first 21 days of the breeding season has been in heat previously or not. Therefore, it is likely that some early calvers may have returned to heat prior to the start of the breeding season. Although this analysis may penalize the early calving groups it still provides a comparison of sorts and is worthy of consideration.

The heifers in this study that were fed at the high level required approximately 65 days to return to heat and rebreed. This is based on the observation that 66 percent of the heifers that settled did so in the first 21 days of the breeding season and as a group had an average post-partum interval of 65 days. It is likely that the post-partum interval of calving to first estrus was shorter than 65 days.

In contrast to the high level, the heifers on the low level required, at best, a minimum of 80 days after calving to rebreed. Approximately 64 percent of the heifers conceived in the first through third 21 day periods and had an average post-partum interval of 78-85 days. Since only one heifer bred during the first 21 days of the breeding season, and a 64 percent conception rate to first service is only slightly less than what should be expected, it might be speculated that these heifers settled on the first heat they had after calving. If this is true, and it seems reasonable, then 80-85 days appears to be the post-partum interval associated with the



low level of wintering used in this study, and is probably the interval from calving to first estrus as well as to conception.

Heifers fed on the moderate level showed a more variable response. Approximately 64 percent rebred during the first and second 21 day periods. Of these heifers, half had a post-partum interval of approximately 70 days and the other half had an interval of approximately 80 days. Thus, although some of the heifers on the moderate level rebred nearly as quickly as the average heifer on the high level, the shortest average post-partum interval associated with the moderate level is approximately 75 days, some 10 days longer than that observed for the high level.

When all heifers rebreeding, regardless of how late, are included in the averages the post-partum intervals from calving to conception are: high, 74 days; moderate, 86 days; and low, 95 days. These differences mean that had all heifers calved on the same date as two-year-olds, the high level heifers would have dropped their second calves 3 weeks earlier than the low level heifers and nearly 2 weeks earlier than the moderate level heifers. It is interesting to note that the heifers on the low and moderate levels were delayed almost the same length of time when bred as yearlings. This suggests that feeding less than an optimum amount of feed is just as detrimental to the lactating two-year-old as it is to the yearling heifer.

What is the optimum feed level for young heifers? These studies do not provide the basis for answering this question. The data do indicate, however, that the high level is superior to either the low or moderate level if only reproductive performance is taken into account and no consideration is given to the economics involved.

Table 2 reveals an interesting relationship indicating the need for more extensive study. In the low level group two subgroups of heifers had an average weight of only 700 lbs. in June and both groups either rebred extremely late or were open. While it is true that the 6 open heifers had a very late average calving date, it is likewise important to note they were among the lightest weight heifers as a group. There is also a tendency for a longer post-partum interval to be associated with the groups of heifers lighter than 800 lbs. on the low level in the fall prior to their winter as bred yearlings.

It may be dangerous to speculate on the influence of body weight on rebreeding from the very limited data available in this study. It is true that it appears to be a factor only in the low level heifers. However, it should be recognized that, in most cases, the heifers on the other levels are all considerably heavier. It is tempting to believe that body weight may be an important factor in determining the magnitude of the effect of low levels of winter feeding on subsequent reproductive performance. Certainly, it indicates the need for further research to determine this relationship if it exists.

One difficulty invariably associated with calving heifers at two-years of age is the number of heifers requiring assistance. In nearly every Ft. Reno study approximately one-half of the heifers have had to be helped. This held true in this study for nearly 48 percent of the heifers required some degree of assistance (Table 3).

Approximately 27 percent of the heifers required considerable assistance. There was the chance an injury may have occurred or an infection introduced resulting in delayed rebreeding. To study this possibility the heifers were grouped according to the calving difficulty scores, and rebreeding dates and post-partum intervals were calculated for each group, Table 3. In no case was there any relationship between calving difficulty and any measure of rebreeding efficiency.

### Summary

A study of the records of three repetitions of project 650 at the Ft. Reno Station was made to determine factors associated with the rebreed-

**Table 3. The Rebreeding Performance of Hereford Heifers Fed Three Levels of Supplemental Winter Feed, Calving First at Two Years of Age, Divided Into Groups on the Basis of the Calving Difficulty Score at First Parturition**

Level of Wintering	Calving Difficulty Score <sup>1</sup>	No. of Heifers	Avg. Calving Date	Avg. Rebreeding Date	Avg. Post-Partum Interval	No. Open Heifers
Low	1	21	3-18	7-4	108	4
	2	8	3-23	6-21	90	1
	3	4	3-13	5-21	69	1
	4-5	3	3-16	5-19	64	1
Moderate	1	15	3-19	6-12	85	2
	2	6	3-9	5-29	81	1
	3	5	3-19	7-6	109	0
	4-5	3	3-9	6-18	101	1
High	1	19	3-13	5-22	70	5
	2	8	3-22	5-27	66	1
	3	10	3-15	5-22	68	1
	4-5	3	3-15	5-18	64	0
All Levels	1	55	3-17	6-14	89	11
	2	22	3-19	6-8	81	3
	3	19	3-16	6-4	80	2
	4-5	9	3-13	5-27	75	2

<sup>1</sup> Calving Difficulty Scores

1—No assistance required, heifer calved normally

2—Heifer required some assistance to calve

3—Heifer required considerable assistance

4—Very difficult parturition

5—Caesarean section necessary

ing of two year old heifers on high, moderate and low levels of winter feeding. Although 47 percent of the heifers required some degree of assistance at calving there was no association between calving difficulty and rebreeding performance.

The average calving dates of the second calf of heifers on the low and moderate levels were, respectively, 5 weeks and 3 weeks later than the average date for heifers on the high level. Approximately one half of this difference was due to later breeding as yearlings as evidenced by later calving at two years of age ( $2\frac{1}{2}$  weeks and  $1\frac{1}{2}$  weeks later for low and moderate respectively). The remainder of the delay in date of calving of the second calf is the result of a longer post-partum interval from calving to conception. The average intervals were: high, 74 days; moderate, 86 days; and low, 95 days.

These observations suggests adequate nutrition is just as critical in the lactating two-year-old as in the yearling heifer. Earliness of calving and promptness of rebreeding of two year old heifers depends, largely, on the level of nutrition provided during the critical wintering period.

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## **The Cumulative Influence of Level of Wintering on the Lifetime Performance of Beef Females Through Five Calf Crops**

*S. A. Ewing, Larry Smithson, L. S. Pope and D. F. Stephens*

The type of forage available to range beef cows in the winter months dictates that supplemental protein and often supplemental energy be provided to insure acceptable cow performance.

The amount of supplemental feed required is of great economic importance in terms of feed cost, reproductive performance and milk production of the dam.

Several experiments have been conducted at this station which relate to this subject and progress reports have been made periodically. This report summarizes performance of spring-calving cows wintered at different levels from weaning through five calf crops.

### **Experimental Procedure**

One hundred twenty weaner heifer calves were selected from the Ft. Reno herd as experimental animals and started on test at an average age of approximately 8 months at weights of near 475 lbs. One-half of