Calving Intervals in Beef Cows at 2, 3, and 4 Years of Age When Breeding Is Not Restricted After Calving

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ABSTRACT: The objective of this study was to evaluate calving intervals and repeatability of calving intervals of young beef cows when breeding seasons were initiated immediately after calving. Average calving date at 2, 3, and 4 yr of age was recorded, and duration of calving interval between the first and second and second and third parities was compared in 178 crossbred beef cows calving between 1981 and 1988. Cows were placed in paddocks with intact bulls immediately after calving so they had the opportunity to conceive at the estrus associated with the initial estrous cycles after calving. Average Gregorian date of calving for cows was progressively earlier with older age (March 9, March 5, and February 14 at 2, 3, and 4 yr of age, respectively). Repeatability of calving intervals within individual cows was also evaluated. There was an interaction between year and parity on calving interval between 2 and 3 (P < .001) and 3 and 4 (P < .004) yr of age. Repeatability of calving interval was low and negative during 5 of the 6 yr. In young beef cows, year and parity interact to influence calving interval, and this average interval is less than 365 d when initiation of the breeding season is not restricted after calving.

Key Words: Cows, Postpartum Interval, Age, Repeatability, Calving Interval

Introduction

Young beef cows have longer periods of postpartum anestrus than mature cows and frequently have calving intervals that are longer than 365 d (Dunn and Kaltenbach, 1980). Cows that calve at an interval of less than 365 d will have an earlier date of parturition each year until they approach a limit set by the initiation of the breeding season (Burris and Priode, 1958). Cows that calve early during the calving season often express their first estrus before initiation of the subsequent breeding season and, therefore, are not able to conceive because they have yet to be exposed to bulls. In comparison, cows that calve late in the calving season may conceive at their first estrus after the start of the breeding season, and consequently calving interval is shortened. In the present study, repeatability of calving intervals of young beef cows was evaluated when all cows in the herd were allowed to mate during the first periods of estrus after parturition.

Experimental Procedures

Calving dates were recorded for 178 crossbred (Shorthorn, Angus, and Hereford) cows at 2, 3, and 4 yr of age from 1981 through 1988. Cows were derived using a three-breed rotational system of crossbreeding. As yearlings, heifers were pastured with fertile bulls for 35 d starting on May 17 each year. Starting immediately after calving at 2 and 3 yr of age, cows were pastured with fertile bulls for at least 150 d. The animals were maintained at the Agricultural Research and Development Center near Mead, NE. The cows grazed brome and native grass pastures during the spring, summer, and early fall and grazed cornstalks during the late fall and early winter months. Hay and a protein supplement were also fed during the late fall and winter months to meet National Research Council (1976) recommendations for cows with moderate milking ability. Similar management was used after the second and third calvings.

Calving interval was calculated as the difference between calving dates in two successive years; therefore, two calving intervals were determined: 1)
Table 1. Average date of calving for cows at 2, 3, and 4 years of age and the change in the average Gregorian date of calving between 2 and 3 and 3 and 4 years of age

<table>
<thead>
<tr>
<th>Year of first calf</th>
<th>Date 2 year</th>
<th>Change 3-2 year</th>
<th>Date 3 year</th>
<th>Change 4-3 years</th>
<th>Date 4 year</th>
<th>Change 4-2 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>Mar. 8</td>
<td>-19</td>
<td>Feb. 17</td>
<td>-7</td>
<td>Feb. 10</td>
<td>-26</td>
</tr>
<tr>
<td>1983</td>
<td>Mar. 8</td>
<td>-1</td>
<td>Mar. 7</td>
<td>-15</td>
<td>Feb. 21</td>
<td>-16</td>
</tr>
<tr>
<td>1984</td>
<td>Mar. 10</td>
<td>8</td>
<td>Mar. 18</td>
<td>-24</td>
<td>Feb. 23</td>
<td>-16</td>
</tr>
<tr>
<td>1985</td>
<td>Mar. 12</td>
<td>17</td>
<td>Mar. 30</td>
<td>-23</td>
<td>Mar. 7</td>
<td>-6</td>
</tr>
<tr>
<td>1986</td>
<td>Mar. 7</td>
<td>-12</td>
<td>Feb. 23</td>
<td>-24</td>
<td>Jan. 30</td>
<td>-36</td>
</tr>
<tr>
<td>Mean</td>
<td>Mar. 9</td>
<td>-4.3</td>
<td>Mar. 5</td>
<td>-19.5</td>
<td>Feb. 14</td>
<td>-24</td>
</tr>
</tbody>
</table>

aThere was a year × parity interaction that was observed for calving interval between 2 and 3 (P < .001) and 3 and 4 (P < .006) years of age.
bDifferences in mean Gregorian date between second and first parity.
cDifferences in mean Gregorian date between fourth and third parity.
dDifferences in mean Gregorian date between fourth and second parity.

interval between calving dates at 2 and 3 yr of age and 2) interval between calving dates at 3 and 4 yr of age. Data from all cows that lost calves at any time during the study were excluded from the analyses. Repeatability of calving intervals of cows between 2 and 3 and between 3 and 4 yr of age were determined with interclass correlations (SAS, 1985). These repeatabilities are equivalent to the correlation between repeated records per cow (i.e., the extent to which an individual above average for the first record is above, similar to, or below average for the second). The GLM procedure was used to test for effects of year of calving, parity of the cow, and interaction between year and parity on calving interval to determine whether cows with relatively short or long calving intervals between 2 and 3 yr of age tended to do the same between 3 and 4 yr of age (SAS, 1985).

Results and Discussion

Pregnancy rates during the 150 d or greater breeding seasons were at least 96% during each of eight calving seasons. Mean calving dates varied from one year to the next (Table 1). For example, cows that were 2 yr of age in 1981 had an average calving date of March 11 in 1981, and the average calving date of these cows at 3 yr of age was February 20. Cows that were 2 yr of age in 1985 had an average calving date of March 12 in 1985, and in 1986 these cows had an average calving date of March 30. Between the first and second parities, average calving date was 19 d earlier in the group of cows calving first in 1981, but it was 17 d later between the first and second parities in the second group (1985).

Differences between years may result from year-to-year changes in climatic conditions. The goal was to feed the cows to meet their nutritional requirements each year; however, the stress of extreme temperatures and winter conditions in some years made this difficult. There might have been differences in body condition of cows across years that contributed to differences in repeatability of calving interval across years. Body condition scores were not recorded, so this is only noteworthy from an anecdotal perspective. During the entire study, cows calved 4.3 d earlier in the year when they were 3 than when they were 2 yr of age.

There was a year × parity interaction that was observed for calving intervals between 2 and 3 (P < .001) and 3 and 4 (P < .004). Cows calving at 4 yr of age calved earlier than at 3 yr of age; thus, calving interval was shorter for cows between 3 and 4 yr of age than for cows between 2 and 3 yr of age. Cows giving birth to their first calf in 1981 had an average calving date of January 25 in 1983 when they were 4 yr of age. Those cows calved 26 d earlier at 4 yr of age than at 3 yr of age, after having calved 19 d earlier at 3 yr of age than they did at 2 yr of age. The pattern of change in calving interval over years was quite different for cows calving first in 1985 compared with those calving first in 1981. Cows that had their first calf in 1985 had an average calving date of March 7 in 1987 when they were 4 yr of age, which meant that cows calved 23 d earlier at 4 yr of age than at 3 yr of age. Those same cows had calved 17 d later at 3 yr of age than at 2 yr of age. During the entire study, the average change in calving date between 3 and 4 yr of age was 19.5 d, with cows calving earlier at 4 than at 3 yr of age. The total change in average calving date between 2 and 4 yr of age was, therefore, 23.8 d. Thus, cows calved 23.8 d earlier when they were 4 yr of age than when they were 2 yr of age.

As a cow matures, her ability to withstand stresses at calving improves; however, this ability is still affected by body condition (Dunn and Kaltenbach, 1980; Short et al., 1990). This ability is likely related to the greater body condition that is typically present in mature, compared with younger, cows. Cows at 2 yr of age tend to have a longer postpartum interval to
time of conception (Dunn et al., 1980, Short et al., 1990). Two-year-old cows are still growing during gestation, and the fetus is also competing for nutrients. If the cow is stressed nutritionally, nutrient needs of the fetus are met first, and any of the dam's energy stores are subject to depletion (Short et al., 1990). After calving, young cows must satisfy their own growth, maintenance, and lactation requirements, as well as replenish their own depleted energy stores before initiation of estrous cycles will occur (Short et al., 1990). If cows are to maintain an annual calving interval, they must have the ability to conceive within 80 to 85 d after calving.

Repeatability of calving interval was affected by an interaction between year and parity. In five of the six groups, there was a negative association between calving interval within individual cows between 2 and 3 and between 3 and 4 yr of age (Table 2). This means that cows that had a relatively short calving interval between 2 and 3 yr of age did not perform in the same way between 3 and 4 yr of age. Because the relationship was negative, cows having relatively short calving intervals between 2 and 3 yr of age tended to have relatively long calving intervals between 3 and 4 yr of age. This indicates that cows had to recover from the stress of a relatively short interval between parities before being capable of conceiving the subsequent year. Similarly, cows having relatively long intervals between two parities were able to conceive earlier after calving than those having relatively short intervals between two parities.

Even though the correlation between calving intervals of cows at 2 and 3 yr of age and 3 and 4 yr of age was negative, it is interesting to evaluate the data as graphed in Figure 1. This indicates that 78 of 178 cows had calving intervals of less than 365 d both between 2 and 3 and between 3 and 4 yr of age. There were only 8 of 178 cows that had calving intervals of greater than 365 d between both 2 and 3 yr of age and between 3 and 4 yr of age. There were 62 of 178 cows with calving intervals of greater than 365 d between 2 and 3 yr of age and of less than 365 d between 3 and 4 yr of age. Twenty-six of 178 cows had a calving interval of less than 365 d between 2 and 3 yr of age but greater than 365 d between 3 and 4 yr of age. Two of 178 cows had a calving interval of exactly 365 d.

![Figure 1. Duration of calving interval relative to a 365-d calving interval (0 = 365 d calving interval) for beef cows between 2 and 3 (first calving interval) and 3 and 4 (second calving interval) yr of age.](image)
between 2 and 3 yr of age and a calving interval of less than 365 d between 3 and 4 yr of age. There were also 2 of the 178 cows with a calving interval of less than 365 d between 2 and 3 yr of age but with a calving interval of exactly 365 d between 3 and 4 yr of age. Calving interval, therefore, was less than 365 d for 142 of the 178 cows between 3 and 4 yr of age, and 78 of these cows had calving intervals of less than 365 d both between 2 and 3 and between 3 and 4 yr of age. It is interesting to speculate that beef producers might be able to develop beef herds with cows of greater fertility if young cows were selected on their ability to become pregnant during the early postpartum period.

The average interval from calving to conception for 2-yr-old cows in this experiment was approximately 75 to 80 d. Previous studies indicate that pasturing cows with bulls after calving decreases the interval to conception (Zalesky et al., 1984; Alberio et al., 1987; Gifford et al., 1989; Custer et al., 1990). Cows in moderate body condition have a greater response to the presence of a bull than cows with greater body condition (Stumpf et al., 1992). Pasturing cows with bulls during the early postpartum period in the present study might have resulted in shortened periods of postpartum anestrus compared with what would have occurred otherwise.

Heifers that conceive late tend to calve later in the season as cows than heifers that conceive early if traditional systems of breeding management are used (Lesmeister et al., 1973). In usual management systems, calving intervals are restricted because the date of initiation of calving season is controlled by the day when the producer initiates breeding. Cows that give birth to calves in an interval of less than 365 d will have an earlier date of calving each year until they approach a limit set by the initiation of the breeding season (Burris and Priode, 1958). Postpartum cows may begin to exhibit estrus and associated reproductive functions before initiation of the breeding season; however, conception cannot occur because the breeding season has not yet been initiated. Early initiation of estrous cycles, therefore, may not be reflected in a shorter calving interval when breeding is not permitted to occur during the early postpartum period. Data from the present study indicate that young beef cows tend to have less than 365-d calving intervals and, therefore, calve earlier in subsequent calving seasons if breeding is allowed to occur during the early postpartum period.

**Implications**

If young beef cows are allowed to breed at the first estrus following calving, calving interval will be greater between 2 and 3 than between 3 and 4 yr of age. Calving interval, however, might be less than 365 d between 2 and 3 and will likely be less than 365 d between 3 and 4 yr of age. There is an interaction between year and parity of cow on the interval between calvings of young beef cows. Beef producers might be able to develop beef herds with cows of greater fertility if young cows were selected on their ability to become pregnant during the early postpartum period.

**Literature Cited**


