SDSU Extension

BEEF

Chapter 31

Managing Reproduction in Postpartum Cows

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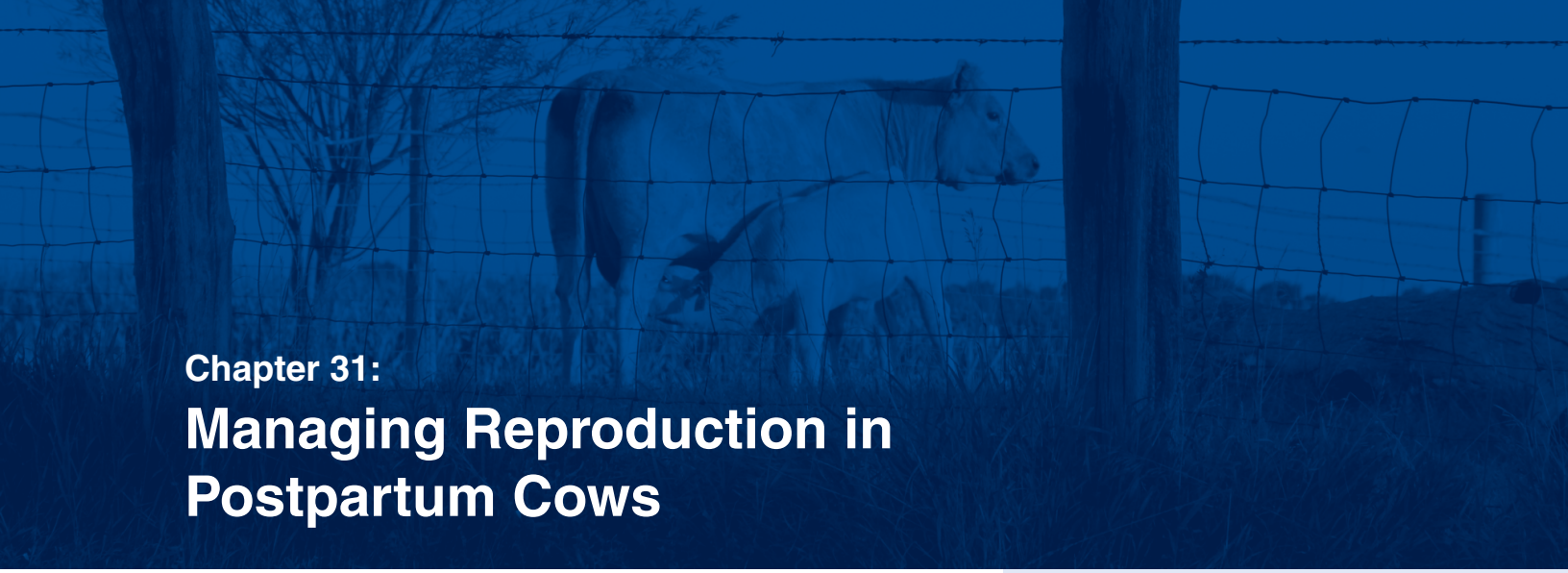

Chapter 31:

Managing Reproduction in Postpartum Cows

Introduction

The reason that cows which calve late have difficulty conceiving is due to the prolonged interval from calving to the establishment of normal estrous cycles (i.e. postpartum interval). In beef cattle, prolonged postpartum intervals decrease the proportion of cows that are cycling at the start of the breeding season and thereby decrease pregnancy rates and pounds of calf weaned per cow exposed during a breeding season. The effect of calving date on the proportion of beef cows calving the subsequent year is shown in Figure 1. Postpartum interval length is influenced by a variety of factors including suckling, nutrition, age, dystocia, genetic variation, stress, and disease (Short et al., 1990; Yavas and Walton, 2000). These factors can be classified into primary factors that have a significant influence on postpartum interval, and secondary factors that influence postpartum interval but may be mediated through primary factors.

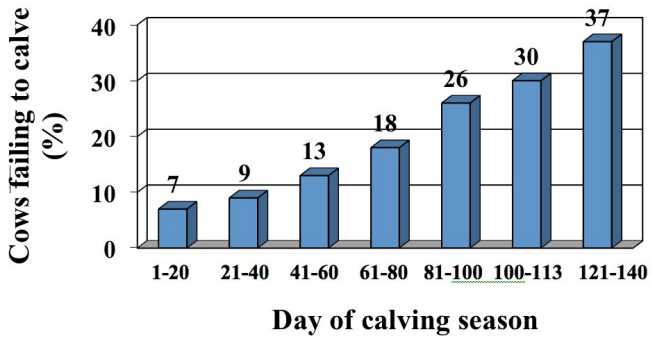

Figure 1: Effect of calving date on the proportion (%) of cows failing to calve the subsequent year (Burris and Priode, 1958). Fewer of the cows that calved the first 20 days of the calving season failed to calve the next year (7%) compared to cows that calved 121 to 140 days after the start of the calving season (37%). This is because cows that calve late frequently don't have time to show estrus and conceive during the breeding season.

Key Points

- Postpartum interval length is influenced by a variety of factors including suckling, nutrition, age, dystocia, genetic variation, stress, and disease.
- Postpartum beef cows that are suckled ad libitum have a longer postpartum anestrous period than cows that are suckled once daily, or not suckled at all.
- Reproduction ranks very low on the biological priorities for nutrient utilization (nutrient partitioning) by cattle.
- Younger cows have a longer postpartum interval than mature cows.
- Cows that experience dystocia have a longer postpartum interval than cows that do not experience dystocia.

Primary Factors Affecting Postpartum Interval Length and Management Strategies to Minimize their Effect:

Suckling: Postpartum beef cows that are suckled ad libitum have a longer postpartum anestrous period than cows that are suckled once daily, or not suckled at all (Williams, 1990). This extended anestrous period is a direct function of suckling and the bond that develops between a cow and her own calf. The ability of a cow to recognize her calf prolongs postpartum interval length in addition to the neural stimulation of the suckling stimulus. Luteinizing hormone (LH) is an important reproductive hormone that is secreted from the anterior pituitary gland into the blood and is required for the establishment and maintenance of estrous cycles in numerous mammals, including cattle. An increase in LH pulse frequency is required for growth and maturation of an ovulatory follicle. As time from calving increases so does the frequency of LH pulses in the circulation and this culminates in a short luteal phase followed by the first normal estrous cycle postpartum. Interestingly, the biological changes from calving to the first ovulatory estrus in a postpartum cow are similar to the physiological changes in a heifer as she approaches puberty. For example, initiation of normal estrous cycles in prepubertal heifers and cows is frequently preceded by an ovulation, without estrus, that results in a short luteal phase (Perry et al., 1991; Werth et al., 1996). This short exposure to progesterone is believed to be necessary for reprogramming the reproductive axis to resume normal estrous cycles. Therefore, in herds that have a large proportion of prepuberal heifers or anestrous cows, progestin pretreatment (Melengestrol acetate or Eazi-BreedTM CIDR treatment) before induction of ovulation can initiate estrous cycles by simulating a short luteal phase.

Management strategies that reduce suckling frequency have been employed to reduce postpartum interval length and facilitate rebreeding (Williams 1990). Methods of reducing suckling frequency commonly include early weaning, once-daily sucking, and temporary calf removal. Normally as the degree of suckling frequency decreases the benefit to postpartum reproduction increases.

Early weaning: Early weaning requires additional management and is normally only used under adverse environmental conditions such as drought, over grazing, or inadequate feed quality. Calves have been weaned between 45 and 80 days of age and conception rate was reported to increase in two year olds, three year olds, and four year olds by 26%, 16%, and 8%, respectively (Bellows et. al., 1974, Ray et. al., 1973; Smith and Vincent 1972). However, costs associated with the increased labor and management associated with early weaned calves must be carefully considered.

Once-daily suckling: As the name implies calves are allowed to suckle once a day beginning at 30 to 40 days of age. Cows are introduced to their calves once a day and the duration of suckling is approximately 30 minutes. Although this management strategy requires daily sorting of cows and calves, once a cow shows estrus and has been inseminated her calf can be returned to her. Normally once-daily sucking does not last more than 40 days. The calves need to be provided proper shelter and nutrition and although calf weights may decrease during the period of once-daily suckling not reduction in weaning weights have been reported (Randel 1981).

Short-term calf removal: This is the least aggressive method of reducing suckling frequency and requires less labor than the two previous methods. Short-term calf removal normally occurs for 48 hours since removing calves for 72 hours has not proved to be advantageous compared to 48 hour calf removal. Calves should be at least 40 to 45 days of age at the time of calf removal and provided water, high quality hay, and a creep feed that is approximately 14% crude protein. At calf return, calves should be allowed adequate time to "mother-up" before cows are moved to pasture. If the weather is inclement (rainy and cold) calf removal should be delayed until the weather improves. Depending upon calf age and body condition score of the cow, approximately 30 to 80% of postpartum cows will return to estrus within 20 days following short-term calf removal and pregnancy rates have been increased by 4 to 8%. In some cases short-term calf removal has been combined with progestin-based estrus synchronization systems and increased pregnancy rates have been reported. Calf removal will work on

anestrous cows that are in moderate body condition (≥ 5 body condition score); however, cows in thin body condition (< 5 score) will require a more aggressive means of reducing suckling frequency such as once-daily suckling or early weaning.

Nutrition: Short et al. (1990) proposed the following biological priorities for nutrient utilization (nutrient partitioning) by cattle: 1) basal metabolism, 2) motor activity, 3) growth, 4) basic energy reserves, 5) maintenance of pregnancy, 6) lactation, 7) additional energy reserves, 8) estrous cycles and initiation of pregnancy, and 9) excess reserves. The preceding priorities for nutrient partitioning demonstrate that reproduction (resumption of estrous cycling and pregnancy) is a low priority, particularly for heifers calving at two years of age. Consequently, underfeeding energy and/or protein precalving and post calving reduced both pregnancy rates and first service conception rates, and increased the postpartum interval (see review by Randel, 1990). Both suckling and nutrition interact to have a powerful effect on return to estrus in beef cows.

A simple method of assessing bovine energy reserves is through a subjective body condition scoring (BCS) system, which ranges from 1 (emaciated) to 9 (obese). The scoring system evaluates the amount of fat cover at specific locations on the female. Cow body condition at calving has a critical role in determining postpartum interval length compared to body condition score at the start of the breeding season (Dziuk and Bellows, 1983). Consequently, prepartum nutrition level and maintenance of nutrition level postpartum has an important effect on subsequent reproductive performance (Randel, 1990). Cows having a body condition score ≥ 5 at calving returned to estrus sooner than cows having a lower body condition score (Spitzer et al., 1995), and cows with a body condition score of six or seven had higher pregnancy rates compared to cows with a body condition score of four or five (DeRouen et al., 1994).

A strategic time to assess cow body condition is at weaning since a cow's nutrient demands are significantly reduced after weaning and this is the most economical time to improve cow body condition. In general, a cow needs to gain approximately 80 lbs (not including the weight of a gestating calf and the associated fluids) to increase one condition score. Consequently, if a cow has a BCS of 3 at weaning and you want her to have a BCS of 5 at calving she will need to gain 160 lbs. By knowing how much weight she needs to gain and the number of days from weaning to calving you can calculate an expected average daily gain to achieve the targeted BCS goal by calving.

Precalving nutrition has an important effect on cow body condition at calving and subsequent postpartum interval length. The effects of poor body condition in cattle can be overcome by feeding cows prepartum to obtain a good body condition score at parturition (Morrison et al., 1999). Cows fed a high energy diet for 135 to 142 days prior to calving had higher pregnancy rates, conceived earlier in the breeding season, had a shorter interval from calving to conception, and exhibited estrus earlier postpartum than cows fed half the energy of the high energy ration (Dunn et al., 1969). Increased energy content of feed as late as two months before calving increased BCS, percent cycling and pregnancy rates during the first half of the breeding season (Espinoza et al., 1995).

Whereas precalving nutrition is an important determinant of postpartum interval length, postcalving nutrition has an important effect on conception rate. Increasing energy content in a ration after calving resulted in higher pregnancy rates and cows conceived earlier in the breeding season, but cows did not exhibit estrus earlier postpartum compared to control animals (Dunn et al., 1969). Waiting until 4 weeks after calving and 11 days before breeding to increase energy supplementation had no effect on concentrations of LH or estradiol, but did increase the size of the largest follicle 7, 9, and 12 days after feeding was initiated, and also increased pregnancy rates and maintenance of the embryo (Khireddine et al., 1998). Therefore, supplementation of cattle following calving resulted in a shorter duration of negative energy balance and increased reproductive performance.

Secondary Factors Affecting Postpartum Interval Length

Age of the cow: As previously discussed, growth is a higher priority for nutrient partitioning than reproduction, and heifers consistently had longer postpartum intervals than multiparous cows (Doornbos et al., 1984; Fajersson et al., 1999). In addition, the first ovulation postpartum in primiparous cows was delayed relative to multiparous cows (Sharpe et al., 1986; Guedon et al., 1999). Consequently, as animals reach mature body size nutrients that were previously partitioned for growth can be utilized for lower priority functions including reproduction. Consequently, feeding first calf heifers separate from older cows and providing supplemental nutrition to first calf heifers can be effective strategies for negating the effect of cow age on rebreeding.

Dystocia: Heifers calving at two years of age have increased incidence of dystocia compared to older cows. Furthermore, heifers that experienced calving difficulty at two years of age weaned fewer calves that were younger and lighter (Brinks et al., 1973). Cows experiencing dystocia resulted in a lower percentage of cows exhibiting standing estrus within 45 days of calving, decreased AI pregnancy rates, and decreased total pregnancy rates (Laster et al., 1973). Therefore, minimizing the incidence of dystocia through proper heifer development and use of "calving ease" bulls as well as being proactive in providing obstetrical assistance will help reduce postpartum interval length and increase reproductive performance.

Additional Methods of Decreasing Postpartum Interval Length

Fixed-time Artificial Insemination (FTAI): At the start of a breeding season, most herds consist of a mixture of cycling and anestrous females. In order to maximize the proportion of females that conceive early in the breeding season estrus synchronization protocols have been developed that permit cycling and anestrous cows to be inseminated at a predetermined time and achieve pregnancy rates similar to synchronization protocols that depend upon estrous detection. To achieve pregnancy rates to FTAI in anestrous cows that are similar to cycling cows it is necessary to utilize a progestin-based protocol. As mentioned earlier, a short luteal phase usually occurs in postpartum beef cows following the first ovulation. This short exposure to progesterone is believed to be necessary for reprogramming the reproductive axis to resume normal estrous cycling. Therefore, in herds with a large proportion of prepuberal heifers or anestrous cows, progestin pretreatment before induction of ovulation will simulate a short cycle and initiate normal estrous cycles. Consequently, progestin-based FTAI protocols can be effective in inducing a fertile ovulation and increasing the proportion of anestrous cows that become pregnant at the start of the breeding season. Two progestin products that are commercially available for estrous synchronization include Melengestrol Acetate (MGA) and the Eazi-Breed CIDR (Controlled Internal Drug Release).

Biostimulation (Bull Exposure): The interval from calving to estrus and ovulation is reported to be decreased by 14 to 18 days following exposure of first calf heifers and older cows to bulls (Berardinelli, 2007). Furthermore, the effect of bull exposure has been reported in both Bos taurus and Bos indicus breeds. The best results have been achieved when the cows are at least 40 days postpartum at the time of bull exposure. The stimulatory effect of yearling bulls seem to be as effective as older bulls and fenceline contact can be as effective as having the bulls mixed with the cows provided the cows have close contact with the bulls for a period of time that has not yet been determined. The cow to bull ratio for effective biostimulation is dependent upon pasture size and bull number. Since the biostimulatory effect is believed to be mediated by pheromones (chemical messages that communicate from animal to animal), cows in a small pasture or pens will not require as many bulls as cows on a large pasture that does not have a local center where the cattle gather. This is an ongoing area of research.

Summary

In summary, the profitability and sustainability of any cattle operation is dependent on the longevity of each animal and the production of a live calf every year. Following the production of their first calf, increasing the proportion of females cycling at the start of the breeding season is essential for maximizing lifetime reproduction. The length of the postpartum interval is primarily affected by

suckling frequency/cow-calf bond and cow body condition score/nutrition and to a lesser extent by cow age and dystocia. There are several strategies available to shorten the anestrous postpartum interval and improve reproductive performance. Methods to eliminate or reduce the negative effect of the previously discussed factors on postpartum interval include: 1) maintain a positive energy balance 2) reduce suckling frequency, and 3) reduce the incidence of dystocia or provide early obstetrical assistance. Other methods to reduce postpartum interval length include: 1) hormonal induction of estrus and ovulation, and exposing anestrous postpartum cows to novel bulls.

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