



BEEF

Chapter 29

My Herd is a Reproductive Wreck: What Can I Do?

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Introduction

Reproductive performance is of critical importance to the profitability of a cow-calf producer and numerous factors (e.g. heifer development, nutrition, cow body condition at calving, bull fertility, environment, etc.) affect reproductive efficiency. The widespread drought over the past couple of years in regions of the USA has had a serious negative impact on reproduction. To evaluate the reproductive performance of your herd you should ask the following questions: **1) Question 1** - Over the past few years, what has been the pregnancy rate for my heifers and cows during the first 60 to 70 days of the breeding season? Pregnancy rate is defined as the total number pregnant during the breeding season divided by the number of females exposed to breeding (expressed as a percent). If the pregnancy rate in your heifers and cows is 85% or greater during the first 60 to 70 days of the breeding season, then your herd is doing well reproductively, **2) Question 2** - What proportion of my herd has calved by day 21, 42, and 63 of the calving season? In high production herds it is common for 61% of the calves to be born by day 21, 85% by day 42 and 94% by day 63, and **3) Question 3** - What does the calving pattern of my two and three year old cows look like? If the majority of your first calf heifers and three year old cows are calving late or in the middle of your calving season, then you should pay attention to heifer development and the management of your first calf heifers. The purpose of this paper is to discuss the primary factors affecting pregnancy rate and to provide some management suggestions for increasing reproductive performance. Management tips for improving reproductive performance in a beef herd are summarized in Figure 3.

Factors Affecting Pregnancy Rate

When it comes to reproductive management the things you do well do not compensate for the mistakes you make. Instead, the mistakes you make cancel out all the things you do well. This is best illustrated by examining the primary factors that affect pregnancy rate when using natural service or artificial insemination (AI).

Key Points

- Reproductive performance is of critical importance for profitability and numerous factors (e.g. heifer development, nutrition, cow body condition at calving, bull fertility, environment, etc.) affect reproductive efficiency.
- Pregnancy rate = estrous detection rate x conception rate.
- Reproductive efficiency is dependent upon a heifer completing the following events: 1) Attain puberty before the start of the breeding season, 2) Conceive at the start or early in her first breeding season and remain pregnant throughout gestation, 3) Calve unassisted and wean a live calf, and 4) Return to estrus and conceive early in the second breeding season.

Pregnancy rate = estrous detection rate x conception rate (see definitions below). Of course with natural service the bull takes on the role of both detecting estrus and inseminating. The following definitions can be applied to an entire breeding season or to a synchronized period (period of time during which estrus is expressed after treatment with an estrus synchronization protocol [normally 5 to 7 days]).

Pregnancy rate – total number pregnant during the breeding season divided by the number of females exposed to breeding (expressed as a percent).

Estrous detection rate – total number of females detected in estrus (or mated in the case of natural service) divided by the number of females exposed to breeding (expressed as a percent).

Conception rate – percentage of females that become pregnant to a designated insemination.

The effect of a decrease in estrous detection rate and/or conception rate on pregnancy rate can be seen in Table 1. Assume that 100% of the heifers have attained puberty and that you or the bulls are able to detect 95% of the heifers in estrus during a synchronized period (AI program) or during the first 21 days of the breeding season (natural service). With a conception rate of 70% per service the pregnancy rate after a single breeding would be: 95% estrous detection rate x 70% conception rate = 67% pregnancy rate! If we hold conception rate at 70% and decrease estrous detection rate to 75%, due to fewer animals cycling, reduced libido of a bull, or less time spent detecting estrus, the pregnancy will be reduced to 53%. Alternatively, if estrous detection rate remains at 95% but conception rate is decreased to 50% due to compromised semen quality or poor insemination technique, the pregnancy rate would decrease to 48%. Finally, a decrease in both estrous detection rate and conception rate will decrease pregnancy rate from 67% to 38%. Therefore, understanding the effect of estrous detection rate and conception rate on pregnancy rate and the importance of attention to detail to the management of your bulls or your estrus synchronization/AI program is essential!

Table 1: Effect of estrous detection rate and conception rate on pregnancy rate in cattle.

Estrous detection rate	Conception rate	Pregnancy rate
95%	70%	67%
75%	70%	53%
95%	50%	48%
75%	50%	38%

Importance of Early Calving Females

The primary reason a beef cow does not wean a calf is that she fails to become pregnant during the breeding season, which is likely due to not showing estrus or a failure to conceive following estrus expression. Furthermore, cows that conceive late will calve late and wean a calf that is much younger at weaning compared to a cow that weans a calf that is born early in the breeding season. Age at calving is generally considered to be the most important factor affecting weaning weights in beef cattle. To maintain an annual calving interval (≤ 365 days), conception must occur within 80 days of calving; however, the period of anestrus (absence of estrous cycles) following calving is frequently greater than 60 days. Based on data from Missouri beef herds only 60% of postpartum beef cows were cycling at the start of the breeding season.

The importance of maximizing the proportion of cows that conceive early in the breeding season cannot be overemphasized in a beef herd. Data from the University of Nebraska reported that heifers born during the first 20 days compared to the second or third 20 days of the calving season had greater weaning weights, prebreeding weights, and precalfing weights; more heifers cycling by the start of the breeding season; and higher pregnancy rates. Heifers that conceive early in the breeding season have greater longevity in the herd which increases profitability. Furthermore, steer progeny born during the first 20 days compared to the second or third 20 days of the calving season had greater weaning weights, increased hot carcass weights, higher marbling score, and greater carcass value (Larson and Funston, 2009; Funston et. al., 2011). Consequently, the advantages of calves born early include improved end product quality as well as increased reproductive performance of heifers. Management strategies for increasing the proportion

of early calving heifers and cows are discussed below.

Principles of Reproductive Management

Maximizing reproductive efficiency is dependent upon a heifer completing the following series of events shown in Figure 1: 1) Attain puberty before the start of the breeding season, 2) Conceive at the start or early in her first breeding season and remain pregnant throughout gestation, 3) Calve unassisted and wean a live calf, and 4) Return to estrus and conceive early in the second breeding season. Any interruption in the preceding series of events will reduce reproductive performance and lifetime reproduction. The two primary areas of reproductive loss in a beef herd include failure to become pregnant (e.g. failure to express estrus or to conceive) during the breeding season and calf loss within the first two weeks of birth. Each of these areas of loss can be minimized by management. Secondary areas of reproductive loss include fetal loss following pregnancy diagnosis and calf loss from two weeks after birth to weaning.

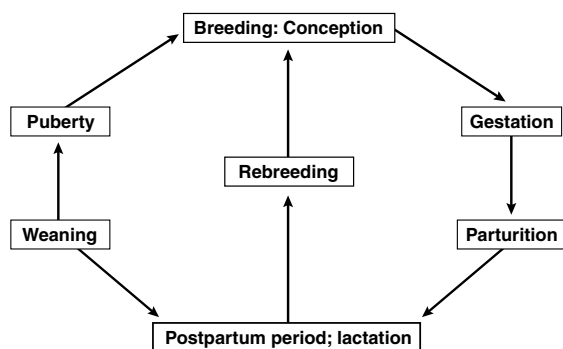


Figure 1: This figure depicts a series of physiological events that a heifer must complete to be a reproductive success. Failure to complete anyone of the events will constitute a form of reproductive loss. Reproduction cycle of the beef female. Bellows, 1987

Development of replacement heifers can be expensive since it takes the net revenue from approximately six calves to cover the development and production costs of each replacement heifer (Mousel et. al., 2012). In addition, any cow that misses a single calving is not likely to recover the lost revenue of that missed calf (Mathews and Short, 2001). Therefore, longevity of a beef female is very important to the sustainability and profitability of any beef operation. It was reported in the 2007-08 NAHMS survey the approximately 16% of animals

culled were less than five years of age and 31.8% culled were 5 to 9 years of age. Females that are culled prior to producing six calves increase the developmental cost of other heifers and do not contribute to the profitability and sustainability of the farm.

Since a heifer must wean approximately six calves to recover her development costs, some producers will extend the length of the breeding season as a strategy for increasing pregnancy rate. However, do long breeding seasons necessarily result in higher pregnancy rates? To examine this question we analyzed the records of 230 beef herds in Missouri which included over 22,000 cows from purebred and commercial herds of various herd sizes. In this study longer breeding seasons did not increase pregnancy rate (Figure 2).

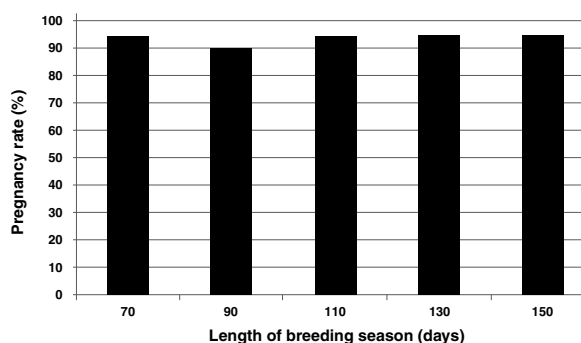


Figure 2: This figure illustrates the relationship between length of the breeding season and pregnancy rates in beef herds. Extending the length of the breeding season did not increase the pregnancy rate.

One of the reasons that lengthening the breeding season does not increase pregnancy rate is that longer breeding seasons result in longer calving seasons. Cows that calve late frequently don't have adequate time to return to estrus and conceive before the end of the breeding season, which can lead to further extension of the breeding season and a perpetuation of the problem. Decreasing the length of the breeding season can actually increase reproductive performance and weaning weights by shortening the calving season and providing cows with more time to return to estrus by the start of the subsequent breeding season and increasing weaning weights due to increased calf age at weaning. Furthermore, a shorter calving season facilitates closer supervision at calving which can reduce calf loss, particularly in heifers.

Summary

The primary goal is to maximize the proportion of females that calve early in the calving season.

The basic management principles that increase the proportion of early calving cows include the following: 1) Select heifers that conceive early in the breeding season as replacements, 2) Manage cows such that they are in moderate body condition at calving (Minimum body condition score of ≥ 5 ; 1 = emaciated; 9 = obese), 3) Systematically shorten the breeding season, 4) Consider the implementation of fixed-time AI to increase the proportion of cows conceiving at the beginning of the breeding season, and 5) Reduce the incidence of calving difficulty by appropriate heifer development and sire selection.

The preceding principles are discussed in more detail below.

Figure 3: Management tips for increasing reproductive performance in a beef herd.

Evaluate reproductive performance of your herd

- If the pregnancy rate in your herd after 60 days is $< 85\%$ there are management issues that need to be addressed.
- In high production herds it is common for 61% of the calves to be born by day 21 and 85% by day 42.
- Set a goal to have 70% of cows calved by day 30 of the calving season.
- Examine the calving pattern of your two and three year old cows. If the majority of your first calf heifers and three year old cows are calving late, then focus on heifer development and the management of your first calf heifers.

General recommendations

- Keep accurate calving, breeding, and pregnancy records.
- Animal identification should be clear and easily readable.
- Maintain breeding females on an adequate nutrition and mineral program.
- Ensure herd health and disease prevention with a well-designed prebreeding vaccination program. Vaccinate females a minimum of 30 days before the breeding season begins.
- Determine if you will purchase or raise replacement heifers and decide how you will market your calves. These decisions affect the traits you emphasize in sire selection!

Heifer development

- At weaning, select the structurally sound, older, and heavier heifers that have not received growth promoting implants.
- Heifers should weigh 60 to 65% of their mature body weight by the start of breeding.
- At least 50% of heifers should have a reproductive tract score (RTS) ≥ 4 by two weeks prior to the start of synchronization or 6 to 8 weeks prior to the breeding season.
- Begin breeding season 2 to 3 weeks before cows and use calving ease sires.
- Consider implementing fixed-time AI to increase the proportion of early calving heifers.
- Utilize calving ease sires to reduce the incidence of dystocia.
- At pregnancy diagnosis, select heifers that conceived early in the breeding season.

Postpartum cow management

- Pay attention to precalving and postcalving nutrition.
- At calving, cows should have a body condition score of ≥ 5 (1 = emaciated; 9.0 = obese).
- Systematically decrease the length of the breeding season to 60 to 70 days.
- Consider implementing fixed-time AI to increase the proportion of early calving cows.
- Have your veterinarian perform a breeding soundness exam on all natural service sires.

Things to do when implementing an estrus synchronization and artificial insemination program

- Make sure females meet the criteria for being good candidates for estrus synchronization.
- Utilize one of the estrus synchronization protocols published in the sire catalogs.
- Meticulously follow the estrus synchronization protocol!
- If detecting estrus, spend as much time observing the animals as possible.
- Use a minimum of one person to detect estrus per 100 head of cattle.
- Use estrous detection aids to facilitate visual observation of estrus.
- Select proven AI sires with high-accuracy EPDs that match performance goals.
- Use a properly trained technician for AI.
- To distinguish between AI and bull bred pregnancies at pregnancy diagnosis, you should wait approximately 10 days to turn in clean up bulls after AI.

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