



Beef Cattle Handbook



BCH-2210

Product of Extension Beef Cattle Resource Committee

Factors Influencing Conception Rate

Larry Corah, Department of Animal Science, Kansas State University
Keith Lusby, Department of Animal Science, Oklahoma State University

The main goal in a commercial cow-calf operation is to optimize pounds of calf produced per cow as economically as possible. A key factor influencing the productivity per cow is conception rate, both at first service and during the remainder of the breeding season.

The Relationship of Conception Rate to Cow Productivity

Cow productivity is closely linked to two key factors— weaning weight and percent of cows weaning calves. Table 1 illustrates the impact of these two factors on pounds of calf produced per cow in a herd. Since conception rate influences the percent of cows weaning calves, lower conception rates greatly reduce the productivity of the total herd.

Factors Affecting Conception Rate

1. Nutrition, before and after calving, has an effect on pregnancy rates. Inadequate nutrition prior to calving, results in cows being thin at calving which delays the onset of estrual activity post-calving. This delay in onset of cycling activity will influence the percent of cows available to be bred during the breeding season, thus reducing overall conception rates.

The level of energy fed after calving will influence conception rates during the breeding season. The amount of energy fed will influence the percent of cows cycling, but even more dramatically influence first service and overall conception rates during the breeding season.

The level of energy required by beef females after calving is influenced by age, weight, and level of milk

production. Cows on an inadequate plane of nutrition after calving can easily have first service and overall conception rates reduced by 5-10 percent and even more dramatic effects, such as a 20-40 percent reduction in conception rates have been noted in research trials.

Increasing the level of energy fed two to four weeks prior to the start of the breeding season, often referred to as “flushing”, will have a varying affect on conception rates. In general, when cows calve in a thin condition, use of high energy “flushing” rations will stimulate weight gains and percent of cows showing estrus, as well as having a positive effect on conception rate. However, for cattle in fairly good condition at calving, the use of “flushing” rations have often shown little or no benefit.

While it is easy to determine the energy consumed by cows fed in a drylot situation, it is not as easy to determine if cows on pasture or range are receiving adequate energy to permit good rebreeding performance. Cows could be weighed periodically, but this is impractical under most commercial conditions. Fortunately, much research in the US, Great Britain and Australia has shown a high correlation between the degree of body condition (fatness) of the cow and her rebreeding performance. Condition scoring is easy to learn and has proven to be an excellent method of gauging the nutritional status of a breeding herd.

Cattlemen can adjust feeding levels to ensure adequate condition for good rebreeding rates by monitoring the body condition of their cows. The condition scoring system used by research workers utilizes a range from

Table 1. Pounds of Calf Produced per Cow in the Herd

| Weaning Weight | Percent of Cows Weaning Calves | | | | | | |
|----------------|--------------------------------|-----|-----|-----|-----|-----|-----|
| | 100% | 95% | 90% | 85% | 80% | 75% | 70% |
| 400 | 400 | 380 | 360 | 340 | 320 | 300 | 280 |
| 450 | 450 | 423 | 405 | 383 | 360 | 337 | 315 |
| 500 | 500 | 475 | 450 | 425 | 400 | 375 | 350 |
| 550 | 550 | 522 | 495 | 467 | 440 | 412 | 385 |
| 600 | 600 | 570 | 540 | 510 | 480 | 450 | 420 |

1 (very thin) to 9 (very fat). A brief description of typical cows in each score is as follows:

1. Severely emaciated. All ribs and bone structure easily visible and physically weak.
2. Emaciated, similar to 1 above but not weakened. Little visible muscle tissue.
3. Very thin, no fat on ribs or brisket, and some muscle still visible. Backbone easily visible.
4. Thin, with ribs easily visible but shoulders and hind quarters still showing fair muscling. Backbone visible.
5. Moderate to thin. Last two or three ribs can be seen. Little evidence of fat in brisket, over ribs or around tailhead.
6. Good smooth appearance throughout. Some fat deposition in brisket and over tailhead. Ribs covered and back appears rounded.
7. Very good flesh, brisket full, tailhead shows pockets of fat, and back appears square due to fat. Ribs very smooth.
8. Obese, back very square, brisket distended, heavy fat pockets around tailhead, and cow has square appearance due to excessive fat. Neck thick and short.
9. Rarely seen. Very obese. Description of 8 taken to greater extremes. Heavy deposition of udder fat.

Most producers are readily able to score their cows after a brief introduction to the system. The system is highly useful for cattlemen who must rely on visual appraisal to adjust feeding levels.

The importance of condition at calving time is illustrated by Texas work with Santa Gertrudis cows in *Table 2*.

Table 2. Cow Condition and Rebreding.

| | Condition Score at Calving | | | |
|-------------------------------------|----------------------------|----|----|----|
| | 4 | 5 | 6 | 7 |
| Number of cows | 25 | 59 | 80 | 23 |
| Pregnant 1st 20 days of breeding, % | 4 | 15 | 36 | 65 |
| Pregnant 1st 60 days of breeding, % | 24 | 51 | 69 | 87 |

Producers should begin evaluating the condition of their cow herd at weaning or, at the latest, about three months prior to calving. Cows that are thin should be sorted from the cows in good condition and fed to calve in good condition. Sorting will ensure that the cows that need more feed will get it. Cows that calve in thin condition may not rebreed within 80 days after calving, even with heavy feeding after calving.

Cows should be scored for condition at frequent intervals. Research shows that condition losses can be quite rapid when cows are subjected to nutritional or environmental stresses. A moderate condition, about 6.0, is desirable at calving and should be maintained through to breeding.

Although the level of energy is often the key nutrient influencing reproductive performance, other nutrients can have a major influence on conception rates. In many areas of the US, phosphorus will influence the reproductive rate in cows. This is especially true in the Southwestern part of the US, where phosphorus deficiencies may reduce conception rates dramatically. In other areas of the United States, possibly associated with the fact that harvested forage adequate in phosphorus is fed, lower incidence of phosphorus deficiency may occur.

Vitamin A is yet another nutrient that is inter-related to conception rate. Severe Vitamin A deficiency can hinder the percent of cows cycling and the conception rate of those cows.

Protein levels do not appear to have a direct affect on conception rates, but indirectly, protein can affect the appetite of cattle and thus reduce the energy intake causing weight losses and a reduction in conception rates.

Post-partum Interval to First Estrus

It generally takes from 30-100 days for cows to cycle following calving. With the level of nutrition and age of the animal having a major influence on the return to estrus. As previously indicated, nutrition prior to calving or even nutrition after calving will influence the post-partum interval. First calf heifers will often require an additional 20-30 days to reach first estrus following calving.

Long post-partum intervals can affect conception rates two ways: 1) lack of estrual activity prevents any chance of conception occurring, 2) cows will be bred on their first post-partum estrus which often slightly reduces conception rate.

Time of Calving

One of the factors that influences the percent of cows cycling at the start of the breeding season or conception rates early in the breeding season, is when the cow calved relative to the start of the breeding season. If a long calving season is practiced, it is conceivable that some of the cows may not even have calved by the start of the breeding season.

Research studies have indicated that cows bred the first estrus following calving, or soon thereafter, are not as fertile as cows that have had an opportunity to cycle a number of times prior to the start of the breeding season. Table 3 demonstrates that animals having a shorter interval from calving to the start of the breeding season have a lower pregnancy rate on first service than those having a longer interval from calving to the start of breeding.

Table 3. Time of Calving and Conception Rate (Wiltbank, 1972)

| Calving Date | Avg. No. Days From Calving to Start of Breeding (May 1) | Cows Conceiving on First Service |
|-----------------|---|----------------------------------|
| Feb. 10-Mar.1 | 70 | 62% |
| Mar. 2-Mar.21 | 50 | 58% |
| Mar. 22-Apr. 10 | 30 | 33% |
| Apr. 11-May 1 | 10 | 33% |

One of the ways of improving percent of cows breeding early in the breeding season is to use a short calving season (60-90 days). This ensures that many of the cows will have had an opportunity to cycle at least once prior to the start of the breeding season. Another excellent management practice is to emphasize reproductive efficiencies with the heifers at the time they are bred as yearlings. Breeding the heifers 20-30 days prior to the start of the regular breeding season can give the heifer additional time to cycle after calving. If that practice cannot be followed, using a short 35-45 day breeding season with heifers is another way of ensuring the heifer has additional time to cycle prior to the start of her second breeding season.

Age of the Female

The age of the female can influence first service and overall conception rates. It has been documented in research studies that first service and overall conception rates may tend to be higher in yearling heifers than in cows, provided the heifers have reached puberty and are cycling. Heifers do not have the added stress or production trauma of nursing a calf.

When heifers calve as two year olds, studies have indicated that first service conception rates and overall conception rates can be considerably lower, compared to mature cows. Also extremely old cows nearing the end of their production life may have lower conception rates.

Calving Difficulty

With increased emphasis on growth rate, unfortunately, the selection of sires that can transmit genetic growth through their progeny also causes a fairly dramatic increase in the birth weight of their calves and, subsequently, an increase in calving difficulty.

A number of studies have shown that increased calving difficulty will not only increase the length of time required for the cows to cycle after calving, but decrease the percent of cows conceiving in the first post-partum estrus and often reduce overall conception rate during the breeding season. In studies conducted in Kansas and at the Meat Animal Research Center in Nebraska, it has been shown that there was a 3-8 percent decrease in conception rates of cows that had calving difficulty, as compared to those calving unassisted.

Sire Influence

Utilizing sires that have been properly evaluated prior to the breeding season is important to ensure that a high conception rate occurs during the breeding season. In a study conducted in Oklahoma, it was shown that the variation in first service conception rate of herd sires ranged from 0-75 percent with overall conception rates during the breeding season ranging from 0-100 percent.

Not only should bulls be properly evaluated prior to the start of the breeding season, but utilizing the proper number of bulls with the cows is important. The traditional recommendation has been to utilize a bull with 25-35 cows. Recent evidence has indicated that bulls that are sexually very active may even breed a larger number of cows. Young bulls (yearling bulls that have reached sexual maturity) which are sexually active will breed from 20-25 females. To be on the safe side, however, producers will often only breed 10-20 cows with the yearling bull.

Recent research has shown that bull libido will influence first service rates. Bulls with medium to high libido had higher first service conception rates than bulls of low libido.

Season of Year and Environmental Affects

Extensive records on dairy cattle have shown that season of the year influences conception rates. This environmental influence on conception rate is probably exerted through both the female and male. For example, during extremely hot weather in the southern states, it has been documented that there can be an 8-10 percent drop in first service conception rate and overall conception rate during extremely hot periods. In contrast, it has also been documented that extremely cold weather can influence conception rate and particularly the fertility of beef sires.

Admittedly, some of the effect of environmental temperature on conception rates may not necessarily relate to fertilization rates, but rather relate to embryonic mortality.

Level of Milk Production and Breed

The increased use of some of the newer Continental breeds in the beef cattle industry and greater selection pressure for milk production in the British breeds has increased the level of milk production in commercial beef cows. A major effect of increased milk production is an increase in the nutritional requirement of those cows. If this added nutritional requirement is not met, the cows will lose weight, thus reducing the percent of cows cycling early in the breeding season and conceiving early.

It is often implied that increased level of milk production is associated with poorer conception rates. Actually, the effect of milk production is probably mainly due to the suckling stimulus affecting post-partum intervals by reducing early conception.

Claims are often made that some breeds of cattle are considerably more fertile than others. The greatest variation will occur within a breed rather than between breeds. Certain breeds of cattle will definitely adapt better to certain types of environmental conditions and topography and, as such, have a higher conception rate under those type of conditions. This improved conception rate will generally relate back to the condition of the animal and the ability to survive more efficiently under the nutritional regime being provided them.

Probably the greatest influence of breed on conception rates is the fact that crossbred females will tend to have a higher conception rate and overall fertility by as much as 5-8 percent than straightbred females.

Genetic and Anatomical Abnormalities

Clinical evaluation of virgin yearling heifers has indicated that from 5-10 percent of the heifers may have infantile reproductive tracts preventing normal conception rates. Other genetic or anatomical abnormalities can occur in females thus reducing the potential for normal conception. Among certain sire female lines, there is a definite linkage between reproductive tract abnormalities and the genetic influence of the sire. Thus, if a fairly high incidence of abnormalities occur, an attempt to trace them back to the sire will be advantageous.

Some evidence exists that the use of growth promoting implants in heifers at birth will hinder reproductive tract development and reduce conception rates. The implants appear to have less effect when the heifer is implanted at an older age (three to four months).

Health

Often one of the key factors reducing conception rates in a cow herd are health problems. A number of reproductive diseases can have a major impact on the overall reproductive performance of a cow herd. Two fairly common diseases, vibriosis and trichomoniasis, will cause lower conception rates. Cows will breed, but then return to heat fairly soon afterwards. Two other diseases that can impact conception rates are red-nose (IBR) and bovine viral diarrhea (BVD). A number of diseases will cause abortion to occur and leave the animals infertile. This would include diseases such as leptospirosis, hemopholous somnus and brucellosis.

To ensure that reproductive problems are not being caused by diseases, following a sound vaccination program in conjunction with a local veterinarian is important.

Forage or Plant Toxin

The most commonly noticed effect of plant toxins on cattle health is illness or, on occasion, death. It has been documented that certain plants, notably clovers, will contain high levels of estrogens which can influence the conception rate and fertility in cattle and sheep. In these studies the cattle and sheep will show abnormal estrous patterns and subsequent reduction in fertility.

Summary

It is extremely important that as the beef cattle industry strives to improve overall efficiency, that proper emphasis be placed on maintaining and possibly improving reproductive efficiency. There are many aspects of reproductive efficiency, but one extremely important aspect is maintaining conception rates that will ensure that a high percentage of the cows calve early in the calving season.

Authors:

Larry Corah, Department of Animal Science, Kansas State University
Keith Lusby, Department of Animal Science, Oklahoma State University

This publication was prepared in cooperation with the Extension Beef Cattle Resource Committee and its member states and produced in an electronic format by the University of Wisconsin-Extension, Cooperative Extension. Issued in furtherance of Cooperative Extension work, ACTS of May 8 and June 30, 1914.