



# Fertility Failures

*Reclaim lost profits by improving reproductive efficiency through cow nutrition and bull exams.*

by *Meghan Richey*

“**R**eproductive inefficiency is one of the most costly and production-limiting problems facing the cow-calf industry,” says George Perry, beef reproductive management specialist at South Dakota State University.

Using bulls and cows with fertility problems may lead to longer calving intervals, fewer calves produced and increased costs from managing open females, which can result in serious economic loss to the cow-calf producer.

Throughout the reproductive cycle — from conception through pregnancy to calving and rebreeding — Perry estimates that fertility-related losses exceed \$1 billion each year. By correcting some of those inefficiencies, cow-calf producers can reclaim lost revenue and better meet the needs of their consumers.

For cows, fertility is heavily influenced by the relationship between nutrition and body condition. Factors affecting a bull’s fertility are best measured through a breeding soundness exam and a look at his service capacity.

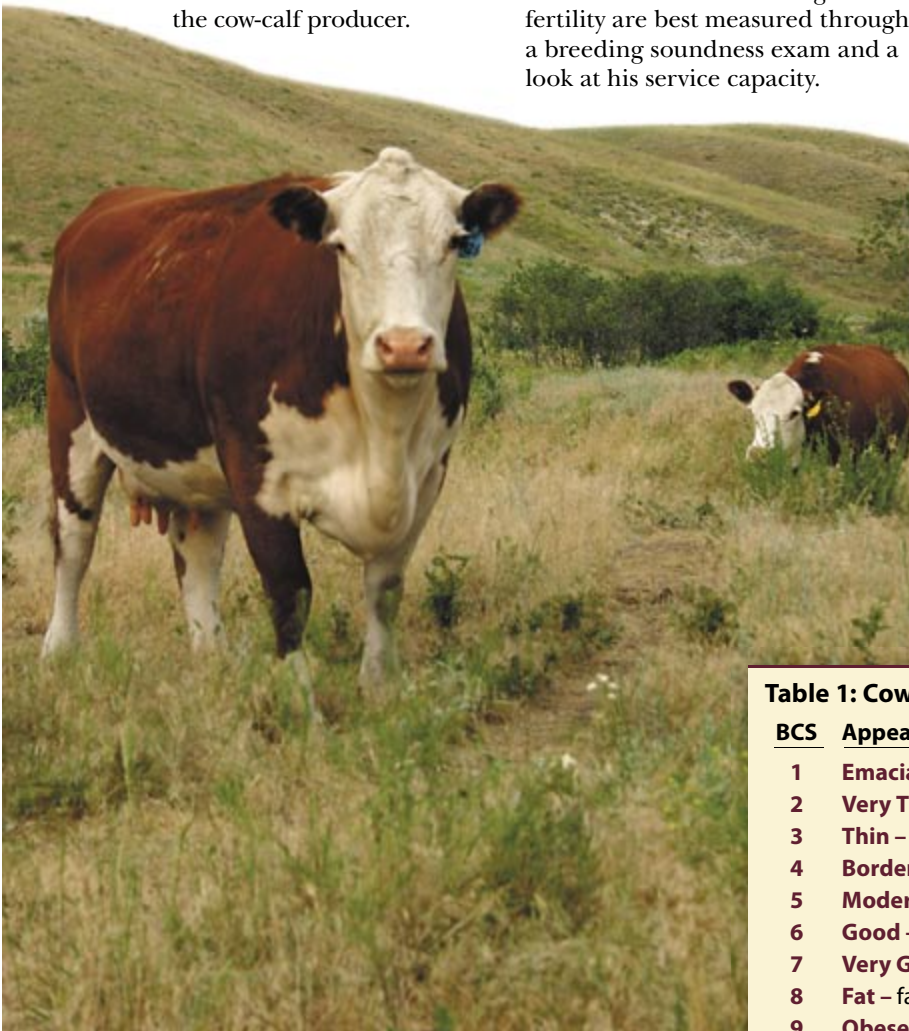
## Body condition

Nutritional challenges are most extreme for cows during the last trimester of pregnancy and at the beginning of lactation. If cows are to maintain a yearly production cycle, they must breed back within 80-85 days of calving. Proper nutrition can bring females back into estrus more quickly and help sustain reproductive functions during the rest of the year.

“Thirty-two percent of embryonic losses can be attributed to nutrition,” says Tom Geary, reproductive physiologist with the U.S. Department of Agriculture (USDA) Agricultural Research Service (ARS). “You can prevent most of that reproductive loss with proper nutritional management.”

Body condition score (BCS) is an effective way to evaluate nutrition (see Table 1). Since body condition greatly affects reproductive performance, using BCS to manage nutrition can positively influence a producer’s bottom line. Geary says cows should be condition scored four times per year — 90 days before calving, at calving, at the beginning of the breeding season and at weaning.

To ensure efficient reproductive performance — approximately 90% pregnancy rate in a 65-day calving season — BCS should be used to overcome two major nutritional challenges, says Rick Funston, reproductive physiologist at the University of Nebraska-Lincoln. First, cows need to have enough body condition (BCS 5 or



**Table 1: Cow body condition scores**

BCS	Appearance
1	<b>Emaciated</b> – shoulder, ribs and back visible
2	<b>Very Thin</b> – some muscle, no fat deposits
3	<b>Thin</b> – some fat deposits, ribs visible
4	<b>Borderline</b> – foreribs not noticeable
5	<b>Moderate</b> – 12th and 13th ribs not visible
6	<b>Good</b> – ribs covered, sponginess to tail head
7	<b>Very Good</b> – abundant fat on tail head
8	<b>Fat</b> – fat over thick and spongy
9	<b>Obese</b> – extremely fat throughout

Source: National Research Council, 1996.

6 on a 9-point scale) at the time they calve to set the stage for early return to cycling after calving. Second, cows need to be gaining weight during the breeding season.

Factors that contribute to a cow's body condition, and consequently her fertility, are energy, protein, mineral and vitamin intake.

### Energy and protein

Although disease and parasitism can also contribute to lower body condition scores, Funston says that "body condition is generally a reflection of nutritional management, with energy and protein being the most influential factors." Cows with low BCS (4 or below) are often deficient in energy and protein, a problem which can lead to suppressed estrus, lower conception rates, fetal re-absorption, premature calving and weak offspring. Inadequate daily energy intake is more common in cows on forage diets.

"In many instances, with warm-season perennial forages and possibly with cool-season perennial forages at advanced stages of maturity, there is an inadequate supply of crude protein, which limits energy intake," Funston says.

When forage contains less than 7% crude protein, Funston says that feeding a protein supplement can improve forage intake and digestibility. By correcting the protein problem, the energy problem is usually fixed, which improves body condition. Before offering supplement to the herd, however, producers should be sure to sort cows by condition score and feed accordingly, he advises.

Excessive energy and protein can also be a problem. Funston cautions that a female carrying a BCS 7 or greater may experience more calving difficulty and lower reproductive performance than females in moderate condition. Other reproductive side effects of overfeeding can include low conception rates, abortion, dystocia, retained placenta and reduced libido.

**Table 2: Effects of nutrient excess or deficiencies on reproduction**

Nutrient consumption	Reproductive consequence
Excessive energy intake	Low conception rate, abortion, dystocia, retained placenta, reduced libido
Inadequate energy intake	Low conception rate
Inadequate protein intake	Suppressed estrus, low conception, fetal reabsorption, premature parturition, weak offspring
Vitamin A deficiency	Impaired spermatogenesis, anestrus, low conception rate, abortion, weak offspring, retained placenta
Phosphorus deficiency	Anestrus, irregular estrus
Selenium deficiency	Retained placenta
Copper deficiency	Depressed reproduction, impaired immune system, impaired ovarian function
Zinc deficiency	Reduced spermatogenesis

Source: H.J. Bearden and J.W. Fuquay, 1992.

### Minerals and vitamins

Mineral and vitamin deficiencies can also reduce reproductive efficiency in both cows and bulls (see Table 2 for specific consequences). The need for supplementation depends on the mineral levels present in the diet. Funston advises having stock water analyzed, since it may be a significant source of minerals affecting the herd's reproductive efficiency.

Requirements for most vitamins are usually met without

supplementation. Rumen microorganisms synthesize vitamins C, D, E and B-complex. However, cattle grazing dry winter range or consuming low-quality crop residues and forages often have a vitamin A deficiency. Since vitamin A plays a role in embryo development, Funston says that supplementing before and after calving may increase conception rates.

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### Minimize lactation's effect on fertility

Lactation is the primary cause of negative energy balance in cows during the breeding season. Since cows bred when they are gaining weight have higher pregnancy rates than cows bred when they are losing weight, correcting the energy balance can improve conception rates.

Tom Geary, reproductive physiologist with the U.S. Department of Agriculture (USDA) Agricultural Research Service (ARS), suggests using early weaning at the beginning of the breeding season.

"Early weaning can take you from a negative energy balance to a positive energy balance in just two days," Geary says. "Two-year-olds often benefit the most."

However, early weaned calves often require more management and higher input costs from creep feeding, according to a study that Geary contributed to at Montana State University. Depending on a producer's management program, these increased production costs may or may not be offset by the improvement in reproductive efficiency. **HW**



### Breeding soundness exams

The use of artificial insemination (AI) and natural service show no difference in pregnancy rates, as long as the bull used in natural service is both healthy and fertile, Perry says. When a bull is found to be subfertile, the effect on the herd is greater than one subfertile female.

Breeding soundness exams should be used to quantify a bull's fertility before each breeding season starts, Perry recommends. The exam can ensure a producer isn't left to rely on low pregnancy rates at the end of the breeding season to identify a subfertile bull.

The exam consists of three parts: physical examination of overall appearance/health, internal and external examination of the reproductive tract and an evaluation of semen. The Beef Improvement Federation (BIF) has adopted the following exam guidelines at the recommendation of the Society for Theriogenology, an organization of veterinarians dedicated to animal reproduction.

**Physical health:** Feet, legs, eyes, teeth and flesh cover should be evaluated in addition to overall health. Since a bull can lose up to 150 lb. during the breeding season, he should also start in good condition. Any disease or deformity that impairs his ability to travel and mount hinders his reproductive performance and must be addressed before breeding.

"Physical health is especially important in range situations," Perry says. "Check your bulls often during the breeding season. If his

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vision or mobility is impaired, he can't get the job done."

**Reproductive tract:** The reproductive tract examiner should measure scrotal circumference and palpate the testes and seminal vesicles. For a bull to pass the BIF guidelines, he must be free of chronic infections of the seminal vesicles and testes. Additionally, his scrotal circumference must exceed the minimum measurement for his age: 15-18 months, 31 centimeters (cm.); 18-21 months, 32 cm.; 21-24 months, 33 cm.; and 24 months or older, 34 cm.

Bulls with adequate scrotal development for their age have a higher probability of becoming satisfactory breeders than bulls with smaller scrotal circumferences. Scrotal measurement is positively correlated with semen volume and quality. It is also positively related to the fertility of a bull's daughters. Heifers from sires with larger than average scrotal circumference tend to reach puberty earlier than those from bulls with smaller measurements.

**Semen quality:** "Just collecting semen is not enough to know how well that bull can breed," Perry says.

Two criteria are commonly used to evaluate semen quality — morphology and motility. Morphology refers to a sperm's shape while motility is a measure of its ability to move. For a bull to pass this portion of the exam, BIF recommends that the bull's sample shows a motility of 30% or greater and a morphology of at least 70% shaped normally.

Semen volume and concentration are also sometimes used to measure quality.

### Service capacity

Once a bull passes his breeding soundness exam, he still needs to prove he has the desire to do the job. Service capacity, the number of females a bull can service in a breeding season, is the result of his desire to mate and the cow-to-bull ratio.

Libido can be evaluated three ways: time to mount from introduction of a female, frequency of mounting in a time period and delay period between successive mountings. Low libido can result from a physical injury or the dominance hierarchy present with other bulls in the herd. Bull age and size influence the hierarchy, and in a multi-sire pasture, the effects may drastically limit a subservient bull's ability or desire to breed.

"Up to 90% of cows in a multi-sire pasture can be bred by one bull if he is dominant," Perry says.

This quickly presents a problem if the dominant bull's fertility is low because low pregnancy rates will result. To limit the effects of social dominance and low libido, Perry suggests producers use bulls of similar age and size.

Service capacity can also be weakened if the bull is overused, often the result of an inappropriate ratio of cows to bulls. Conception rates suffer when producers expect a bull to service too many females. A common rule of thumb is approximately 50 cows per bull, sometimes fewer for a young bull. With higher ratios, bulls often won't have time — or energy — to service all estrus females. **HW**