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Increasing your calf crop by management, pregnancy testing, and breeding soundness examination of bulls

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IMPORTANCE OF HIGH-PERCENT CALF CROP

Percent calf crop weaned is influenced more by management decisions than by any other single factor in a cow herd, and therefore can be a very important factor in annual returns for a cow-calf operation. Percent calf crop weaned is calculated by dividing the number of calves weaned by the total number of females exposed during the breeding season. As shown in Table 1, as percent calf crop weaned increases, pounds of calf weaned per cow exposed increases and production cost per hundred pounds of calf produced decreases. Increasing weaning weights approximately 50 pounds is equal to an increase of 10% in calf crop weaned.

Table 1. Effects of percent calf crop weaned on average pounds of calf weaned per cow and cost of production per hundred pounds of calf weaned

Percent calf crop	Weaning weights[1]			
	Cost per hundredweight of calf[2]			
100	500	450	400	350
	$120.00	$133.33	$150.00	$171.43
95	475	428	380	333
	$126.32	$140.19	$157.89	$180.18
90	450	405	360	315
	$133.33	$148.15	$166.67	$190.48
85	425	383	340	298
	$141.18	$156.66	$176.47	$201.34
80	400	360	320	280
	$150	$166.67	$187.50	$214.29
75	375	338	300	263
	$160.00	$177.51	$200.00	$228.14

[1] Top figure in each row represents the average pounds of calf produced per cow. Pounds of calf produced per cow equals the average weaning weight multiplied by the percent calf crop.
[2] Bottom figure in each row represents the cost per hundredweight of calves. This figure considers an annual cow cost of $600.00 and is calculated by dividing annual cow cost by average pounds of calf produced per cow multiplied by 100.

CAUSES OF A REDUCED CALF CROP

The greatest single loss in potential calf crop is in the failure of cows to become pregnant during the breeding season (Wiltbank et al. 1961). There are four main factors during the postpartum to rebreeding period that contribute to infertility in beef cows: 1) a general infertility, 2) short estrous cycles, 3) uterine involution, and 4) anestrous (Short et al. 1990). A general infertility related to the breeding of a cow at any time exists (Short et al. 1990). Short estrous cycles occur in approximately 80% of all cows following the first ovulation after calving (Yavas and Walton 2000). Short estrous cycles occur when the cow cycles

before their body recognizes the presence of a fetus (Odde et al. 1980). The involution of the uterus causes a physical barrier to sperm transport for about the first 20 days postpartum (Short et al. 1974). However, the length of time from parturition until the first estrus, referred to as the postpartum anestrous interval, is the main factor that determines if a cow will become pregnant during the breeding season (Wiltbank 1970). Management of the postpartum interval is a complex process (Short et al. 1990); this topic will be discussed below in "Ways to Increase Percent Calf Crop."

The second greatest area of loss of potential calf crop weaned occurs with calves lost at or near birth (Witlbank et al. 1961). Dystocia, or calving problems, affect not only the current calf crop but can also increase the postpartum interval and delay rebreeding (Short et al. 1990), thus affecting next year's potential calf crop, too. Management of dystocia will be discussed in a later section.

WAYS TO INCREASE CALF CROP

A. Nutrition

Proper nutrition for a cow plays a major role in her ability to reproduce. Body condition scores are a subjective but effective way for ranchers to evaluate the nutritional status of their herd. To maintain a 12 month calving interval, cows must be bred within 80 days of calving. Body condition scores allow a producer to determine if cows are losing weight during the postpartum period. A body condition score of ≥5 has been determined to be the minimum score at calving that allows for adequate postpartum reproductive performance. Cows having a body condition score ≥5 at calving return to estrus sooner and rebreed more quickly than cows with body condition scores ≤4 at calving (Richards et al. 1986; see Table 2). In addition, cows that have inadequate energy intake during the late precalving and postcalving periods have lower pregnancy rates when compared to cows receiving adequate energy intake during the late precalving and postcalving periods (Randel 1990).

Table 2. Average length from parturition until estrous and from parturition until pregnancy for cows with a body condition score ≤4 at calving compared to cows with a body condition score ≥5 at calving

Body condition score	≤4	≥5
Days to estrus	61	49

Body condition score	≤4	≥5
Days to pregnancy	90	84

(*Adapted from Richards et al. 1986*)

B. Herd health

Herd health can be divided into two categories:

1) Diseases that affect the reproductive performance of the cows.
2) Diseases that cause calf loss from birth to weaning.

Control of diseases that affect reproductive performance

The goal of a good herd vaccination program is not necessarily to render each individual animal immune to a disease, but rather to stimulate a sufficient immunity in a sufficient number of animals in the herd so that an epidemic, or widespread outbreak, does not occur. Therefore, it is important to vaccinate all animals in the herd. For maximum protection during the breeding season, cattle should be vaccinated 30 to 45 days before the breeding season. This gives sufficient time for animals to build immunity and for antibody levels to remain elevated during the breeding season. All animals in the breeding herd—cows, heifers, and bulls—should be vaccinated annually for reproductive diseases such as Bovine Viral Diarrhea Virus (BVDV), Leptospirosis, Vibriosis, and Infectious Bovine Rhinotracheitis (IBR).

Bovine Viral Diarrhea Virus is a virus that is widespread throughout the world. Reproductive signs of BVDV in a cow herd depend on the stage of gestation in which cows or heifers were infected. BVDV infections during early gestation result in low conception rates, due to early embryonic death. If cattle are infected during midgestation, BVDV may result in persistently infected calves; this occurs when animals are infected during the specific period of fetal development when the fetus is differentiating its own cells from foreign materials (roughly, between 40 and 120 days of gestation); this results in a calf that has incorporated BVDV into its own body and that will shed high levels of virus persistently throughout the calf's life. Late-gestation BVDV infections may result in congenital defects, late-term abortions, or the birth of congenitally infected calves, which are weaker and more prone to illness than normal calves.

Leptospirosis has long been recognized as a cause of infertility in cattle. Symptoms of *Leptospira* infection include early embryonic death (manifested as repeat breeders and reduced pregnancy rates), late-term (7th to 9th month of gestation) abortions, weak live-born calves, and low-grade uterine infections.

Vibriosis is a bacterial disease that affects the reproductive tract of male and female cattle. Symptoms of vibriosis manifest themselves as infertility (decreased pregnancy

rates and prolonged returns to estrus). Late-term abortions are rare. The effects of these bacteria result from inflammation the bacteria cause in the inner lining of the uterus (endometritis).

Infectious Bovine Rhinotracheitis (IBR, "red-nose"), also termed bovine herpesvirus 1 (BHV-1), is a herpes virus (in the same family as viruses that cause cold sores in humans) that has a propensity to become "latent" or dormant in nerve clusters in the throat area or lower spine, and that can re-activate during times of stress. Because of this potential latency, any animal exposed to IBR in the past could potentially transmit the virus to susceptible animals in the future.

Control of diseases that cause calf loss from birth to weaning

Neonatal diarrhea: The most significant cause of illness and subsequent death losses in baby calves is neonatal diarrhea. Neonatal diarrhea is best described as *a complex*—in other words, several factors combine to result in disease or death losses. These factors include exposure of the calf to disease-causing organisms; environmental factors that enhance the survival of these organisms and place stresses on the calf; and the ability of the calf—through protective levels of colostrum or through active immunity—to resist infection.

Because most diarrhea-causing organisms are common in cattle herds, steps should be taken to reduce the exposure of calves to high levels of these agents. Ideally, calves should not spend their first hours of life in a dirty, contaminated environment. Paying attention to calving area sanitation and calving cows and heifers on clean lots will drastically reduce calf exposure to these pathogens. An adequate amount of high-quality colostrum consumed within the first 12 hours of life will provide the calf with some passive resistance against common pathogens. The quality of this colostrum may be enhanced by vaccinating pregnant cows in late gestation with appropriate vaccines (i.e., "scour shots").

Following the neonatal period, illnesses that may result in death losses include blackleg and pneumonia, among others. Depending on pasture location and disease history, a vaccination program should be implemented—with close consultation with a veterinarian for calves being turned out to pasture. Typically, vaccination programs include a 7-way clostridial vaccine and possibly vaccines against viral (IBR, BVDV, Bovine Respiratory Syncytial Virus (BRSV) and Parainfluenza (PI-3) and bacterial (Pasteurella and Mannheimia) pneumonia pathogens.

C. Defined breeding and calving seasons

Many advantages can be gained from defined breeding and calving seasons. Defined breeding and calving seasons can both match the time of year most suitable for each and limit the time required to accomplish each. And defined breeding and calving seasons focus the labor required for each to a limited length of time. And defined breeding and calving seasons also allow for easier management of the herd.

Breeding and calving season

There are tremendous benefits to a short, defined breeding season. A short breeding season results in a longer interval from calving to the start of the breeding season, which allows cows to recover from calving and initiate estrous cycles before the start of the breeding season. A short breeding season also results in a shorter calving season, which focuses the labor of calving into a shorter period of time and produces a more uniform calf crop. Health benefits are also realized when calf ages do not vary greatly. Calves born late are more likely to become exposed to the diarrhea-causing organisms that have been building up from the beginning of the calving season.

Calving distribution

When calves are weaned at a single time, the distribution of the calves, in terms of birth time, has a large impact on the pounds of calf weaned. Calves born earliest in the breeding season are older and heavier at weaning—and the single largest factor that affects the weight of a calf at weaning is the age of the calf. When more calves are born at the beginning of the calving season and the percent of calves weaned remains the same, weaning weights and pounds weaned per cow exposed are increased (Table 3).

Table 3. Difference in calf crop value between two herds[1]

Ranch	Calving group (days)	Number born	Avg. body weight	Market price (cwt)	Value of group	Total value
Late	0–21	15	578	$111.09	$9,631.50	
	22–42	60	545	$111.08	$36,323.16	
	43–63	15	501	$111.07	$8,346.91	
	64+	10	451	$111.18	$5,014.22	
						$59,315.79
Early	0–21	55	578	$111.09	$35,315.51	
	22–42	35	545	$111.08	$21,188.51	
	43–63	10	501	$111.07	$5,564.61	
	64+		451	$111.18		
						$62,068.63

[1] Value is determined by taking body weight · market price in each calving group.

D. Dystocia problems

Dystocia is defined as difficulty with calving. To assist with calving problems, one must first understand the stages of labor. Stage I labor (the preparatory stage) is marked by a general restlessness of the dam while the calf orients itself in preparation for birth and dilation of the cervix begins. Stage II labor (the expulsion stage) is the first appearance of the water bag until the calf is delivered. In heifers, stage II labor usually lasts around 60 minutes; but in cows, stage II labor only lasts around 30 minutes. Cows experiencing dystocia have fewer cycles prior to the breeding season and lower pregnancy rates during the breeding season (Doornbos et al. 1984). Furthermore, research has reported that **after 1.5 hours of stage II labor, every 30-minute delay in assistance results in a 6-day longer interval to pregnancy** (Doornbos et al. 1984). In addition, assisting earlier in stage II labor results in both more cows initiating estrus cycles before the breeding season (Doornbos et al. 1984) and greater pregnancy rates during the breeding season (Doornbos et al. 1984; Bellows et al. 1988). Also, calves from dams assisted early have increased average daily gain compared to cows that are not assisted unless the calf had to be pulled or delivered by cesarean section (Bellows et al. 1988).

E. Record keeping

Similar to the importance of the records kept for filing taxes, records are important for determining both the current status of your herd and your goals for the herd. The only method for tracking how management decisions influence your calf crop is through maintaining accurate records. Herd records should include the following: 1) the body condition of the herd at calving, breeding, and weaning; 2) calving distribution; 3) calf death loss; 4) number of cows at the start of the breeding season; 5) number of bulls; 6) beginning and ending date of the breeding season; 7) number of calves weaned; and 8) number pregnant at the end of the breeding season, or, even better, pregnancy distribution. A Reproductive Score Card has been developed and is available through your Extension livestock educator or Specialist to help with these records.

BREEDING SOUNDNESS EXAM

Breeding soundness examinations should be performed yearly, prior to the beginning of the breeding season, to help insure good herd fertility. Herd bulls have a large influence on many aspects of beef operations, especially profitability. Herd bulls influence overall herd fertility more than any other single animal—the loss of fertility by a bull can mean the potential loss of an entire calf crop. In addition, herd bulls supply half of the genetics to all the calves he sires; therefore, bull selection can be the most powerful method of genetic improvement in the herd. Details of herd bull fertility are discussed in detail in SDSU Extension Extra 2066, "Reproductive Fertility of Herd Bulls." Extension Extra 2066 includes information on puberty, bull development, breeding soundness exams, libido, male to female ratios, and social dominance in multiple sire breeding pastures. Managing the nutrition level of a bull can also play a large role in bull performance. Details of bull nutrition are discussed in SDSU Extension Extra 2065, "Bull Nutrition." Extension Extras are available through your local extension office or online at http://sdces.sdstate.edu or at http://agbiopubs.sdstate.edu/.

PREGNANCY TESTING

Each year, all cows should be pregnancy tested following the breeding season. As feed costs increase, so does the cost to maintain non-pregnant cows through the winter. The cost to feed these non-pregnant cows must be paid for by the calves that are born and weaned the following year. For example, in a herd of 200 cows and with winter costs of $300 per cow, 12 non-pregnant cows kept through the winter would cost an additional $3,600, increasing the cost for each of the 188 calves born by $19.15.

Pregnancy diagnosis is usually performed by your local veterinarian and can be determined by several methods. The most common method is rectal palpation. This method is performed by manually feeling for a calf in the uterus of the cow through the rectal wall. Other methods for determining pregnancy include transrectal ultrasonography and blood sampling.

SUMMARY

Percent calf crop is an extremely important measure of productivity and potential profitability for the cow-calf operation. Many management decisions directly affect percent calf crop, including those relating to cow nutrition, the control of diseases that affect reproductive performance and post-calving calf health, the length and timing of breeding and calving seasons, dystocia, and bull fertility. Attention to record keeping and pregnancy diagnosis will aid in decision making and further enhance the productivity of the cow-calf enterprise.

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