AS-1207

Preparing for a Successful Calving Season

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Cow Nutrition Prior to Calving

During the last trimester of pregnancy, the fetus grows rapidly, placing increasing nutrient demands on the cow. In addition, cold weather increases the cow's nutrient requirements. Body condition (fat cover) plays an important role in successfully wintering beef cows. Late weaning, overstocking, late supplementation, poor parasite control programs, and inadequate winter rations can all lead to cows in poor body condition.

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Why is body condition important?

In spring-calving cow herds, body condition score (BCS) at calving is closely related to a number of production parameters in the cow and the newborn calf. Research has clearly demonstrated that spring calving cows should be at BCS 5 or higher at calving time for optimal reproductive performance the following breeding season. It is also recommended that earlier calving cows (January and February calving) and young cows (2- and 3-year-olds) calve in slightly higher BCS (5.5). The time to manipulate BCS is during the fall of the year when weaning date and supplementation programs can dramatically affect body condition. It is very difficult and expensive to change BCS following calving, since the nutrient demands of lactation are very high during that time.

Table 1 shows BCS of cows and the percentages in heat 60 and 90 days following calving. A greater percentage of cows with BCS 5 or greater at calving will be in heat at the start of the breeding season. If a cow is in heat at the beginning of the breeding season, the greater the chance that she will breed and calve early in the season, resulting in heavier weaning weights the subsequent fall.

Table 2 shows the effect of cow body condition score at calving on colostral immunoglobulins. Immunoglobulins are proteins that contain antibodies present in the colostrum. These immunoglobulins help protect the calf from disease. Cows in higher body condition scores had more immunoglobulins in their colostrum than thinner cows. Thus, you can see that cow nutrition during gestation will affect the health and productivity of the newborn calf.

Table 3 shows data from research that investigated weaning dates and supplementation programs in eastern Montana. Calves were weaned and supplementation programs started in either mid-September or mid-December. This research shows there is more than one way to manipulate BCS. Either early weaning or early supplementation allowed cows to maintain condition going into the winter. However, both late weaning and lack of supplementation for cows nursing calves caused loss in weight and condition. Cows gain body condition when calves are weaned and proper supplementation is provided.

Table 1. Effect of body condition score on cows in heat at beginning of breeding season.

	Cows in Heat (%)	
BCS at Calving	60 days	90 days
Thin (1-4)	46	66
Moderate (5-6)	61	92
Fleshy (7-9)	91	100

Adapted from Whittier and Stevens, 1993, Missouri Cooperative Extension Service G2230.

Table 2. Effect of cow condition at calving on calf serum immunoglobulin level.

	Cow Body Condition Score				
	3	4	5	6	P-Value
Calf serum IgM (mg/dl)	146	157	193	304	.05
Calf serum IgG (mg/dl)	1998	2179	2310	2349	.23

Adapted from Odde, 1997, Proceedings Bovine Connection to Profit.

Table 3. Effect of weaning date and supplementation on cow weight and body condition score changes in eastern Montana.

	Weaning Date			
	September 19		December 11	
	No Supplement	Supplement	No Supplement	Supplement
Weight change (lbs)	–23	80	–130	–25
BCS change	–0.1	+1.3	–1.4	–0.6

Adapted from Short et al., 1996, Journal of Animal Science 74:1701-1710.
Supplement and weaning significant ($P < .01$). Interaction was nonsignificant.

Some research also indicates that supplementation with whole oilseeds (particularly safflower and soybean) in late gestation may have positive effects on calf survival and cow rebreeding performance. However, this response has not been seen with all research conducted with whole oilseed supplementation and more research is necessary before conclusive recommendations can be made regarding this practice.

Proper energy and protein nutrition is important for cows to maintain or increase body condition.

For specific information on beef cow nutrient requirements, refer to EB-74, "NRC Nutrient Requirements for Beef Cows." For more information on body condition scores of beef cattle, refer to AS-1026, "Managing Your Cow Herd Through Body Condition Scoring."

Adequate vitamin A is also necessary to ensure that calves are vigorous and healthy at birth. The precursor to vitamin A (carotene) is found in green, leafy forages and good quality green hays. Supplemental vitamin A can be given through fortified feeds, mineral mixes, or injection. Poor quality forages, crop residues, and weathered dormant grasses are deficient in vitamin A. Deficiencies of vitamin A will result in weak, blind or stillborn calves, as well as respiratory problems, poor reproduction, and poor gain.

Many other trace minerals and vitamins play a role in producing a healthy, vigorous calf. These include vitamin E, selenium, zinc, and copper. Providing a good quality trace mineral and vitamin supplementation program during late gestation is important to both the cow and the gestating calf.

Effect of precalving nutrition on birth weight and calving difficulty

Some producers mistakenly believe that reducing nutrient intake prior to calving will reduce calf birth weight and subsequently reduce the incidence of dystocia or calving difficulty. This is validated in numerous research trials conducted across the country. Low planes of nutrition have been shown to have no effect or slightly decrease birth weight. However, calving difficulty typically increases with this practice since the cow tends to be weaker. In addition, weak calves which are less active immediately after birth can also result.

Research by Dr. Bob Bellows from the Fort Keogh Research Center at Miles City, Montana, (Table 4) indicates that plane of nutrition during gestation plays a role in dystocia (calving difficulty) and calf survival. Even though cows fed on a high plane of nutrition during gestation had higher birth weights, dystocia was lower, scours incidence and mortality were lower, calf survival at weaning was higher, and cows had higher pregnancy rates the following breeding season.

Overfeeding gestating beef cows can result in problems at calving time. Cows that are over-conditioned deposit fat in the birth canal, resulting in calving difficulty. Extremely cold temperatures during late gestation can increase calf birth weight by increasing blood flow to the uterus, which results in increased nutrient supply to the fetus.

Effect of precalving nutrition on calf and dam behavior

Research conducted in Australia has investigated the effects of precalving nutrition level on calf and dam behavior immediately following calving (Table 5).

Table 4. Effect of low or high gestation feeding level on calving and subsequent reproduction.[a]

	Low	High
Calf Traits		
Calf birth weight (lbs)	63	69
Dystocia (%)	35	28
Calf survival at birth (%)	93	91
Calf survival at weaning (%)	58	85
Scours incidence (%)	52	33
Mortality due to scours (%)	19	0
Dam Traits		
Estrus at the beginning of the breeding season (%)	48	69
Pregnancy (%)	65	75

[a] Summary of seven research trials by Dr. Bob Bellows, USDA-ARS, Miles City, Montana. Range Beef Cow Symposium XIII, 1993, pp. 175-189. Cows on low plane of nutrition lost weight. Cows on high plane of nutrition gained weight.

Table 5. Effect of precalving nutrition on calf and dam behavior.

	High Plane	Maintenance Plane	Low Plane
No. dams observed	19	20	20
No. calves observed	16	18	20
Duration of parturition (min.)	109.0[a]	89.4[a]	142.7[a]
Time taken by dams to rise after calving (min.)	11.6[a]	14.4[a]	30.7[a]
Time taken by calves to stand after birth (min.)	23.5[a]	160.0[b]	221.3[b]
Time elapsing from birth to first suckling (min.)	86.5[a]	134.8[a]	305.7[b]

[a,b] Values with different superscripts are significantly different (P < .05). Krokev and Cummins, 1979, Australian Vet Journal 55:467.

Calves born to dams on a low plane of nutrition took significantly longer to nurse than calves born to dams on a maintenance or high plane of nutrition. The longer the calf takes to nurse, the higher the likelihood that colostrum absorption will not be adequate to protect the calf from disease.

Can feeding time affect when calves are born? (The Konefal Calving Method)

The time of day that cows are fed during the calving season can influence the time when calves are born. Cows fed at night tend to calve during the daylight hours (when you have an opportunity to watch them more closely). This method of management was developed by Gus Konefal, a Manitoba Hereford breeder. The system involves feeding twice daily, once at 11:00 a.m. to 12 noon and again at 9:30 to 10 p.m. This practice should be started about one month before the first calf is born and continue for the duration of the calving season. Konefal reported that using this regime, 80 percent of his cows calved between 7 a.m. and 7 p.m. Iowa State University research indicated similar results.

Scientists at USDA-ARS, Miles City, also conducted a three-year study on feeding time. Their results were not as dramatic. However, the percentage of cows calving from 10 p.m. to 6 a.m. was consistently 10 to 20 percent lower for the late-fed cows compared with the early-fed cows. Similar research at the Brandon, Manitoba research station indicated a 13.5 percent reduction in the number of cows calving between midnight and 7:00 a.m. However, research conducted in Indiana with dairy cows showed no particular benefit to night feeding.

Colostrum Management

Colostrum — a vital food for the newborn

Colostrum intake is critical for the newborn calf. At birth, a calf's immune system is not fully developed. The calf must rely on colostrum from the cow until its own immune system is totally functional (about 1 to 2 months of age). Colostrum contains antibodies or immunoglobulins necessary to provide the calf protection from disease. For colostrum to be most effective, the calf should receive 1 quart within six hours after birth and a total of 2 to 3 quarts within 12 hours of birth. After this time the gut begins to "close" and it becomes more difficult for the calf to absorb the antibodies found in the colostrum.
At six hours after birth, calves absorbed 66 percent of the immunoglobulins in colostrum, but at 36 hours after birth calves were able to absorb only 7 percent of immunoglobulins.

Colostrum contains 22 percent solids, compared to 12 percent solids in normal whole cow's milk. Much of the extra solid material in colostrum is immunoglobulin, but colostrum is also an important source of protein (casein), sugar (lactose), fat, and vitamins A and E.

The amount of colostrum produced by a cow is affected by breed type (dairy breeds produce more than beef breeds) and cow age (mature cows produce more than heifers). Cows on higher planes of nutrition also produce more colostrum than cows on a low plane of nutrition.

Calves that have experienced a difficult or prolonged birth tend to take longer to stand and nurse, resulting in a weak calf that lacks the proper immunoglobulin protection necessary to fend off disease threats. These calves may need to be tube fed colostrum or colostrum substitutes.

Handling and storing colostrum

Some cows don't produce an adequate amount of colostrum. The use of colostrum from other cows or stored colostrum is sometimes necessary to ensure that each calf receives adequate colostrum. For optimum results, colostrum should be collected from cows within 24 hours of calving and fed fresh. Colostrum can be collected at calving, stored frozen, and used at a later date as well. To facilitate storage and thawing, you may want to consider storing colostrum in Ziploc® bags or Serving Savers®. The bags or containers will store flat in the freezer and you can use a size which makes thawing individual "servings" of colostrum easier (1 or 2 quarts). Colostrum should not be thawed and refrozen.

Antibodies and immunoglobulins in colostrum are protein. Correct thawing is important to prevent colostrum from being damaged. Colostrum should be thawed slowly, either in a microwave or in warm water. Here are two suggested methods:

1) Place frozen colostrum and its container in warm water (110°F) and stir every five minutes. The colostrum should be warmed to 104 to 110°F.
2) Thaw colostrum in a microwave oven. Set the oven at no more than 60 percent power for gentle thawing. Agitate or stir the colostrum frequently to assure even thawing and warming. This is important since many microwaves do not heat material evenly. Warm the colostrum to 104°F.

How much colostrum does a calf need?

As a general rule of thumb, a calf should receive 5 to 6 percent of its body weight as colostrum within the first six hours of life. That same amount should be fed again when the calf is about 12 hours old. Colostrum weighs approximately 8 pounds per gallon. For an 80-pound calf, this equates to approximately 2 quarts (4 pounds) of colostrum per feeding.

What about commercial colostrum supplements?

A number of commercial products that act as colostrum substitutes are available. Research studies with these products conducted at universities indicate that calves that received these products were healthier than those that received no colostrum at all; however, they did not receive the level of protection they would if fed frozen, stored colostrum.

What about the risk of Johne's Disease?

Johne's disease (Myobacterium paratuberculosis) can be spread to your herd through infected colostrum. If you are using colostrum from another cow as a supplement, be sure the cow from which you get it is free of Johne's disease. (See NDSU Extension Service publication V-1209, Johne's Disease in the Beef Herd.)

Calving Season – Vaccinations

The goal of any vaccination program in a successful calving program focuses on the calf's immune system. As mentioned in the colostrum management section, colostrum is the single most important factor in preventing disease in the very young calf. A good vaccination program utilizes the cow's immune system (via colostrum) to protect the calf.

Cows should be vaccinated approximately four weeks prior to anticipated calving date and then again two weeks prior to calving date. This allows the cow's immune system to produce the antibodies needed by the calf. Two doses are recommended to properly stimulate the cow's immune system.

After initial vaccination, a minimum of a yearly booster will be required to maintain the cow's immune system every year to protect each calf. It is very important that you follow the labeled directions for every vaccine you use. Different vaccines have different requirements to ensure their effectiveness.

There are approximately eight viral, 29 bacterial, one neorickettsial and one protozoal diseases that vaccines are currently marketed for use in the United States. Most, when used properly, are highly effective, yet it is not economically advisable to vaccinate for all of them.

Which diseases should you vaccinate for?

Those that exist within the local area. Your veterinarian will be able to advise you about the specific diseases in your locale.

The most common complaint at calving time is enteric (diarrhea) disease. It is generally the result of poor sanitation (muddy lots),

adverse weather conditions (cold and wet), and the mixing of sick and well animals (no hospital or recovery pens). Sound management is vital to a successful calving season. A vaccination program alone will not protect your animals. Even the best vaccine can be overpowered by overwhelming numbers of bacteria, viruses, and parasites. The most common enteric agents for which vaccines are available are rota virus, corona virus, *Escherichia coli* and *Salmonella spp*.

In a few herds, respiratory disease or even botulism can be a problem in young calves. Consult your veterinarian regarding these conditions. Often these conditions will require vaccinating the cow before calving and then vaccinating the calf soon after calving. This can cause special problems. The colostrum the calf receives protects it from infectious agents, but it will also inactivate a vaccine. If you vaccinate a young calf, you may have to re-vaccinate the calf at least once and maybe more until the calf is six months old. It is best to involve your veterinarian if considering this type of program.

Parasite Control

All adult cows should be treated for external parasites (lice). Adults cows are fairly resistant to internal parasites (worms). Many herds can benefit from an internal parasite control program. This allows maximum feed efficiency for the cow and decreases feed costs and maintains the cow's level of immunity. One of the best times to worm adult cattle is at weaning. If the cows are maintained on dry-lot, they will not be reinfected until turned out on grass in the spring. If the cows are allowed to winter graze, they may reinfect while grazing and, depending on the parasite load, may need to be retreated during the winter.

Very young calves are not usually adversely affected by lice and worms. They are adversely affected by coccidia, cryptosporidia, and giardia. These internal parasites cause diarrhea. They are usually associated with poor sanitation, wet environment, and mixing ill and well animals in the same pen. There are no vaccines effective against these pathogens. There are medications available to treat coccidia and giardia, but there is no medication effective against cryptosporidia. Again, consult your veterinarian regarding management of these illnesses.

General Management

Providing a clean, dry area for cows that are calving and cow-calf pairs is critical to limiting the spread of disease in newborn calves. Calves born in muddy, damp pens or calves that nurse udders contaminated with fecal material are at increased risk for a number of disease conditions. Bedding should be provided as needed to ensure that the animals have a clean, dry area which is free from mud and manure.

For more information on this and other topics, see: www.ag.ndsu.nodak.edu

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