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Health and Management of the Nursing Calf

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Proper nutritional and health management of the nursing calf is important not only because it results in the most pounds of beef to sell at weaning, but also because it sets the calf up for achieving optimal postweaning performance.

Prenatal Nutrition and Health of the Cow

The health and well-being of the nursing calf starts with the health and nutritional status of the cow prior to the birth of the calf. Nutrient needs of the cow increase during the last trimester of gestation, and by the last month prior to calving, the fetus is gaining approximately 1 pound per day. In addition to this late-term fetal growth, the cow is also preparing for lactation. Research has shown that cows who are thin (body condition score ≤ 4) have a decreased concentration of immunoglobulins in the colostrum compared with cows in a body condition score of 5–6 (1–9 scale).

Additionally, calves born to very thin cows may be weak and slow to nurse, also reducing the colostrum they consume and making them more susceptible to disease. For more information on the nutrient needs of the cow, see NebGuide G2268, *Supplementation Needs for Gestating and Lactating Beef Cows and Comparing the Prices of Supplement Sources*. For assistance determining body condition score of beef cows, see Extension Circular EC281, *Body Condition Scoring Beef Cows: A Tool for Managing the Nutrition Program for Beef herds.*

A Healthy Start for the Newborn Calf

In addition to a healthy mother, the newborn calf needs a clean environment. Healthy adult cattle often shed very low levels of bacteria and viruses that can cause scours and other diseases in calves. Manure and mud provide an ideal environment for disease-causing bacteria and viruses. Early in the calving season, calves are exposed to these pathogens and often develop minor, undetectable infections; however, these young calves amplify the pathogen load in the environment faster than do adult cattle. As the calving season progresses, newborn calves are challenged with increasingly higher levels of pathogens. Infection with high doses of bacteria or viruses combined with other risk factors like overcrowding, temperature extremes, and precipitation can quickly overwhelm calves' defenses, and clinical cases of scours may develop. Long calving seasons further exacerbate the situation by providing a steady supply of new calves that are susceptible to infection over a long period of time. These conditions often lead to scours outbreaks, which cause great financial loss due to increased labor, reduced weight gain, and even calf death loss.

Extension veterinarians at the University of Nebraska–Lincoln have found that segregating cow/calf pairs by the age of the calf has helped reduce the incidence of scours outbreaks. When possible, calving areas should be divided into large lots. After a week to two weeks of calving, cows that have not calved should be moved to the clean area.

Figure 1. Ideally, a cow in good body condition gives birth to a vigorous calf and quickly stimulates the calf by licking it clean. (Photo: Groves Ranch)

This process should be repeated every week to two weeks so that the older calves are not housed with the younger calves, as it is the older calves that infect younger calves.

After the youngest calves are 4 weeks old, all calves can be comingled. Managing breeding to achieve a short, intense calving season enables optimal management by reducing the number of lots needed to calve out a herd as well as by shortening the time susceptible calves can be born, become infected, and further contaminate the environment.

The timing and the amount of colostrum consumption is critical for the newborn calf as well. Ideally, newborn calves need to stand and nurse within the first few hours of life to maximize colostral absorption and immunity. The best case scenario occurs when a cow in good body condition gives birth to a vigorous calf in a clean environment and promptly stimulates the calf by licking it clean. Vigorous calves quickly nurse a large colostrum meal. The first meal a calf consumes is one of the most important meals of its life because a sequence of gut changes begins with that meal. The intestines of a newborn calf have the ability to carry their contents across the wall of the intestine directly into the blood. This ability is critical to move colostral antibody from the intestines into the blood; however, the process is not selective for antibodies and can allow pathogens into the blood as well.

To protect the calf from pathogens, the gut begins to "close" (loses its ability to take contents directly across into the blood) as soon as the calf's first meal is introduced to the intestinal tract. As a result, less and less antibody can be absorbed from each subsequent meal until gut closure is complete. A common misconception about the window of time available to deliver colostrum to calves is that a calf always has 24 hours. In reality, the window depends on when the calf first consumes any kind of meal. If a calf has nothing to eat, it can still absorb some antibody at 24 hours, but if the calf consumes anything, gut closure begins immediately and can be complete before 24 hours has passed. Unfortunately, "anything" can be a dose of colostrum that is too small, milk replacer, or debris nursed from a dirty udder or environment. All of these meals will initiate gut closure and decrease the amount of antibody absorbed.

Worse yet, bacteria nursed from a dirty environment, including the udder, can be directly absorbed into the blood and cause severe disease. Good passive transfer is accomplished most effectively by implementing preventive management strategies. These include maintaining adequate BCS in cows, providing a clean calving environment, and routinely observing calves to make sure they have paired up and nursed. Calves born following prolonged labor, especially if the calf had to be pulled or removed via caesarian section, are at high risk for failure of passive transfer. Calves born to first-calf heifers are more vulnerable as well. Close observation of these pairs can allow early intervention to maximize passive transfer.

Interventions depend on producer preferences as well as recommendations from local veterinarians. In cases where the calf cannot nurse colostrum from its own dam, the following options are available:

1. Milk out dam and feed with bottle or tube feed.
2. Feed colostrum banked from other cows that have lost their calves.
3. Feed commercial colostrum replacement product.
4. Feed colostrum banked from neighboring herds (beef or dairy if available).
5. Feed colostrum supplement.

These options are listed in order of decreasing efficacy and increasing risk of introducing new diseases. Resident cattle have the ideal colostrum for their own calves because the antibodies match the pathogens present in the herd and the surrounding environment. Disease transmission is also less likely if colostrum from within the herd is used.

Commercial colostrum replacers are available, are effective, and come from carefully tested herds. These products are usually costly and must be mixed carefully according to the provided instructions. Feeding colostrum banked from neighboring herds can be effective, but dramatically increases the risk of introducing diseases into a

Figure 2. Many ranchers provide a shed or other shelter for their calves to reduce environmental stresses. (Photo: Groves Ranch)

producer's herd. Colostrum supplements are relatively safe in terms of disease transmission but typically do not contain a high enough concentration of antibody to guarantee adequate passive transfer. Visit with your local veterinarian when considering these options.

Regulating body temperature can be a challenge for the very young calf. Depending on the time of year a calf is born and the current weather conditions, the challenges can vary. Producers need to be aware of what those might be and plan accordingly. Calves born in cold and wet conditions may need a dry, warmer place to acclimate. Initially, this may be a barn with the dam. However, many ranchers have devised innovative ways to make a shelter or hutch that calves can access without their dams to reduce cold and wind stress. Conversely, calves born in the summer months may need access to shade and plenty of easily accessible water to combat heat and humidity.

Feed and Water for the Young Calf

While milk intake is very important to the nutritional status of the young calf, it is not the only source of nutrition that must be made available. When a calf nurses, the esophageal groove closes and the milk bypasses the rumen and enters the abomasum. This allows this highly digestible nutrient source to be used for skeletal and muscle growth of the calf rather than be used by rumen bacteria. However, it is critically important that the young calf begin rumen development, which requires both a solid food source, such as grass or hay, and water. Young calves start to nibble at feed within the first week or so of life. Research has shown they are eating 1 percent of their body weight by the time they are 3 months old. The development of the rumen is critically important for both preweaning and postweaning weight gain. Therefore, making sure easily accessible, palatable feed is available to the calf as early as possible is important.

Water is an important nutrient often overlooked, even in adult animals. For the young calf it is critically important for both health and rumen development. Water intake and dry matter intake are highly correlated. Beef calves that start feed consumption early will gain weight quickly and tend to thrive. Iowa dairy researchers found that dry matter intake explained more than 60 percent of the variation in free choice water intake of bottle-fed dairy calves.

Dairy industry researchers also determined that when temperatures increase, water intake increases exponentially rather than linearly in a nursing calf. Careful attention should be given to water access for calves, especially when daily temperatures begin to increase. Producers should consider pushing dirt up around tanks that have blown out to ensure calves can reach the water. Additionally, they should evaluate the water flow into the tank. If the cows drink the tank down to a level below what the calf can reach, how quickly does the tank refill? If the producer has small automatic waterers, then observing whether the cows are pushing calves away from the water source is important. If this is happening, the calves may need an additional water source in a creep area where cows cannot reach it.

Calfhood Vaccinations and Other Management Practices

Calves should be processed early in life to maximize growth and minimize disease and stress. Processing can include vaccination, castration, use of growth implants, and branding. Vaccination is an important tool to prevent disease in calves before and after weaning. Early vaccination, even in calves as young as a week old, has been shown to generate protective immunity. Each producer's vaccination program, including the products and timing of vaccinations, should be built with the help of a local veterinarian who understands disease pressure in the area, vaccine use and efficacy, and the producer's goals.

Castration, and if necessary, dehorning should be done as early as possible. Complications associated with castration increase dramatically as calves get older and heavier. Many studies have shown that calves castrated early in life will achieve the same or higher weaning weights as calves castrated later because the detrimental impacts of late castration far outweigh any increase in growth associated with maintaining bull calves intact. Castration near the

time of birth is ideal and should be completed in the vast majority of herds by the time calves are 2 months old. Pain management should be discussed with a local veterinarian, especially if late castration is unavoidable.

Growth implants in nursing calves have been shown to increase weaning weights by 15 to 30 pounds. If given once at approximately 30 days of age, they have not been shown to negatively impact reproductive performance in heifers. Implants should not be given to bull calves intended for reproduction. Steer calves should be at least 30 days old when given the first implant. Calves should be given a growth implant approved for nursing calves, and all label instructions should be followed regarding proper ear placement, and hygiene of the implant needle.

Preconditioning Calves for Weaning

Good nutrition is a key component of a good immune system. Therefore, nutritionally preparing calves for a stressful experience such as weaning is as important as a good vaccination program. Zinc and copper are minerals that play an important role in immune function. Therefore, prior to weaning calves should have access to a good trace mineral that supplies those nutrients. As discussed earlier, feed that allows for good rumen development is important prior to weaning since the calf is going to transition to a milk-free diet. When possible, calves should be fed a diet of high quality, long stem hay or allowed to graze grass in an area where they become familiar with the water source before the cows are removed. When practical, introducing calves to supplements containing coccidiostats (monensin, lasalocid, and decoquinate) prior to weaning can help calves transition to bunk feeding and prevent clinical coccidiosis. Keeping things as common and familiar as possible when cows are removed helps reduce stress. For more information on weaning procedures see NebGuide G2057, *Management, Health, and Nutritional Considerations for Weaning Calves*.

Processing, either before, or at the time of weaning can reduce disease risk and increase growth performance of calves. As is the case with early vaccination, a protocol should be designed to match the characteristics of the producer's herd as well as augment calf value in the post-weaning phase of development. Coordination between the producer, the local veterinarian, and, when possible, the stocker or feedlot producer taking possession of the calves postweaning is important for planning vaccination programs to match disease risk and desired outcomes. Other processing events should also be considered at this time. Antiparasitic treatment is important in calves because they tend to be more susceptible to parasites than older cattle. Internal parasite burdens not only decrease feeding efficiency, but also have been linked with decreased immune function. Reimplanting at preconditioning/weaning can be valuable and should be considered.

Conclusion

Providing proper nutrition, a clean environment, and proper vaccination protocols prior to and after calving helps ensure a healthy, thriving calf crop at weaning. Understanding the importance of a good source of colostrum, the timing of delivery, and the development of gut function in the newborn will help producers give their calves a healthy start. Developing and executing a management protocol with a local veterinarian and extension personnel will help guard against local pathogens and assist in setting calves up for preweaning and postweaning success.

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