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Lanette Butler
South Dakota State University

Russ Daly
South Dakota State University

Cody Wright
South Dakota State University

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Cold Stress and Newborn Calves

Lanette Butler, Extension Educator
Russ Daly, Extension Veterinarian
Cody Wright, Extension Beef Specialist

Calf survival in northern climates can be a challenge. Death losses after birth may be due to one or more of several factors including infectious agents, dystocia, genetic abnormalities, and environmental stress.[2] Cow nutrition also influences calf survivability[2,3,7] as well as the timing and type of colostrum intake.[8] These factors, whether singular events or in combination, dramatically impact calf survival.

Infectious Agents

Cold stress can increase a calf's susceptibility to certain diseases, such as calf scours, pneumonia, and navel infection.

Outbreaks of calf scours are often traced back to purchased foster calves from an outside herd source such as the neighbor or livestock salebarn. A sound herd health program can address infectious agents and prevent infection. Included in the program should be routine health vaccinations for your cows and calves and handling and management plans for new breeding stock (cows and bulls) and for disposal of dead animals. Management of calving and treatment facilities to reduce infectious agent buildup also should be part of your herd health program. Work with your veterinarian and follow your Beef Quality Assurance Critical Management Plan to ensure that you have the best plan for your operation in place.

Dystocia

Dystocia, or calving difficulty, can contribute to death loss at calving. Selecting light-birth-weight bulls is the best management strategy to reduce the incidence of dystocia.

Measuring the pelvic area of yearling heifers prior to the breeding season is another way to check that your females can handle calving.

Heifer development programs that manage heifers to reach 65% of mature body weight by breeding and 85% of mature body weight at the time of calving will minimize dystocia.

It is a misconception that reducing the plane of nutrition prior to calving will reduce dystocia. Research has clearly demonstrated that reducing the cow's plane of nutrition prior to calving may reduce calf birth weight, but it does not reduce dystocia.[11] It may, in fact, reduce reduce calf survival and increase scours.

Intervention during dystocia increases calf survivability, since dystocia affects both cow and calf. Effects on the cow will be seen in the presence of immunoglobulins in the milk. Dystocia will also affect the calf's ability to absorb immunoglobulins from the colostrum.[8]

Dystocia during cold weather can be hard on the calf. If assistance is not offered in a timely fashion, both the cow and calf are put through undue stress. Calving facilities should be ready prior to calving season so you can provide assistance to a cow that is experiencing dystocia.

Colostrum

Colostrum provides the calf with its first mechanism against infectious agents. Contained in colostrum are various immunoglobulins and other substances which

provide the first immunity against infectious agents the calf is exposed to. Colostrum also provides energy to the calf.

The calf's ability to absorb immunoglobulins decreases rapidly with age. This is why it is recommended that calves consume colostrum within the first 2 hours following birth. Two quarts of colostrum should be administered by drench or bottle, followed by 2 more quarts 4 to 6 hours later.[8] Gut closure will start to occur after consumption of any liquid. Once this happens, the calf's ability to absorb immunoglobulins decreases.

Colostrum quality will vary from animal to animal. Cow colostrum will have a higher concentration of antibodies than that from heifers. Colostrum from beef cows will be more concentrated in those from dairy cows.[12]

Commerical colostrum products are on the market. These products may be termed "supplements" or "replacements." They usually only contain antibodies against *E. coli* but have no antibodies against viruses or other bacteria. They also do not contain white blood cells and other immune substances that real colostrum has. Thus, these products will be less effective in passing on immunity to the newborn calf. The best source for colostrum is from within the existing cow herd.

Be cautious about getting colostrum from dairies or other sources besides your own operation. Diseases can be introduced this way. An example is Johne's disease. *Mycobacterium paratuberculosis*, the causative bacterium for Johne's, is generally more prevalent in dairy animals and can be shed into the colostrum. Calves are especially susceptible to infection in the first few weeks of life.[5]

Cow Nutrition

Good cow nutrition is essential to good health of the calf at birth. Protein, energy, and supplemental fat all play a role in getting the calf off to a good start.

Cows fed an adequate energy diet have more calves born alive than cows fed a restricted energy diet (100% vs. 90%, respectively). The difference does not stop there but continues on through weaning (100% vs. 71%, respectively).[2] It should be noted calves from cows receiving restricted energy diets could produce less heat than calves from cows fed an adequate energy diet.[1]

Crude protein consumption the last 60 to 90 days of gestation is a key area for improving calf survivability. Feeding crude protein at a rate of 2 pounds per head per day reduced the incidence of weak calf syndrome to zero.[3]

Fat supplementation for the cow has been shown to improve the newborn calf's response to cold stress[7] by increasing glucose concentration in its blood. It is believed that this increased substrate is available for heat generation.[7] There is also some indication that serum immunoglobulins in calves of fat-supplemented cows are higher then non-supplemented cows.[6]

Environmental Stress

Wet, cold weather can be rough on calves born in winter and early spring. Wet and cold calves are more prone to cold stress or hypothermia. Precipitation adds to the negative effect on calf survival when temperatures drop.[1]

So it is important to combat cold stress (hypothermia) in newborn calves. Rectal temperature is the most accurate method of determining if a calf is experiencing hypothermia.[9] Mild hypothermia is when core body temperature drops below 100°F. Severe hypothermia is when the core body temperature drops below 94°F.

To combat hypothermia, the calf shivers to increase heat production and shunt blood from body extremities to the body core. As body temperature continues to drop, the body continues to shunt blood away from the extremities. This allows acid metabolites to build up in the muscle extremities.[9]

At 94°F, vital organs are cold and impaired brain function results. As core body temperature drops below 86°F, signs of life are hard to detect. Pupils are fixed and dilated and the pulse may be undetectable. Occasional gasps for air may be the only signs of life.[9]

Methods for rewarming are varied and include warm water bath, warm air or heat lamps (hot box), and warm blankets.

Warming Methods

Warm blankets should not be so hot that they cause skin burns. Change the blankets often to maintain a consistent temperature. As the calf becomes more active, it may become difficult to keep the blanket on the calf but keep after it. It is critical not to let the calf cool off after being warmed.

A hot box or warming box is another tool you can use to warm calves. There are commercial ones avail-

able or you can build one yourself. Consider temperature regulation, ventilation, and sanitation.

Some hot box concerns are the same as for warming blankets. The temperature should not be so high that it can cause burns. Keep the temperature at 105-108°F.[10] Some type of venting is necessary to prevent buildup of carbon monoxide and moisture. Moisture buildup could cool the calf back down.

Air movement, such as from a fan, is important to ensure thorough warming of the calf. It can also prevent hot spots in the warming box. Thermostatic control will help maintain consistent temperatures because the heat will cycle on and off as needed.

Sanitation is important to prevent the spread of disease between calves. Clean out the hot box between uses to reduce the spread of disease. Warming boxes are a potential reservoir of calf diarrhea organisms and may make the spread of scours within a herd easier if attention is not paid to thorough cleaning and disinfection between calves.

When using a warm water bath, you need to support the calf to prevent drowning. The water should be gradually warmed to 100°F. Then watch the thermometer; the water will need to be changed to keep it at 100°F.

The calf must be stable before returned to the cow. Watch it closely to monitor its condition, now and later on. The calf may be more susceptible to disease challenges such as scours and pneumonia after having such a hard birth.

Summary

Providing adequate nutrition for cows and having a herd health program in place to manage disease are critical to a successful calving season. It is also necessary, if a cow is having difficulty calving, to intervene—for the health and life of the cow as well as the calf.

Insuring newborn calves receive adequate colostrum in a timely manner has a dramatic and positive impact on calf health. Colostrum is the first line of defense against pathogenic challenges to the calf.

If a calf is cold-stressed, it will be more susceptible to disease, so warming the calf may be necessary. The best method to use depends on your facilities. Once the calf has been warmed, provide colostrum and maintain body temperature. When the calf is warm and the situation has stabilized, move it back to its mother.

Cold stress in newborn calves is inevitable in South Dakota. However, by using sound management practices, you can improve newborn calf survival and health.

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