



Control of Calf Diarrhea [Scours] in Midwest Beef Cattle Farms

Introduction

Diarrhea (scours) is the main cause of disease and death loss in calves 2–30 days of age. Many factors contribute to scours including: cow nutrition, the calving process, management factors and immunity. Calf immunity to scours is more than a vaccine program and because it is caused by a variety of reasons, prevention and treatment must include an array of considerations and solutions.

Causes of Scours

Multiple potential pathogens are involved in calf diarrhea and at different ages. Calves less than 5 days old can be affected by enterotoxigenic *Escherichia coli* K99 (*K99 E. coli*). However, after 5-7 days of age the calf's intestinal tract becomes resistant to the bacteria. Three other pathogens that destroy cell lining of the intestinal tract, leading to malabsorption and watery diarrhea, commonly affect calves 1-3 weeks of age. *Bovine rotavirus*, *bovine coronavirus* and microscopic protozoan parasite, *Cryptosporidium spp.*, are common causes of diarrhea in young calves. All of these pathogens are commonly carried in the digestive tract of healthy heifers and cows, and shed in manure, so caregivers should practice good hygiene when caring for calves in the first weeks after birth.

Other bacteria, such as enterohemorrhagic *E. coli* and *Salmonella*, also cause scours. Typically, affected calves have less diarrhea, although it may be bloody or contain mucous. These calves commonly have other complications, such as septicemia, joint infections or meningitis, as the bacteria invades beyond the mucosa (intestinal surface) and goes deeper into the intestine. *Clostridium perfringens* is another bacterium associated with diarrhea in older calves, however it is often associated with sudden death in calves rather than scours.

Clinical Signs

Calf scours is characterized by diarrhea and dehydration. Dehydration can be estimated by the degree that the eyes are sunken or length of time that pinched skin (Figure 1) remains tented (Table 1). Calves will also develop a cold mouth and extremities as dehydration advances. Calves with diarrhea lose not only water but electrolytes, including bicarbonate. The combination of bicarbonate loss and dehydration reduces kidney function, causing metabolic acidosis. Acidotic calves become depressed and eventually comatose.

Description	Percent Dehydration	Sunken Eye	Skin Tent	Level Acidosis
Normal, alert, active	<6%	None	None	Normal
Depressed, slow, lethargic	6-8%	Mild 2-4 mm	1-3 seconds	Mild
May stand with help, no suckle reflex, sternal recumbency	8-10%	Moderate 4-6 mm	2-5 seconds	Moderate
Cannot stand, comatose, lateral recumbency	10-12%	Severe 6-8 mm	5-10 seconds	Severe

Treatment

The primary goal in treating scours is to treat the clinical signs and allow the calf to recover from the pathogens. For the main causes of diarrhea, including *rotavirus*, *coronavirus* and *cryptosporidium*, antibiotics are **not** beneficial. Antibiotics are only effective against bacteria, not viruses or protozoa. Aggressive vaccination and prevention programs have decreased the occurrence of the disease in calves less than 5 days of age with *K99 E. coli* or older calves with bloody diarrhea or septicemia.

Scours caused by dehydration and acidosis need direct treatment. Calves with mild dehydration and acidosis will benefit from supplemental oral electrolytes. Look for products that are high in sodium, have energy added and a buffering agent such as acetate or bicarbonate. Calves that can still stand should be given 2 quarts of supplemental electrolytes every 8 hours. In between electrolyte treatments, calves should either be allowed to suckle milk from the cow or be provided milk from a bottle. Allow 4 hours between treating with buffered electrolyte solution and providing milk so the buffer will not hinder proper milk digestion.

Calves that are moderate to severely dehydrated and acidotic need intravenous (IV) fluids. Oral fluids are not effective because the circulatory system of a severely dehydrated calf cannot absorb the solution from the intestinal tract. Intravenous solutions will provide the necessary fluid, electrolytes and buffer to correct imbalances.



Figure 1. Skin tent performed on dehydrated calf. Photo courtesy of Josh Ydstie.

Diagnostics

Although the diagnosis of calf diarrhea can be made on clinical signs through observation of calves and fresh feces, some circumstances require further diagnostics to identify the exact pathogen. Any time a calf dies from scours or cases that do not respond to standard therapy, further diagnostics are warranted. Calf scours mortalities need to be necropsied in order to ascertain organ involvement. Common scours pathogens, *rotavirus*, *coronavirus* and *cryptosporidium* presenting through extreme dehydration, are confined to the interior of the intestinal tract. Evidence of other organ involvement, such as inflamed intestines, liver, lungs, heart and joints, indicates the presence of additional pathogens and further diagnostics are necessary to determine the cause.

It is not uncommon in calf scours to find multiple pathogens in a single sample. Most commonly *rotavirus* and/or *cryptosporidium*, and occasionally *coronavirus*, are found with routine diagnostics. For best necropsy results, a full

set of tissues including loops of intestine, colon, liver, lung and heart are beneficial in arriving at a diagnosis.

Prevention

Prevention and control of calf scours centers on several key areas: calf health and immunity, and biosecurity, which includes cow and calf nutrition and a clean living environment.

Calf health and immunity: In order for a newborn calf to thrive and be resilient to pathogens, the cow must have adequate nutrition in the last trimester to support fetal growth. A cow in good nutritional shape will produce adequate colostrum and experience a normal labor process. The cow's diet should be balanced with proper amounts of energy, protein, minerals and vitamins.

Colostrum quality can be bolstered by vaccinating the cow with a targeted calf scours vaccine 4-6 weeks prior to calving. Proper care at calving is critical to make sure the calf is delivered successfully and then nurses on colostrum. Calves born at risk (dystocia) tend to be slower to stand and nurse, and are subsequently at greater risk for calf scours. It is important to remember that just because the calf was born on its own, some degree of calving difficulty may have occurred that could make it vulnerable to scours.

Biosecurity: Once a calf is born and takes in colostrum, the next factor to consider in fighting scours is biosecurity. Since most female cows shed small amounts of the pathogens in their feces, no environment will be completely clean. The goal is to keep the pathogens from building up to a level that overwhelms the calf's ability to ward them off. Calves that become infected with any of these pathogens will go on to shed large amounts of organisms into the environment making it more likely to infect other calves. The first step in biosecurity is to start with a clean, dry environment and then manage it with regular cleaning. Bedding and old hay should be removed regularly, and mud and manure scraped as needed. In addition, avoid overcrowding of cows and calves to decrease the potential for pathogen exposure since larger animal populations make it more difficult to keep the living area clean.

Managing the flow of cows and calves through the calving season also plays a major role in controlling pathogen buildup. Typically, calves born early in the calving season do not have calf scour problems. After several waves of calves have been born, pathogen levels reach an infective threshold and calf scours can become a major problem. Separating groups of calves by age will not only decrease pathogen loads in general but protect the most susceptible newborn calves from pathogens shed by older calves.

Segregation of calves: Many producers have a single calving area, such as a barn or dry lot, that they calve in. This increases the likelihood of pathogen buildup and scours problems. One remedy is to only bring calving cows into the calving area. After calving, move the cow/calf pair as

soon as possible onto a clean pasture with calves of similar age; no calves older than one week of age. In addition, clean the calving area thoroughly after each calving event, and don't bring sick calves into the calving area. It is still possible to get pathogen buildup in the calving area even after following these steps.

A more effective method to manage pathogen/disease exposure is to implement the Sandhills Calving System by incorporating multiple calving areas on pasture. Cows are calved in a designated calving area. After 7-10 days, pregnant cows are moved to a new area to calve, leaving behind pairs of cows and calves in the area where they have already been exposed to pathogens. The next group of cows calve in a fresh, clean environment, remaining for 7-10 days before moving on. This management system prevents older calves that may be shedding higher levels of pathogens than cows, even though they may not have clinical diarrhea, from exposing younger, at-risk calves.

The Sandhills system requires 6-8 calving areas and may not be practical to implement on smaller Midwestern farms. However, the system can be modified down to three calving areas to help prevent outbreaks of scours.

Calving areas could include calving barns, dry lots and pastures. Movement of pregnant cows to the next calving area can either be timed or in response to disease. A set timed move would happen every 20-30 days. Although this does not protect every calf from exposure, it does disrupt the cycle enough to help manage a scours problem instead of letting it get out of control. The other option is to use a primary calving area until calf diarrhea starts, then moving pregnant cows to a new calving area. With a good management system, it is possible to calve in the same place all season without problems. It is essential to plan ahead for cow and calf movement in case problems arise, and to protect the calves that are yet to be born.

Implementing a preventative program and managing nutrition of cows prior to calving is critical to keep calves healthy. Appropriate female vaccination programs and calving management systems can improve early calf health. Early recognition of diarrhea and proper fluid management will improve calf viability and limit death loss. Veterinarian assistance can provide meaningful animal health advice, develop treatment programs and solve calf diarrhea problems.

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