

Calf Scours: Causes, Prevention and Treatment

Introduction

Calf scours causes more financial losses to cow-calf producers than any other health problem in their herds. Calf scours is not a single disease; it is a clinical sign associated with several diseases characterized by diarrhea. Regardless of the cause, diarrhea prevents the absorption of fluids from the intestines; also, body fluids pass from the scouring calves body into the intestines. A calf is approximately 70 percent water at birth. The scouring calf loses fluids and rapidly dehydrates. In addition, dehydration is associated with loss of essential body chemicals (electrolytes)-sodium and potassium-and the buildup of acid. The scouring calf becomes dehydrated and suffers from electrolyte loss and acidosis. Infectious agents cause the primary damage to the intestine, but death from scours usually results from dehydration, acidosis, and loss of electrolytes. The identification of infectious agents which cause scours, however, is essential for implementing effective preventive measures.

Causes of Calf Scours

The known causes of scours are grouped into two categories: (1) noninfectious causes, and (2) infectious causes. The noninfectious causes are often referred to as "predisposing" or "contributing" factors. Whatever they are called, there is a dramatic interaction between noninfectious causes and infection. Any effort to prevent infectious causes is usually fruitless unless serious control of contributing (non-infectious) factors is part of the overall program.

Noninfectious Causes of Calf Scours

Noninfectious causes are best defined as flaws in management which appear as nutritional shortcomings, inadequate environment, insufficient attention to the newborn calf, or a combination of these. The most commonly encountered noninfectious problems include:

(a) Inadequate nutrition of the pregnant dam, particularly during the last third of gestation. Both the quality and quantity of colostrum are adversely affected by shortchanging the pregnant dam in energy and protein.

Deficiencies in vitamins A and E have been associated with greater incidence of calf scours.

(b) Inadequate environment for the newborn calf. Muddy lots, crowding, contaminated lots, calving heifers and cows together, wintering and calving in the same area, storms, heavy snow or rainfall, etc. are stressful to the newborn calf and may increase the chance for easy exposure to infectious agents. The wet and chilled newborn calf experiences a drainage of its body heat, may be severely stressed, and all too often lacks the vigor to nurse sufficient colostrum early in life.

(c) Insufficient attention to the newborn calf, particularly during difficult birth or adverse weather conditions. The calf is born without scours-fighting antibodies. The calf will acquire these antibodies only by nursing colostrum early in life. Any effort to prevent scours by vaccinating cows is wasted unless the calf nurses colostrum, preferably before it is two to four hours old. As the calf grows older, it loses its ability to absorb colostrum antibodies by the hour. Colostrum given to calves 24-36 hours old is practically useless; antibodies are seldom absorbed this late in life.

Infectious Causes of Calf Scours

Infectious causes of calf scours may be grouped as follows:

Bacterial cause	<i>Escherichia Coli</i> <i>Salmonella</i> spp. <i>Clostridium perfringens</i> and other bacteria
Viral causes	Rotavirus Coronavirus BVD virus IBR virus
Protozoan parasites	Cryptosporidium Coccidia
Yeasts and molds	

Some pathogens may be more predominant than others in a given area. It appears that cryptosporidium is more common than previously thought. Single infectious are common, but mixed infections (eg: *E. Coli* + cryptosporidium or coronavirus + salmonella, etc.) are often reported.

Bacterial Causes of Calf Scours

Escherichia Coli (E coli)

E. coli appears to be the single most important cause of bacterial scours in calves. There are numerous kinds of *E. Coli*. Recent research indicates that the majority of *E. coli* strains able to cause diarrhea first colonize (or adhere) to the calves gut. They do so by means of very fine, fuzz-like protrusions known as “pili” or limbriae. These pili arc designated as the K99 antigen. *E. coli* strains which possess the K99 antigen are called enterotoxigenic *E. coli* (ETEC). Enterotoxigenic means abilty to produce toxins in the intestines. Obviously there are exceptions to any rule: some ETEC have a different type of pili known as the K88 antigen. Some other features of scour-causing *E. coli* are known as “capsular antigens,” but it would appear that the K99 (pilus) antigen is the most common characteristic of ETEC.

Most newborn calves have a chance to pick up *E. Coli* scours infections from the environment, particularly when sanitation is marginal. Severe outbreaks of *E. coli* may affect calves as young as 16 to 24 hours. The younger the calves, the greater the chance for death from progressive, severe dehydration.

Salmonella

Salmonella produces a potent toxin or an endotoxin (poison) within its own cells. Animals may be more severely depressed following treatment with antibiotics because treatment causes the *Salmonella* cells to release the endotoxin, producing shock. Therefore, treatment should be designed to combat endotoxic shock. Calves are usually affected at six days of age or older. The source of *Salmonella* infection in a herd can be from other cattle, birds, cats, rodents, water supply or human carriers.

Clinical signs associated with *Salmonella* infection include diarrhea, blood and fibrin in the feces, depression, and elevated temperature. The disease is more severe in young or debilitated calves. Finding a membrane-like coating in the intestine or necropsy is strong evidence that *Salmonella* might be involved.

Clostridium Perfringens

Clostridium perfringens infections are commonly known as enterotoxemia. Enterotoxemia is fatal and caused by toxins released by various types of *C. perfringens*. Types B, C, and D have been reported. The disease has a sudden onset. Affected calves become listless, display uneasiness, strain or kick at their abdomen. Bloody diarrhea may or may not occur. This is usually associated with a change in weather, change in feed of the cows, or management practices that cause the calf to not nurse for a longer period of time than usual.

The hungry calf may over-consume milk, which establishes a media in the gut conducive to growth and production of toxins by Clostridial organisms. In many cases, calves may die without any signs being observed.

Viral Causes of Calf Scours

Coronavirus and Rotavirus

Little was known about the role played by these two viruses prior to 1970 when researchers at the University of Nebraska published their findings. Today, many diagnostic laboratories are using technology pioneered in Nebraska, and the importance of these viruses in outbreaks of calf scours have been confirmed.

Both of these viruses possess the ability to disrupt the cells which line the small intestine with resulting diarrhea and dehydration. Coronavirus also damages the cells in the intestinal crypts and slows down the healing process in the intestinal lining. Furthermore, the damage caused by either corona or rotavirus is often compounded by bacterial infections, and the risk for fatal diarrhea is increased when mixed infections occur.

The rotavirus was originally known as reovirus, or reo-like virus, but the correct name, as used today, is rotavirus.

Calves as young as one or two days old may scour from corona or rotavirus infection; however, most outbreaks seem to occur when calves are near a week of age and older. The morbidity (number of sick calves) ranges from one to two percent up to 20-30 percent. Mortality rates are quite variable. Many calves will recover if treated early. Conversely, up to 25 percent losses have been reported, particularly when bacteria compounded either corona or rotavirus infections. Death losses were consistently associated with pronounced dehydration.

Bovine Virus Diarrhea (BVD) Virus

Exposure to the BVD virus can cause diarrhea and death in young calves. Diarrhea begins about 26 hours to three days after exposure and may persist for quite a long time. Erosions and ulcers on the tongue, lips and in the mouth are the usual lesions found in the live calf. These lesions are similar to those found in yearling and adult animals affected with BVD virus.

Infectious Bovine Rhinotracheitis (IBR) Virus

The IBR (“red nose”) virus causes mainly respiratory disease, abortions, vaginitis and conjunctivitis. There are, however, reports associating the IBR virus with digestive disorders in young calves. Affected calves had erosions and ulcers in the esophagus and complicated by dullness, loss of weight, scours and death.

Protozoan Causes of Calf Scours

Cyptosporidium

Cryptosporidium is a protozoan parasite much smaller than coccidia. It has the ability to adhere to the cells which line the small intestine and to damage the microvilli. Several reports from researchers and diagnosticians have associated cryptosporidium with outbreaks of calf scours. As a rule, cryptosporidium is detected in combination with coronavirus, rotavirus, and/or *E. coli*. Calves infected by cryptosporidium have ranged from one to three weeks in age.

Coccidiosis

Coccidiosis is seldom a problem in young calves. However; outbreaks in calves three to four weeks of age and older have been reported. Most outbreaks were associated with stress, poor sanitation, over-crowding, or sudden changes in feed. Some affected calves may exhibit signs of brain damage but tarry or bloody scours are commonly observed.

Yeasts and Molds

Yeast and molds are sometimes associated with lesions in the stomach or intestines of scouring calves. These organisms are not considered a *primary cause of scours* but rather secondary invaders. Very often they are found when scouring calves are victims of overuse of antibiotics or sulfas when very little was done to counteract dehydration by using fluids and electrolytes.

Nutritional Scours

Under range conditions, a calf adapts a pattern of nursing that fills its needs. Nutritional scours can be caused by anything that disrupts this normal habit. A storm, strong wind or the mother going off hunting for new grass disrupts the normal nursing pattern. When the calf does get up to nurse, it is overly hungry and the cow has more milk than normal, so the calf may overload, resulting in a nutritional scours. This is usually a white scours caused by undigested milk passing through the intestinal tract. This type of scours usually presents little problem in treatment. Many of these calves, if they are still active and alert, do not require treatment. If the calf becomes depressed or quits nursing, treatment should be started. Oral antibiotics can be used for treatment along with fluids, if the calf begins to dehydrate.

Prevention of Calf Scours

Because calf scours result from a combination of noninfectious factors and infectious microorganisms, it is essential to use more than shots and pills in any effort to control scours successfully. There are managerial as well as medical requirements which must be met. They must complement each other. Furthermore, calf scours prevention is a year-round effort, not a set of activities centered only around the calving season.

Management Aspects

All facets of management are important. Particular attention should be paid to nutrition, environment, sanitation, and care of the newborn calf. Nutrition. The ration of the pregnant female should be balanced in energy, protein, minerals and vitamins. Care should be given to adjust the nutritional requirements

during cold, inclement weather and to keep in mind that pregnant replacement heifers have not reached their mature size. Particular care must be taken to provide them with sufficient feed energy for maintenance and growth. Failure to meet energy needs will not only result in a weak calf at birth but also contributes to delays in return to estrus and lowered conception rates. Best results occur when replacement heifers are wintered and calved in advance of, and separate from the mature cow herd. Special attention should be given to energy deficiencies and/or vitamin A and E shortages.

Environment and sanitation. Historically, severe outbreaks of scours are associated with bad weather, storms, slush and mud. Weather conditions are unpredictable and beyond our control. We can, however, control the environment in which the calf is born and raised early in life. The newborn calf needs a dry/clean place if we expect it to survive free of scours. Geographic and climatic conditions dictate the type of management needed to assure decent shelter.

Sanitation is just as important as a dry/clean environment. Ideally, provide a special area used only for calving. Many cattlemen have to winter their pregnant females in confinement. Manure and urine accumulate and it becomes necessary to have a special calving area separate from the wintering area. After the calf is born and has nursed, it should be moved with its dam to a nursing area before being turned to pasture.

Attention to the newborn. Calving difficulties may weaken the newborn and its dam; the calf may not nurse sufficient colostrum and scour later on. Perhaps the single most important requirement for the newborn calves is to nurse colostrum early in life. The calf must nurse one to two quarts of colostrum during the first two to four hours immediately after birth. The calf is born without disease protection. Only by absorbing antibodies present in the colostrum will a calf acquire immunity against the various infectious causes of scours. At times it is not practical to milk a beef cow or heifer, but the calf still needs colostrum. Many cattlemen will have frozen colostrum on hand in small containers.

Plastic bags, one to two pints in size, are ideal for storage. Colostrum may be saved from dairy cows. Make sure it is from cows vaccinated against infections predominant in your area and attempt to get it from older cows in the dairy herd. Older, vaccinated cows are more likely to have greater antibody levels than young, unvaccinated heifers. Colostrum should be saved from only the first two milkings. When needed, frozen colostrum should be thawed out slowly; boiling will destroy most of the antibodies. Colostrum may be kept frozen almost indefinitely. Many calves will also benefit from a vitamin A injection. Vitamin A deficiency is associated with scours. The calf should be given 500,000 I.U. (usually 1 cc) of vitamin A early in life.

Vaccination Programs

A well-planned and consistent vaccination program is an

effective tool to prevent scours if the management aspects are taken care of. Different regions, even different herds in the same region, may vary in the type of infectious agents present. There is no such thing as a universal vaccination program. Each program must be tailored to the herd's specific needs. A productive relationship with the local veterinarian, accurate records and diagnostic laboratory assistance are integral components in designing an effective vaccination program.

Effective vaccines have been developed during the last decade, but the vaccination program is not completed until the calf nurses sufficient colostrum early in life. Some of the disappointment associated with the use of scour vaccines may reflect a missing link—the cow was vaccinated and collected antibodies in the colostrum, but the calf did not ingest colostrum early enough to be protected.

Treatment

Treatment of calves for scours is very similar regardless of cause. Treatment should be directed toward correction of the dehydration, acidosis and electrolyte loss. Antibiotic treatment can be given simultaneously with the treatment for dehydration. Dehydration can be overcome with simple fluids given by mouth early in the course of the disease. If dehydration is allowed to continue, intravenous fluid treatment becomes necessary. The clinical signs of dehydration first occur when the fluid loss reaches five to six percent of the body weight. Fluid loss of eight percent results in depression, sunken eyes, dry skin and a calf will probably be unable to stand. A 12 percent loss of fluids usually results in death. Oral fluids used early in the scouring process have been quite successful. Consult your veterinarian for electrolytes to be given orally. There are dry electrolyte powders available that can be mixed with water for oral administration.

Most dehydrated calves suffer from hypothermia (body temperature lower than normal); it is often necessary to provide them with an external source of heat during fluid / electrolyte treatment. A warm barn or heat lamps are needed during treatment of hypothermic calves.

If electrolyte powders are not available, a solution for administration can be prepared on the ranch by using a

tablespoon of baking soda, one teaspoon of salt, and P 50 cc (eight ounces) of 50 percent dextrose. **DO NOT USE TABLE SUGAR.** Add enough warm water to make one gallon and administer up to one quart of this material every three to four hours, depending upon the degree of dehydration and fluid loss. This solution can be used as the only source of nutrients for a period of 24 to 48 hours. Do not use milk or milk replacers, as milk in the intestinal tract makes an ideal medium for bacteria such as *E. coli* to grow. Return the calf to the cow that has been milked out as soon as the calf is able to follow its mother.

Another formula often used includes: One package (one ounce) of fruit pectin, one teaspoon of Lite salt, two teaspoons of baking soda, one can of beef consommé, plus enough warm water to make two quarts. Give one warm quart orally at four to six hour intervals. Giving electrolytes orally may be difficult unless the calf will nurse from a bottle. There is, however, a device on the market that works well for administering oral fluids to calves. It is a collapsible plastic pouch, about one-half to one gallon capacity, with a lid and a flexible esophageal tube. This plastic pouch or a stomach tube should be used when giving calves large amounts of fluids. If the plastic pouch or stomach tube are used, thoroughly disinfect and lubricate them between uses.

Antibiotics should be used both orally and by injection whenever treating calves for diarrhea. Use systemic antibiotics, that is, either those that are injected or those which are absorbed from the intestinal tract. These are necessary to prevent pneumonia. Drugs which decrease intestinal motility and corticosteroids should not be used.

Oral antibiotics, sulfas or scour-pills may or may not be beneficial. If used, they should only be used at the proper dosage and frequency and for two or three days at the most. If they are ineffective after two to three days, discontinue use. Otherwise, resistant bacteria or molds and yeast may overgrow in the calf's gut. Consult your veterinarian. In some Salmonellosis outbreaks antibiotics may cause the release of excess endotoxins, so consider using fluid therapy only.

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