

CALF SCOURS

CAUSES • PREVENTION • TREATMENT



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Introduction

Calf scours is not a single disease entity; it is a clinical syndrome associated with several diseases characterized by diarrhea. Regardless of the cause, absorption of fluids from the intestine is altered, and life threatening electrolyte imbalances occur; that is, the scouring calf loses fluids, rapidly dehydrates, and suffers from electrolyte loss and acidosis. Infectious agents may cause initial damage to the intestine, but actual death from scours usually results from dehydration, acidosis, and loss of electrolytes. Identification of infectious agents which cause scours is essential for implementing effective preventive and treatment 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 because there is a proven interaction between noninfectious causes and infection. Any effort to prevent infectious causes is usually fruitless unless serious control of contributing “noninfectious” factors is part of the overall program.

Noninfectious Causes of Calf Scours

Noninfectious causes are best defined as flaws or gaps in management. Inadequate nutrition, exposure to severe environment, insufficient attention to the newborn calf, or a combination of these are often involved in scours outbreaks.

The most commonly encountered noninfectious problems include:

- **Inadequate nutrition of the pregnant dam**, particularly during the last third of gestation. Both the quality and quantity of colostrum are adversely affected by not meeting the energy and protein requirements of the pregnant dam. Deficiencies in vitamins A and E, and trace minerals have been associated with greater incidence of calf scours. For more detailed information see extension bulletin AS-1207, “Preparing for a successful calving season.”
- **Inadequate environment for the newborn calf.** Mud, overcrowding, contaminated lots, calving heifers and cows together, wintering and calving in the same area, storms, heavy snow, cold temperatures and rainfall are all stressful to the newborn calf and increase its exposure to infectious agents. The wet and chilled (hypothermic) newborn calf experiences a loss of body heat, becomes severely stressed, and lacks the vigor to nurse aggressively and receive adequate colostrum early in life.

Attention to the newborn calf is essential, particularly during difficult births or adverse weather conditions. The calf is born without most antibodies, including those that fight the infectious agents which cause scours. The calf will acquire these antibodies only from colostrum. Because of this, **any effort to prevent scours by vaccinating cows is wasted unless the calf actually receives colostrum**, preferably before it is two to four hours old. As the calf grows older, it rapidly loses its ability to absorb colostrum antibodies. Colostrum given to calves that are more than 24 to 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:

- **Bacteria:** *Escherichia coli*, *Salmonella* spp., *Clostridium perfringens*, and other bacteria
- **Viruses:** coronavirus, rotavirus, BVD virus, IBR virus
- **Protozoa:** *Cryptosporidium*, coccidia
- **Yeasts and molds**

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Some pathogens may be more predominant than others in a given area. Diagnostic laboratories in the Great Plains region report greater incidence of *E. coli*, coronavirus, and rotavirus infections than the other agents listed above. *Cryptosporidium* also is being isolated with greater frequency. Single infections 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 serotypes (kinds) of *E. coli*. The majority of *E. coli* strains which cause diarrhea must first colonize (or adhere to) the calf's gut. They do so by means of very fine, fuzz-like protrusions known as pili or fimbriae. These pili may possess the K99 antigen. *E. coli* strains which possess the K99 antigen are called enterotoxigenic *E. coli* (E.T.E.C.). Enterotoxigenic means that these bacteria have the ability to produce toxins in the intestines. Some E.T.E.C. produce other types of pili antigens.

Most newborn calves are exposed to *E. coli* from the environment, particularly when sanitation is marginal. Manure from healthy cows and stools from scouring calves provide a source of *E. coli* for 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. Antibiotic treatment damages the *salmonella* organism, causing it to release the endotoxin. This endotoxin is potent and will poison the animal, resulting in endotoxic shock, and severe illness. 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, the water supply, or human carrier. Clinical signs associated with *Salmonella* infection include diarrhea, blood and fibrin in the feces, depression, and fever. The disease is more severe in young or debilitated calves.

- *Clostridium perfringens*

Clostridium perfringens infections are commonly known as enterotoxemia. Enterotoxemia is fatal and is caused by toxins released by various types of *C. perfringens*.

The disease has a sudden onset. Affected calves become listless, and strain or kick at their abdomen. Bloody diarrhea may or may not occur. Infection is usually associated with changing weather conditions, changes in the feed or feeding 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*

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

Calves as young as one or two days old may scour from corona or rotavirus; 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 to 30 percent of the herd.

Mortality (death) rates are quite variable. Conversely, up to 25 percent mortality has been reported, particularly when bacteria compounded either corona or rotavirus infections. Death losses are consistently associated with pronounced dehydration.

Many calves will recover if treated early.

- *Bovine Virus Diarrhea (BVD) Virus*

The BVD virus can cause diarrhea and death in young calves. Diarrhea begins about 24 hours to three days after exposure and may persist for days or weeks (if the animal survives that long). 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 older animals affected with BVD virus.

- *Infectious Bovine Rhinotracheitis (IBR) Virus*

The IBR (red nose) virus mainly causes respiratory disease, abortions, vaginitis, and conjunctivitis. However, cases associating the IBR virus with digestive disorders in young calves have been reported. Affected calves had erosions and ulcers in the esophagus, and complicated by dullness, loss of weight, scours, and death.

Protozoan Causes of Calf Scours

- *Cryptosporidium*

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. *Cryptosporidia* can be a primary pathogen, but they are often found to be part of a mixed infection in combination with coronavirus, rotavirus, and/or *E. coli*. Calves infected with *Cryptosporidium* range from one to three weeks in age.

Cryptosporidia as well as other bacterial and protozoal pathogens described in this publication are transmissible from animals to man; therefore, good hygiene and sanitation should be practiced when handling scouring calves.

- **Coccidiosis**

Coccidiosis can be a very serious disease in weaned calves, but 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, overcrowding, or sudden changes in feed. Occasionally, affected calves may exhibit signs of brain damage but tarry or bloody scours are commonly observed.

Yeast 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. Often they are found when scouring calves are subject to overuse of antibiotics and 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 dam going off in search of new grass disrupts the normal nursing pattern. When the calf eventually nurses, it is overly hungry and the cow has more milk than normal. Consequently, the calf may over consume milk, resulting in 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. 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 initiated.

Prevention of Calf Scours

Because calf scours can result from a combination of noninfectious factors and infectious microorganisms, it is essential to use more than injections and medications in any effort to control scours successfully.

There are managerial as well as medical requirements which must be met. They must complement each other.

Calf scour 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 increased dystocia (difficult calving), delayed 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 adequate environment.

Sanitation is just as important as a dry, clean environment.

Ideally, provide a special area used only for calving.

Many cattlemen in the northern Great Plains have to winter their pregnant females in confinement or semi-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 receive sufficient colostrum and may scour later in life.

Perhaps the single most important requirement for the newborn calf is to receive colostrum early in life. The calf must receive 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 free of Johne's disease (see V-1209), cows vaccinated against infections predominant in your area and attempt to get it from the 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. A microwave oven may be used if the defrost setting is employed. Colostrum may be kept frozen almost indefinitely.

Newborn calves will 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, but the vaccination program is not completed until the calf receives sufficient colostrum early in life. Some of the disappointment associated with the use of scours vaccines may reflect a "missing link." For example, the cow was vaccinated and produced antibodies in the colostrum, but the calf did not ingest enough colostrum or early enough to be protected.

Most commercial "scours" vaccines contain K99 *E. coli* antigen singly or in combination with coronavirus and rotavirus. Some manufacturers incorporate *C. perfringens* in their *E. coli* bacterins.

The manufacturers recommendations vary from vaccine to vaccine. Understand and follow these recommendations. Failure to do so may render the vaccine useless.

Treatment

Treatment of 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 in an advanced state, 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 the inability 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. If electrolyte powders are not available, a solution for oral administration can be prepared on the ranch by using one tablespoon baking soda, one teaspoon salt, and 250 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: one package (one ounce) fruit pectin, one teaspoon of Lite® salt, two teaspoons 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.

NOTE: Homemade formulas are not a replacement for commercially balanced preparation and are for oral use only.

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.

Most dehydrated calves suffer from hypothermia (body temperature is 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.

Antibiotics should be used 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 to three days at the most. If they are ineffective after two to three days, discontinue use. Consult your veterinarian. In some salmonellosis outbreaks, antibiotics may cause the release of excess endotoxins, so consider using fluid therapy only.

SUMMARY

Calf scours is a preventable and treatable condition. However, if the noninfectious causes of calf scours are ignored or receive inadequate attention, the subsequent infectious causes of calf scours can and will cause serious hardship for the calf and subsequently the producer.

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



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