



Pro Earth Animal Health



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Understanding the Causes of Calf Scours

An insidious and devastating syndrome, diarrhea in calves falls under the generalized umbrella term of “calf scours.” Technically, it’s a symptom of any number of causes or diseases, but the result is invariably the same regardless of origin – an incredibly compromised calf.

Dissecting the Syndrome

Because calf scours can be attributed to many different factors, it is important to first determine which general heading it falls under – **non-infectious** or **infectious** scours. From there it can be further assessed and a treatment plan developed.

Non-Infectious Calf Scours

Poor husbandry is the number one cause of non-infectious calf scours. This can encompass a vast number of influencing factors. Typically, if a calf contracts non-infectious calf scours, it is due to poor environmental conditions, inadequate nutritional support for the pregnant cow and/or neglect of the newborn calf. To better understand how these factors can work individually (or in combination with one another) to lead to scours, it’s important to know what defines each.

Calf scours falls into two categories:

Infectious & Non-Infectious calf scours. It’s essential to isolate the cause of calf scours to ensure that the proper corrective actions are taken to prevent further or future outbreaks.

Poor or Harsh Environmental Conditions



Calves kept in close or squalid quarters are more likely to develop scours.

Stress from being born into and/or kept in harsh conditions will take its toll on calves. From the basic care standpoint, a calf being born into an overcrowded, muddy or unclean environs will be exposed to an unnecessary number of infectious and non-infectious agents. Because their immune systems are so delicate when they’re born, they are already susceptible to pathogens and even molds and spores. When these agents enter the calf’s body, its inability to properly fight them off leaves it weak and unable to nurse properly.

Weather can also play a large part in the success of a calf when it is born. Particularly cold, rainy or snowy conditions can wreak havoc on the calf’s ability to thermoregulate (adjust body temperature per external factors), and as it loses body heat, it also loses the ability to nurse properly and receive the necessary colostrum and nutrients so vital to those first few hours and days of life.

Colostrum is the most important part of ensuring that a calf is healthy and develops a

strong immune system. The first 24 hours can make or break a calf's entire life – during this time the cow will provide the most potent colostrum. It is also in the first few hours that the calf will best absorb the antibodies provided through the colostrum, so it's incredibly important that a calf be strong enough to suckle and stand long enough to receive adequate colostrum levels.

The Under-Nourished Cow



Properly nourished cows have few calves that contract scours.

Many times, it is erroneously assumed that a cow's nutritional needs will not change throughout the course of her pregnancy. This is not only incorrect, but it can prove fatal for the unborn calf and have a strong effect on the ability of the cow to carry to term and give birth to healthy calves in the future.

A cow's dietary needs will increase and shift during the third trimester. At this point, the calf she is carrying will be growing exponentially, and so, too, will her energy and protein requirements. Cows that are deficient in trace minerals, vitamin A and vitamin E are more likely to give birth to calves that will develop scours. They are also less likely to be able to provide high-quality colostrum for their newborn calf.

The quality of a cow's colostrum is directly dependent on her ability to properly absorb nutrients and build strong antibodies. Poor-quality colostrum can predispose calves to developing scours.

In addition, cows should be vaccinated at proper intervals against scours-causing pathogens, so that they will pass strong and plentiful antibodies to the calf. A properly-trained herd veterinarian will be able to advise when and how frequently a cow should be receiving vaccinations. It can vary depending on the prevalence of a certain disease in each region, the overall health of the cow and the likelihood of exposure to these pathogens. This topic will be further explored in the following units.

Calf Neglect



Newborn calves may require additional support to ensure a good start.

On the surface, it may seem like a cow should be able to provide all the care her calf needs. The reality is far from the ideal, though. Both a cow and her calf that have been through a difficult birthing process will be compromised. Depending on the circumstances, either calf or cow or both may need additional support. Adverse weather conditions, such as snow, rain or extreme cold can contribute to making a cow and calf more vulnerable.

In some cases, a calf may not receive the first (and most potent) colostrum from its mother, setting it up for some serious immunity issues.

In these instances, the antibodies which would normally protect a calf until it can start to develop its own immunity are lacking, making it more likely that it will contract scours.

Infectious Calf Scours

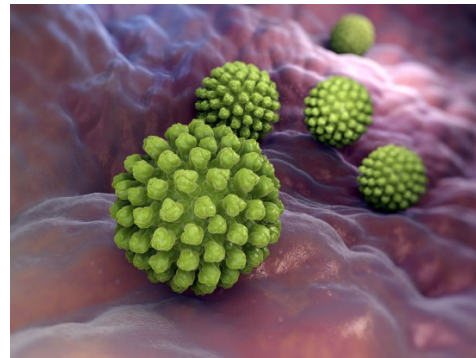
Infectious calf scours can be one of the most devastating and quick-moving causes of calf mortality. Because it can be viral, bacterial, parasitic, or a combination of the three, it is harder to get under control (see Figure 1).

The underlying pathology of each of these causes is different, but they all have one thing in common – they are mediated through one or more of three culprits and the result is the same – an extremely sick and compromised calf.

Viral Infections

There are two viruses that can cause scours symptoms – rotavirus and coronavirus. Both viruses are highly contagious and can wreak havoc on calf populations in a short period of time.

Rotavirus



Rotaviruses are the most common cause of infectious calf scours.
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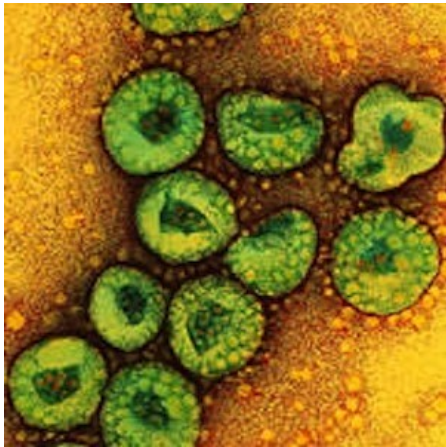
There are several strains of rotaviruses that can infect neonatal calves. Because of this, it is the most common infectious cause for scours in calves from 4 days to 2 weeks old, but it's not uncommon to see calves both younger and older contract rotavirus.

Poor hygienic conditions are one of the biggest factors in the spread of rotavirus to calves. Asymptomatic adult cattle can shed the virus through their feces, leaving calves with low immunity at high risk for contracting the disease. Unfortunately, it can also be spread from exposure to pig and rabbit feces, making it all the more important to ensure a sanitary environment for calves.

The rotaviruses target the intestinal epithelium (the cells that line the inner surfaces of the intestines), destroying the villi (tiny finger-like projections that help capture and guide nutrients through the gut wall). As this occurs, the calf is unable to properly assimilate the milk it takes in from its mother, allowing undigested and unabsorbed nutrients to pass through the gut. The end result is diarrhea that leaves the calf dehydrated and undernourished.

It is estimated that the mortality rate for calves that contract rotavirus to be upwards of 50% when treatment is not initiated.

Coronavirus



Coronaviruses are one of the leading causes of calf scours.

The coronavirus is spread by adult cattle shedding the virus through their feces and into the environment. Neonatal calves are then exposed to the virus, and because they still have immature immune systems, are highly susceptible to infection. Coronavirus, like

rotavirus, will attack the epithelium (inner lining of the intestines), compromising the absorption of fluids and nutrients. Because of this, diarrhea ensues, leading to dehydration and electrolyte imbalances.

Interestingly, concurrent infections from both coronavirus and rotavirus can occur, and can be shortly followed by a bacterial and/or parasitic infection, as well.

Other Viral Infections

There are a few other viral infections that can lead to scours, but are less commonly found in the majority of scours cases. Nonetheless, it's important to be on the lookout for any signs of these diseases in the herd.

Bovine Viral Diarrhea Virus (BVD) causes diarrhea and oral lesions and ulcers, leading to subsequent acidosis and scours.

Infectious Bovine Rhinotracheitis Virus (IBR) is associated with some cases of calf scours. Although it is not of gastrointestinal origin, it manifests as ulcers and erosions in the esophagus, causing difficulty eating, thus causing the calf to experience the symptoms of acidosis, scours and, in many cases is fatal.

Bacterial Infections

Bacterial infections can be contracted on their own, or infect a calf at the same time as a viral or parasitic infection. Poor sanitation practices are one of the leading causes of bacterial exposure and consequent disease; most are spread via shedding of the bacterium through feces of carrier animals. Other sources can include contaminated water or feed, but are less likely to spread disease in young calves.

E. coli



E. coli is the leading cause of bacterial calf scours.

E. coli is a gram-negative bacterium commonly found in the intestinal tract of most animals. It can, however, become pathogenic; some strains can cause severe illness, including intestinal infection or septicemia (blood infection). These different strains are known as either being enterotoxigenic, meaning the effects are seen in the gastrointestinal system, or septicemic, which indicates the pathogen has entered the blood stream and traveled to various parts of the body, including organs and joints. In calves, enterotoxigenic E. coli is the most common and devastating form, making it the most prominent cause of bacterial diarrhea in calves, typically 3-5 days of age.

E. coli is most commonly contracted through ingestion of the bacteria, which is shed through the feces of carrier or infected cows and calves. E. coli is particularly difficult to isolate, as carriers can show no signs of disease at all, but regularly infect other neonatal and adult cattle.

Some of the most common places for calves and cows to ingest E. coli are from unsanitary living conditions such as contaminated bedding or feed troughs and water sources, diarrhea-stricken calves in calving pens and the skin on the udder or perineum of the cow.

Enterotoxigenic E. coli adheres to the walls of the small intestine. As it multiplies it gives off toxins that prompt the calf's body to send fluids

into the intestines, causing potentially fatal diarrhea in the first three days of the calf's life.

Further along, there is the possibility that a calf will develop enterohemorrhagic E. coli, in which a shiga-like toxin is released. This toxin, with a behavior much like the action of rotaviruses and coronaviruses, destroys the intestinal villi and causes bloody diarrhea in older calves, typically between the ages of 2 – 5 weeks old.

Regardless of the age of the calf, due to the severity of diarrhea associated with E. coli and the hemorrhagic nature of the disease, calves often develop severe scours due to the dehydration and potential anemia that can occur.

While it is also possible for the calf to contract E. coli via inhalation, causing other disease processes, for the sake of this application the focus is on the enterotoxigenic form.

Salmonella



Salmonella is responsible for gastrointestinal infections in many species of animals – not just cattle.

Salmonella is the second most common cause of bacterially-mediated scours in calves. Because it can create its own toxin that is released when the bacterial cells are damaged, it can be more difficult to treat.

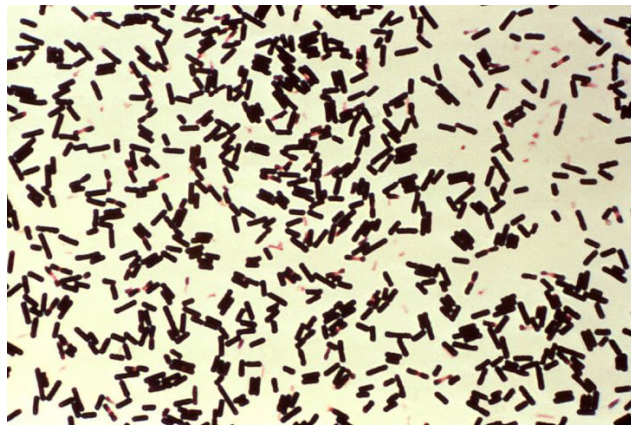
Salmonella most commonly occurs in calves that are six days old or older, making colostrum

antibodies almost completely ineffective against it.

Salmonella can be spread quite easily and rapidly via saliva or feces of cattle and other animals, or through water supplies. It can even potentially be spread via contact with a human carrier, making hygiene of both the environment and equipment essential to prevent its spread.

Since salmonella can cause severe diarrhea, it can lead to scours with all the associated symptoms, including dehydration, depression and emaciation.

Clostridium perfringens



Clostridium perfringens can be a silent killer of calves.

Unlike many other bacterial diseases, *C. perfringens* can come on suddenly. This tenacious bacterium creates and releases toxins that can cause acute illness in calves of almost any age. Poor calf management practices can be blamed for many cases of *C. perfringens*. Lengthy separation of a calf from the mother is perhaps the biggest contributor to calf scours caused by *C. perfringens* infections.

While it is often present in the environment and to a lesser extent in adult cattle, in the right conditions the rapid growth of this bacteria is what allows it to become a problem. It is most commonly found in calves that may go for extended periods of time without nursing, causing them to consume an excess amount of

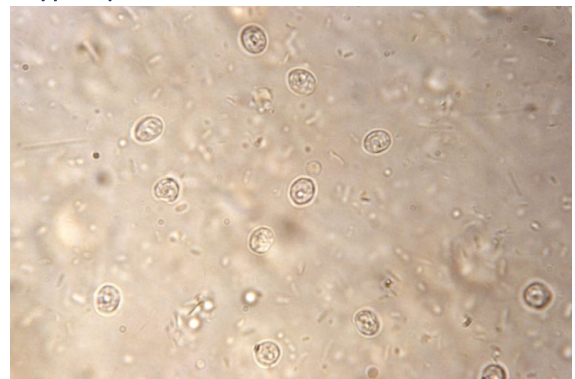
milk once reunited with the cow. This excess can create an environment in which *C. perfringens* can take a hold, growing quickly and releasing toxins that will overwhelm the calf's system. In some cases, calves die without any obvious signs of disease or distress.

Clostridium bacteria of all types can be found in soil, poorly-stored feed such as silage, milk or colostrum that has been improperly stored, water sources and unsanitary calf pens. Given the poor rate of recovery, it is more important to focus on prevention than cure in both beef and dairy settings.

Parasitic Infections

Because calves have not developed a strong immune system yet, they can be particularly susceptible to the ravages caused by protozoan infections. While a slightly less common cause of scours in calves, parasitic infections should still be considered a possibility when dealing with scours.

Cryptosporidium



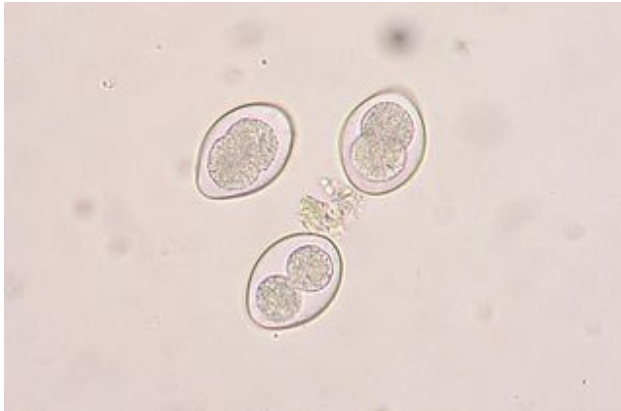
Cryptosporidium can be more difficult to isolate and diagnose due to its tiny cyst size.

As a protozoan parasite, cryptosporidium can wreak havoc on the delicate intestinal walls of a calf, infecting them at the age of 1 – 3 weeks, then showing symptoms between 4 weeks and 4 months. Just as many of the other scours-causing pathogens will attach themselves to the cells lining the intestines, so too does this protozoan, damaging the microvilli that are vital

to absorption of fluids and nutrients. The result is severe diarrhea that leads to the dehydration and electrolyte imbalances associated with calf scours.

Once a calf is weaned, it will become asymptomatic, making it vital to try and prevent *Cryptosporidium* from infecting younger calves.

Coccidia



Coccidia reproduce at exponential rates, making them difficult to control.

Coccidia have a complex life cycle with rapid reproductive rates. This allows greater numbers to be shed via feces into the environment in a

short amount of time. Because of the manner that it invades host cells within the intestines, reproduces and then bursts the cell walls, it can cause serious imbalances and irritation of the intestinal lining of calves, resulting in diarrhea (sometimes hemorrhagic) that can lead to the development of scours.

Coccidiosis (the disease associated with the infection of coccidia) is directly related to how many oocysts are consumed. Thus, severe coccidial infections in both calves and adult cattle can be attributed to poor sanitation practices.

Calf scours is a complex, multi-faceted condition that can stem from many causes. The key to preventing or lessening its effects is to ensure that calves have the strongest immune systems possible. Even at a young age, a balanced pH and healthy digestive system can be the difference between a calf that will perform optimally as opposed to one that will fail to thrive.

Figure 1

Cause	Symptoms	Typical Calf Age
Rotavirus	Loose/watery stool, brown or yellowish, possibly containing blood or mucus.	First month, but especially 3-21 days.
Coronavirus	Profuse watery diarrhea	Between 1-3 weeks.
Coccidia parasite (Coccidiosis)	Thin, watery diarrhea with blood and mucus in more severe cases.	After 3 weeks.
Cryptosporidium parasite (Cryptosporidiosis)	Loose/watery stool, brown or greenish, possibly containing blood, mucus, milk, or bile.	Between 1-4 weeks.
Salmonella bacteria (Salmonellosis)	Yellowish diarrhea, high fevers.	After 10 days.
E. Coli bacteria	Yellowish-white diarrhea	First week.