



Coccidiosis in Weaned Calves

How to combat a costly disease in young cattle.

by Heather Smith Thomas

It is well documented that disease prevention improves performance in weaned calves. Ranchers go to great lengths to protect calves from parasites that jeopardize their herd's health and their bottom line. Coccidiosis, an infection caused by coccidia protozoa, is a disease found commonly in young calves and is considered one of the five most economically consequential diseases in the industry.

All cattle naturally carry coccidia in the small and large intestines, so efforts to counteract outbreaks are geared toward preventing flare-ups. "You can't raise cattle without them being infected by coccidia," says Floron "Buddy" Faries Jr., DVM, Texas A&M AgriLife Extension Services, College Station, Texas.

There are several different species of pathogenic coccidia, and each species has its own host-specific coccidia. For instance,



Calves gathered for weaning are more at risk for contracting coccidiosis because they are stressed and confined. It is important to reduce stress levels in calves during weaning to protect their immunity.

the genus of coccidia that infects dogs does not infect cattle. Many species that live in cattle are not pathogenic, but there are three species that do produce disease — *Eimeria bovis*, *E. zuernii* and *E. auburnensis*.

Most cattle have encountered the protozoa and have developed some form of immunity against them. There is no cross immunity among the different species, though, so developing an immunity to one does not protect calves from other species of coccidia.

Older animals beyond a year of age generally have enough immunity to ward off disease. Despite being hosts to the parasites, the only time adult animals might show signs of coccidiosis occurs when their immune system is unable to launch a defense — caused by malnourishment or high stress or from fighting another disease. Calves, on the other hand, are always prone to the disease because they have not yet developed strong immunity.

Calf vulnerability

Calves are most at risk when they encounter concentrated amounts of coccidia before having enough prior exposure to have developed immunity. Calves out on large pastures may have been exposed to a few protozoa but not enough to cause disease. When the group is finally gathered and confined, calves are suddenly exposed to more fecal material and a high level of coccidia and become more vulnerable.

Outbreaks normally occur the first month of confinement, when manure is likely to build up and calves are likely to be stressed. The stress of weaning can stifle the immune system, so if conditions are ideal for coccidia to multiply, calves are even more likely to contract the disease.

“Stress plays a significant role in vulnerability, as does the confinement,” says Dr. John Campbell with the Department of Large Animal Clinical Sciences, Western College of Veterinary Medicine, Saskatchewan. “This is probably why we commonly see some cases of coccidiosis at weaning time, just as we might see respiratory diseases.”

Cows are the source of oocysts, and if the calf nurses a dirty udder — if mama was lying in manure — or lies in manure and licks itself, it ingests oocysts.

“There may be a high number of oocysts that have [reached an infectious stage] and these young cattle are very susceptible,” Campbell says. A few oocysts will not make a calf sick, but if it ingests a high number of protozoa its immune system may be overwhelmed, which can cause a coccidiosis outbreak.

Outbreak factors

Coccidiosis is known for surfacing sporadically during wet seasons and in feedlots year-round. Manure build-up over time is a major factor in establishing infection. Because oocysts are shed in feces, confined groups of calves become more exposed. As protozoa levels build up in that group, even more shedding of oocysts occurs.

“This is largely a disease involving confinement and hygiene,” Campbell notes. “The more fecal material, the more risk for disease.”

“Many people like to have their cattle congregated for calving, where they can be monitored closely. Even if they move the pairs out into a larger pasture when the calves are a few days old, the young calves have already picked up oocysts in the confined pen,” Faries says.

“Another risk factor is congregating cows and calves in the same feeding area,” he says. “If a person is using round bales and never moving the feeders, or feeding hay on the ground in the same high places in the field, manure builds up in those places. During a drought some of those areas become sterilized in the dry heat. But as soon as the rancher starts feeding hay on those same areas again, contamination builds up, and eventually the calves may start breaking with coccidiosis. Even though it was clean when they started, the cows have been there several months and built up a lot of manure around the bale feeders.”

Weather is also a factor in outbreaks. If everything is wet and cattle are lying in dirty bedding and licking themselves, they are more apt to pick up heavy loads of oocysts or may ingest them when drinking out of contaminated puddles.

“Even if it’s been hot and dry, and the ground is sterile, a rain during weaning may create ideal conditions for disease — especially if the rancher brings in some calves, takes them out, brings in some more to wean, et cetera, and keeps bringing new cattle into the same contaminated weaning pen,” Faries says.



Placing feed in bunks helps to minimize the risk of coccidiosis because it keeps feed away from manure.

A hot, dry summer will sterilize pastures, and temperatures more than 100 degrees will kill the coccidia. Still, there are coccidia living inside cattle, so when it gets cooler and wetter these will recontaminate the environment. If a new group of weaned calves is brought into a confined and contaminated facility like weaning pens or a feedlot, they may break with coccidiosis within four weeks.

Prevention

The key to preventing outbreaks is sanitation by keeping the environment from becoming heavily contaminated with feces. Corrals, pens, small pastures that are used year after year, with cattle confined for calving, breeding, weaning, etc cetera are high risk environments. It helps to keep cattle more spread out or to clean up the pens now and then. If cattle can be more spread out, such as weaning the calves on pasture or using fenceline weaning or another low-stress method, risks of contracting coccidiosis may be reduced.

“Anything you can do to lower the stress at weaning could be helpful, but calves can still get coccidiosis without stress if the environment is dirty. The stress, however, could make it worse,” Campbell explains.

Another way to minimize problems is feeding off the ground, like in bunks, where cattle are less apt to defecate on the feed. It also helps to avoid contaminating water bowls and troughs.

“Most programs for coccidiosis are based on control because the infection is already there,” Faries notes. “If we move young animals to a feedlot and they have not been previously exposed to a particular species of pathogenic coccidia we might try to prevent it — because the environment we moved them to is contaminated. In a cow-calf operation, however, with all the calves getting exposed to what is already there we are just trying to keep it under control.”

Coccidiosis can be prevented with medicated feed. It is harder to medicate baby calves because they do not typically eat enough for the medication to be effective, even if they are on creep feed. Weaned calves, by contrast, can be on some kind of feed or have a water source that can be medicated.

“Calves at weaning are somewhat easier to deal with than baby calves that get coccidiosis,” Campbell says. “The younger calves usually get it before they are eating much solid feed.”

Often, a coccidiostat is given to calves to slow the multiplication of the naturally-occurring protozoa. An effective coccidiostat prevents the full development of coccidia, giving the host animal

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time to develop immunity. Coccidiostats do not kill coccidia but do slow their life cycle. The life cycle takes about three weeks.

“If it hasn’t occurred within four weeks, it won’t happen,” Faries says. “The preventive program is to use a coccidiostat for four weeks, and this would stop any incidence of disease.

“If we shut that down, we prevent further damage. There is some wounded intestine and if we don’t use something to slow it down there will be more damage,” he continues.

Coccidiosis causes tissue damage that needs to be treated to help the damaged wall heal. Antibiotics are used to fight secondary bacterial infections.

“I compare the intestinal damage to a horse that has run through a barbed-wire fence,” Faries says. “If he has a scratch or minor cut he doesn’t need treatment. If the skin got ripped open we may need to medicate it and maybe suture it. If it is torn clear down into the muscle and bleeding, we need more extensive treatment of the wound.”

Minor versus severe cases

At a basic level, calves have a simple infection in which the coccidia are a normal inhabitant of the intestine. Minor infections cause a reduction in feed efficiency, although cattle appear healthy. However, if there is damage to the intestinal lining that gets deep into the connective tissue underneath the lining, there will be symptoms, and it becomes a disease with clinical symptoms. Visible symptoms of clinical coccidiosis include watery feces, sometimes accompanied by blood. Animals also exhibit some discomfort.

“In an acute infection there may not be very many oocysts in the feces yet, but we want to shut down the infection so we use a coccidiostat to retard the multiplying,” Faries says. “This will still allow some immunity to develop. If the condition has been going on for many days and there are a lot of oocysts in the feces, the asexual cycle is probably over with and a coccidiostat won’t do much good because we are too late. That’s when we need to use an antibiotic to prevent or treat a bacterial infection instead.”

He adds, “But there may be a few calves passing blood, with watery diarrhea, possibly shedding some mucosal lining. If they are becoming anemic from blood loss, or weak and dehydrated

because they can’t absorb fluid and nutrients, they need supportive treatment.”

Cattle with severe infections, which are rare, produce bloody diarrhea, develop fever, lose their appetites, and become depressed, dehydrated and thin. Serious cases may need IV (intravenous) fluid and electrolytes if the intestine is too damaged to absorb oral fluid and electrolytes. In extreme cases, cattle can die during the acute period or from later secondary complications like pneumonia. Cattle that do survive a severe form of the infection suffer significant weight loss, which takes a long time to regain, or their growth is permanently stunted.

Natural immunity

If calves are doing okay, it may be best to let the disease run its course instead of treating it and shutting down asexual multiplication, which would interfere with development of immunity. Sometimes, no treatment is necessary even if a sample tests positive for oocysts and the prognosis may be coccidiosis.

“We have to be careful in our interpretation of a fecal sample,” Faries cautions. “If you run a fecal sample, you will always find a few [oocysts]. Thus we have to make the distinction between infection and disease.”

Generally, coccidiosis is left to run its course. Most calves recover in a few days, especially if they don’t go off feed. Often, it is best just to monitor the condition.

“If there are only a few coccidia ingested, this is beneficial, because it stimulates immunity against that species, and when the calf encounters a higher level of exposure he has some immunity and won’t get sick. If a larger number are ingested and there is some damage, the immunity kicks in and shuts down the asexual multiplying and the disease is what we call ‘self-limiting’ and ‘runs its course.’ If immunity stays strong, due to good nutrition and good health, and the calf won’t get the disease if he is exposed again later,” Faries explains.

Calves will always have opportunities to be exposed to coccidia, and, ultimately, the best way to prevent a costly outbreak is to implement effective management tactics that reduce stress and improve hygiene. **HW**

Life cycle

To prevent or control parasitic disease, we have to understand the life cycle of the parasite. Floron “Buddy” Faries Jr., DVM, with Texas A&M AgriLife Extension Services, College Station, Texas, explains how coccidia form and develop.

Oocysts from coccidia reproducing in the intestine are passed in the manure. They are very tiny and much smaller than worm eggs and consist of a thin wall around some protoplasm.

“Even though people call them ‘eggs’ — these are not eggs,” Faries says. “Eggs are formed in a reproductive process in the ovary of a worm, fertilized and passed out in the feces. Protozoa don’t have an ovary. They go through a one-cell process of reproduction.”

At this stage the coccidian is not infectious. When the coccidian comes out of the animal and into fresh manure, it then develops into four cells. Each of those four cells contains two structures called sporozoites.

“These eight sporozoites are the infective stage,” Faries says. When calves ingest one cyst, they are really getting eight coccidia. How long it takes for the simple oocyst to develop into the infective stage depends on the temperature and the weather — how cold, hot or wet it is. Normally, the process takes two to four days.

“If it gets cooler than 35 degrees, development is prolonged. If it gets hotter than 85 or 90 degrees it will also be prolonged,” Faries explains. “But at optimal temperatures the oocysts sporulate and form the sporozoites in two to four days.”

After the calf ingests sporozoites, they invade the lining of the small and large intestines. From there sporozoites get down into the mucosa where they multiply by asexual development.

Then they form a second stage called merozoites. They rupture out of the mucosal cells and invade new cells, multiply again and produce a second generation. They rupture out and go back in, and this process continues for at least four asexual multiplication cycles. After a few days with all this damage, they re-enter the mucosal lining and form male and female gametes. These unite and secrete a wall around themselves and form an oocyst — and this oocyst is passed out with feces, to start the life cycle over again.

By the time we see the oocyst under a microscope in a manure sample, damage has already been happening in the intestines, and the calf’s immune system is kicking in to fight it. “Right at the beginning, when the merozoites are re-entering the lining, this is like giving the calf a vaccination,” Faries says. “Its body starts fighting the pathogen and building immunity against that specie. If the calf is healthy, its immunity becomes fairly high, fairly quickly and there is no further damage.” **HW**

