

The Quick & the Deadly

A lethal bacteria lives in the gut of healthy animals and waits for its moment to strike.

Story & photos by **Paige Nelson**, field editor



Because of their naive immune systems, baby calves seem to be the most susceptible to clostridial diseases. One of the largest problems producers face with the bacterial family Clostridia is it naturally lives in the digestive tract of cattle. If given the chance, it strikes hard and fast.

Joe Campbell, senior veterinarian of cattle professional services for Boehringer Ingelheim Vetmedica Inc., says clostridial infections are highly fatal.

“When disease strikes, it’s often deadly,” he explained as he addressed an audience of Idaho cattle ranchers at the MacKay Livestock Supply general meeting.

“Cattle are susceptible to contamination throughout their entire lives. Usually, if we get them vaccinated well and then they have some low levels of exposure, that helps booster the vaccination; but, they still remain susceptible,” he said.

Unique to clostridial bacteria, infection is not spread by nose-to-nose contact or reproductively. Each case is isolated to the individual in which it occurs.

Campbell explained that clostridia aren’t

► **Above:** Cattle remain susceptible to clostridial diseases throughout their lives, young, nursing calves are the most at risk, especially to enterotoxemia.

choosy about who gets sick. They don’t target the poor-doing, lightweights in the herd.

“A lot of the time, it’s the best-doing calf in the bunch that dies. There’s no signs, you just find him dead,” he noted.

Clostridial diseases strike quickly; they don’t leave much of an open window for treatment. Campbell said occasionally there is time for treatment, but don’t count on it.

He added, “There are a few cases where we may get lingering disease, they might show some signs for few days and then gradually go downhill and eventually die.

“These are very fast-acting organisms, and the toxins that they produce work quickly, as well.”

Clostridia prefer to grow in areas lacking oxygen — hence their ability to survive with other anaerobic microbes in the gut.

The bacteria are only the start of the problem. Clostridia bacteria produce deadly spores. These spores are released into the environment where they can live up to 100 years in the right conditions.

“Those spores get into the soil, especially along creeks and rivers. They just basically lay there in nice, moist, protected-from-the-sun environments,” Campbell described.

There are two common ways for cattle to pick up a Clostridial disease, he explained.

Ingestion — Spores are ingested when animals graze or are fed crops contaminated during the harvest. Drought and flooding are also causes for ingestion.

“During drought, animals are

overpastured. They eat closer to the ground and pick up more and more dirt. In the case of a flood, the spores come out on top of the grass, then the water goes away, and the spores are left on the ground,” he said.

Wound contamination

— Clostridial bacteria or spores find their way into the body through a contaminated wound site.

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Common clostridial diseases

Blackleg — *Cl. chauvoei*

Instead of being a nice red color, blackleg causes any muscle, not just the leg muscles, to be blackened in color.

Most generally, blackleg occurs in young calves that have ingested spores, he added. The spores travel through the bloodstream and basically end up in large muscle masses. When an injury occurs in that muscle, like a bruise, the oxygen level drops. The bugs begin to grow and release toxins.

“That toxin damages the tissue, which makes more area for more bacteria to grow until it consumes the animal. Commonly, we

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just find these guys dead,” said Campbell. “Rarely do we find one that is limping or showing any clinical signs.”

Malignant edema – *Cl. septicum*

Malignant edema, also known as *Cl. myositis* (inflamed muscle), is very similar to blackleg.

“We see it very commonly in postpartum dairy cows — where small tears happen during the birth process and then pick up the contaminant. It can also happen in beef cows in the same way,” Campbell described.

Red water – *Cl. haemolyticum*

When liver flukes migrate through the liver, they create a damaged liver with dark spots throughout. The damaged tissue allows the *haemolyticum* to grow. One of the toxins produced by *haemolyticum* breaks down the red blood cells, causing the urine to turn red and bloody.

Tetanus – *Cl. tetani*

Tetanus is sometimes called the sawhorse stance because infected animals are so rigid they can't move. *Tetani* spores enter the body through a puncture wound, or around an elastrator band or in an umbilical infection and propagate in the damaged tissue surrounding the injury.

“It produces basically two toxins,” says Campbell, a neurotoxin that paralyzes the animal and another toxin that helps break down more tissue so more bacteria can grow.

When needed, Campbell prescribes giving two doses of a tetanus toxoid.

“When banding older bulls, for example, every tetanus toxoid on the market requires two doses. A single dose at the time of banding is not sufficient. We've had years when people have called up because they've lost 30 to 40 bulls,” he emphasized.

Enterotoxemia/overeating disease/ purple gut disease – *Cl. perfringens*

“We don't know all the answers about what causes enterotoxemia,” said Campbell, “but we do know that it's most generally associated with some sudden change in the digestive function of those calves.”

A common scenario, described Campbell, are early spring storms in areas with young, nursing calves. During the storm the baby calf doesn't get up and nurse, so his mama fills up with milk. When the weather finally lets up, the cow finds her calf and gets him up. The now-hungry calf fills his empty gut with loads of milk.

“That's a big change. Those are the types of changes that can play a part in setting this off,” said Campbell.

“There's basically five types [of *Cl. perfringens*] based on which one of the toxins they produce. The ones that we most



► Clostridia bacteria normally live in the intestinal tract of the animal and strike when given the chance, either through ingestion or a contaminated wound. Often there are no clinical signs of disease.

generally see in the U.S. are Types C and D. Type A has become more and more common, especially as we have suppressed the expression of Types C and D. There's also a Type E that I have seen come up on a few diagnostic reports,” Campbell explained.

Similar to the previously mentioned clostridial diseases, day-old calves to month-old calves can be stricken, and often, they are just found dead.

Campbell said, occasionally, a clinical sign of colic — a calf kicking at its belly, bawling, standing up then laying down repeatedly, showing discomfort — is spotted in live calves.

When an otherwise healthy-looking calf is found dead, Campbell advised having a veterinarian do a necropsy and then



► *Cl. tetani* spores enter the body through puncture wounds. They release a neurotoxin that paralyzes the animal. Then a second toxin breaks down the surrounding tissue, letting more bacteria grow.

diagnostics. Taking samples is critical, said Campbell, because just finding the bacteria in the gut doesn't mean it is the culprit for the dead calf. If the bacteria released toxins, however, their effects can be spotted on organ tissues under a microscope.

Today, there is a polymerase chain reaction (PCR) test that will show which type of *perfringens* attacked the calf, an essential fact to developing an appropriate plan, said Campbell.

He explained that current commercial vaccines protect against Types C and D. Because of the toxins they have, this vaccine will also cross-protect against Type E. There is only a conditional vaccine on the market for Type A.

He advised vaccinating the cow before she calves, so she can produce antibodies for her colostrum. That colostrum will provide antibodies to help protect the newborn for three to four weeks. Vaccinate the calf at birth, he said. The vaccination will kick in at about three weeks of age. Then stand ready with Types C and D antitoxin in case there are some breaks during the calf's nursing period.

“As a general rule we may not be able to eliminate enterotoxemia, but we can surely reduce the incidence that we see,” said Campbell.

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Editor's Note: Paige Nelson is a cattlemaster and freelance writer from Rigby, Idaho.