

Nutrition Edition

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* Clostridial diseases do not grow in healthy animals and are easily prevented with vaccines.

Clostridial Disease Unpacked

Vic Cortese, DVM, Ph.D., breaks down clostridial identification, prevention and treatment.

by Kayla Jennings

Clostridial disease is often overlooked by many cattle producers and researchers today. It is an age-old disease that does not often see new breakthroughs. However, considering its toxicity, Vic Cortese, DVM, Ph.D., technical director of cattle immunology and biologics with Zoetis, argues it is critical to keep in mind.

Cortese broke down the technicalities of clostridials and provided several preventive strategies and vaccination protocols for producers to reduce their risk at the Cattlemen's College during the National Cattlemen's Beef Association Convention in Phoenix earlier this year. He says while the disease has been around a long time, there are still many misconceptions about the disease itself and treatment strategies.

Identification

Cortese mentions several producers facing clostridial diseases on their operation. He notes a common worry is the potential of an epidemic. However, contrary to popular belief, he says clostridials cannot spread amongst animals. They are fast-acting bacteria that are not contagious. Further, he notes, "The most important thing that you need to know about clostridials, is that clostridials cannot grow in a healthy animal. Clostridials require the blood flow to be disrupted in order for clostridial bacteria to grow."

While there are several types of bacteria within the clostridium family, they share several commonalities. First, the bacteria require anaerobic conditions to grow. In order to create an anaerobic condition, blood flow must be disrupted. Some examples are during band castration or bruising while being hauled.

"That is why clostridials are not contagious," he explains. "Because in order for it to spread, that animal has to have some kind of damage done, as well."

Secondly, clostridials are designed to break down organic material – which is why they grow where there is no oxygen. "They grow in dead material – it is nature's garbage disposal."



Additionally, clostridials release some of the most lethal toxins known. In fact, the number of *Costridium botulinum* it would take to fill the head of a needle would be enough to kill the population of New York City. Unfortunately, they are not only lethal but also very durable. They can adapt to a multitude of environmental conditions and can survive decades in the soil of a farm.

There are two types of poisons released by clostridial bacteria – endotoxins and exotoxins. Cortese says endotoxins are components of bacteria that are toxic and released when an animal dies. Exotoxins are released as a part of the life cycle. Cortese says exotoxins tend to be more dangerous than endotoxins, but vaccines are designed to protect against both.

Interestingly enough, the bacteria lie dormant as spores in the soil across the country when the environment is not fair for them to thrive. "These spores are how they [bacteria] survive in the soil," Cortese explains. "These spores are extremely environmentally resistant. They are resistant to cleaning; they are resistant to disinfectants, and to drying or freezing. That is how they survive on your property."

He says as the animals are grazing, they pick up these spores, and the spores will circulate through the body. If there is no obstruction of blood flow, they get passed back out.

Cortese divides clostridial diseases into three categories based upon which toxins they release: enterotoxins, histotoxins and neurotoxins. Enterotoxins affect the gastrointestinal tract causing overeating disease, specifically in young calves, and metabolic deaths in arrival cattle. These types of clostridials are perfringens A through D.

"Histotoxins are bacteria that cause gangrene," Cortese notes, "or they cause a lot of gas formation in the tissues. These are the ones that cause your muscle lesions." Some of the specific diseases are blackleg, malignant edema, gas gangrene and redwater disease. Cortese says redwater disease is unique because it is only found in areas where liver flukes are present.



Neurotoxins, which attack the nervous system, are the last category. With this toxin, producers can expect to see tetanus and botulism.

Cortes divides all the bacteria into two disease categories: intestinal and muscle diseases.

The most common intestinal disease is overeating. “Like all clostridials, it requires a change in blood flow, but now the change is blood flow is going to be in the digestive tract — primarily from overeating,” Cortes indicates.

Overeating can be expected in the high performing calves, which are consuming a lot of milk. “One of the things we can do here to limit clostridial perfringens is try to keep the nursing consistent throughout the day,” he advises.

Additionally, intestinal disease from clostridials can occur when there is too rapid of a ration change.

Cortes says there are fewer action items combatting muscle diseases because they result in sudden death most of the time. A postmortem examination of these animals will reveal an influx of black muscle or gas.

Prevention and treatment

He says the four primary strategies to minimize risk on an operation are promoting consistency in feed and intakes, minimizing overcrowding in pens and trailer, minimizing overgrazing and minimizing access to areas with rotting vegetation.

“When you overgraze an area, two things occur: cattle tend to pick up more of the soil as they are deep grazing, so they are more likely to pick up more spores,” he explains. “The second thing is we tend to work up more of that soil, so more of the spores make their way up to the surface.”

In addition to minimizing risks from a managerial perspective, Cortes advises producers to employ a vaccination protocol that fits their needs. He says clostridium vaccines come in many combinations, so selecting the correct option is sometimes challenging.

“The first way to begin to contain *Clostridium perfringens* in your young calves is by vaccinating mom,” he advises. “There is very good transfer of *Clostridium perfringens* antibodies in the colostrum.” The optimum timeframe to maximize production of antibodies in colostrum

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is between six and nine weeks prior to calving.

Depending on the producer’s timeline, Cortes says including clostridials with other vaccines is an option. However, perfringens protection decreases with the larger combination of vaccines.

Many producers also try to include viral vaccines during this process. However, “The work shows that when I vaccinate calves for the first time with their viral vaccines with an injectable IBR [infectious bovine rhinotracheitis] and a clostridial, only about one out of three will respond to that clostridial with a protective response,” Cortes warns.

In older calves, Cortes strongly advises

producers to provide not only the first round of vaccines to protect them but also a booster. “Booster shots should be no closer than 14 to 21 days apart and no further than 90 days,” he explains.

Environment used to be the only dictator of vaccination frequency. “The big change today has been the change in beef to go to synchronization programs,” he explains. Prostaglandins used to synchronize cattle actually inhibit blood flow at the injection site — setting up an anaerobic environment. He advises producers who are using prostaglandins to also administer a clostridial vaccine each year regardless of geographic location.

Because many clostridial vaccines have been known to give some type of long-term muscle lesion, or knot, Cortes suggests all clostridial vaccines be administered subcutaneous. In addition, Cortes advises producers to store the vaccine between 35 to 45 degrees Fahrenheit, to use it within 30 days and to dispose of frozen vaccines.

He indicates some reexamination needs to be done on vaccination protocol on several operations. Employing the correct plan is yet another way to increase efficiency on an operation long-term.

“If we time our vaccinations right and we look at our vaccination protocols to make sure that we are maximizing our clostridial protection, and if we look at doing some of the prevention things that we now know to decrease the uptake of spores,” he explains, “we can really limit the amount of clostridials that you may see in your facility.” **HW**