



Cattle Producer's Handbook

Animal Health Section

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Clostridial Diseases

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The clostridial diseases are a group of mostly fatal infections caused by bacteria belonging to the group called *Clostridia*. These organisms have the ability to form protective shell-like forms called spores when exposed to adverse conditions. This allows them to remain potentially infective in soils for long periods of time and to present a real danger to the livestock population. Many of the organisms in this group are also normally present in the intestines of man and animals.

Blackleg

Blackleg is a disease caused by *Clostridium chauvoie* that primarily affects cattle under 2 years of age and is usually seen in the better doing calves. The organism is taken in by mouth. Symptoms first noted are lameness and depression. A swelling, caused by gas bubbles, often can be felt under the skin as a crackling sensation. A high temperature is present. Occasionally, sudden death occurs with no symptoms observed.

Upon a postmortem examination, the infected area is composed of black, dead (necrotic) muscle that is pocketed with gas bubbles and is usually found in the heavier, more active muscle masses of the animal. A sweetish odor of rancid butter may be detected from a fresh lesion. Lesions may occasionally be discovered in the diaphragm, heart, or tongue. Diagnosis is based on the symptoms of lameness with a gaseous swelling under the skin in young cattle and is confirmed by postmortem and laboratory tests.

The chances for survival are poor unless symptoms are discovered early in the disease. Large doses of penicillin may save the life of the animal if administered early.

Prevention is readily accomplished by the use of Blackleg bacterins, which over the years have proven very effective. Vaccination at less than 4 months of age will not produce a lasting immunity. Calves vaccinated at less than 4 months should be revaccinated at 5 to 6 months.

Malignant Edema

Malignant edema, a disease of cattle of any age caused by *Cl. septicum*, which is found in the feces of most domestic animals and in large numbers in the soil where livestock populations are high. The organism gains entrance into the body in deep wounds and can even be introduced into deep vaginal or uterine wounds in cows after difficult calving.

The symptoms are those primarily of depression, loss of appetite, and a wet doughy swelling around the wound that often gravitates to lower portions of the body. Temperatures of 106°F or more are associated with the infection. Death frequently occurs in 24 to 48 hours.

Postmortem lesions seen are those of necrotic, darkened, foul-smelling areas under the skin, often extending into muscle. Very little, if any, gas is associated with the swellings.

Diagnosis is based on the history of illness in unvaccinated cattle, typical symptoms, and postmortem lesions with laboratory confirmation. Treatment with massive doses of penicillin is occasionally successful in cases observed early.

The disease can be prevented by the use of *Clostridium septicum* bacterins usually produced in combination with other bacterins.

Clostridium Novyi

Infections caused by *Cl. novyi*, infrequently called Black disease, occur sporadically in cow-calf operations. They are more often seen under feedlot conditions. The route of infection and transmission are not known; however, the organism is thought to gain entrance into the body by a wound infection, or possibly taken in orally. Only sudden deaths are thought to occur, and sick cattle are not generally recognized.

Postmortem lesions are similar to those of *Cl. septicum* with a wet, foul smelling lesion being present.

Diagnosis is based on the history of sudden death, significant postmortem lesions, and positive laboratory confirmation on fresh tissue. No treatment is recognized due to the sudden death aspect of the disease.

Clostridium novyi bacterins are available in combination with other clostridial bacterins and are generally thought to offer greater and more solid protection with two injections given 4 to 6 weeks apart.

Clostridium Sordellii

Cl. sordellii is a sudden death disease of feedlot cattle primarily, infrequently seen in cows. The route of transmission is unknown, but thought to be by mouth. No symptoms are observed as only dead animals are found.

The postmortem findings are somewhat specific, as they tend to be found in the areas of brisket and throat, consisting of massive black hemorrhage and smelly muscle necrosis with no gas formation. No treatment is of value as sick animals are not observed.

The diagnosis is based on the history of sudden death, with the typical postmortem lesions of the brisket and throat and by laboratory confirmation. *Clostridium sordellii* bacterins are available.

Tetanus

Tetanus in cattle is caused by *Cl. tetani*. Although cattle are less susceptible to tetanus than most other animals, it can occur. The organism lives in the intestines of many animals and is found widespread in soil. The organism is introduced into wounds created by punctures or lacerations caused either by accident or following "dirty surgery."

The organism does not actively invade tissues creating a larger more noticeable wound, but remains in the small area where introduced and produces powerful toxins or poisons that primarily attack nerve tissue, affecting both the spinal cord and brain.

The symptoms observed are those of muscle spasms, sometimes violent, brought about by sudden sounds or touch. The spasms make normal locomotion difficult, and animals are often seen uncoordinated in early cases. Also, in early stages, the ears are erect, the tail is stiff and elevated, and the third eyelid located in the corner of the eye is seen to protrude partially across the eye.

In general, about 60 percent of affected untreated cattle die. No lesions are found at postmortem, and only occasionally can the original offending wound be found. Diagnosis, therefore, is based on typical clinical signs and perhaps the history of a recent wound.

Treatment consists of tranquilization of the animal and antibiotics, preferably penicillin, to stop the organisms from producing further toxins. Tetanus antitoxin may be used in large doses, but some question its effectiveness in treatment. Supportive treatment to prevent dehydration and starvation may need to be given for 1 to 4 weeks.

Prevention is best accomplished by making sure lots and pasture areas are free from objects that may cause puncture wounds, and by accomplishing surgical procedures as cleanly as possible. In areas of high risk, tetanus antitoxin can be given at the time of surgical procedures.

Clostridium Hemolyticum

Cl. hemolyticum causes an infection commonly called redwater disease. The disease has somewhat limited geographic locations, occurring mostly in Montana and along the coast of Texas, being found primarily in marshy lowlands. Nevada, Idaho, California, Oregon, and Washington all have problems with *Cl. hemolyticum*.

The organism, taken in orally, is frequently associated with liver fluke infection. Liver tissue damage caused by the flukes allows the bacteria to proliferate, grow, and produce powerful toxins, that destroy red blood cells, spilling the released red hemoglobin into the urine, hence the name redwater disease.

Symptoms seen are those of depression, anemia, bloody diarrhea, red stained urine, high temperature, collapse, and death in 1 to 3 days. Postmortem lesions are those of an extremely pale animal, red-stained urine in the bladder, thin watery blood, and usually a large necrotic area in the liver.

Treatment is usually of no avail unless begun early. Large doses of penicillin may help. A bacterin is available for use in areas where the disease appears, but must be given every 6 months. More frequent vaccination may be necessary in heavily infected areas.

Enterotoxemia

This disease condition is caused by *Cl. perfringens*. This organism is found throughout the world in the lower intestinal tract of man and animals. The disease entity seen most frequently in the cow-calf operation is hemorrhagic enterotoxemia, caused by *Cl. perfringens* type C.

There does seem to be somewhat of a geographical limitation to the condition, as it is seen most frequently in the mountain states and the western parts of Kansas, Nebraska, and South and North Dakota. It is, however, seen sporadically in the remainder of the Great Plains area.

As *Cl. perfringens* is a normal inhabitant of almost all mammals, a specific set of circumstances must exist for the disease to present itself to the animal: (a) The type C strain of the bacteria must be present in the intestinal tract; (b) the bacteria must have an abundance of nutrient, especially carbohydrates, for the bacteria to attack, as for instance, would be present in milk; and (c) there must be at least a partial slowdown or stoppage of intestinal tract movement brought about by ingesting a particularly large amount of feed, allowing the toxins to accumulate and be absorbed in the gut.

These conditions could be met in the case of a young, vigorous week-old calf who, after exercise, develops a real hunger, and drinks more than its normal amount of milk from a good milking dam, overloads its digestive tract, and the right conditions exist.

The disease is usually seen then in calves 1 week of age or less. Although riders may find only dead calves, more often the symptoms observed are those of acute abdominal pain as evidenced by kicking at the stomach and straining. Later the calves go down, frequently go into "padding" type convulsions and die, usually within 12 hours after symptoms are noted. Infrequently a bloody diarrhea may develop before death.

At postmortem one finds spectacular lesions of an extremely reddened section of the small intestine, several inches to several feet in length, which can be seen as soon as the abdominal wall is opened. A blood-tinged thick fluid is found when the gut is opened. Hemorrhages may be found on the heart and thymus as well.

Diagnosis is based on the typical clinical symptoms and the spectacular lesion at postmortem. A definitive diagnosis can be made in the laboratory with gut content. However, it must be collected and frozen or delivered to the laboratory within 6 hours of death.

There is no treatment of value as the animals almost always die following the appearance of symptoms. The disease can be prevented by giving the calf an injection of *Clostridium perfringens* type C antitoxin (antiserum) as soon as possible after birth. One preventive injection seems to protect almost all of the calves through the dangerous early period of life.

A more efficient method of protection, if there is a history of a problem with the disease on the premises, is to vaccinate the cows with *Clostridium perfringens* type C toxoid. Two doses are given during pregnancy and a yearly booster thereafter. The vaccine should be given in late gestation for maximum benefit. This allows the cow to produce her own antitoxin in the colostrum and therefore protects the calf after nursing. Vaccine should be given in late gestation for maximum benefit.

Sporadic outbreaks of type D enterotoxemia do occur, but infrequently, usually occurring in calves after weaning and while on dry feed.

Calves dying of type D do not show the spectacular bloody intestinal lesions at postmortem but have hemor-

rhages on the heart and thymus. A laboratory confirmation is necessary to absolutely diagnose type D.

Types C and D enterotoxemia, of course, do occur in feedlot cattle, but rarely in mature stock cows.

Botulism

Botulism caused by *Cl. botulinum* occurs only rarely in the United States and has only been reported in Texas. The organism is found as a contaminant in feeds usually present in a decomposing animal, such as a rabbit or rat, which, as it grows in the small animal, produces a powerful toxin that leaks out into the surrounding feedstuff. When cattle ingest the contaminated feed, the symptoms are those of progressive paralysis ending in death.

No significant lesions are present at postmortem. No treatment is of value. Since the disease is so sporadic and rare, no preventive bacterins are available for cattle. Diagnosis must be based on presumptive evidence, and definitive diagnosis is almost impossible.

Clostridium Biological Products

The following biological products (bacterins, antitoxins, and toxoids) for immunizing cattle against clostridial diseases have been licensed by USDA for production in the United States. Some of the less widely used products may not be available in all areas.

Consult your local veterinarian for his recommendations for your particular herd health program.

Bacterins

1. *Clostridium chauvoei*
*Pasteurella hemolytica-multocida**
2. *Clostridium chauvoei*
*Pasteurella multocida**
3. *Clostridium chauvoei*
Clostridium septicum
4. *Clostridium chauvoei*
Clostridium septicum
*Pasteurella hemolytica-multocida**
5. *Clostridium chauvoei*
Clostridium septicum
*Pasteurella multocida**
6. *Clostridium haemolyticum*

Antitoxins

1. *Clostridium perfringens* type D
2. *Clostridium perfringens* type C
3. *Clostridium perfringens* type C & D

Bacterin-Toxoids

1. *Clostridium chauvoei*
Clostridium septicum
Clostridium novyi

*Causes secondary bacterial pneumonia.

2. *Clostridium chauvoei*
Clostridium septicum
Clostridium novyi
Clostridium sordellii
3. *Clostridium chauvoei*
Clostridium septicum
Clostridium novyi
Clostridium perfringens type C & D
4. *Clostridium novyi*
5. *Clostridium novyi*
Clostridium sordellii
6. *Clostridium novyi*
Clostridium perfringens type C & D
7. *Clostridium perfringens* type C
8. *Clostridium perfringens* type D
9. *Clostridium perfringens* type C & D

Common terminology of disease conditions caused by:

Clostridium chauvoei—blackleg

Clostridium chauvoei—malignant edema

Clostridium novyi—black disease

Clostridium sordellii—big head

Clostridium perfringens C & D—enterotoxemia or overeating

Summary

The clostridial diseases as a group present a unique problem in control and diagnosis. Cow-calf operators should work closely with local veterinarians in evaluating the prevalence of these agents in their area. As was noted in the discussion, prompt postmortem examinations and tissue collection for laboratory testing are essential for an accurate diagnosis.

Duration of Immunity

In highly contaminated areas, it may be necessary to revaccinate cattle with these vaccines several times each year. Consult your local veterinarian to see if this is necessary in your area.

