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NebGuide

PUBLISHED BY COOPERATIVE EXTENSION SERVICE
INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES
UNIVERSITY OF NEBRASKA - LINCOLN

G77-326
(Revised September 1981)

Clostridial Diseases of Cattle

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The Clostridial diseases are a group of frequently 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, presenting a significant 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, a disease caused by *Clostridium chauvoei,* primarily affects cattle under two years of age and is often seen in the better doing calves, occasionally even while still nursing. This organism is taken in by mouth. Symptoms (clinical signs) first noted are those of lameness and depression. A swelling, caused by gas bubbles, can often be felt under the skin as a crackling sensation. A high temperature is usually present. Occasionally, sudden death occurs with no clinical signs observed.

A post mortem examination shows the infected area to be composed of black, dead muscle that is pocked with gas bubbles and usually located in the heavier, more active muscle masses of the animal. A sweetish, "rancid butter" odor may be detected from a fresh lesion. Lesions may occasionally be present in the diaphragm, heart or tongue. Diagnosis is based on the signs of lameness and occasional sudden death, with a gaseous swelling under the skin in young cattle. It is confirmed by post mortem and laboratory tests.

The chances for survival from blackleg 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 using blackleg vaccines which, over the years, have proven very effective. Vaccination at a very young age will not produce a lasting immunity, however, and calves vaccinated during those times should be revaccinated at 5 to 6 months.

Malignant Edema

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

The symptoms are primarily those of depression, loss of appetite and a wet, doughy swelling around the wound which often gravitates to lower portions of the body such as the belly wall or lower limbs. Temperarures of 106 °F (41 °C) or more are often associated with the infection, with death frequently occurring in 24 to 48 hours.

Post mortem lesions seen are those of wet, darkened, foul smelling areas under the skin, often extending into muscle. Very little gas, if any, is associated with these swellings.

Diagnosis is based on the history of illness in unvaccinated cattle, typical signs and post mortem lesions with laboratory confirmation. In cases observed early, treatment with massive doses of penicillin is occasionally successful.

Malignant edema can be prevented by the use of *Clostridium septicum* vaccines, which are usually produced in combinations commonly known as 2-way, 4-way or 7-way vaccines.

Clostridium Novyi

Infections in cattle caused by *Cl. novyi,* infrequently called Black disease, occur sporadically in cow-calf

operations but are more often seen under feedlot conditions. The route of infection and transmission are not known, however, it is thought to gain entrance into the body by wound infection, or possibly taken in by mouth. Only sudden deaths are thought to occur and cattle sick with the disease are not generally recognized.

Post mortem 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 post mortem lesions and positive laboratory confirmation on *fresh tissue.* No treatment is recognized due to the sudden death aspect of the disease.

Clostridium novyi vaccines are available in combination with other bacteria and are generally thought to offer greater and more solid protection with two injections given four to six weeks apart.

Clostridium Sordellii

Cl. sordellii is a sudden death disease primarily of feedlot cattle. It is infrequently seen in cows. The route of transmission is unknown, but is thought to be by mouth. Clinical signs are not observed as only dead animals are found.

The post mortem findings are somewhat specific. They tend to be found in the brisket and throat areas, consisting of massive black hemorrhage, foul odor and muscle damage with no gas formation. Treatment is of no value as sick animals are not observed prior to death.

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

Tetanus

Tetanus in cattle is caused by *Cl. tetani.* Although cattle are less susceptible to tetanus than most other animals, it does 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 during calving, accident or following "dirty surgery."

The organism does not actively invade tissues, creating a larger, more noticeable wound or lesion, but remains in the small area where it was introduced, producing powerful toxins or poisons which are absorbed by the body. These toxins primarily attack the nervous tissue of the spinal cord and brain.

The symptoms observed are those of muscle spasms, which are sometimes violent, brought about simply by moving, sudden sounds or touch. The spasms make normal locomotion difficult and animals are often incoordinated in early cases. In early stages, the ears are erect, the tail 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 untreated affected cattle die. No lesions are found at post mortem, 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 or surgery.

Treatment consists of tranquilizing the animal and the use of antibiotics, preferably penicillin, to stop the organisms from producing further toxin. Tetanus antitoxin may be used in large doses, but some authorities question its effectiveness in treatment after symptoms have been noted. Supportive treatment to prevent dehydration and starvation may be needed for 1 to 4 weeks.

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

Clostridium Hemolyticum

Cl. hemolyticum causes an infection commonly called red water disease. This disease is somewhat limited geographically, occurring mostly in Montana and along the coast of Texas, and is associated primarily with marshy lowlands. Occasional cases are diagnosed in Nebraska.

Taken in by mouth, this organism is frequently associated with liver fluke infection. Liver tissue damage caused by the flukes allows the bacteria to proliferate, grow and produce powerful toxins which destroy red blood cells, spilling the released red hemoglobin into the urine, hence the name red water disease.

Symptoms seen are those of depression, anemia, bloody diarrhea, red stained urine, high temperature, collapse and death in 1 to 3 days. Post mortem signs are those of an extremely pale (anemic) animal, red stained urine in the bladder, thin watery blood, and usually a large dark area of dead tissue in the liver.

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

Enterotoxemia

Enterotoxemia 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 seems to be a geographical limitation to this

condition, as it is seen most frequently in the mountain states and the western part of Kansas, Nebraska, and the Dakotas. It is, however, also seen sporadically in the rest of the Great Plains area.

As *Cl. perfringens* is a normal intestinal inhabitant of almost all mammals, the following specific set of circumstances must exist in order for the disease to affect the animal:

(a) The type C strain of *Cl. perfringens* must be present in the intestinal tract;
(b) there must be an abundance of nutrients, especially carbohydrates for organism growth, such as would be present in the milk;
(c) there must be at least a partial slow down or stoppage of intestinal tract movement brought about by ingesting a particularly large amount of feed, allowing the toxins of *Cl. perfringens* to accumulate and be absorbed in the gut.

Enterotoxemia is usually seen in calves one week to 10 days of age or less. Although observers may find only dead calves, often the visible signs are those of acute abdominal pain as evidenced by kicking at the stomach and straining. Later the calves go down, frequently developing "paddling" type convulsions, and die, usually within 12 hours after symptoms begin. A bloody diarrhea may occasionally develop prior to death.

Spectacular lesions seen at post mortem are those of an extremely reddened section of small intestine, of various lengths, that can be easily 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 signs and the spectacular lesion at post mortem. A definitive diagnosis can be made in the laboratory with gut content, but it must be collected and frozen or delivered fresh to the laboratory within six hours of death.

There is no treatment of value as the animals almost always die following the appearance of signs. 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.

However, if there is a history of a problem with the disease on the premises or in the herd, a more efficient method of protection is to vaccinate the cows with *Clostridium perfringens* Type C Toxoid. Two doses are given during late pregnancy and a yearly booster thereafter. This allows the cow to produce her own antitoxin in the colostrum which protects the calf after it begins nursing.

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

Calves dying of type D do not show the spectacular, bloody intestinal lesions at post mortem, but may have hemorrhages on the heart and thymus. A laboratory confirmation is necessary to absolutely diagnose type D.

Types C & D enterotoxemia also occur infrequently in feedlot cattle, but rarely in mature stock cows.

Botulism

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

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

Diagnosis of Clostridial Diseases

Definitive diagnosis of clostridial diseases in cattle is difficult because most of the bacteria that cause the various diseases are found normally in the intestinal tract. They can escape rather rapidly into the tissue from that location after death from other causes. They then may be isolated from the decomposing tissue and mistakenly blamed for the problem. It is, therefore, very important that only tissues from freshly dead carcasses be submitted for autopsy and laboratory confirmation. Laboratory confirmation is important because of the similarity of many of these diseases. Vaccination history and clinical signs are also important items of information needed when attempting to make an accurate diagnosis.

Clostridial Vaccines

A confusingly large number of vaccines containing clostridial organisms are available for use. At least 40 different combinations are currently (1981) licensed by the USDA, many of which are manufactured by different companies. Many are in combination with nonclostridial bacteria such as *Pasteurella sp.*

The choice of the vaccine to be used should be based on the judgment of local disease incidence as viewed by area veterinarians. Consult your veterinarian about costs and risk factors before choosing any vaccine.

Summary

As a group, the clostridial diseases present a unique problem in control and diagnosis. The cattle producer should work closely with his local veterinarian in

evaluating the prevalence of these agents in his area. Prompt post mortem examinations and tissue collection for laboratory testing are essential for an accurate diagnosis.

Common names of Clostridial diseases.

Name	*Caused by*
Blackleg	Clostridium chauvoei
Malignant edema	Clostridium septicum
Black disease	Clostridium novyi
Black neck	Clostridium sordellii
Red water disease	Clostridium hemolyticum
Botulism	Clostridium botulinum
Enterotoxemia *or* overeating	Clostridium perfringens C & D

File Under: ANIMAL DISEASES
A-14, Cattle

Revised September 1981, 10,000

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture
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