

Blackleg and Other Clostridial Diseases in Cattle

► The term “blackleg” is often used today to describe several diseases caused by organisms in the *Clostridium* class of bacteria. Learn about various clostridial diseases, how they are transmitted, signs of the disease in a calf, prevention, and treatment.

What is blackleg?

Blackleg has been recognized as a livestock disease since before medieval times, and today we often use the term loosely to describe several diseases caused by organisms in the *Clostridium* class of bacteria. However, there are more than 60 different types of *Clostridium* bacteria, and not all cause disease.

What we commonly call blackleg is a highly fatal infection caused by *Clostridium chauvoei*, resulting in a gas gangrene in the muscle of young cattle, usually occurring between 4 months and 2 years of age. Blackleg seldom affects cattle older than 2 years of age, most likely due to immunity induced by vaccines or natural exposure. However, sporadic cases do occur in cattle older than 2 years and are often associated with the reuse of needles for multiple injections. Blackleg can also be a problem in cattle less than 4 months old that do not receive adequate passive immunity through colostrum. Some of the other clostridial diseases are not as restricted to younger animals as is seen with blackleg.

What are other clostridial diseases?

Some diseases caused by other clostridial bacteria include lockjaw (tetanus), botulism, enterotoxemia, red water (bacillary hemoglobinuria), and malignant edema. The type of disease depends on the particular type of *Clostridium* and the type and location of toxins produced.

In a case of tetanus caused by *Clostridium tetani*, the toxins from bacteria growing in contaminated wounds cause uncontrollable muscle spasms. With botulism, caused by *Clostridium botulinum*, the ingestion of toxins in contaminated food or water causes paralysis, a profound weakness, and death. In enterotoxemia caused by *Clostridium perfringens*, the organisms in a young animal's gut overgrow the normal microflora and form toxins that cause severe poisoning and death. In the case of red water, the spores of *Clostridium hemolyticum* grow in the animal's liver, usually in areas damaged by liver fluke parasites. These spores sometimes cause the animal to pass dark red urine and may cause severe sickness and death. With malignant edema, caused by a number of different clostridial bacteria, muscle or skin is infected with bacteria, toxins are produced, and death can result. Malignant edema is very similar to blackleg in that it

results in gas production in the muscle, followed by severe swelling in body tissues.

Different species of animals have different susceptibilities to clostridial disease. Blackleg is probably the most common clostridial disease seen in cattle in the southeastern United States, while tetanus is the most common clostridial disease in horses. Tetanus does occur in cattle, particularly in older steers after castration, but it is not very common.

How are clostridial bacteria transmitted?

Clostridial bacteria are found in the soil virtually everywhere that livestock have been kept. In the presence of oxygen, the bacteria form spores that allow them to resist environmental changes and survive in the soil in a dormant state for years. Animals are infected by ingesting feed or pasture contaminated with clostridial spores.

Certain environmental conditions can aid transmission of clostridial bacteria. Animals that die from blackleg or other clostridial diseases can seed the environment with clostridial spores; therefore, these animal carcasses should be burned or buried in deep pits. Blackleg and clostridial disease outbreaks are often associated with land excavation or flooding that causes large amounts of spores to resurface.

What are the signs of blackleg in a calf?

The exact disease process of blackleg is not completely understood, but it often occurs in calves growing rapidly on a high plane of nutrition. Once ingested, the bacteria can sometimes pass through the intestinal wall, enter the bloodstream, and be deposited in muscles or other tissues. Under certain conditions, the bacteria proliferate rapidly, producing toxins that cause muscle death and eventually death of the animal. Blackleg often occurs with no history of open wounds, although bruising or excessive activity precipitate cases due to the resulting muscle damage. The muscle damage creates an environment that is devoid of oxygen and conducive to replication of *Clostridium chauvoei* in the damaged tissue.

A calf with blackleg will often be depressed and have swelling of a muscle or group of muscles. The skin will sometimes be discolored and may “crackle” when it is touched. If the muscle is cut into, it will contain dark areas, hence the name blackleg.

The cut tissue will often contain a foul-smelling liquid and gas, which is formed by the clostridial bacteria in the muscles. Sometimes the animal will appear lame on the affected leg before any other sign is noticed. The infection can occur in areas other than leg muscle, such as in the tongue, diaphragm, udder, or brisket. Because the disease develops over a short period of time (12 to 48 hours), calves with blackleg are often found dead without any prior signs of trouble.

How can you tell that blackleg is the cause of disease?

If an animal dies suddenly, your veterinarian should conduct a necropsy to attempt to determine the cause. With blackleg, an on-farm necropsy may often be enough to establish a diagnosis. However, this is not always true, and a more complete necropsy is sometimes necessary. Muscles such as the tongue and diaphragm may be the site of the infection, and unless a thorough necropsy exam is conducted, these muscles may be overlooked. Laboratory work such as microscopic examination of organs, at a veterinary diagnostic lab, may be necessary to confirm a diagnosis of clostridial disease. If a veterinarian is not readily available to conduct a necropsy, submit the animal directly to one of the four Alabama Department of Agriculture and Industries Veterinary Diagnostic Laboratories located in Auburn, Boaz, Elba, or Hanceville:

Auburn	334-844-4987
Boaz	256-593-2995
Elba	334-897-6340
Hanceville	256-352-8036

Can blackleg be treated?

Some calves may recover if treated very early in the course of blackleg with appropriate doses of an antibiotic, such as penicillin. However, since blackleg develops so rapidly, most affected animals are not able to be treated at all, and those that do receive treatment are often too debilitated to recover, so treatment is rarely successful. The best approach by far is to ensure that cattle are vaccinated against blackleg and the other major clostridial diseases that occur in a particular area.

How can you prevent blackleg from becoming a problem in your herd?

It is not possible to prevent clostridial bacteria from being present in the soil, but it is possible to vaccinate animals to prevent the occurrence of the disease. Clostridial vaccines are very effective if given to young, healthy animals in time for them to increase their immunity before being challenged by the disease. **Read and follow the instructions on the label of the vaccine to be sure that you store the vaccine properly and that you administer it to the correct animals at the correct time and in the correct manner.** Because all blackleg vaccines are killed, or inactivated, it is critical that animals receive the initial primary and booster vaccination according to

label directions. A single blackleg vaccination will not provide adequate protection. If blackleg has been a problem on a farm, a veterinarian may recommend vaccinations of newborn calves, but this is typically not necessary on most farms. Up until 3 to 4 months of age, calves are protected if they absorbed adequate colostrum from their dams within a few hours after birth. However, when they are 3 to 4 months old, they become susceptible to the disease, so all calves should be vaccinated for blackleg by 4 months of age. A revaccination 3 to 6 weeks later according to product label directions is necessary to provide the best protection. Delaying vaccination until a calf is older can be inviting disaster, and even if a newborn calf was vaccinated for blackleg, it will need to be revaccinated at 3 to 4 months of age.

In the southeastern United States, all calves should be vaccinated against *Clostridium chauvoei*, *Clostridium septicum*, *Clostridium novyi*, *Clostridium sordelli*, and *Clostridium perfringens* types C and D, which are the seven organisms found in 7-way blackleg vaccines. Whichever blackleg vaccine you use, make sure that you check the label to be sure that it protects against at least these types of clostridial organisms. Do not rely only on a trade name, but check the label to be sure that you are getting the protection that is necessary. Some 8-way vaccines may also contain *Clostridium hemolyticum*, which is recommended in areas where liver flukes are prevalent.

Intramuscular injection of clostridial vaccines causes significant muscle damage and, therefore, clostridial vaccines must be injected under the skin (subcutaneously or SQ) in the neck area. This will prevent injection-site damage to high-value cuts of meat. Good injection practices will prevent most injection-site damage. Even a negative reaction to an SQ vaccination will not harm underlying muscle. However, subcutaneous knots resulting from the injection of clostridial vaccines are an indication of either a negative vaccine reaction or improper injection techniques, neither of which is normal.

Consult your veterinarian for advice on all vaccinations and treatments in your herd.



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