Anthrax: A Guide for Livestock Producers

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Anthrax occurs worldwide and is associated with sudden death of cattle and sheep. Very few livestock producers or veterinarians have witnessed the disease or its signs so many do not consider it in their animal health program. However, it has been reported in Nevada since the beginning of commercial livestock production and several endemic areas have been recorded. During summer of 2000, three outbreaks occurred in Nevada. What follows is a brief guide to assist livestock producers in recognizing anthrax signs, treating, and preventing the spread the disease.

Anthrax can infect all warm-blooded animals, including humans. However, ruminants, particularly cattle and sheep, are more susceptible. Horses, swine, deer, and humans are less susceptible than cattle or sheep. Wild ruminants such as deer, wild carnivores, dogs, and cats may also become infected. Birds have only been infected experimentally. However, carnivorous birds can transmit spores in their feces.

The anthrax organism, *Bacillus anthracis*, has the ability to form spores and become resistant to adverse weather conditions if the animal carcass is opened and the organisms are exposed to air. Vegetative anthrax organisms, i.e. the bacterial body, in animals or their secretions may be destroyed by pasteurization or ordinary disinfectants. Sporulated anthrax organisms are highly resistant to heat, cold, chemical disinfectants and drying. The anthrax spore may live indefinitely in the soil of a contaminated pasture or yard.

Sources of Infection

Outbreaks typically occur when livestock are grazing on a neutral pH or slightly alkaline soil and have been exposed to the spores via one or more of the following avenues (Figure 1).

- From an anthrax infected carcass that was not burned or was left exposed
- From ingesting contaminated soil areas when forage is sparse due to overgrazing or drought or when soil has been disturbed due to digging or excavations
- By flooding pastures with water contaminated with anthrax spores or dumping an infected carcass into streams or ponds. Flooding often uncovers buried spores.
- Wounds caused by blood sucking insects that came from terminally infected animals or carcasses
- Contaminated feed, especially in the form of bone meal, meat scraps, and other animal protein products
Signs associated with anthrax depend on the species involved and the route of infection. When the anthrax organism enters the animal’s body by mouth or nostrils, the signs occur soon after infection (acute form) followed rapidly by death. When infection takes place through the skin because of injury or insect bites, it appears localized at the site of injury in the initial stage. The affected area is initially hot and swollen, and then becomes cold and insensitive. Later, infection can become generalized.

Anthrax in cattle is often a fatal disease with the signs not usually observed due to their rapid occurrence. Upon or near death, blood oozes from the body openings. This blood is heavily laden with anthrax organisms and characteristically the blood does not clot. The carcass bloats and rapid decomposition occurs (Figure 2). If the infection is less acute, there may be a sudden staggering, difficult breathing, trembling, collapse, and death. In horses, colic may be observed.

If illness is observed, swelling may be seen over the body, particularly at the brisket. This can occur for one to two days for ruminants, but it may last up to five days in horses. Swelling is
preceded by fever, with a period of excitement in which the animal may charge anyone nearby. Excitement is followed by depression.

Sometimes the anthrax organism localizes itself in the throat area of swine, dogs, and wild carnivores. The tongue, throat, and neck are extremely swollen and a frothy blood-tinged discharge comes from the mouth.

**Diagnosis of Anthrax**

Of course, not all cases of sudden death are anthrax. Diseases causing sudden death include clostridial diseases, lightning strike, acute lepto, hypomagnesemia, snake bite, lead toxicity, poisonous plants, gun shot, and acute rumen bloat. If anthrax is suspected, confirmation through laboratory examination is necessary. **Do not perform an autopsy** which will expose the vegetative forms of *Bacillus anthracis* to oxygen resulting in sporulation. Using a sterile technique, your veterinarian will collect a sample of blood from the jugular vein and send or deliver it to the diagnostic laboratory in a sealed, leak proof, iced container, with an accompanying history identifying it as an anthrax suspect.

**Disposal**

The carcass and all materials associated with the carcass should be destroyed and the ground should be disinfected. This can be very difficult. The preferred method of destruction and disinfection is incineration of the carcass, followed by burial at least 6 feet and covering the carcass and the affected area with quicklime (anhydrous calcium oxide).

**Prevention and Control**

Anthrax in livestock can be controlled largely by annual vaccination of all grazing animals in the endemic area. Vaccinations should be given 2-4 weeks before the season when outbreaks may be expected. The nonencapsulated Sterne-strain vaccine requires two injections the first year followed by an annual booster. Anthrax vaccine is a live vaccine and antibiotics should not be administered within one week of vaccination. Animals should not be vaccinated within two months of slaughter. Affected animals that have been treated with antibiotics and survive can be kept by the owner yet, should be vaccinated following recovery.

When an outbreak occurs, it is best to move the herd from the contaminated premise, use antibiotics for the sick animals, and vaccinate all apparently healthy animals in the herd and on surrounding premises. Livestock respond well to penicillin if treated in the early stages of the disease.

In addition to treatment and vaccination, other specific control procedures are necessary to contain the disease and prevent its spread. In Nevada, the Nevada Department of Agriculture must be notified of any outbreak. The herd should be quarantined and the quarantine enforced. Cremation or deep burial must be used to dispose of dead animals, manure, bedding and all contaminated material. The facilities and equipment used on livestock are to be disinfected with a general purpose disinfectant and general sanitary procedures by people who contact diseased animals should be followed for the safety of humans and to prevent spread of the disease.
Personal Protection

It is preferable to have a veterinarian collect the jugular blood samples. Do not autopsy the animal. If veterinary assistance is not possible, then producers should take every precaution to avoid skin contact with the potentially contaminated carcass and soil. Protective, impermeable clothing and equipment such as rubber gloves, rubber or leather apron, and rubber boots with no perforations should be used. Skin, especially which is compromised with wounds or scratches, should not be exposed. Disposable personal protective equipment is preferable, but if not available, decontamination can be achieved by washing exposed equipment in hot water and detergent. Disposable personal protective equipment should be burned and buried with the carcass.

Human Implications

Anthrax is a Zoonotic disease (disease that can affect both humans and animals). Anthrax in humans can take three forms: cutaneous, respiratory, and intestinal (Figure 1).

The cutaneous or skin form occurs when anthrax spores invade a cut or abrasion. Initially the site will itch followed by swelling and discoloration of the affected area. Pain is not usually present. If left untreated, cutaneous anthrax can eventually invade the bloodstream and lead to death. Antibiotic therapy is very effective for the cutaneous form of anthrax.

The respiratory form of anthrax occurs when the spores are inhaled and then infect the lung tissue. Initial symptoms are mild and may resemble having the flu or common cold. The disease will progress at a rapid rate with shock developing within three to five days, followed shortly by death. Once shock has developed, any therapy is met with limited success.

The intestinal form of anthrax occurs when spores are ingested, primarily through ingesting contaminated meat. It is a very rare condition and almost always involves an explosive food borne outbreak where many individuals are involved. The cases are usually reported from underdeveloped countries where dead animal carcasses are sometimes salvaged for human food. Symptoms include fever, abdominal distress, shock, and death.

Conclusion

Anthrax bacteria have historically existed in our environment. While anthrax is a deadly disease that affects livestock, some wildlife, pets, and humans, outbreaks have been rare. It is important to recognize disease signs and use proper handling methods of infected animals in order to avoid spreading anthrax.

References

