

## 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, therefore, 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. In summer 2000 alone, three separate outbreaks occurred in Nevada. What follows is a brief guide to assist livestock producers to recognize anthrax signs, and how to treat and prevent the spread of 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, carnivores birds can transmit spores in their feces.

The anthrax organism, *Bacillus anthracis*, has the ability to form spores and become resistant to adverse conditions if the animal carcass is opened and the organisms are exposed to air. Vegetative anthrax organisms 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 neutral or slightly alkaline soils and have been exposed to the spores via one or more of the following avenues (Fig. 1).

- From an anthrax afflicted carcass that was not burned or was left exposed.

- From ingesting contaminated soil in endemic areas when forage is sparse because of overgrazing or drought or when soil has been disturbed by digging or excavations.
- By flooding pastures with anthrax spore contaminated water or dumping an infected carcass in streams or ponds. Flooding often uncovers buried spores.
- Wounds caused by blood sucking insects.
- Contaminated feed, especially in the form of bone meal, meat scraps, and other animal protein products.

### Signs

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 no signs observed. 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 (Fig. 2). If the infection is less acute, symptoms may include a sudden staggering, difficult breathing, trembling, collapse, and death. In horses, colic may be observed.

Swelling may be seen over the body, particularly at the brisket. Illness is observed for 1 or 2 days, but it may last for 5 days; signs are preceded by fever, with a period of excitement in which the animal may charge anyone nearby. This is followed by depression in cattle or sheep.

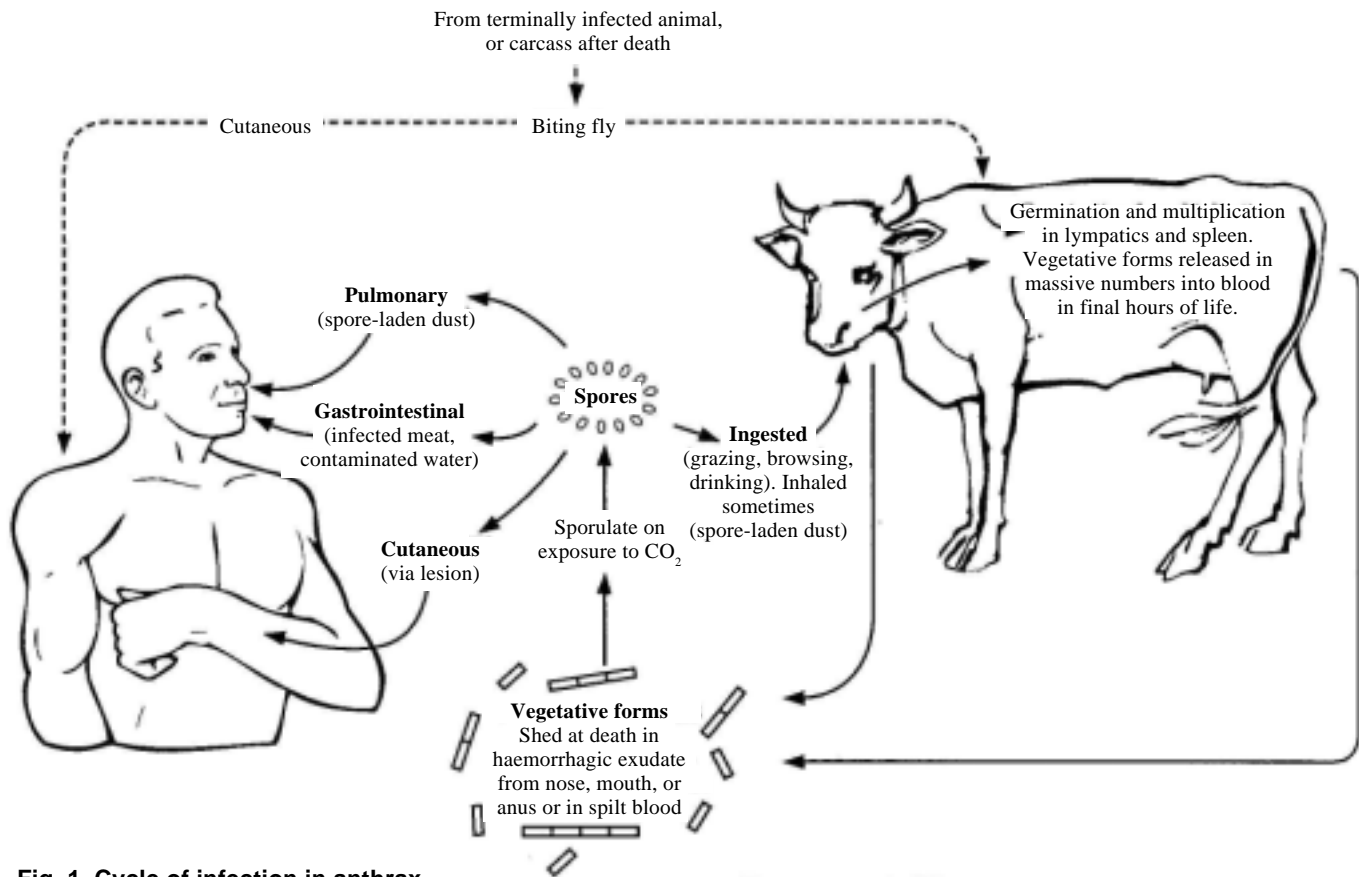


Fig. 1. Cycle of infection in anthrax.

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

## Diagnosis of Anthrax

Not all cases of sudden death are anthrax. Diseases causing sudden death include clostridial diseases, lightning strike, acute leptospirosis, hypomagnesemia, snake bite, lead toxicity, poisonous plants, gun shot, and acute rumen bloat. If anthrax is suspected, confirmation through laboratory examination is necessary. If anthrax is suspected, producers are advised to not perform an autopsy, which will expose the vegetative forms of *Bacillus anthracis* to oxygen resulting in sporulation. Rather, using a sterile technique, have a veterinarian collect a jugular sample of venous blood and send or deliver it to the diagnostic laboratory in a sealed, sturdy, 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 difficult. The preferred method of destruction would be incineration of the carcass.



Fig. 2. Anthrax infected cow.

Burying the carcass at least 6 feet and covering with quick lime is still acceptable.

## Prevention and Control

Anthrax in livestock can be controlled largely by annual vaccination of all grazing animals in the endemic area. Vaccination should be done 2 to 4 weeks before the season when outbreaks may be expected. The non-encapsulated Sterne-strain vaccine requires two injections the first year followed by an annual booster.

Anthrax vaccine is a live vaccine, and producers should not administer antibiotics within 1 week of vaccination. Animals should not be vaccinated within 2 months of slaughter. Affected animals that have been treated with antibiotics and survive should be vaccinated after recovery.

When an outbreak occurs, producers are advised 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, 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.

## Personnel Protection

If anthrax is suspected, aseptically collect a jugular blood sample for culture. **Do not autopsy the animal.** Producers should take every precaution to avoid skin contact with the potentially contaminated carcass and soil. Producers should use protective, impermeable clothing and equipment, such as rubber gloves, rubber or leather apron, and rubber boots with no perforations. No skin, especially that which is compromised with wounds or scratches, should be exposed.

Use of 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 (see Fig. 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 quite 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 3 to 5 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 rare condition and almost always involves an explosive foodborne outbreak where any 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.

## References

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