



# Anthrax: danger in raw hides

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**A**nthrax – sometimes known as Charbon, Splenic Fever, or Milzbrand - is an infectious disease among animals caused by the bacteria '*Bacillus anthracis*'. It can be transmitted to man via endospores by:

- Entering broken skin and germinating there to cause cutaneous anthrax
- Being inhaled and germinating in the lungs to cause inhalation anthrax
- Being eaten and germinating in the gastrointestinal tract to cause gastrointestinal anthrax.

## What are *Bacillus anthracis* and endospores

Endospores are spores formed by certain types of bacteria that include *Bacillus anthracis*. Although *B. anthracis* is inactivated in 10 – 15 minutes at 55 – 58°C, these spores are extremely resistant to physical and chemical factors. Sterilisation takes 15 minutes at 121°C in an autoclave and 60 minutes at 160°C in dry air.

The disease is characterised in infected animals by elevated body temperature, swollen spleen, very dark blood, and coagulating blood. Other symptoms include stumbling, weakness, inability to stand, nervousness, respiratory distress, edema under the neck and on other sites of the body, pustules or carbuncle-like lesions on the skin before falling and dying. Hemorrhages occur from the mouth, nose, anus and vulva both pre and post mortem, and *Bacillus anthracis* occur in this blood and within the animal.

The bacteria does not form spores in the body of an animal dying from anthrax, but when blood comes in contact with air, such as from hemorrhages as previously described, or from bleeding if the animal undergoes slaughter or autopsy. Spore formation also occurs when the bacteria ceases to grow, such as if carbon and nitrogen sources are restricted, and it has been reported that *Bacillus* bacteria form endospores within eight hours.

During the formation, active cells are converted to a stable and dormant structure where water has been lost at high rates. In addition, these spores contain essential macromolecules, calcium dipicolinate and soluble small protein that are not found in the active state. These spores may remain dormant for very long time – up to 50 to 60 years and possibly much longer – but can transform to active form and begin to grow when conditions are suitable. This is the basic cause of their resistance and continuity. The incubation period varies between one and 14 days depending on the route of transmission.

## Animals infected with *Bacillus anthracis*

This is a disease that must be reported to regulatory authorities. Diseased animals must be isolated and the healthy animals must be vaccinated in order to protect other animals; antibiotics of penicillin-type are used in fighting this bacterium. Diagnosis requires expertise including several techniques such as examining the DNA samples with

## Panel 1: Colonies of *Bacillus anthracis* on blood agar

Microbiological analyses are made in samples from the infected animal such as blood, spleen, etc. *Bacillus anthracis* grow in liquid and solid media (agar, blood agar) used in the laboratory under aerobic conditions in 24 hours. It forms wrinkled gray colonies with irregular edges 2-3mm in diameter as shown in the image.



polymerase chain reaction (PCR), but efforts are ongoing to improve these techniques.

All animals feeding on herbs may be infected, although the disease may course differently in each animal species. No matter what the type of animal, an infected animal must not be butchered. Carcasses should be burned, or buried in pits 2.0-2.5 metres deep after liberally covering with lime.

Everyone coming into direct contact with infected animals and their products - veterinarians, animal breeders, butchers, and those handling hides and skins - are at risk.

## Dangers in hide processing

It has been reported that the hides with anthrax might be soaked by adding sodium acid fluoride (1:10.000) into the 24-hour soaking water, and that there is no danger if one preceded directly lime pit. However, it is not considered plausible to process the hide of an animal known to have died from anthrax as millions of spores will form after the hide/skin is flayed from the infected animal, and may then be transmitted via the skin and respiratory routes. Mortality rate is as high as 90% in pulmonary anthrax. Moreover, if hides are subjected to a normal soaking process, the dormant endospores may convert to the active state and spread to the wider environment. ☹

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