Government of Saskatchewan

Anthrax Information for Producers in Saskatchewan

ANTHRAX - THE DISEASE

Anthrax is an environmental disease caused by the spore-forming, rod-shaped bacterium *Bacillus anthracis*. Animals on pasture acquire the disease by ingesting soil contaminated with anthrax spores. It can also be acquired from hay containing anthrax-contaminated soil. There is no direct animal to animal transmission of the disease. There is some evidence that it can be spread animal to animal by biting flies.

Bacillus anthracis bacteria exists in two forms, a "vegetative" form that only survives inside a living animal and a "spore" form that can exist in the environment for prolonged periods of time. When an animal dies from an anthrax infection, the vegetative form of the bacteria in blood and body fluids escapes from the body and will form spores when exposed to oxygen (the ambient temperatures must be over 20°C for this process to be completed). The vegetative form of the bacteria is fragile and easily killed by disinfectants or temperatures less than 4°C or greater than 58°C. The spore form of the bacteria is very resistant to temperature and disinfectant and can survive for long periods of time in the environment. Control measures for anthrax are aimed at interrupting the infection cycle by reducing or eliminating the environmental contamination with spores.

Anthrax remains a federally reportable disease and any confirmed cases must be reported to your nearest CFIA office. Anthrax is also a notifiable disease in Saskatchewan, so any laboratory diagnosing anthrax must report the details to the office of the Chief Veterinary Officer (CVO) of Saskatchewan.

PROVINCIAL ANTHRAX PLAN

A new provincial anthrax plan is in place in 2013 that consists of:

1. Diagnostic support
2. Movement controls
3. Confirmation of correct carcass disposal

1. Diagnostic Support

- Samples submitted as suspect anthrax cases to Prairie Diagnostic Services, Saskatoon, will have the anthrax test portion of the diagnostic workup paid for by the provincial government.
- Information on sample collection, shipping and reporting is provided to all large and mixed animal veterinary practices in the province.

2. Movement Controls

- Quarantine will be placed when a positive diagnosis of anthrax has been made. The quarantine will restrict the movement of susceptible animals on and off the premises for 7 days after the last death.
- Land that will be included in the quarantine will be determined by the local veterinarian, in discussion with a provincial veterinary inspector, based on an evaluation of the geography and environmental conditions. Adjoining land under single ownership may not all be subjected to quarantine.

- The producer will be required to supply information on all animal movements on and off the quarantined premises for the 7 days prior to the first diagnosed case of anthrax. Some basic information will be collected to assist in determining likely source of infection.
- Animals can be moved to another pasture to reduce risk of infection and /or if animals can be better observed during quarantine, i.e. a pasture that has not flooded, better grass condition, a facility that has feed bunks and water troughs/bowls, a pasture with less bush cover.
- The animals should be moved with recommendation of the private veterinarian and agreement of the provincial veterinary inspector. When this is done, the quarantine is applied to the new pasture. Animals should not be placed back on the "contaminated" site until at least 2 weeks after vaccination, where possible.
- Pastures with dense bush should be avoided - as animals should be checked and accounted for twice daily until vaccine immunity is achieved (14 days). This allows deaths to be detected and disposed of promptly.
- The quarantine will be released from the premises following 7 days after the last death associated with anthrax, providing that the carcass(es) have been confirmed to have been properly disposed of.
- All susceptible animals on a positive premise should be vaccinated, following vaccine label directions. For some species, vaccination may be "off-label", so veterinary advice should be sought.
- **It is recommended that animals in areas where anthrax is known to have occurred be vaccinated annually.** Vaccination schedules should be discussed in consultation with the producer's private veterinarian.
- A protective level of vaccine induced immunity is reported to be achieved within 8 to 10 days of vaccination, in most situations. However, full protection is achieved 14 to 21 days after vaccination.

Note: In some situations deaths can occur up to 14 days post vaccination. Animals should be monitored twice daily for a minimum of 14 days post vaccination. **Deaths occurring more than 14 days after vaccination should be investigated for other causes.**

3. Confirmation of Correct Carcass Disposal

- This is an extremely important component of the anthrax program. Prompt disposal will limit or prevent further contamination of the environment with anthrax spores and thereby reduce the risk to animals grazing on these sites in the future.
- Owners/Managers must take steps to ensure carcasses are found as soon as possible to prevent scavenging.
    - Check animals at least twice daily for the first 14 days after vaccination.
    - Move animals to pastures (with approval) that promote easy monitoring of the herd for deaths – i.e. avoid heavy bush.
- Owners/Managers should have formalin on site to apply to the carcass to inactivate spores on and around the carcass. Formalin sprayed on the carcass also discourages scavenging.
- Formalin can be obtained from various hardware/farm supply stores or local veterinary clinics. Follow product insert or label for dilution and safe handling instructions. Formalin run-off or water contamination should be avoided.

- Information on proper handling of formalin is available from Saskatchewan Occupational Health.
- The document “Anthrax in Animals - Human Health Precautions” can be found at: http://www.health.gov.sk.ca/anthrax

CARCASS MANAGEMENT/CONTROL

Personal Protective Equipment (PPE) is important to prevent skin contamination. If skin contamination occurs, thorough washing with soap and water will remove anthrax and reduce the possibility of infection. Ensure wash water is contained and disinfected after use. If bare skin is directly exposed to an infected carcass, contact your family doctor.

PPE can include:
- Coveralls
- Gloves
- Rubber Boots

If handling chemicals you may need:
- Face Mask
- Eye Protection

Supplies needed include:
- Disinfectants (more information below)
- Bucket
- Scrub Brush

When anthrax is suspected carcass management should begin immediately and continue until a negative laboratory diagnosis is received or the carcass is disposed of in accordance with these guidelines.
- Wear PPE (gloves, boots and coveralls) when handling carcasses.
- Steps should be taken to prevent bloody exudates escaping from the carcass
    1. Plug all body openings (anus, mouth, and nose) with an absorbent material to prevent further exudate leakage (see Figure 1). The absorbent material could be soaked in 10% formalin to be even more effective.
    2. Cover entire head with a heavy duty plastic bag secured at the neck, behind ears with duct tape or tied with rope or twine (see Figure 2).
- To move a carcass put it on a conveyance that can be destroyed with the carcass or easily cleaned and disinfected.
- If disposal is delayed, carcasses must be covered with a tarp or heavy plastic to prevent scavenging and spread of spores by insects, birds or mammals until disposal (see Figure 3). Spraying the tarp with 10% formalin can be an additional deterrent.
- The natural decomposition of a carcass will destroy most of the vegetative anthrax organisms within 48 to 72 hours in warm weather conditions. These carcasses will pose a smaller risk of environmental contamination during subsequent handling for disposal.

Figure 1: plugged openings

Figure 2: Head covered with heavy plastic

Figure 3: Tarping

METHODS OF DISPOSAL

The following advice and recommendations are provided for proper carcass disposal. The method chosen will be selected by the producer, in consultation with the local veterinarian and the provincial veterinary inspector. The local Rural Municipality should be consulted. The Ministry of Agriculture can assess burial sites and the Ministry of Environment should be consulted prior to burning carcasses.

All labor and costs associated with correct disposal are the responsibility of the producer, but advice and support will be provided by the Ministry of Agriculture through the provincial veterinary inspector and your veterinarian.

Once disposal is completed a final site visit will be made by a local veterinarian or provincial veterinarian/designate to confirm that it is complete. In some cases additional measures may be recommended.

<u>Incineration/Burning - General considerations</u>

This is the preferred method of disposal especially when a carcass has been opened for post mortem examination or scavenged. The goal of burning is to destroy as many spores as possible and thereby decrease environmental contamination.

- Ventilation and adequate airflow within the pyre are essential. Prevailing winds should be taken into consideration so as to provide a good supply of air to the fire.
- If the fire burns too quickly - a complete burn will not be achieved and a secondary burn will be necessary.
- Do not use materials that may be environmentally harmful (i.e. rubber tires).
- Ensure an adequate amount of fuel is available to completely reduce the carcass to ash.
- Any carcass parts or materials that fall off the pyre during the burn must be added back onto the fire for complete incineration.

Figure 4: Wood pyre – logs arranged in a criss-cross fashion

It is recommended that the producer contact both the RM and Saskatchewan Environment, and discuss the intent to dispose of deadstock by incineration.

To contact Environment, please call 1-800-667-7525 and specify that you are reporting a controlled burn.

Figure 5: Incineration

Pyre System

Wood (Figures 4 and 5)

- Bottom layer: large sized logs, fence posts, railway ties, wood pallets spaced eight to 10 inches (20 – 25 cm) apart in a criss-cross fashion so as to allow air to enter the fire from below.
- Middle layer: smaller pieces of wood or coal placed over top of the bottom layer.
- Top layer: the carcass, propped up so that it is laying on its back, and any soil potentially contaminated by the animal/exudates is placed on top of the pyre.
    - Kerosene or diesel fuel (accelerant) to soak down all the materials (approximately 5 gallons (23 litres) per carcass).
    - The fire should be lit from two opposing ends of the pyre.

Note: Approximately one cord of wood (4'x4'x8' or 128 cubic feet; 1.2x1.2 x 2.4 or 3.4m^3) is required per 1000 lb (500 kg) of carcass to be incinerated.

Straw (Figure 6)

- Bottom layer: large sized logs, fence posts, railway ties, wood pallets spaced 8 to 10 inches (20 - 25 cm) apart in a criss-crossed manner so as to allow air to enter the fire from below.
- Middle layer: two large round bales per carcass - approximately 1200 lb (545 kg) each. The bales can be laid on their sides or placed on end. A layer of wood pallets on top of the bales to make platform for the carcass(es). Pallets wedged between the bales will increase air flow into the pyre.
- Top layer: the carcass propped up so that it is laying on its back and any soil potentially contaminated by the animal/exudates.
- Diesel fuel or kerosene to soak down all the materials (approx 5 gallons (23 litres) per 1000 lb carcass).

Note**:** Flax bales burn at a very high temperature and are well suited to burning carcasses. However, when used as the sole fuel they may burn too fast for effective incineration of the carcass. Use of flax bales in the center of the pyre surrounded by other straw bales will burn hot enough for complete carcass incineration. When other types of straw bales are used as the sole fuel source more accelerant will be required.

Figure 6: Straw pyre

Figure 7: Complete incineration

Note: After an effective burn primarily ash and bits of bone should remain with minimal fly attraction to the site.

Burn pits/trenches

- The use of a pit will facilitate burial of ashes and prevent fire spreading (see Figure 8).
- Sloped sides on the pit will facilitate airflow to the fire.
- For a mature animal, the pit should be 18 to 20 inches (0.5 m) deep and extend approximately 2.5 feet (0.75 m) beyond each end of the pyre

Figure 8: Pit burning

that will be constructed. The pit should be approximately 10 inches (25 cm) wider than the pyre on each side; this will allow air to flow around the carcass.
- The bottom of the pit is covered with straw or wood, etc., placed in such a way as to facilitate air flow. This material is soaked with accelerant (i.e. diesel fuel, kerosene).
- Pieces of heavy timber (or other beams) are placed across the pit to support the pyre.

Note**:** It is necessary to decontaminate the ground surrounding the carcass as well as the equipment, tools, etc. used in handling the carcass and any contaminated materials. Decontamination is done by burning the area using a propane torch and/or by application of 10% formalin.

In all cases, a Ministry of Agriculture representative will assess the burn site to ensure there was adequate incineration of the carcass. The Ministry representative will report back to the office of the CVO on the total number and species affected

Burial

If incineration is not feasible or cannot take place immediately, deep burial may be permitted (Figure 9).

Figure 9: Burial pit

General Considerations
- Consult with the Ministry of Agriculture to identify appropriate locations for burial.
- Owners are required to cover all costs associated with digging of burial pits.
- Use of heavy excavating equipment such as a back hoe is required to dig a suitable hole.
- Locate the burial pit in clay or till soils. Avoid locations with sand or gravel.
- Avoid shallow aquifers (useable groundwater).
- Pits may be dug to the depth allowable by excavation equipment (i.e. 4 to 5 m).
- Maintain at least 1 m between the top surface of the carcasses and natural ground level.
- Mound the final soil cover about 1 m above surrounding terrain.
- Formalin (10%) can be used to decontaminate the carcass and all soil put into the burial pit.
- Document the perimeter of the burial site, and provide GPS co-ordinates to the Ministry of Agriculture.

For more information, refer to the Ministry of Agriculture publications titled “Managing Livestock Mortalities” and “Emergency Livestock Disposal Sites”, available on the Ministry website at www.agriculture.gov.sk.ca.

Special Circumstances

In certain situations, due to environmental conditions such as prolonged rain, carcass inaccessibility (i.e. standing water, heavy bush) or logistical problems such as lack of proper equipment, manpower etc., the prompt disposal of infected carcasses may not be possible. In

these circumstances, to prevent or minimize anthrax environmental contamination, the local veterinarian and provincial veterinary inspector will assess the situation with the owner and decide on an appropriate course of action. The carcass and the surrounding area must be covered with disinfectants such as 10% formalin or 5% solution of lye (sodium hydroxide) and repeated as needed, unless it is located in water. In that case avoid chemical contamination of the water.

CLEANING AND DECONTAMINATION

Information in this section was obtained from: World Organisation for Animal Health. 2008. Anthrax in humans and animals, 4th Ed, available at www.who.int/csr/resources/publications/anthrax_webs.pdf

Note: Current research indicates that the use of lime, white wash or other calcium products is contraindicated for use as a disinfectant for anthrax contaminated sites. Therefore, where possible, DO NOT use these products as a disinfectant for anthrax sites, carcasses or materials.

Soil:

- If possible, soil at an anthrax site should be removed up to a depth of 20 cm and incinerated. If this is not possible, soil should be disinfected with 10% formalin (contains 3.7% formaldehyde) at 50 litres per m^2.

10 % formalin (1:10 dilution)	1 part formalin to 9 parts water

* Formalin is sold as 37% solution of formaldehyde in water. Always follow manufacturer's label directions to get proper dilution rates.

- When soil is water saturated or heavy type soil complete penetration of formalin may not be possible, it is recommended in these situations to check effectiveness with additional cultures.
- Where it is not feasible to remove and incinerate or chemically decontaminate soil, the alternative is to close or seal off the site, i.e. covering with concrete or planting with thorny bushes and fencing off the area.

Equipment and Structures:

<u>Stage 1: Preliminary Disinfection</u>

One of the following disinfectants may be used in amounts of 1–1.5 litres per square metre for an exposure time of 2 hours:

- 10% formalin (temperature should be ≥ 15 °C);
- Hypochlorite (bleach) solution containing 10 000 parts per million (ppm) active chlorine (note: chlorine is rapidly neutralized by organic matter; if this is present, it should be washed down first with water and collected into suitable containers for autoclaving or aldehyde disinfection);

Available chlorine 1% or 10,000 ppm	1 part bleach to 4 parts water.

(1:5 dilution)	
Available chlorine 0.5% or 5000 ppm (1:10 dilution)	1 part bleach to 9 parts water

* Calculations based on a 5% hypochlorite (bleach) solution

- 3% hydrogen peroxide solution.

3 % Hydrogen Peroxide (1:12 dilution)	1 part hydrogen peroxide to 11 parts water

* Calculations based on a 35% hydrogen peroxide solution

Stage 2: Cleaning

Where practical, cleaning of all surfaces should be done by washing and scrubbing using ample hot water or mild hypochlorite solution (5000 ppm active chlorine). The operator should wear protective clothing, face and hands included. Cleaning should be continued until the original colours and surfaces are restored and the wastewater is free of dirt particles. At the end of the process, residual water should be removed and disinfected and the surfaces dried.

Stage 3: Final Decontamination

For final disinfection, one of the following disinfectants should be applied at a rate of 0.4 litres per square metre for an exposure time of at least 2 hours:

- Hypochlorite (bleach) solution (10 000 ppm available chlorine)
- 10% formalin (temperature should be ≥ 15 °C)
- 3% hydrogen peroxide solution.

After the final disinfection, closed spaces such as rooms or animal houses should be well ventilated before being used.

Clothing and Boots:

Where possible, contaminated materials should be incinerated. Use of disposable boots and coveralls makes this easier. If you don't want to dispose of items such as clothing, boots, tools, etc., excess dirt should be scraped off and incinerated. The items themselves should be soaked overnight (at least 8 hours) in 10% formalin. (Caution: avoid skin contact with formalin solutions or inhalation of their vapors). Bleach is a possible alternative if discoloration or corrosion is not of consequence, and there is little organic material left on the items after scraping.

Manure, bedding and feed:

If manure, bedding or feed require decontamination, please contact the Saskatchewan Ministry of Agriculture for instructions.

Contaminated feed should be safe to feed 2 weeks after animals have been vaccinated; however, make sure that you do not create dust when handling the feed, i.e. do not put use a bale shredder.

Contact Information:

Ministry of Agriculture (Livestock Branch, Chief Veterinary Officer): 306-787-5547

Ministry of Environment: 1-800-667-7525.