

primefact

Anthrax

February 2014 Primefact 114 third edition Samantha Allan, Senior Veterinary Officer, Animal Biosecurity, Tamworth

What is anthrax?

Anthrax is a serious, usually fatal disease caused by the bacterium *Bacillus anthracis*. It occurs world-wide and can infect a wide range of domestic and wild animal species as well as humans.

In grazing livestock anthrax usually presents as the sudden death of one, or a group of animals in a mob. Affected stock often show few or no signs of ill health before they die. In an outbreak situation the disease may begin with the sporadic deaths of single animals over a few days, building to dramatic losses in a very short time.

Anthrax can kill stock of any age or class with no warning. All cases of sudden death in livestock should be reported to a Local Land Services (LLS) veterinarian so that anthrax can be ruled out.

Anthrax is treated very seriously in Australia because of its risk to human and animal health, export markets and farm productivity. It is a notifiable disease in NSW.

History of anthrax in NSW

Anthrax was first recognised in Australia in 1847 in the County of Cumberland ('Cumberland disease') and caused significant losses in parts of New South Wales in the 1800s.

Cases of anthrax tend to occur in an area known as the anthrax 'belt', which runs through the centre of New South Wales and into Victoria. In NSW the 'belt' lies approximately between Bourke and Moree in the north to Albury and Deniliquin in the south.

Figure 1 The Anthrax Belt – for the last 50 years almost all cases of anthrax in NSW have occurred within the highlighted region termed the 'anthrax belt'.



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Anthrax survives for long periods in the environment by forming tough spores which lie dormant in the soil, and its re-appearance is unpredictable. It can recur more than 50 years after the last known case in a district. An example of this is the serious incident which occurred in 2007 in the NSW Hunter Valley. Anthrax had not been seen there for over 60 years, so it is essential that all stock owners in New South Wales remain aware of the disease, and report all suspicious livestock deaths.

Occurrence of anthrax in NSW

The incidence of anthrax in NSW is very low, with an average of eight properties affected each year over the past decade. Properties which have had anthrax cases in the past are strongly encouraged to vaccinate all stock annually to prevent anthrax reoccurring.

Species affected

Most cases of anthrax diagnosed in NSW involve sheep or cattle, but there have been occasional historical reports of pigs affected. Goats and horses have rarely been affected. Carnivores such as dogs and cats are highly resistant to anthrax.

Humans can be infected, with very serious consequences including death. The most likely way that people can become infected with anthrax is by handling the carcases of livestock which have died of anthrax. In NSW there have been three cases of human anthrax infections since 1982. For more information see the NSW Health Anthrax Factsheet.

Anthrax is a notifiable disease

Anthrax is a notifiable disease under the Stock Diseases Act 1923.

If you think that anthrax may be affecting your stock you have a legal responsibility to immediately notify an inspector authorised under the Act. Contact your Local Land Services (LLS) office or call the Emergency Disease Hotline on 1800 675 888.

For more information on notifiable diseases of livestock in NSW see Primefact 402.

Development of the disease

Grazing animals become infected by eating the spores of anthrax while feeding. The spores germinate into the active form of the bacterium and begin to multiply rapidly once inside the animal. Within a few days the animal's immune system is overwhelmed and masses of bacteria and their toxins are released into the bloodstream causing sudden death.

Carcases of animals that have died from anthrax are full of infectious bacteria. A feature of anthrax infection is failure of the blood to clot, so after death blood and body fluids ooze from body orifices and sites of predation on an infected carcase. These fluids are loaded with anthrax bacteria which form resistant spores as soon as they are exposed to the environment outside the carcase.

Spores are the 'resting' form of the anthrax bacterium. They are inert with a tough shell which makes them highly resistant to environmental factors such as heat, cold, ultraviolet radiation, dryness and other factors which would kill the bacterium in its 'active' form. Spores can survive in the soil for many years, waiting for conditions to be suitable for them to gain entry to an animal and cause disease.

When to suspect anthrax

Be suspicious of anthrax if animals die suddenly and one or more of the following occur:

- Blood oozes from one or more body orifices and sites of predation (e.g. eyes, anus, udder)
- Blood from the carcase does not clot
- There is a history of anthrax at any time on the property
- The property is located within the anthrax belt

Signs of anthrax in animals

Grazing animals are usually found dead, often with blood seeping from the carcase. Closely observed animals like dairy cows may be noted to be depressed and show signs of fever followed by a drop in milk production prior to death.

Horses usually die suddenly and show swelling of the body and legs, but may linger for a few days with colic and body swelling before dying.

Pigs may develop localised infection in the throat which leads to obvious illness and fever lasting two to seven days before they die.

Dogs and cats are highly resistant but should be monitored carefully if they have had access to infected carcases.

Figure 2 – A sheep that has died from anthrax. Note blood discharge from nostrils

Figure 3 – A cow that has died from anthrax. Note blood dripping from eyes, nostrils and mouth



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Signs of anthrax in humans

The greatest risk of contracting anthrax in Australia for people is from handling the carcases of animals which have died from anthrax. Anthrax infection is very serious in people and anyone who thinks they may have been exposed to anthrax infected livestock or materials should seek medical advice immediately. See the NSW Health factsheet.

When anthrax is diagnosed in animals in NSW, the appropriate public health units are notified and they provide advice to any people who have been in contact with livestock on the affected property.

Anthrax vaccine is used to protect livestock from infection in NSW. Although the strain of anthrax used in the vaccine is not known to cause infection in people, extreme care should be taken when using the vaccine. Accidental self injection with anthrax vaccine can cause an inflammatory reaction and medical advice should be sought immediately.

Figure 4 - Anthrax infection in humans - skin lesion



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Diagnosis of anthrax

The carcase of an animal which has died of anthrax is an extreme infection risk to people and other animals. If you suspect an animal has died of anthrax report it immediately and do not handle, open or skin the carcase. Do not move the carcase. Keep all other animals away from it.

A veterinarian or an Inspector under the Act will investigate suspect cases of anthrax. If suitable samples can be collected they can be tested on-farm using the Anthrax ICT test kit. This test gives a result in about fifteen minutes. If samples for the ICT test are not available, smears of blood and a piece of the animal's ear will be collected for examination at the laboratory.

Do not perform a post mortem examination.





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What happens if anthrax is confirmed?

Anthrax is treated as an emergency disease because of the potential danger to people, other livestock and the possible impact on Australia's export markets.

Quarantine and tracing

Infected properties are placed under quarantine and tracing is immediately conducted on all animal movements off the property in the 21 days preceding the first livestock death. This is to ensure that all potentially exposed animals are found and assessed.

NSW Health are informed and they make contact with the owners of the infected property to advise on human health matters.

Vaccination

Livestock remaining on the infected property must be vaccinated as soon as possible and the risk to neighbouring properties is assessed. Neighbours are notified and are encouraged to vaccinate their livestock if they are not already done. (Many properties in the anthrax belt practice preventive vaccination for anthrax annually.) See the Primefact on anthrax vaccination.

Treatment of livestock

Anthrax can be treated with antibiotics, but it is extremely rare to detect infection early enough for treatment to be effective. Treating with antibiotics also interferes with vaccination and may prevent animals from being protected. For this reason vaccination of livestock is the preferred approach, although antibiotic treatment could be considered to protect valuable animals.

Deaths due to anthrax normally stop within five to seven days of giving the vaccine.

Carcase disposal

Ruminant (cattle and sheep) carcases are the primary source of anthrax infection for other animals and contamination of the environment as they produce massive amounts of bacteria.

Figure 6 - Discharges from anthrax carcases are the primary source of environmental contamination



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It only takes a very small number of anthrax spores to infect a cow or sheep. During the course of the disease the number of anthrax bacteria present in the animals' body is multiplied by many thousand-fold by the time of death. Once the infected animal dies there are two possible outcomes for the anthrax bacteria.

- 1. If the carcase remains unopened and undisturbed the anthrax bacteria do not form spores and are destroyed by the natural putrefaction processes, or by burning of the carcase. This minimises further environmental contamination with anthrax spores.
- 2. If the carcase is opened or disturbed by people, predators or curious livestock, exposure to air stimulates the anthrax bacteria to produce resistant spores. Spores in the top fifteen centimetres of soil survive for around three years. Spores in the deeper layers survive for many decades. For this reason, deep burial of anthrax carcases is not allowed as it creates a potential reservoir of future infection on the property.

The required method for disposal of anthrax infected carcases is by burning to ash.

Figure 7 – Incomplete burn of carcase, anthrax contamination still present.



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Figure 8 - Complete burn, no carcase material remaining.



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Burning carcases in situ is ideal as further environmental contamination is minimised, but it is not always possible, for example where stock have died in a dam or otherwise unsuitable location. With planning it may be possible to move carcases with earthmoving equipment that also removes the surrounding

contaminated soil with the carcase and a burial pyre can be constructed. This may also make the most efficient use of the available fuel for burning.

Figure 9 – Preparing a pyre to destroy anthrax carcases



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Figure 10 - Completed pyre. Note use of PPE



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Anthrax cases often occur during the hot summer months when fire restrictions may be in place. Local fire authorities can provide advice and assistance with permits and fire risk mitigation if required. In situations where total fire bans are in place, carcases must be secured so that they are not able to be disturbed by livestock and scavengers (including birds). This must be authorised and supervised by an Inspector under the Act. Burning must take place as soon as it is safe to do so.

Decontamination

The area surrounding an anthrax carcase will be contaminated with spores formed from the bloody discharges which are present. Keep people and vehicles clear of the area as the spores can be spread around on shoes and tyres.

As well as the ground surrounding the carcase, there is potential for contamination of clothing, machinery and equipment that has been used on the site. If anthrax is confirmed on your property an Inspector will advise you on what decontamination processes are needed. For further information the Ausvetplan Anthrax manual contains detailed instructions for decontamination of people, places and equipment.

Risk factors for anthrax

There are no firm guidelines for what constitutes an anthrax risk period but the following general principles apply:

- 1. Infection of ruminants is usually via the oral route (by mouth), so anything that increases the chance of soil containing anthrax spores being ingested is a factor. For example:
 - deep cultivation of paddocks
 - o earthworks in paddocks
 - grazing of stubbles or very short pastures
 - heavy rain causing movement of soil or exposure of old anthrax grave sites
 - contact with infected carcases
- 2. Moderate rainfall following prolonged dry periods
- 3. Alkaline soils which favour spore survival
- 4. History of anthrax on the property

Figure 11 - Anthrax occurring following drought breaking rain within the anthrax belt

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Prevention of anthrax

Annual vaccination of cattle and sheep on properties with a history of anthrax is strongly recommended, especially within the first three years following an anthrax case. Research has shown that anthrax spores survive in the top layers of soil for about three years, so this is the highest risk period. However, because the appearance of anthrax is unpredictable, vaccination should be considered on all properties where anthrax has occurred, even if it was a long time ago. Vaccination provides effective protection against anthrax when the manufacturer's directions are followed.

Anthrax vaccine is available in NSW through Virbac Australia. Stock owners must be authorised to order and use the vaccine, but this is a simple process. An application form to order and administer anthrax vaccine must be completed and authorised by a NSW DPI veterinarian. An order can then be placed through your local rural supplier or private veterinarian. See the Primefact for details.

More information

For more information on anthrax:

- contact your Local Land Services veterinarian
- see: http://www.dpi.nsw.gov.au/biosecurity/animal/humans/anthrax, or
- see the Ausvetplan Anthrax manual for detailed technical information on anthrax and Australia's national policies for anthrax management.

Acknowledgments

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For updates go to www.dpi.nsw.gov.au/factsheets

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