



Anthrax

Best Practice for Cattle Feedlots

January 2003

1. INTRODUCTION

Anthrax is an acute infectious disease caused by the bacterium *Bacillus anthracis*. A wide range of animals are susceptible to anthrax, with sheep and cattle most commonly affected. Most cattle that develop anthrax are simply found dead without any signs of illness being observed.

Humans are also susceptible to anthrax, though in Australia cases of anthrax in humans are very rare. The reported cases have typically involved a skin infection that is serious, but with appropriate treatment is not fatal. The greatest risk of human infection occurs with skinning or cutting up an infected carcass. This risk should be considered in the feedlot OH&S policy.

Anthrax is an emotive disease, because of the rapid death that occurs in sheep and cattle and the possibility of human infection. Anthrax is a notifiable disease of animals in all States/Territories of Australia.

The national policy (as stated in the Ausvetplan - Disease Strategy Anthrax, v. 3.0, 2002) is to control anthrax in Australia using a combination of strategies including:

- Regular vaccination of susceptible livestock located on sites with a known history of anthrax to prevent cases occurring;
- Epidemiological investigation to promptly identify the source of infection and record where anthrax has occurred in livestock;
- Quarantine of affected premises to prevent spread;
- Decontamination of the environment at death sites, and facilities, products and equipment that may have been contaminated;
- Safe disposal of carcasses to control spread of infection;
- Prompt vaccination and/or treatment of exposed livestock;
- Tracing livestock movement in and out of infected premises (IPs);
- In unusual outbreaks¹, establishment of a vaccination zone around IPs encompassing premises with common circumstances to the IPs within which livestock are vaccinated and premises quarantined;
- Ensuring the safety of livestock products by preventing potentially infected livestock and livestock products from being processed for human or animal consumption or industrial use;
- Using recording systems to facilitate trade in livestock and livestock products, by providing accurate data from investigations to assure area and farm freedom from anthrax, enabling accurate certification of livestock and livestock products and communicating anthrax surveillance information to the livestock industries; and
- A public awareness campaign to ensure reporting of sudden unexplained deaths of livestock, reduce the risk of human infection by providing advice to people handling livestock and by liaising with public health authorities in the event of an anthrax case in a human.

An uncontrolled outbreak of anthrax would cause severe production losses to the affected producers with potential dislocation and financial losses to the livestock industries from effects on exports. There is serious potential for fatal human disease.

¹ On the decision of the relevant state/territory Chief Veterinary Officer (CVO) when there are a number of cases on more than 5 premises within a defined geographical area in a short period of time.

Major outbreaks of anthrax are included in the government-industry Cost-sharing Deed of Agreement as a category 3 emergency animal disease for which costs will be shared 50% by government and 50% by industry.

There is a small risk that cattle might enter a feedlot whilst incubating anthrax and succumb to the disease shortly after arrival. The risk of anthrax spread amongst grain-fed cattle in a feedlot is exceedingly low, unless there is direct contact with a clinical case.

There is also a remote risk of anthrax if the feedlot is located on an anthrax-contaminated site and earth disturbance allows buried spores to reach the soil surface.

Although the risk of anthrax in a cattle feedlot is low, should anthrax be diagnosed the economic impact on the feedlot from quarantine restrictions and loss of markets could be devastating. These best practice guidelines describe how this risk can be minimised.

2. HOW ANTHRAX SPREADS

Anthrax bacteria survive outside a living animal by forming spores. Anthrax spores buried in the soil can remain alive for many years. However, if exposed to sunlight and air, anthrax spores deteriorate over a period of about three years.

Cattle usually become infected by consuming anthrax spores. This can occur by grazing contaminated land, eating contaminated feed or licking discharges or contaminated ground around an infected carcass. Once the spores are eaten, they enter the body through abrasions in the mouth. Five to ten days later the bacteria multiply rapidly in the bloodstream, producing lethal toxins. Infected cattle generally show no obvious signs of disease during the incubation phase then die suddenly.

The disease is not contagious in that it does not spread from one live animal to another. Outbreaks of anthrax occur when a number of animals are exposed to contaminated soil, feed or dead animals.

When an animal dies from anthrax the carcass decomposes rapidly and there is often a bloody discharge from the mouth, nose and / or anus. This discharge contains large numbers of bacteria, which if conditions are right, form spores to further contaminate the soil around the carcass. Other cattle grazing around the carcass or licking the discharges can become infected, leading to further cases 5 - 10 days later.

3. DIAGNOSIS

Normal feedlot practice is to investigate mortalities to establish the cause of death. This involves considering the animal's history, developing a list of differential diagnoses in descending order of probability, and post-mortem examination of the carcass and / or other investigations as appropriate.

If sudden death occurs within the first ten days after cattle arrive at the feedlot, anthrax should be considered as a possible cause of death. The source of the cattle, anthrax vaccination history and time in the feedlot are important factors to be considered when developing the list of differential diagnoses.

A number of pathological and environmental conditions cause blood-stained discharges from the mouth, nose or anus of a carcass. The presence or absence of blood-stained discharges is not a reliable diagnostic sign.

A diagnosis of anthrax can be made by examining a smear of blood from the suspect animal or carcass. Anthrax bacteria have a characteristic appearance when stained with polychrome methylene blue dye and examined under a microscope. Microscopic examination for anthrax bacteria is a skilled process that should only be undertaken by suitably trained personnel.

If anthrax is a likely diagnosis, a post-mortem examination should not be done.

The blood and body fluids in an infected carcass contain billions of anthrax bacteria. The carcass should not be opened as this invariably results in much greater contamination of the surrounding area with anthrax spores. If the carcass is left unopened, the anthrax bacteria cannot form spores and die as the carcass decomposes.

Post-mortem examination of suspect carcasses also exposes the people involved to a greater risk of human infection.

4. TREATMENT

Cattle with anthrax die within hours of disease signs becoming apparent. Anthrax bacteria are susceptible to a range of antibiotics, but cattle noticed sick are invariably severely ill and unlikely to recover if treated.

Cattle that are incubating anthrax but have yet to develop obvious signs of the disease may respond to antibiotic treatment. Procaine penicillin and oxytetracycline are the antibiotics of choice. Antibiotics do not provide on-going protection against the disease.

Unless absolutely necessary, antibiotics should not be administered within two weeks of anthrax vaccination, as they interfere with development of immunity to the disease.

5. VACCINATION

The anthrax vaccines available contain live attenuated anthrax spores in a saponin base. The vaccines cause a febrile response and may be quite irritating at the vaccination site. Protective immunity develops about two weeks after vaccination and lasts for about twelve months. The slaughter withholding period after vaccination is 42 days.

The impact on productivity of anthrax vaccinating feedlot cattle is unknown. However, given the febrile response that is known to occur, there may be a detrimental effect on feedlot performance with inappetance and / or increased susceptibility to stress-related diseases in the first few days after vaccination.

6. ANTHRAX RISK AREAS

There has not been a confirmed case of anthrax in the Northern Territory. The last confirmed case in South Australia was in 1914 and in Tasmania in 1933. These areas are now considered free of anthrax.

There was not a confirmed case of anthrax in Queensland for 70 years until one animal was diagnosed with the disease in 1993. In 2002 anthrax occurred on a property in southern Queensland near the New South Wales border and further cases occurred in cattle moved from the index property to another property some 400km north.

Western Australia was free of the disease until 1994 when anthrax occurred on three nearby properties. No further cases have occurred in Western Australia.

Anthrax occurs sporadically in Victoria, with most cases occurring in the northern and north-eastern parts of the State. In 1997 there was a major outbreak of anthrax in the Stanhope - Tatura area. The last confirmed case of anthrax before that was in 1988. In autumn 2002 there was a single case of anthrax on each of 2 separate properties, which had had cases in 1997 and there was also a single case of anthrax confirmed on a property at Swan Hill in November 2002.

In New South Wales, there have only been sporadic incidents from 1997 - 2002, with the highest incidence being 6 sporadic incidents in 1997 - 1998. Most cases occur in an area extending down the centre of the state, with an annual rainfall of 250-500 mm. However, many properties within this area have never had an incidence of anthrax recorded.

7. FEEDLOT RISK REDUCTION

The risk of introducing anthrax to a feedlot can be reduced by sourcing low-risk cattle. Similarly, with prior planning and appropriate management, the potential impact of the regulatory controls that might be imposed if anthrax does occur in a feedlot can be greatly reduced.

Feedlot operators are strongly advised to obtain endorsement of their anthrax risk management procedures from the state Animal Health Service.

7.1 Sourcing Cattle

Cattle should not be sourced from properties where anthrax has occurred during the last five years unless the cattle are vaccinated against anthrax at least 14 days before introduction to the feedlot.

Anthrax vaccination on arrival at the feedlot is of secondary benefit. This is because:

- If cattle are incubating anthrax at the time of arrival, the disease will run its course before protective immunity develops;
- Protective immunity does not develop until about 2 weeks after anthrax vaccination and vaccinated cattle are susceptible to the disease during this period; and
- The 42 day withholding period may restrict feedlot management options.

Any cattle from a property where anthrax has occurred during the last five years, which have not been vaccinated prior to arrival at the feedlot, should be held in an isolation area for at least ten days prior to induction. Property of origin identification must be maintained during this period.

The isolation area should:

- Not allow direct contact with inducted cattle; and
- Have facilities that allow sick animals to be physically separated from all other livestock.

If isolation is strictly enforced, should an animal be incubating anthrax and succumb to the disease shortly after arrival, quarantine restrictions should only be needed for the isolation area.

7.2 Site Contamination

If a feedlot is located in an anthrax risk area, and earth disturbance allowing buried spores to reach the soil surface is considered a significant risk, cattle should be routinely vaccinated against anthrax before entry to the feedlot.

7.3 Sourcing Feed and Other Materials

Feedlot management should be aware that anthrax spores could be transported to the feedlot with contaminated soil in fodder.

7.4 Suspicious Cases

The National Feedlot Accreditation Scheme (NFAS) Quality Manual for the feedlot should include the action to be taken if there is a case of sudden death² in the feedlot. The feedlot manager and all staff working with livestock should be trained in the required procedure.

² 'Sudden death' means death after an illness lasting less than 8 hours, where the cause of death is not readily apparent.

If sudden death occurs in the feedlot a risk assessment should be undertaken. If the risk assessment suggests that anthrax is a likely diagnosis:

- Other cattle should be removed from the pen containing the carcass and be isolated;
- The feedlot veterinarian should be notified and a diagnostic test for anthrax performed by examining a blood smear collected from the ear or a peripheral blood vessel (if anthrax smears are examined on-site, they should also be sent for laboratory confirmation);
- An autopsy should not be carried out unless anthrax has been excluded as a possible cause of death;
- The carcass and the immediate surrounding area should be liberally sprayed with a solution containing 5% formaldehyde; and
- Soil contaminated with body fluids from the carcass should be decontaminated for at least 12 hours with 5% formaldehyde at a rate of 5 L/m² or deep buried with a liberal treatment of quick lime or chloride of lime to raise the pH.

As anthrax is a notifiable disease in all states/territories of Australia, if it is confirmed or cannot be excluded as the cause of death:

- The state Chief Veterinary Officer, or District Veterinarian (depending on state arrangements) must be notified; and
- The entire pen should be sprayed with 5% formaldehyde at a rate of 5 L/m². The pen may be restocked with cattle 24 hours after spraying.

If the reportable level of cattle deaths is reached (as stated in NFAS Guidelines), the Australian Lot Feeders' Association (ALFA) Industry Response Group (IRG) must be notified.

7.5 At Risk Contact Animals

If anthrax is confirmed, or anthrax is considered likely and has not been excluded as the cause of death, cattle in the same pen and any others arriving from the same property during the previous ten days should be considered *at risk*. These cattle should be isolated from other cattle.

At risk cattle not intended for slaughter within the next six weeks should be vaccinated against anthrax and withheld from slaughter for the 42 day withholding period.

At risk cattle intended for slaughter within the next six weeks should be:

- Vaccinated against anthrax and withheld from slaughter for the 42 day withholding period; or
- Assessed for ill health twice daily for ten days, with any animal developing a temperature of 40.0°C or above immediately treated with antibiotics and withheld from slaughter for the drug withholding period. Cattle that show no signs of ill health and do not develop a temperature of 40.0°C or above may be slaughtered twenty days after the last potential exposure to anthrax.

7.6 Carcase Disposal

If anthrax is confirmed, or anthrax is considered likely and has not been excluded as the cause of death, the carcass may be disposed of by:

- Burning; or
- Deep burial.

Burning is the preferred method for anthrax control, as relatively few anthrax spores form. However, there are obvious logistical and aesthetic difficulties.

Deep burial is the second preferred method of carcass disposal. The carcass should be buried at least 1m, preferably 2m deep to prevent future contamination.

Heat rendering may also be a carcass disposal option, however it should not be undertaken without prior approval from the state Chief Veterinary Officer.

Under no circumstances should the carcass be disposed of to a knackery or abattoir digester, where the carcass is not heat-treated, as these disposal methods allow widespread dispersal of anthrax spores.

Whatever carcass disposal arrangements are made;

- Disposal should be undertaken under the control of government officers;
- Disposal should be in accordance with state Environmental Protection Authority (EPA) legislation.
- Care should be taken to avoid spillage of body fluids;
- Other livestock should be excluded from the carcass disposal area;
- Pigs and vermin should be excluded from the carcass disposal area; and
- Surfaces in contact with the carcass or contaminated with body fluids from the carcass should be sprayed with a solution containing 5% formaldehyde at a rate of 5 L/m².

