AUSTRALIAN VETERINARY EMERGENCY PLAN

AUSVETPLAN

Disease Strategy

Rinderpest

Version 3.0, 2009

AUSVETPLAN is a series of technical response plans that describe the proposed Australian approach to an emergency animal disease incident. The documents provide guidance based on sound analysis, linking policy, strategies, implementation, coordination and emergency-management plans.

Primary Industries Ministerial Council

This disease strategy forms part of:

AUSVETPLAN Edition 3

This strategy will be reviewed regularly. Suggestions and recommendations for amendments should be forwarded to:

AUSVETPLAN — Animal Health Australia
Manager, Veterinary Services
Suite 15, 26–28 Napier Close
Deakin ACT 2600
Tel: 02 6232 5522; Fax: 02 6232 5511
email: admin@animalhealthaustralia.com.au

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DISEASE WATCH HOTLINE

1800 675 888

The Disease Watch Hotline is a toll-free telephone number that connects callers to the relevant state or territory officer to report concerns about any potential emergency disease situation. Anyone suspecting an emergency disease outbreak should use this number to get immediate advice and assistance.

Preface

This disease strategy for the control and eradication of rinderpest is an integral part of the **Australian Veterinary Emergency Plan**, or **AUSVETPLAN (Edition 3)**. AUSVETPLAN structures and functions are described in the AUSVETPLAN **Summary Document**. The disease strategy provides information about the disease (Section 1); the relevant risk factors and their treatment, and the options for the management of a disease outbreak depending on the circumstances (Section 2); and the policy that will be adopted in the case of an outbreak (Sections 3 and 4).

This manual has been produced in accordance with the procedures described in the AUSVETPLAN **Summary Document** and in consultation with Australian national, state and territory governments and the cattle industry.

Rinderpest is included on the World Organisation for Animal Health (OIE) list of notifiable diseases as a multiple species disease. This obliges OIE member countries that had been free from the disease to notify the OIE within 24 hours of confirming the presence of rinderpest. OIE-listed diseases are diseases with the potential for international spread, significant mortality or morbidity within the susceptible species and/or potential for zoonotic spread to humans.[1]

The strategies in this document for the diagnosis and management of an outbreak of rinderpest are based on the recommendations in the OIE *Terrestrial Animal Health Code*[2] and the OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals*.[3]

In Australia, rinderpest is included as a Category 2 emergency animal disease in the *Government and Livestock Industry Cost Sharing Deed In Respect of Emergency Animal Disease Responses* (EAD Response Agreement).[4]

Where in this manual text has been placed in square brackets [xxx], this indicates that that aspect of the manual remains contentious or is under development; such text is not part of the official manual. The issues will be worked on by experts and relevant text included at a future date.

Detailed instructions for the field implementation of AUSVETPLAN are contained in the disease strategies, operational procedures manuals, management manuals and wild animal manual. Industry-specific information is given in the relevant enterprise manuals. The full list of AUSVETPLAN manuals that may need to be accessed in an emergency is shown below.

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[1] These criteria are described in more detail in Chapter 1.2 of the OIE *Terrestrial Animal Health Code* (http://www.oie.int/eng/normes/mcode/en_chapitre_1.1.2.htm).
[2] http://www.oie.int/eng/normes/mcode/en_chapitre_1.8.13.htm
[3] http://www.oie.int/eng/normes/mmanual/2008/pdf/2.01.15_RINDERPEST.pdf
[4] Information about the EAD Response Agreement can be found at https://www.animalhealthaustralia.com.au/programs/eadp/eadra.cfm

In addition, *Exotic Diseases of Animals: A Field Guide for Australian Veterinarians* by WA Geering, AJ Forman and MJ Nunn, Australian Government Publishing Service, Canberra, 1995 (to be updated) is a source for some of the information about the aetiology, diagnosis and epidemiology of the disease.

AUSVETPLAN manuals[5]

Disease strategies
- Individual strategies for each of 30 diseases
- Bee diseases and pests
- Response policy briefs (for diseases not covered by individual manuals)

Operational procedures manuals
- Decontamination
- Destruction of animals
- Disposal
- Public relations
- Valuation and compensation
- Livestock management and welfare

Wild animal manual
- Wild animal response strategy

Summary document

Enterprise manuals
- Artificial breeding centres
- Dairy processing
- Feedlots
- Meat processing
- Poultry industry
- Saleyards and transport
- Zoos

Management manuals
- Control centres management (Parts 1 and 2)
- Animal Emergency Management Information System
- Laboratory preparedness

[5] The complete series of AUSVETPLAN documents is available on the internet at: http://www.animalhealthaustralia.com.au/programs/eadp/ausvetplan_home.cfm

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1 Nature of the disease

Rinderpest (cattle plague) is classically a peracute to acute, usually fatal, viral disease, principally of cattle and buffalo; a subacute or mild form of the disease is seen in populations in which the disease is endemic. It is spread mainly via aerosols between animals in direct contact. An outbreak of the classical disease is characterised by sudden onset, fever, and inflammation and necrosis of the mucous membranes, manifested by erosive stomatitis, gastroenteritis and dehydration. Dysentery is a common feature of the disease, accompanied by rapid respiration and discharge from the nose and eyes. Mortality may approach 90%.

Rinderpest does not affect humans.

1.1 Aetiology and pathogenicity

The rinderpest virus is a member of the genus *Morbillivirus* of the family *Paramyxoviridae*. Viruses in the same genus include the causative agents of peste des petits ruminants (PPR), canine distemper and human measles.

There is only one serotype of rinderpest, but strains vary in virulence. Three genetically distinct lineages limited in geographic distribution have been recognised as causing disease in Ethiopia and Sudan, East Africa, and Asia, respectively. Two of the three (the Ethiopian–Sudanese and Asian lineages) have been globally eradicated under the Global Rinderpest Eradication Programme (GREP), run jointly by the United Nations Food and Agriculture Organization and the World Organisation for Animal Health (OIE). A milder form of the disease with the potential to revert to classical virulence is endemic in East Africa.

1.2 Susceptible species

1.2.1 Cattle and buffalo

Cattle and buffalo are highly susceptible, and rinderpest is most frequently seen in these species.

Bos indicus (zebu) breeds of cattle have more resistance than *B. taurus* (European) breeds.

In endemic areas, the spread of the disease is reduced by the presence of more resistant breeds of cattle and immunity in previously infected animals. In this situation, it is usually young animals that are infected.

1.2.2 Sheep and goats

There are many reports of sheep and goats in close contact with infected cattle becoming infected and developing clinical signs (Narayanaswamy and Ramani 1973, Ramani et al 1974). However, serious clinical rinderpest in sheep and goats is uncommon. The more likely outcome of infection is seroconversion, with

subclinical or inapparent infection that is not readily transmitted back to cattle (El Hag Ali 1973, Wafula and Kariuki 1987, Anderson et al 1990ab).

In East Africa, the virus has been known to infect sheep without spreading to goats, and goats without apparently involving sheep (Plowright 1968). Rinderpest is unlikely to occur in sheep and goats without simultaneous involvement of bovines.

1.2.3 Other animals

Inapparent infection develops in camels but is not transmitted to other animals.

The susceptibility to infection of farmed and feral deer species in Australia is unknown, but it is assumed that they can become infected and transmit the disease.

European pigs can be infected but rarely develop serious disease. Asian pigs are more susceptible and can transmit the disease back to cattle (Ramani et al 1974). Feral pigs in Australia are predominantly of European origin.

Infection of pigs is predominantly by contact with infected animals. The ingestion of meat from infected animals may act as a less common source of infection (Geering et al 1995).

1.2.4 Native animals

No disease developed in two kangaroos and two possums inoculated or drenched with infected blood (Robertson 1924).

As rinderpest is restricted to ruminants and pigs in other countries, there is no reason to suspect that the disease would establish itself in populations of Australian native animals. The disease in wildlife (giraffe, eland and kudu) in Africa is not maintained without simultaneous disease in cattle.

1.3 World distribution and occurrence in Australia

Rinderpest originated around the Caspian Basin many centuries ago, and spread with marauding armies throughout Europe and Asia, causing death and devastation. It was introduced into the Horn of Africa in 1889. In the 7 years to 1896, a pandemic spread throughout Africa, killing 90% of the cloven-hoofed animals in its path. This was the most devastating visitation of a disease on an animal population.

Rinderpest was introduced into Australia in 1923 in cattle on a ship also containing Asian pigs. However, it was quickly eradicated (Weston 1924).

Through successful eradication programs, the distribution of rinderpest is now limited (in 2007) to East Africa. Sudan, Ethiopia and Uganda are officially free from

rinderpest, and parts of Kenya are also free. The GREP aims at global eradication by 2010 (Mariner et al 2003).

For the latest information on the distribution of rinderpest, refer to the website of the OIE World Animal Health Information Database (WAHID).[6]

1.4 Diagnostic criteria

Rinderpest should be suspected when acute fever with diarrhoea in cattle or buffalo is accompanied by erosions of the mouth linings and high mortality. Rapid spread from animal to animal and herd to herd can occur, with animals of all ages becoming sick and dying. Any disease outbreak with these features is highly suggestive of rinderpest.

1.4.1 Clinical signs

Cattle

In the peracute form, seen in highly susceptible and young animals, the typical signs are high fever, congested mucous membranes, and death within 2–3 days.

Acute cases are characterised by the sudden onset of a rapidly mounting fever, which reaches 40–42°C by the second or third day after onset and remains high for the next 3–5 days.

Early in the fever, individuals may show depression, loss of appetite, congestion of the visible mucous membranes, watery discharges from the eyes and nose, drying of the muzzle, constipation, harshness of the hair coat and, in the case of dairy animals, loss of milk production. None of these symptoms permits a diagnosis of rinderpest.

From the second or third day of fever, shallow necrotic erosions appear on the lower lip and gums and, increasing in extent and severity, become the dominant feature for the remainder of the fever. Ultimately, these lesions, which are characteristic of rinderpest, may be found on the underside of the free portion of the tongue, on the floor of the mouth, on and between the buccal papillae, on the margin between the upper lip and dental pad, and on and between the ridges of the hard palate. Erosions may also be noticed on the lining of the front of the nose and on the vulva and vagina. Eye and nasal discharges become profuse and assume a mucopurulent character, and the animal's breath becomes strongly fetid.

Profuse diarrhoea usually commences 2 or 3 days after the onset of mouth lesions. Watery at first, it later contains mucus, blood and fragments of necrotic epithelium. It results in dehydration, weakness and prostration in animals not succumbing in the early stages of the disease. Most animals die 8–12 days after the onset of clinical signs, but some animals recover after a period of diarrhoea lasting 4–5 days.

[6] http://www.oie.int/wahid-prod/public.php?page=home

In the endemic area in Africa, the subacute form of rinderpest is currently seen as a mild, nonfatal infectious disease of cattle, but with the ability to undergo virulence modulations to the classic form.

When the virus is introduced into a large and fully susceptible bovine population, it is probable that some or all of the manifestations of classic rinderpest will be seen. For example, the mortality rate, which may vary initially between 30% and 90%, may increase with repeated transmissions of the virus because of increasing virulence on passage of the virus. Under these circumstances, it is even possible that peracute cases will occur. However, the fever might be brief and accompanied by the transient appearance of mouth lesions and a short and light bout of diarrhoea. In such cases, it would be difficult to make a diagnosis based entirely on clinical appearance.

Sheep and goats

Sheep and goats can be affected and develop clinical signs. Narayanaswamy and Ramani (1973) reported great variation in the clinical picture of rinderpest in sheep. Recent opinion suggests that the signs in sheep and goats may be caused by PPR.

In the clinical form, a high fever (41–42°C) lasts 3–4 days, and pinpoint discrete or coalescent erosions emerge on the lining of the mouth and are prominent on the gums and lips. There is concomitant mucopurulent nasal discharge, conjunctivitis and respiratory distress. Diarrhoea, loss of appetite and laboured breathing also occur. Lambs and kids suffer more severely than adults, and total mortalities range from 70% to 90%. Death generally occurs 3–7 days after the onset of fever.

Buffalo

The clinical signs in buffalo are assumed to be similar to those in cattle.

Pigs

In European pigs, usually only mild symptoms develop, with transient fever.

Asian pigs may develop the classical clinical symptoms seen in cattle and suffer high mortality (Ramani et al 1974).

1.4.2 Pathology

Gross lesions

Postmortem findings include a dehydrated carcase; fluid faeces, containing blood, and faecal staining of the legs; erosions of the mucosa in the mouth, pharynx and oesophagus; congestion, oedema and erosion of the abomasal mucosa; prominent necrotic Peyer's patches; and congestion and erosion of the mucosa of the large intestine, especially along the longitudinal folds, giving a 'tiger (or zebra) striping' appearance.

Microscopic lesions (histopathology)

Histopathology findings are characterised by lymphocyte and epithelial necrosis and by the formation of multinucleated giant cells containing intracytoplasmic and

intranuclear inclusions in the germinal centres in lymphatic tissues and in stratified squamous epithelial cells.

1.4.3 Laboratory tests

Specimens required

Rinderpest virus is most easily isolated during the early, acute stage of the disease when clinical signs are still apparent. The specimens that should be collected from the live animal include blood (whole EDTA, and clotted), lymph node fluid or biopsy, necrotic material from oral lesions, and lachrymal fluid. Specimens for virus isolation are best taken from animals with a high temperature and before diarrhoea has started (for example, from the early, less obvious cases).

At postmortem, fresh samples of spleen, lymph nodes and affected sections of alimentary tract mucosa should be collected for virus isolation. Samples of tonsil, tongue, spleen, lymph nodes and affected parts of the alimentary tract should be collected for histopathology. Postmortem samples should be collected only from animals slaughtered for the purpose or very fresh carcases.

Transport of specimens

Specimens should initially be sent to the state or territory diagnostic laboratory. From there, they will be forwarded to the CSIRO Australian Animal Health Laboratory (CSIRO-AAHL), Geelong, for emergency disease testing. This should be done after the necessary clearance has been obtained from the chief veterinary officer (CVO) of the state or territory of the disease outbreak and after the CVO of Victoria has been informed about the transport of the specimens to Geelong.

All unpreserved tissue samples, swab and biopsy material and whole blood should be chilled and forwarded with water ice or frozen gel packs. If the journey is expected to last more than 72 hours, the samples should be frozen and forwarded packed in dry ice. For further information, see the **Laboratory Preparedness Manual**.

Laboratory diagnosis

AAHL tests **[TO BE UPDATED]**

Tests currently available at CSIRO-AAHL for the laboratory confirmation of diagnosis of rinderpest are shown in Table 1.1.

Table 1.1 Laboratory tests currently available at CSIRO-AAHL for the diagnosis of rinderpest

Test	Specimen required	Test detects	Time taken to obtain result
Virus isolation	Tissue/whole EDTA blood	Virus	5–7 days
Serum neutralisation	Serum	Antibody	6–7 days
Histopathology	Tissue samples	Microscopic changes	2 days
Animal inoculation	Virus isolate	Host range	10 days
Electron microscopy	Tissue samples	Virus	1 day

Note: CSIRO-AAHL now has a polymerase chain reaction test available and can obtain an ELISA test.
Source: Information provided by CSIRO-AAHL, 1995 (refer to CSIRO-AAHL for most up-to-date information).

Other tests

Other tests not currently available in Australia include an immunocapture enzyme-linked immunosorbent assay (ELISA) specific for rinderpest antigen, and differential immunohistochemical staining that differentiates PPR from rinderpest. Cross-virus serum neutralisation tests or the competitive ELISA using monoclonal antibodies will distinguish rinderpest antibodies from PPR antibodies (Anderson et al 1991). However, since it is unlikely that both diseases would occur in Australia at the same time, either a serum neutralisation test using rinderpest antigen or the indirect ELISA would be the test of choice.

1.4.4 Differential diagnosis

The following diseases should be considered in a differential diagnosis of rinderpest in cattle:

- foot-and-mouth disease;
- malignant catarrhal fever;
- bovine virus diarrhoea; and
- infectious bovine rhinotracheitis.

Rinderpest is distinguished by the characteristic nonvesicular lesions not involving the feet, high morbidity, and mortality approaching 100%. The other diseases rarely involve both high morbidity and high mortality.

In sheep and goats, the major disease considered in a differential diagnosis would be PPR. As the GREP nears completion, rinderpest signs in small ruminants in rinderpest-free countries will be more likely to be due to PPR (OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals)*.[7]

1.4.5 Treatment of infected animals

There is no treatment for rinderpest.

[7] http://www.oie.int/eng/normes/mmanual/a_summry.htm

1.5 Resistance and immunity

Susceptible cattle of all ages, sexes and breeds can be infected with rinderpest virus and develop serious clinical disease. In countries free from rinderpest, its introduction is dreaded because it is believed that the disease would spread rapidly in such susceptible populations and mortality would be high. This may not always be so, however, because of variations in the pathogenicity of virus strains and differences in susceptibility among breeds of cattle.

1.5.1 Innate and passive immunity

Because the disease has been widespread in Asia and Africa, all breeds of cattle must be considered to be susceptible. In general, zebu breeds (*Bos indicus*) have more resistance than European breeds (*B. taurus*). European breeds have been seriously affected in outbreaks that were relatively mild in native African cattle (although not all African cattle are zebu breeds).

Australia's cattle population has a significant proportion of zebu-type animals. If the disease first occurred in such animals, the classic expression of disease may therefore be muted.

Calves suckling immune cows in the first 12–34 hours after birth acquire passive immunity, which is protective for 4–9 months.

1.5.2 Active immunity

Antibodies appear around the sixth day of the disease, and recovered cattle are solidly immune and resistant to reinfection for life.

All rinderpest virus strains are immunologically the same.

1.5.3 Vaccination

Attenuated ('live') vaccines have been used in the control of rinderpest. An example is the tissue culture rinderpest vaccine (TCRV) — RBOK strain. This vaccine is safe to use in all animals and provides protection for at least 11 years. Unfortunately, serological differentiation between vaccinated animals and field-infected animals is difficult. As the GREP nears completion, the problems posed by TCRV interfering with serosurveillance of field infection have resulted in a virtual halt in TCRV production. The development of marker attenuated vaccines is an urgent requirement.

In calves, since passive immunity derived from maternal antibodies in the colostrum provides protection against infection for 4–9 months, vaccination of calves less than 9 months old may not be effective in producing immunity.

1.6 Epidemiology

1.6.1 Incubation period

The OIE *Terrestrial Animal Health Code* gives a maximum incubation period, for regulatory purposes, of 21 days.

The incubation period in susceptible animals may be as short as 2–3 days (Nawathe and Lamorde 1983) and ranges up to 15 days (Scott 1981). Rinderpest virus may appear in the blood, excretions and secretions 1–2 days before the appearance of clinical signs. The maximum excretion of virus occurs 3–7 days after signs have developed.

The strain of the virus, dosage and route of exposure may influence the course of the disease so that a period of 8–15 days may pass before clinical signs are seen in in-contact animals. The rapidity of within-herd spread following introduction is an inconsistent diagnostic feature. However, most cattle in infected herds become infected within 3–4 weeks of introduction of the virus into the herd.

1.6.2 Persistence of agent

General properties

Rinderpest virus has a lipid envelope, and strains vary in their pH stability. At 4°C, rinderpest virus is most stable at pH 7.2–7.9, with a half-life of 3.7 days (Plowright 1968). The virus is inactivated at pH values of less than 5.6 or more than 9.6 (Geering et al 1995).

These features ensure a high degree of susceptibility to all disinfectants. In general, the alkalis (sodium carbonate, sodium hydroxide), the halogens (chlorine) and phenolic compounds are good for disinfecting buildings, wooden structures, concrete surfaces, equipment and vehicles. For personal disinfection, citric acid, alcohols and iodophors are suitable. Further information, including dilution rates and trade names, is available in the **Decontamination Manual**.

Environment

Rinderpest virus may survive in culture for at least 4 months at –20°C, 8 weeks at 4°C, 1 week at 20–25°C and more than 2.6 days at 37°C (Plowright 1968). The half-life of the virus in cattle blood, spleen or lymph node at 56°C is 5 minutes. The virus is inactivated at temperatures above 70°C (De Boer and Barber 1964).

The virus is rapidly inactivated at environmental temperatures by ultraviolet light and desiccation, as follows:

- Contaminated enclosures devoid of vegetation may be infective for cattle for a maximum of 48 hours after the removal of infected animals.
- Contaminated buildings without ventilation or sunlight may remain infective for 48–96 hours.
- Contaminated pasture may remain infective for only 6–8 hours if unshaded and for 18–24 hours if shaded (Plowright 1968).

Live animals

Recovered animals carry the virus for no longer than 7 weeks (see reference to milk below) and develop solid immunity and a high antibody titre (Nawathe and Lamorde 1983). There is no known chronic carrier state.

Pregnant animals may abort 2–12 weeks after recovery, and foetal discharges may contain infectious virus (Plowright 1968). The aborting cows are not viraemic, and their sera contain high levels of antibodies (Scott and Provost 1992). Vaginal

discharges from cows that abort have been found to be infectious up to 12 weeks after abortion (Plowright 1968), but Wafula et al (1989) reported no virus in vaginal discharges later than 24 hours after abortion (see also Section 1.6.3, Semen and embryos).

Animal products and byproducts

Rinderpest virus is rapidly inactivated by autolysis and putrefaction and so will not survive more than 24 hours in the carcase of an animal that has died from the disease (Plowright 1968, Nawathe and Lamorde 1983).

The pH of bovine muscle falls from about 7.2 at death to between 5.5 and 5.8 about 6 hours later. Since rinderpest virus is sensitive to low pH, it is likely to be inactivated in hung beef but not necessarily in the meat of other animals. Ezzat et al (1970) recorded that infected meat kept refrigerated for 7 days was still infective to cattle.

Virus may be present in milk from 1–2 days before clinical signs develop and, exceptionally, has been recorded up to 45 days after clinical recovery. Although the virus is rapidly inactivated at temperatures above 70°C, there is no confirmation that it is inactivated by pasteurisation of milk. Heat drying of milk for inclusion in milk powder should inactivate the virus.

Equipment and personnel

Persistence of the virus on inanimate objects and personnel is unlikely in view of the low resistance of the virus in the environment.

1.6.3 Modes of transmission

Live animals

Infection spreads to new areas by the movement of infected animals. Transmission between herds is principally by movement of cattle, although transmission via contaminated water, equipment and clothing is also possible (see below).

There is no chronic carrier state in recovered animals. However, animals other than cattle (ie sheep, goats, camels, wild African ruminants, pigs) can all be subclinically infected and may act as inapparent carriers.

Rinderpest is usually transmitted by contact with secretions and excretions from infected animals (particularly nasal discharge). Virus is found in expired air, nasal and eye discharges, peri-parturient vaginal discharges, saliva, faeces, semen and urine, and may be present in milk. Contact transmission is unlikely in the first 24 hours of the fever or more than 24 hours after the disappearance of fever.

The route of entry is the upper or lower respiratory tract, with nasal epithelium being the usual site of the first infection. The first significant virus multiplication probably occurs in tonsils and lymph nodes draining the respiratory tract. Viraemia occurs, and widespread viral distribution throughout the body follows.

Cattle can be infected experimentally by any route of inoculation. Infection occurs readily after conjunctival or nasal instillation of nasal discharges. The virus cannot pass through intact skin.

Animal products and byproducts

Ingestion of food contaminated with secretions from infected animals, or ingestion of infected meat, may be a source of infection in pigs (via the gastrointestinal route), and hence of transmission back to cattle.

It is unlikely that any virus on wool or fibre would remain infective and spread disease, and salted or frozen meat is unlikely to be important in the transmission of disease.

Equipment and personnel

Rinderpest virus survives poorly outside the host and does not persist in the environment (see Section 1.6.2). Indirect transmission of virus, by clothing or equipment contaminated with faeces or other excretions from infected cattle, is therefore unlikely.

Vectors

The virus has been isolated from a number of insects, but they are not considered important factors in transmission.

Semen and embryos

The virus is present in all secretions, and semen transmission was demonstrated by very early work.

For in vivo derived embryo transfer in cattle, rinderpest has been assessed as a Category 3 disease by the International Embryo Transfer Society (IETS). As such, preliminary evidence indicates that the risk of transmission is negligible, provided that the embryos are properly handled between collection and transfer (according to the IETS Manual 1998, updated in 2004). However, additional in vitro and in vivo experimental data are required to substantiate the preliminary findings.

See the **Artificial Breeding Centres Manual** for further information.

Windborne spread

Transmission is mainly by aerosol over a short distance (up to 2 metres), where the animals are in contact for several hours outdoors or for 15 minutes indoors. However, spread of the virus over several hundred metres is possible at normal wind velocities (Scott and Provost 1992). Airborne spread is most likely to occur at night when the effects of sunlight and temperature are lowest (Scott and Provost 1992). High and low humidity aid the survival of the airborne virus, which is rapidly destroyed when the relative humidity is 50–60% (Hyslop 1979, cited by Scott 1985).

1.7 Manner and risk of introduction to Australia

The importation of an infected animal is indisputably the most likely route for the introduction of rinderpest into Australia. Since the virus survives poorly outside the host, contaminated clothing or equipment or smuggled meat products are not considered to be likely sources for the introduction of rinderpest.

The importation of ruminants from endemic countries is not permitted, and so the risk of introduction is remote.

1.8 Social and economic effects

An uncontrolled outbreak of rinderpest in Africa from 1889 to 1896 killed 90% of ruminants in its path as it spread from the Horn of Africa to South Africa. A similar result could be expected in an uncontrolled outbreak in Australia, which might reasonably be expected to cause very high mortality in infected herds. It is possible, however, that the outbreak may be characterised by subacute clinical signs.

If the disease can quickly be brought under control, there may be negligible disruption to the community. In a large-scale outbreak, which might take several weeks to control, there would be severe, widespread losses in the cattle industry and possibly in the pig, sheep and goat industries. The resulting financial losses at the local level and from loss of export markets would have a serious effect throughout the country. Job losses both on farms and in support industries would occur during a prolonged outbreak. A large outbreak in a dairy area would affect the viability of dairy factories and may result in short-term shortages of dairy products.

If rinderpest became endemic, continuing economic loss would occur due to losses in young animals and the cost of preventative vaccination. Permanent loss of some markets could be expected. For example, legislation in the United States currently prohibits the importation of beef from countries in which rinderpest is present, and all meat exports to the United States would therefore cease. Other countries could also place a ban on imports, at least in the short term.

It is of prime importance that interference with normal local trade in animals and animal products be restricted to the minimum required to prevent transmission of infection. This minimum must also take into consideration any constraints that will apply if a zoning strategy is implemented for international trade purposes. Movement control procedures within the control area (see Section 4) should ensure that, as far as possible, normal local production and distribution of animal and animal products are maintained from 'free' properties.

Movement restrictions within the restricted area and control area (see Section 4) would cause some loss of market opportunities and associated financial losses to unaffected properties in the area and also to support industries such as stock transporters.

Meat and milk supplies in the areas near an outbreak may be restricted for a short period. As the international export of meat is likely to be greatly reduced, at least in the short term, meat would only be directed to the domestic market. Prices are likely to fall. If an area supplying milk to a major population centre is affected, milk shortages and consequent higher prices could be expected if the outbreak is large in scale. In dairying areas, however, the disease is even more amenable to eradication than in extensive grazing areas, so large-scale outbreaks are unlikely.

1.9 Criteria for proof of freedom

According to the OIE *Terrestrial Animal Health Code*, Australia would be considered to be free from rinderpest 3 months after the last case if a stamping-out policy is practised or, if vaccination is carried out, 3 months after the last vaccinated animal is slaughtered or destroyed.

Clinical surveillance should be supported by serological testing of the susceptible animal population in the restricted area and control area to an appropriate level of confidence to provide sufficient proof that the disease has been eradicated.

If vaccination has to be used, animals would need to be permanently identified and slaughtered commercially when possible. This is necessary because the presence of vaccinal antibodies could mask evidence of transmission or a subsequent outbreak.

As the disease has a short incubation period and does not survive long in the environment, a sentinel animal restocking program would be unnecessary. The farm could be safely restocked 15 days after destruction and disposal of the last clinical case. After restocking, the premises would be quarantined and placed under surveillance.

See Appendix 1 for further details on proof of freedom.

2 Principles of control and eradication

2.1 Critical factors assessed in formulating response policy

Features of rinderpest:

- Rinderpest is a peracute to acute, usually fatal, viral disease, principally of cattle and buffalo; a subacute or mild form of the disease is seen in populations in which the disease is endemic.
- The disease may establish in pigs and susceptible feral ruminants (deer, buffalo, camels, goats).
- Rinderpest is rapidly spread by direct contact and has a short incubation period, so that the disease should become apparent soon after introduction in a closely settled area.
- Infection spreads to new areas by the movement of infected animals.
- Tests are available for rapid detection. The diagnosis of acute cases should be relatively simple, but diagnosing subacute (mild) cases may be more difficult, including in species other than cattle.
- Recovered animals show solid immunity, and there is no known chronic carrier state in recovered animals.
- The virus survives for only a short time in the environment and is rapidly inactivated by disinfectants.
- A safe, reliable vaccine is available, but distinguishing vaccinated from field-infected animals is difficult.
- There are no public health implications.

Features of susceptible populations:

- There is a small likelihood of outbreaks in remote parts of Australia, where stock populations are sparse, before the disease is detected.
- The expected severe market disruption would reduce the value of all related industries.

2.2 Options for control or eradication based on the assessed critical factors

As there is a global rinderpest eradication program, the only viable policy option for the control and eradication of rinderpest is stamping out. This would involve the prompt destruction and sanitary disposal of animals infected with or exposed to rinderpest virus.

Managing the risks of rinderpest would be based on the identified critical factors:

- registration of all commercial and noncommercial livestock holdings, with biosecurity programs being compulsory;

- early recognition and laboratory confirmation of cases to determine the extent of infection, using quickly instituted serosurveillance and animal tracing (using the National Livestock Identification System, where available), based on an epidemiological assessment;
- rapid imposition of effective quarantine on infected and potentially infected premises to prevent direct and indirect contact between infected and at-risk animals;
- elimination of infection from infected premises and infected animal populations by the rapid destruction of animals, the sanitary disposal of carcases and decontamination;
- swift declaration and effective policing of control areas to prevent movements of animals carrying or potentially carrying rinderpest virus;
- elimination of infection from possibly infected feral animal populations by the rapid destruction of animals and the sanitary disposal of carcases;
- implementation of appropriate zones and compartments;
- possible use of ring vaccination — infected animals would need to be distinguished from vaccinated animals; and
- gaining of livestock owner support.

The policy to be implemented is described in Section 3.

3 Policy and rationale

3.1 Introduction

Summary of policy

Rinderpest is an OIE-listed disease that has the potential for rapid spread within herds and serious production losses, and is of major importance in the trade of cattle and cattle products.

Rinderpest is an Animal Health Australia Category 2 disease under the government–industry EAD Response Agreement for cost-sharing arrangements. Category 2 diseases are those for which costs will be shared 80% by government and 20% by industry.

The policy with regard to an outbreak of rinderpest is to eradicate the disease in the shortest possible time using *stamping out*, supported by a combination of strategies, including:

- ***early recognition*** **and laboratory confirmation of cases;**
- ***quarantine and movement controls*** **over animals, products and other potentially contaminated items in declared areas, to minimise spread of infection;**
- ***disposal*** **of destroyed animals and animal products likely to be contaminated, to remove the source of infection;**
- ***tracing and surveillance*** **(based on epidemiological assessment) to determine the source and extent of infection and subsequently to provide proof of freedom from the disease;**
- ***control of all susceptible populations of animals*** **through assessment and management of the risk posed by species other than cattle, including feral pigs and feral goats;**
- ***decontamination and/or disposal*** **of fomites (facilities, equipment and other items) to eliminate the pathogen;**
- ***zoning/compartmentalisation*** **to define infected and disease-free areas and premises, and to assist in regaining market access; and**
- ***an awareness campaign*** **to facilitate cooperation from the industry and the community.**

Although vaccination is used overseas where rinderpest is endemic to control the disease before eradication is attempted, it is not envisaged that vaccination would be required in Australia.

The chief veterinary officer (CVO) in the state or territory in which the outbreak occurs is responsible for developing an Emergency Animal Disease Response Plan for the particular outbreak.

The Consultative Committee on Emergency Animal Diseases (CCEAD), convened for the incident, assesses the response plan drawn up by the affected jurisdiction's chief veterinary officer (CVO) for technical soundness and consistency with AUSVETPLAN, and endorses or seeks modifications to it. Overall operational management of the incident rests with the CVO of the affected jurisdiction, with oversight by the CCEAD.

The National EAD Management Group (NMG), also convened for the specific incident, decides on whether cost sharing will be invoked (following advice from the CCEAD) and manages the national policy and resourcing needs.

For further details, refer to the **Summary Document**.

CVOs will implement disease control measures as agreed in the EAD Response Plan and in accordance with relevant legislation. They will make ongoing decisions on follow-up disease control measures in consultation with the CCEAD and the NMG, based on epidemiological information about the outbreak.

For information on the responsibilities of the state or territory disease control headquarters and local disease control centres, see the **Control Centres Management Manual**.

3.2 Control and eradication policy

The policy for an outbreak of rinderpest is to control and eradicate the disease through **stamping out** and to re-establish the rinderpest-free status of Australia as quickly as possible.

This can best be achieved through the immediate quarantining of infected premises (IPs) and dangerous contact premises (DCPs), imposition of movement controls, and destruction of animals on the quarantined premises to contain and eliminate the main source of virus.

Tracing and surveillance will be required to determine the extent of infection so that adequate areas can be declared for disease control purposes and to assist in establishing proof of freedom.

3.2.1 Stamping out

Control measures will initially focus on eradicating the disease by stamping out to remove the most dangerous source of the virus. This will be the best use of available resources and will permit return to international trade as early as possible.

As soon as practical after rinderpest has been diagnosed and stock have been valued, all infected and in-contact cattle on the IP will be humanely destroyed.

Since the virus survives for only a few days outside the host, in many cases it will be sufficient to declare only part of a property as an IP or DCP, depending on the separation of animal groups and the management practices in place. In this way, not all animals on a property may need to be destroyed. Care must be taken to examine management practices when deciding which groups may have been exposed to infection. Non-exposed cattle on the property will be placed under

quarantine and observed for a period for the presence of clinical disease. Such decisions, if possible, will prevent the unnecessary slaughter of a large number of animals.

The following factors will be considered when making a decision on whether to destroy groups of ruminants and pigs on an IP, based on the likelihood of infection being present in such animals:

- results of transmission tests undertaken by the Australian Animal Health Laboratory (AAHL);
- degree of direct contact that may have occurred with infected animals;
- whether pigs have ingested infected material;
- risk from other susceptible species in contact populations (eg feral pigs, feral goats);
- the likelihood that the disease will die out anyway if the group is isolated from other animals;
- the level of intervention required to control the disease in feral animal populations to avoid re-infection; and
- resources available.

Significantly exposed cattle on DCPs will also be destroyed. Animals from a DCP or suspect premises (SP) that are not viraemic (do not show clinical signs and have a normal temperature) may be slaughtered for human consumption, provided that they can be moved safely to an abattoir in accordance with strict guidelines.

Sheep, goats and European-type pigs on DCPs are unlikely to become infected without simultaneous disease in cattle. They should not be destroyed unless it can be shown that they are excreting the virus, or that spread is occurring in the group.

It will not be necessary to destroy any buildings or materials because the virus survives for only a few days in the environment (see Section 1.6.2).

For the same reason, the use of specific sentinel animals is not warranted. If the premises have been destocked, restocking will be permitted after 15 days. If some susceptible animals are allowed to remain on the premises, they should be tested for antibodies, and restocking should be permitted only if no evidence of infection is detected.

A property will remain in quarantine for 2 months after repopulation, with stock movement allowed only for direct slaughter. During this period, a sample of animals will be inspected weekly for 4 weeks, then fortnightly for another month, for the appearance of clinical signs or positive serology.

3.2.2 Quarantine and movement controls

Quarantine and movement controls will play a major role in restricting the spread of virus from farm to farm and in preventing spread between in-contact animals and other animals on IPs and DCPs. Movements of animals and animal products from IPs and DCPs will be prohibited, and movements from SPs will be prohibited while the premises are under observation and surveillance. However, non-exposed

animals on IPs, DCPs and SPs may be moved under permit for immediate slaughter.

People, vehicles and equipment likely to be contaminated will need to be decontaminated before leaving IPs, DCPs and SPs.

The declaration of a restricted area (RA) around IPs will assist in preventing spread by restricting movements of potentially contaminated materials that have had direct or indirect contact with the IP. The RA will be of sufficient size to ensure that it includes all IPs, DCPs and processing establishments, and as many of the SPs as possible. Although wild pigs, deer, buffalo, camels and goats are unlikely to be of major significance in the spread of disease, their presence must be considered in the declaration of an RA.

A control area (CA) will form a buffer zone of at least 10 km between the infected and free areas, and movement into and out of the area will be controlled. All movement restrictions will remain in force until the disease is under control.

Animals will be prohibited from entering the RA and CA; any such animals would be subject to slaughter and compensation if they became infected or were in contact with infected animals.

Some animal products may be removed from premises within the RA and CA where disease is not present, subject to permit and treatment before release.

Animals for slaughter will need to go direct to an abattoir in the RA or CA (as appropriate). They must not be held in the lairage any longer than the minimum time required for meat hygiene purposes (24 hours).

Milk from the RA will go only to processing. It will be collected only at a time when cattle are not in the area around the dairy, because the air vented from the tanker may be contaminated with virus from milk already collected from a property where the disease is incubating. However, the risk of aerosol spread of rinderpest from milk tankers is low, so that removal of cattle from the immediate area only at the time of aerosol production should be sufficient. Milk-fed calves or pigs normally penned near the dairy should be moved out of the immediate vicinity while the RA is in force. Alternatively, HEPA filters should be fitted to milk tanker vents. Refer to the milk handling guidelines in the **Disease Strategy** for foot-and-mouth disease for further guidance.

Vehicles carrying susceptible animals will be allowed to pass through the RA or CA as long as they are not off-loaded within the area. If the animals are off-loaded during rest stops, the yards used must be rested for 7 days and water troughs decontaminated before the next consignment.

See Section 4 for further details on declared areas and on quarantine and movement controls.

3.2.3 Tracing and surveillance

Detailed tracing of the movement of animals, animal products and feedstuff to and from IPs or DCPs will be urgently carried out.

Trace-back of animals, people and things should extend back for 21 days before the detection of the first clinical case on the initial IP. Trace-forward will need to cover the period from 21 days before the first case to the time quarantine was imposed to enable identification of the DCPs and SPs and to determine the extent of the RA.

Surveillance will be used to assess the extent of infection within the RA and CA, particularly on DCPs and SPs. The surveillance strategy will involve inspection of suspect stock and in-contact animals, examinations of reported illnesses, and serological testing of all susceptible species. Surveillance will also be widely used, in the form of serological testing and animal observation, during the period after the disease is under control and until proof of freedom is obtained.

Surveillance will concentrate on properties considered to be at risk because of recent introduction of animals from IPs, as well as properties in close proximity to IPs (see Appendix 1 for details). Broad surveillance must be maintained by farmers, veterinarians, stock agents, abattoir workers and others watching for signs of disease and promptly reporting any suspicion of infection.

See Appendix 1 for further details on surveillance.

3.2.4 Zoning and compartmentalisation

Once the extent of the outbreak has been defined, the major part of Australia may be able to be declared a disease-free zone. Due to the nature of the disease, disease-free premises may be able to be established in infected areas using the principles of compartmentalisation.

3.2.5 Vaccination

It is unlikely that vaccination will be used for the control of rinderpest in Australia because the policy of stamping out should be successful. However, if it is decided to use vaccination as part of the overall strategy, vaccination should be introduced as early as possible in the response for best effect and use of vaccine.

Ring vaccination around an outbreak may become necessary if the outbreak is not being easily controlled by stamping out. (See Appendix 2 for details on the use of vaccine.)

Modification of the stamping-out policy may be required if the disease becomes established in extensive grazing areas or in the feral ruminant or pig populations. The principal modification would be the application of vaccination. If available, a marked attenuated vaccine that can be differentiated from field strains of the virus would be used. The current attenuated cell-culture vaccine is safe for all species and breeds and provides long-term immunity. It is the vaccine of choice for ring vaccination around an outbreak to provide a buffer zone of immune animals until stock within the RA can either be mustered or destroyed. Ring vaccination should aim at the effective vaccination of at least 90% of the surrounding herd in areas where mustering within the ring is a problem. All vaccinated animals will be permanently identified in case a decision is made to slaughter or destroy vaccinated cattle before the declaration of freedom.

3.2.6 Treatment of infected animals

Infected or other susceptible animals will not be treated.

3.2.7 Treatment of animal products

Certain products may be removed from premises within the RA or CA, and removed from the RA or CA, subject to permit and treatment.

Milk and milk products from IPs will be destroyed and disposed of as appropriate. Milk and milk products that have left the IP during the 5 days before the first case will be traced and suitably heat treated. Marketing of milk from non-exposed animals on DCPs will be permitted, subject to heat treatment for milk powder, since pasteurisation alone may not inactivate rinderpest virus.

Because meat is not infectious for humans, animals from free premises within the RA and CA and animals not showing clinical signs on IPs and DCPs may move direct to slaughter for local consumption. To prevent infection of pigs by ingestion of infected beef, the carcases must not be chilled quickly but must be hung to ensure that the normal decrease in pH can occur to a level that will destroy the rinderpest virus; additional precautions may need to be taken with pig carcases as the pH fall is less. It may also be necessary to prepare processed meats in a manner that will destroy the virus, although such meat is unlikely to be important in the transmission of rinderpest.

Hides, skins and fibre should be disinfected before removal from IPs and DCPs, although they are unlikely to remain infective.

Crops and grains may be removed, provided they are not fed immediately to livestock.

3.2.8 Disposal of animals and animal products

Carcases will be buried, composted or burned, or allowed to decompose if they can be protected from scavengers such as dogs and feral pigs. Feedstuff and bedding that may have been contaminated will also be buried, composted or burned (see the **Disposal Manual**).

3.2.9 Decontamination

Although the survival of rinderpest virus in the environment is very limited, decontamination is an important strategy to ensure that the virus is not carried from an IP on contaminated material, people or vehicles. Materials of this type do not play an important role in the transmission of the disease, but they are possible sources of infection, and their decontamination will help to prevent the spread of infection.

Decontamination will comprise the general cleaning of cowsheds, dairies and any other building in which infected animals were kept. Faeces and other wastes removed at cleaning will be disposed of appropriately, such as by burying (see the **Disposal Manual**). Fomites, including bedding materials, feedstuff, footwear, clothing and stock-handling equipment, should be appropriately decontaminated or destroyed. People who have had close contact with infected animals or other material will be appropriately decontaminated before leaving the IP.

The IP should remain destocked of ruminants and pigs for 15 days following the destruction of infected stock.

3.2.10 Wild animal and vector control

If rinderpest escapes into the feral buffalo, cattle, goat, pig or deer population, a policy of search and destruction will be followed. If the terrain makes the eradication of feral animals difficult, the formation of a buffer area around the population, either by depopulating the area or by ring vaccination, will be required to contain the disease until the feral animals can be eradicated.

The relevant wild animal management agencies should be involved. For more details, see the **Wild Animal Response Strategy**.

Vectors play no role in the transmission of rinderpest.

3.2.11 Public awareness and media

The public needs to be aware:

- of which species are susceptible;
- that transmission is predominantly by direct contact with infected animals or their secretions;
- that disease spread is predominantly via animal movement; and
- that there are no human health implications.

3.2.12 Public health implications

There are no public health implications.

3.3 Other policies

Due to the high mortality, short incubation period and restriction of spread mainly to direct contact, it is unlikely that an outbreak of rinderpest would not be eradicated. If the size of an outbreak outstripped the resources available for control, and ring vaccination was not able to contain the disease, then rinderpest would have to be considered endemic.

Endemic rinderpest, which is only likely to occur in extensive or remote areas, will be controlled by vaccination of all cattle in areas where the disease occurs, using an attenuated cell-culture vaccine of an appropriate level of attenuation for the breed in which it is to be used. Initially, all stock would be vaccinated, but in subsequent years, only young and introduced stock not previously vaccinated would require vaccination. Vaccination of the entire susceptible population should result in the field virus dying out, allowing the discontinuation of vaccination after only a couple of years.

Areas in Africa where rinderpest is endemic are moving towards eradication by the use of vaccination. The major limiting factors to the success of eradication in these areas are civil unrest and the lack of veterinary infrastructure. Australia has neither of these problems and has an agreed policy and framework to quickly eradicate the disease.

The OIE *Terrestrial Animal Health Code* describes the requirements that must be met to obtain official OIE recognition of country freedom from this disease (Article 8.13.26).

3.4 Funding and compensation

Rinderpest is classified as a Category 2 emergency animal disease under the EAD Response Agreement between the governments of Australia and the livestock industries.

Category 2 diseases have the potential to cause major national socioeconomic consequences through very serious international trade losses, national market disruptions and very severe production losses in the livestock industries that are involved. Category 2 also includes diseases that may have slightly lower national socioeconomic consequences, but also have significant public health and/or environmental consequences. For this category, the costs will be shared 80% by governments and 20% by the relevant industries (refer to the EAD Response Agreement for details).[8]

Information on the cost-sharing arrangements can be found in the **Summary Document** and in the **Valuation and Compensation Manual**.

[8] Information about the EAD Response Agreement can be found at https://www.animalhealthaustralia.com.au/programs/eadp/eadra.cfm

4 Recommended quarantine and movement controls

4.1 Guidelines for classifying declared areas

A declared area is a part of a country with defined boundaries that is subject to mandatory disease control measures (such as animal movement controls, animal destruction, decontamination) under emergency animal disease legislation. Types of declared areas include restricted area, control area, infected premises, dangerous contact premises and suspect premises, but not all classifications are relevant to all diseases.

4.1.1 Declared premises

Infected premises

A premises classified as an infected premises (IP) will be a defined area (which may be all or part of a property) in which rinderpest disease or rinderpest virus exists, or is believed to exist. An IP will be subject to quarantine served by notice and to eradication and control procedures.

Dangerous contact premises

Premises classified as dangerous contact premises (DCPs) will be:

- those that contain animals, animal products, waste or other items that have recently been introduced from an IP (up to 21 days before the premises were declared infected) and are likely to be infected or contaminated;
- those that contain animals, animal products, waste or items that may have been in substantial contact with people, vehicles or equipment that have been associated with an IP within 21 days before visiting the DCP;
- all neighbouring premises on which cattle have been sharing a common fence-line with infected animals on an IP for the 21 days before the appearance of clinical signs and where it is necessary to impose disease control measures; and
- all premises to which cattle have moved from an IP within 21 days before the appearance of clinical signs on the IP and where it is necessary to impose disease control measures.

These premises will remain under quarantine and close surveillance until 42 days after the last contact with the IP. Release from quarantine will require satisfactory surveillance and final inspection.

Suspect premises

Premises classified as suspect premises (SPs) will be those that contain animals that have possibly been exposed to rinderpest virus, such that quarantine and surveillance, but not pre-emptive slaughter, are warranted; OR animals not known

to have been exposed to rinderpest virus but showing clinical signs requiring differential diagnosis.

Premises considered as SPs will be:

- all other premises owned or managed in conjunction with an IP;
- other neighbouring premises containing cattle; and
- all premises where it is considered that disease could possibly have spread to cattle from an IP by way of the movement of people, vehicles, equipment or feedstuff during the 21 days before the first appearance of clinical signs.

Subject to satisfactory surveillance, premises will be designated as SPs for 30 days only.

'Suspect premises' is a temporary classification because the premises contains animals that are suspected of having the disease. High priority should be given to clarifying the status of the suspect animals so that the SP can be reclassified either as an IP and appropriate quarantine and movement controls implemented, or as free from disease, in which case no further disease control measures are required.

4.1.2 Declared areas

Restricted area

A restricted area (RA) will be a relatively small declared area (compared with a *control area*) around IPs that is subject to intense surveillance and movement controls. Multiple RAs may exist within one control area (CA).

The RA does not need to be circular but can have an irregular perimeter, provided that the boundary is initially an appropriate distance from the nearest IP, DCP or SP. This distance will vary with the size and nature of the potential source of disease agent, but will be at least 1 km around the IP, depending on the density of premises. There should be at least two stockproof barriers between the two. The boundary could be the perimeter fence of the IP if the IP is in an isolated location. The boundary in a densely populated area will take into account the distribution of susceptible animals; traffic patterns to markets, service areas and abattoirs; and areas that constitute natural barriers to movement.

Control area

The CA will be a larger declared area around the RA(s) and, initially, possibly as large as a state or territory, where restrictions will reduce the risk of disease spreading from the RA(s). The boundary of the CA will be adjusted as confidence about the extent of the outbreak increases but must remain consistent with the OIE Terrestrial Code recommendations on zoning and compartmentalisation (see Chapter 4.3 of the code)[9] and surveillance (see Chapter 1.4 of the code).[10] In general, surveillance and movement controls will be less intense than in the RA, and animals and products may be permitted to move under permit from the area.

[9] http://www.oie.int/eng/normes/Mcode/en_chapitre_1.4.3.htm
[10] http://www.oie.int/eng/normes/Mcode/en_chapitre_1.1.4.htm

The declaration of a CA helps to control the spread of the outbreak from within the RA. The CA is a buffer zone between the RA and the rest of the industry. The boundary does not have to be circular or parallel to that of the RA, but should be at least 10 km from the boundary of the RA. There should be at least two stockproof barriers between the two. This type of control area allows reasonable commercial activities to continue.

4.2 Movement controls for rinderpest

4.2.1 Declared premises

Table 4.1 shows the movement controls that will apply to IPs and SPs in the event of a rinderpest incident.

Table 4.1 Movement controls for declared premises

Quarantine/movement controls	Infected and dangerous contact premises	Suspect premises
Movement out of:		
– cattle and buffalo	Prohibited, except that non-exposed animals may be moved for immediate slaughter under permit	As for IPs/DCPs
– sheep, goats, pigs	Allowed under permit, subject to appropriate decontamination or for slaughter for human consumption	As for IPs/DCPs
– milk	Prohibited from IPs but may be allowed from non-exposed animals on DCPs for processing under permit	Allowed for processing under permit
– hides, skins and fibre	Allowed under permit	No restrictions
– grain and crops	Allowed under permit, subject to condition that it is not to be used for stockfeed	Subject to permit if it is to be used for stockfeed
– meat	Allowed under permit	No restrictions
Movement in and out of:		
– people	Allowed under permit, subject to appropriate decontamination	As for IPs/DCPs
– vehicles and equipment	Allowed under permit, subject to appropriate decontamination	Unrestricted
Movement in of:		

Quarantine/movement controls	Infected and dangerous contact premises	Suspect premises
– susceptible animals	Allowed under permit after decontamination	As for IPs/DCPs

4.2.2 Declared areas

Table 4.2 shows the movement controls that will apply to RAs and CAs in the event of a rinderpest incident.

Table 4.2 Movement controls for declared areas

Quarantine/ movement control	Restricted area (if declared)	Control area (if declared)
Movement out of:		
– susceptible animals[a]	Prohibited; non-exposed animals may be moved under permit for immediate slaughter at an abattoir in the RA or CA	Prohibited while disease is spreading, except that non-exposed animals may be moved for immediate slaughter under permit; allowed under permit once disease is under control
– milk	Milk from infected and in-contact cattle to be destroyed. Milk from non-exposed animals may be processed under permit.	No restriction
– people, vehicles and equipment	Allowed, subject to appropriate decontamination	No restriction
Movement within of:		
– susceptible animals	Allowed under permit	As for RA
Movement through of:		
– susceptible animals	Allowed under permit	As for RA
Movement in of:		
– susceptible animals	Allowed under permit for restocking purposes	As for RA
Movement along stock routes, rights of way	Prohibited	May be allowed under permit
Ongoing harvesting of game meat	Allowed under permit	As for RA
Risk enterprises:		
– abattoirs	May continue to operate under permit; meat may not be quickly chilled	As for RA

Quarantine/ movement control	Restricted area (if declared)	Control area (if declared)
– artificial breeding centres	May continue to operate under permit	As for RA
– dairy factories	May continue to operate under permit; milk from dairy factories must be heat treated	As for RA
– sales/shows	Prohibited if cattle involved	Allowed under permit
– live export holding premises	Allowed under permit	As for RA

a 'Susceptible animals' include cattle, pigs, sheep, goats and buffalo.

4.3 Criteria for issuing permits

When conducting a risk assessment regarding the issue of a permit, the officer should take into account the following:

- status of the originating and destination premises;
- species of animal;
- confidence in animal tracing and surveillance;
- destination and use of the animals or products;
- likelihood of contamination of the equipment/product/material (ability to decontaminate); and
- security of transport.

Appendix 1 Procedures for surveillance and proof of freedom

Following the successful eradication of an outbreak by stamping out, Australia would be able to claim freedom from rinderpest 3 months after the last case if serological surveillance had been applied in accordance with articles 8.13.20 to 8.13.27 of the OIE *Terrestrial Animal Health Code,* and if all vaccinated animals were slaughtered or destroyed. The time period is 3 months after the slaughter of all vaccinated animals where a stamping-out policy, emergency vaccination and serological surveillance are applied.

Infected premises

On IPs (and DCPs that have been destocked), restocking will be allowed after 15 days. On IPs where some ruminants or pigs are allowed to remain, serological evidence that no spread is occurring after the slaughter of the infected mob will be required before restocking. Surveillance visits of all restocked premises should be made weekly for 4 weeks, then fortnightly for another month.

Suspect or dangerous contact premises

An SP or DCP requires daily physical surveillance of cattle for 15 days after the first appearance of clinical signs on the IP, followed by weekly inspections for a further 2 weeks. These premises should be included in later serosurveillance.

Restricted area

On other properties in the RA, surveillance visits should be made as soon as possible after detection of the first IP in the RA and then 1, 2, 3 and 4 weeks later.

At surveillance visits, every group of cattle must be inspected and numbers accounted for. In extensive grazing areas, where the degree of contact between groups of animals in a herd may be low, care must be taken to ensure that all groups of animals are present and healthy. If feral animals are detected, appropriate measures must be taken to destroy them.

Once the disease is confidently contained, all cattle herds within the RA should be serologically sampled to provide a 95% confidence level that the disease is not present at 10% prevalence. Small groups of animals should be kept under close examination. This should take place about 1 month after the last IP has been restocked and repeated 2 months later. Herds giving seropositive results should be further tested for evidence of infection.

Control area

All reports of disease in the CA will need to be investigated. Random sampling should be carried out about 1 month after the last IP has been restocked and then 2 months later.

Appendix 2 Procedures for vaccination

If it becomes necessary to vaccinate against rinderpest, the tissue culture rinderpest vaccine (TCRV) will be used. This vaccine is accepted as safe for all breeds and species into which it has been inoculated. It can be cheaply and readily produced in large quantities, is noncontagious and is genetically stable on cattle passage. Small supplies of this vaccine produced at the AFRC Institute for Animal Health, Pirbright, UK, are present in Australia. It has been tested and approved by AAHL.

In Africa, annual vaccination never exceeded 90% of cattle. In some countries, eradication was achieved with no more than 75% of cattle seropositive.

Variable and often low rates of seroconversion following vaccination have been reported from Africa. Likely causes are:

- a breakdown in the cold chain;
- rapid reduction in vaccine effectiveness after reconstitution;
- using vaccine beyond its shelf life;
- poor quality vaccines; and
- interference in calves from colostral antibodies.

Care must be taken in hot, arid areas of Australia to ensure that vaccine is used properly.

The shelf half-life after reconstitution is very short — about 1 hour. Higher titres are obtained by culturing the virus on Vero cells, and the half-life can be extended up to 30 days. Heat-stable clones are also now being used.

All vaccinated animals must be permanently identified for later tracing for destruction/slaughter or serological testing, depending on what is required by international market forces.

Appendix 3 Features of rinderpest

Disease and cause

Rinderpest is classically a peracute to acute, usually fatal, viral disease affecting mainly cattle and buffalo; subacute or mild forms of the disease may be found in populations in which the disease is endemic. The disease is caused by a virus belonging to the family *Paramyxoviridae* and affects the gastrointestinal and respiratory systems. Death rates during outbreaks may approach 90%.

Species affected

As well as cattle and buffalo, which are highly susceptible, rinderpest also affects giraffe, eland and kudu. Sheep and goats may develop clinical signs, but serious disease is uncommon. Disease occurs but may be inapparent in camels and deer. Pigs can also be infected; Asian pigs seem more susceptible than African and European varieties. Humans are not affected.

Distribution

In the past, rinderpest was found throughout Europe, Africa and Asia, including West Asia (India, Pakistan and Afghanistan). It is still found in a small area in Africa but has been eradicated from other parts of the world.

Australia is free from rinderpest. An occurrence in Western Australia in 1923 was quickly eradicated, and the disease has not recurred.

Key signs

Rinderpest infections can be peracute, acute or subacute (mild), depending on the virulence of the virus strain and resistance of the infected animal.

In the endemic area in Africa, rinderpest is currently seen as a mild, nonfatal infectious disease of cattle, but with the ability to undergo virulence modulations to the classic form.

In the peracute form, seen in highly susceptible and young animals, the typical signs are high fever, congested mucous membranes, and death within 2–3 days.

Animals with the acute or classic form show fever, depression and anorexia. The disease then progresses to serous to mucopurulent ocular and nasal discharge, and oral erosions with salivation. After 2–3 days, the fever subsides and gastrointestinal signs appear. Animals may have profuse watery or hemorrhagic diarrhoea, abdominal pain, weakness and recumbency. Death may occur within 8–12 days, but some animals recover.

Spread

Transmission is mainly through aerosols between animals in close contact. Infection spreads to new areas by movement of infected animals. The virus may be excreted 1–2 days before clinical signs are observed. Virus is found in expired air, eye and nose discharges, saliva, faeces, urine and milk. Recovered animals have a solid immunity, and there is no known chronic carrier state. Indirect transmission on clothing, equipment and other items is very unlikely.

Persistence of the virus

Rinderpest virus survives poorly outside the host and is not known to survive in dried secretions or excretions for more than a few days in the environment. The virus may occur in milk 1–2 days before clinical signs develop and can be detected in the milk of recovered animals up to 45 days after recovery. The virus remains viable for long periods in chilled and frozen tissues, but is sensitive to a wide range of disinfectants.

Glossary

Animal byproducts	Products of animal origin that are not for consumption but are destined for industrial use (eg hides and skins, fur, wool, hair, feathers, hooves, bones, fertiliser).
Animal Health Committee	A committee comprising the CVOs of Australia and New Zealand, Australian state and territory CVOs, Animal Health Australia, and a CSIRO representative. The committee provides advice to PIMC on animal health matters, focusing on technical issues and regulatory policy (formerly called the Veterinary Committee). *See also* Primary Industries Ministerial Council (PIMC)
Animal products	Meat, meat products and other products of animal origin (eg eggs, milk) for human consumption or for use in animal feedstuff.
Australian Chief Veterinary Officer	The nominated senior veterinarian in the Australian Government Department of Agriculture, Fisheries and Forestry who manages international animal health commitments and the Australian Government's response to an animal disease outbreak. *See also* Chief veterinary officer
AUSVETPLAN	*Aus*tralian *Vet*erinary Emergency *Plan*. A series of technical response plans that describe the proposed Australian approach to an emergency animal disease incident. The documents provide guidance based on sound analysis, linking policy, strategies, implementation, coordination and emergency-management plans.
Chief veterinary officer (CVO)	The senior veterinarian of the animal health authority in each jurisdiction (national, state or territory) who has responsibility for animal disease control in that jurisdiction. *See also* Australian Chief Veterinary Officer
Compensation	The sum of money paid by government to an owner for stock that are destroyed and property that is compulsorily destroyed because of an emergency animal disease. *See also* Cost-sharing arrangements, Emergency Animal Disease Response Agreement
Consultative Committee on Emergency Animal Diseases (CCEAD)	A committee of state and territory CVOs, representatives of CSIRO Livestock Industries and the relevant industries, and chaired by the Australian CVO. CCEAD convenes and consults when there is an animal disease emergency due to the introduction of an emergency animal disease of livestock, or other serious epizootic of Australian origin.

Control area	A declared area in which the conditions applying are of lesser intensity than those in a restricted area (the limits of a control area and the conditions applying to it can be varied during an outbreak according to need). *See* Section 4 for further details
Cost-sharing arrangements	Arrangements agreed between governments (national and states/territories) and livestock industries for sharing the costs of emergency animal disease responses. *See also* Compensation, Emergency Animal Disease Response Agreement
Dangerous contact animal	A susceptible animal that has been designated as being exposed to other infected animals or potentially infectious products following tracing and epidemiological investigation.
Dangerous contact premises	Premises that contain dangerous contact animals or other serious contacts. *See* Section 4 for further details
Declared area	A defined tract of land that is subjected to disease control restrictions under emergency animal disease legislation. Types of declared areas include *restricted area, control area, infected premises, dangerous contact premises and suspect premises*. *See* Section 4 for further details
Decontamination	Includes all stages of cleaning and disinfection.
Depopulation	The removal of a host population from a particular area to control or prevent the spread of disease.
Destroy (animals)	To slaughter animals humanely.
Disease agent	A general term for a transmissible organism or other factor that causes an infectious disease.
Disease Watch Hotline	24-hour freecall service for reporting suspected incidences of exotic diseases — **1800 675 888**.
Disinfectant	A chemical used to destroy disease agents outside a living animal.
Disinfection	The application, after thorough cleansing, of procedures intended to destroy the infectious or parasitic agents of animal diseases, including zoonoses; applies to premises, vehicles and different objects that may have been directly or indirectly contaminated.
Disposal	Sanitary removal of animal carcases, animal products, materials and wastes by burial, burning or some other process so as to prevent the spread of disease.

Emergency animal disease	A disease that is (a) exotic to Australia or (b) a variant of an endemic disease or (c) a serious infectious disease of unknown or uncertain cause or (d) a severe outbreak of a known endemic disease, and that is considered to be of national significance with serious social or trade implications. *See also* Endemic animal disease, Exotic animal disease
Emergency Animal Disease Response Agreement	Agreement between the Australian and state/territory governments and livestock industries on the management of emergency animal disease responses. Provisions include funding mechanisms, the use of appropriately trained personnel and existing standards such as AUSVETPLAN. *See also* Compensation, Cost-sharing arrangements
Endemic animal disease	A disease affecting animals (which may include humans) that is known to occur in Australia. *See also* Emergency animal disease, Exotic animal disease
Enterprise	*See* Risk enterprise
Enzyme-linked immunosorbent assay	A serological test designed to detect and measure the presence of antibody or antigen in a sample. The test uses an enzyme reaction with a substrate to produce a colour change when antigen–antibody binding occurs.
Epidemiological investigation	An investigation to identify and qualify the risk factors associated with the disease. *See also* Veterinary investigation
Exotic animal disease	A disease affecting animals (which may include humans) that does not normally occur in Australia. *See also* Emergency animal disease, Endemic animal disease
Exotic fauna/feral animals	*See* Wild animals
Fomites	Inanimate objects (eg boots, clothing, equipment, instruments, vehicles, crates, packaging) that can carry an infectious disease agent and may spread the disease through mechanical transmission.
In-contact animals	Animals that have had close contact with infected animals, such as noninfected animals in the same group as infected animals.
Incubation period	The period that elapses between the introduction of the pathogen into the animal and the first clinical signs of the disease.
Index case	The first or original case of the disease to be diagnosed in a disease outbreak on the index property.

Index property	The property on which the first or original case (index case) in a disease outbreak is found to have occurred.
Infected premises	A defined area (which may be all or part of a property) in which an emergency disease exists or is believed to exist, or in which the infective agent of that emergency disease exists or is believed to exist. An infected premises is subject to quarantine served by notice and to eradication or control procedures. *See* Section 4 for further details
Local disease control centre (LDCC)	An emergency operations centre responsible for the command and control of field operations in a defined area.
Monitoring	Routine collection of data for assessing the health status of a population. *See also* Surveillance
Movement control	Restrictions placed on the movement of animals, people and other things to prevent the spread of disease.
Mucopurulent	Consisting of mucus and pus.
National management group (NMG)	A group established to direct and coordinate an animal disease emergency. NMGs may include the chief executive officers of the Australian Government and state or territory governments where the emergency occurs, industry representatives, the Australian CVO (and chief medical officer, if applicable) and the chairman of Animal Health Australia.
Native wildlife	*See* Wild animals
OIE Terrestrial Code	OIE *Terrestrial Animal Health Code.* Reviewed annually at the OIE meeting in May and published on the internet at: **http://www.oie.int/eng/normes/mcode/a_summry.htm**
OIE Terrestrial Manual	OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals.* Describes standards for laboratory diagnostic tests and the production and control of biological products (principally vaccines). The current edition is published on the internet at: **http://www.oie.int/eng/normes/mmanual/a_summry.htm**
Operational procedures	Detailed instructions for carrying out specific disease control activities, such as disposal, destruction, decontamination and valuation.
Owner	Person responsible for a premises (includes an agent of the owner, such as a manager or other controlling officer).
Peyer's patches	Lymphoid organs in the small intestines.

Premises	A tract of land including its buildings, or a separate farm or facility that is maintained by a single set of services and personnel.
Prevalence	The proportion (or percentage) of animals in a particular population affected by a particular disease (or infection or positive antibody titre) at a given point in time.
Primary Industries Ministerial Council (PIMC)	The council of Australian national, state and territory and New Zealand ministers of agriculture that sets Australian and New Zealand agricultural policy (formerly the Agriculture and Resource Management Council of Australia and New Zealand). *See also* Animal Health Committee
Quarantine	Legal restrictions imposed on a place or a tract of land by the serving of a notice limiting access or egress of specified animals, persons or things.
Restricted area	A relatively small declared area (compared with a control area) around an infected premises that is subject to intense surveillance and movement controls. *See* Section 4 for further details
Risk enterprise	A defined livestock or related enterprise, which is potentially a major source of infection for many other premises. Includes intensive piggeries, feedlots, abattoirs, knackeries, saleyards, calf scales, milk factories, tanneries, skin sheds, game meat establishments, cold stores, artificial insemination centres, veterinary laboratories and hospitals, road and rail freight depots, showgrounds, field days, weighbridges, garbage depots.
Sensitivity	The proportion of affected individuals in the tested population that are correctly identified as positive by a diagnostic test (true positive rate). *See also* Specificity
Sentinel animal	Animal of known health status that is monitored to detect the presence of a specific disease agent.
Seroconversion	The appearance in the blood serum of antibodies (as determined by a serology test) following vaccination or natural exposure to a disease agent.
Serotype	A subgroup of microorganisms identified by the antigens carried (as determined by a serology test).
Serum neutralisation test	A serological test to detect and measure the presence of antibody in a sample. Antibody in serum is serially diluted to detect the highest dilution that neutralises a standard amount of antigen. The neutralising antibody titre is given as the reciprocal of this dilution.

Specificity	The proportion of nonaffected individuals in the tested population that are correctly identified as negative by a diagnostic test (true negative rate). *See also* Sensitivity
Stamping out	Disease eradication strategy based on the quarantine and slaughter of all susceptible animals that are infected or exposed to the disease.
State or territory disease control headquarters	The emergency operations centre that directs the disease control operations to be undertaken in that state or territory.
Surveillance	A systematic program of investigation designed to establish the presence, extent, or absence of a disease, or of infection or contamination with the causative organism. It includes the examination of animals for clinical signs, antibodies or the causative organism.
Susceptible animals	Animals that can be infected with a particular disease.
Suspect animal	An animal that may have been exposed to an emergency disease such that its quarantine and intensive surveillance, but not pre-emptive slaughter, is warranted. *or* An animal not known to have been exposed to a disease agent but showing clinical signs requiring differential diagnosis.
Suspect premises	Temporary classification of premises containing suspect animals. After rapid resolution of the status of the suspect animal(s) contained on it, a suspect premises is reclassified either as an infected premises (and appropriate disease control measures taken) or as free from disease. *See* Section 4 for further details
Tracing	The process of locating animals, persons or other items that may be implicated in the spread of disease, so that appropriate action can be taken.
Vaccination	Inoculation of healthy individuals with weakened or attenuated strains of disease-causing agents to provide protection from disease.
– swamp vaccination	Widespread vaccination of a large proportion of susceptible animals.
– ring vaccination	Vaccination of susceptible animals around a focus of infection to provide a buffer against the spread of disease.

Vaccine	Modified strains of disease-causing agents that, when inoculated, stimulate an immune response and provide protection from disease.
– attenuated	A vaccine prepared from infective or 'live' microbes that have lost their virulence but have retained their ability to induce protective immunity.
– inactivated	A vaccine prepared from a virus that has been inactivated ('killed') by chemical or physical treatment.
Vector	A living organism (frequently an arthropod) that transmits an infectious agent from one host to another. A *biological* vector is one in which the infectious agent must develop or multiply before becoming infective to a recipient host. A *mechanical* vector is one that transmits an infectious agent from one host to another but is not essential to the life cycle of the agent.
Veterinary investigation	An investigation of the diagnosis, pathology and epidemiology of the disease. *See also* Epidemiological investigation
Viraemia	The presence of viruses in the blood.
Wild animals	
– native wildlife	Animals that are indigenous to Australia and may be susceptible to emergency animal diseases (eg bats, dingoes, marsupials).
– feral animals	Domestic animals that have become wild (eg cats, horses, pigs).
– exotic fauna	Nondomestic animal species that are not indigenous to Australia (eg foxes).
Zebu (cattle)	Bovine animals (*Bos indicus*) with characteristic large hump over the shoulders. Widely distributed in India, China, eastern Africa, etc, and used for cross-breeding in Australia.
Zoning	The process of defining disease-free and infected areas in accord with OIE guidelines, based on geopolitical boundaries and surveillance, in order to facilitate trade.

Abbreviations

AAHL	Australian Animal Health Laboratory
AUSVETPLAN	Australian Veterinary Emergency Plan
CA	control area
CCEAD	Consultative Committee on Emergency Animal Diseases
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CVO	chief veterinary officer
DCP	dangerous contact premises
EAD	emergency animal disease
EDTA	ethylenediaminetetraacetic acid
ELISA	enzyme-linked immunosorbent assay
GREP	FAO/OIE Global Rinderpest Eradication Programme
IETS	International Embryo Transfer Society
IP	infected premises
NMG	national management group
OIE	World Organisation for Animal Health (Office International des Epizooties)
PPR	peste des petits ruminants
RA	restricted area
SP	suspect premises
TCRV	tissue culture rinderpest vaccine

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Video/training resources

See the **Summary Document** for a full list of training resources.