

AUSTRALIAN VETERINARY EMERGENCY PLAN

AUSVETPLAN

1996

Disease Strategy

Sheep and goat pox

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

Agriculture and Resource Management Council of Australia and New Zealand

This Disease Strategy forms part of:

AUSVETPLAN Edition 2.0, 1996

[AUSVETPLAN Edition 1.0, was published in 1991]

This strategy will be reviewed regularly. Suggestions and recommendations for amendments should be forwarded to the AUSVETPLAN Coordinator (see Preface).

Record of amendments to this manual:

There are occasional minor differences in the page breaks between the paper and this electronic version which we can unfortunately not avoid.

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PREFACE

This **Disease Strategy** for the control and eradication of **sheep pox** and **goat pox** is an integral part of the **Australian Veterinary Emergency Plan**, or AUSVETPLAN (Edition 2.0). AUSVETPLAN structures and functions are described in the **Summary Document**.

This strategy sets out the disease control principles for use in a veterinary emergency caused by the introduction of sheep pox or goat pox to Australia. The strategy has been approved by the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) out-of-session in January 1996.

Sheep pox and goat pox are designated as List A diseases by the Office International des Epizooties (OIE). List A diseases are, 'Communicable diseases which have the potential for serious and rapid spread, irrespective of national borders; which are of serious socioeconomic or public health importance and which are of major importance in the international trade of animals and animal products'. The principles contained in this document for the diagnosis and management of an outbreak of sheep and goat pox conform with the **OIE International Animal Health Code 1992** (OIE Code; see Appendix 3).

Sheep and goat pox are not included in the Commonwealth/States cost-sharing agreement for the eradication of certain exotic diseases.

Detailed instructions for field implementation of the strategies are contained in the AUSVETPLAN **Operational Procedures Manuals** and **Management Manuals**. Cross-references to strategies, manuals and other AUSVETPLAN documents are expressed in the form:

Document Name, Section no.

For example, **Decontamination Manual, Section 3**.

In addition, *Exotic Diseases of Animals: A Field Guide for Australian Veterinarians* by W.A. Geering, A.J. Forman and M.J. Nunn, Australian Government Publishing Service, Canberra, 1995 (**Exotic Diseases Field Guide**) is a source for some of the information about the aetiology, diagnosis and epidemiology of the disease and should be read in conjunction with this strategy.

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

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The writing group was responsible for drafting this strategy. However, the text may have been amended at various stages of the consultation/approval process and the policies expressed in this version do not necessarily represent the views of all members of the writing group. Contributions may also have been made by other people not listed above and the assistance of all involved is gratefully acknowledged.

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1 NATURE OF THE DISEASE

Sheep pox and goat pox are highly contagious diseases of sheep and goats characterised by fever, lacrimation, salivation and nasal discharge. Typical pox lesions appear on the skin and on the respiratory and gastrointestinal mucosa. There is high mortality in susceptible populations.

It is most likely that any sheep pox or goat pox virus that enters Australia would be infective for both sheep and goats. It would be wise, however, as soon as one of these viruses is detected in Australia, for transmission tests to be urgently conducted at AAHL to determine: (i) whether sheep and/or goats can be infected clinically and/or excrete the virus, and (ii) which of these species develop neutralising antibodies. The role of cattle should also be elucidated.

1.1 Aetiology

The sheep pox, goat pox and lumpy skin disease viruses belong to the genus *Capripox* of the family Poxviridae. These viruses are morphologically indistinguishable from each other with different host species adaptation. The viruses are difficult to distinguish serologically and cross protection does occur.

The sheep pox and goat pox viruses are usually considered host specific, but numerous strains exist exhibiting differing host predilection and differing virulence, and in some areas non-host adapted strains exist (Kitching and Taylor 1985b). Even if clinical disease is seen only in one host, subclinical disease caused by the same strain will most likely occur in the other host species (Fenwick 1989). The greater prevalence of disease in a particular host may result from continued passage of the virus within, and hence greater adaptation to, that host.

No seroconversion has been demonstrated from infected sheep or goats to in-contact cattle or from infected cattle to in-contact sheep or goats (Davies 1991c).

1.2 Susceptible species

Goats and sheep

- Merino and European breeds of sheep are more susceptible to sheep pox than other breeds.
- Goat breeds also vary in susceptibility to goat pox with breeds exotic to the source area being more severely affected.
- The viruses are usually host specific to either sheep or goats, but numerous strains exist exhibiting differing host adaptations and both species are often infected.

Cattle

- Little is known about the reaction of cattle to infection with sheep pox or goat pox. The potential role of cattle in the epidemiology of these diseases should be determined during an outbreak by field observations.

Humans

- Mild lesions of small red papules followed by vesicles on the hands and arms have been reported in humans working with capripox virus in Sweden and India. No generalisation occurred. These are isolated incidents and humans are generally regarded as being non-susceptible. No pathogenicity for humans has been recorded for most sheep pox strains.

1.3 World distribution and occurrence in Australia

Sheep pox and goat pox occur in Africa, mainly north of the equator, the Middle East, central Asia including southern Russia and western China, and the Indian subcontinent as far east as Myanmar (Burma). The geographical distribution of sheep pox has been relatively stable. A mild form of goat pox has been reported in California and in Scandinavia but this may be reindeer pox.

Neither of these diseases has ever been recorded in Australia.

1.4 Diagnostic criteria

[For terms not defined in the text see Glossary]

Sheep pox or goat pox should be considered when an acute disease with fever is accompanied by pox-like skin lesions and high mortality occurs in sheep or goats. It is possible, however, that a strain of low virulence producing only mild signs may occur.

1.4.1 Clinical signs

The acute form of sheep pox or goat pox would be expected in susceptible Australian sheep or goats. The diseases are more severe in lambs and kids than in adults. The overall flock mortality may be 50% while the mortality in young animals may approach 100%.

A sudden onset of fever develops, which peaks at 40–42°C, with discharges from the nose and eyes and excess salivation. The animal loses its appetite and is reluctant to move. Skin lesions erupt in 1–2 days. The lesions extend over all the skin but are most obvious where wool or hair is shortest, such as on the face, ears, axillae, groin, perineum and under the tail. Lesions may be seen on the mucous membranes of the mouth, nostrils and vulva. Acute respiratory distress occurs if lung lesions are present.

The lesions follow the classical pox cycle of skin erythema (redness), papule (0.5–1.5 cm diameter), vesicle, pustule with exudation, encrustation and scab formation, over about two weeks. Matting of the fleece occurs due to the exudate from ruptured pustules. Healing of skin lesions is slow, taking 5–6 weeks. Deaths may occur at any stage of the disease with peak mortality occurring about two weeks after the appearance of lesions.

A peracute form is also seen in virgin epidemics. This is characterised by fever, generalised haemorrhages, widespread cutaneous ulceration and death.

A nodular form of sheep and goat pox, called stonepox, can occur. This resembles lumpy skin disease (of cattle) with skin lesions 0.5–3 cm diameter, being hyperaemic (engorged with blood), thickened and raised above the surrounding skin.

1.4.2 Pathology

Gross lesions

At postmortem examination haemorrhagic ulcerations may be found in the linings of the trachea and gastrointestinal tract. Lung lesions consisting of small pale grey nodules may be found.

Microscopic lesions (histopathology)

Histologically there are extensive inflammatory, necrotic and proliferative changes typical of pox lesions. The presence of Borrel cells or 'cellules claveleuses' (epithelioid cells that infiltrate the lesions), and intracytoplasmic inclusion bodies similar to the inclusions found with all pox viruses, are characteristic for sheep and goat pox. Electron microscopy reveals virus particles indistinguishable from the orthopoxviruses, and these can be readily differentiated from the virus particles of contagious pustular dermatitis.

1.4.3 Laboratory tests

Animal specimens should initially be sent to the State or Territory diagnostic laboratory from where they will be forwarded to the Australian Animal Health Laboratory (AAHL), Geelong for exotic disease testing after obtaining the necessary clearance from the chief veterinary officer (CVO) of the State or Territory of the disease outbreak and informing the CVO of Victoria (for transport of the specimens to Geelong).

Specimens required

Specimens which should be collected from live animals include blood from animals with fever, sera, vesicular fluid, scabs, and skin scrapings from lesions. At postmortem a range of samples, both fresh and fixed, should be taken from skin lesions and lesions in the respiratory and gastrointestinal tracts.

Transport of specimens

Unpreserved specimens and those preserved in glycerol-phosphate buffer should be chilled and forwarded with water ice or frozen gel packs. For further information see the **Laboratory Preparedness Manual, Section 6 and Appendix 3**.

Laboratory diagnosis

AAHL tests. A rapid tentative diagnosis of sheep pox or goat pox can be made by electron microscopy and histopathology of tissue samples (see Section 1.4.2, above). Confirmation of the diagnosis is obtained by specifically identifying the virus in tissues from early lesions or in tissue culture using virus-specific tests. The diagnostic tests currently available at AAHL are shown in Table 1, however, AAHL cannot prepare positive controls for these tests.

Table 1 Diagnostic tests currently available at AAHL for sheep and goat pox

Test	Specimen required	Test detects	Time taken to obtain result
Electron microscopy	tissue samples	virus particles	1 day
Histopathology	formalin-fixed tissue	characteristic pox lesions	2 days
Inoculation into various cell cultures	vesicular fluid or tissue samples	virus/viral antigen	4–14 days

Source: Information provided by AAHL, 1995 [refer to AAHL for the most up-to-date information].

Other tests. There is no good serological test but indirect immunofluorescence, serum neutralisation and immunodiffusion tests have been used for detecting antibody in sera. Indirect immunofluorescence is not an easy test and is difficult to interpret. It may be replaced by the immunoperoxidase test. Serum neutralisation is the test of choice for serosurveillance, but it has low sensitivity. Serum neutralisation test is not available in Australia. There may be problems detecting low titres in individual animals, but it is a reasonable flock test. The immunodiffusion test cross reacts with scabby mouth and has low specificity. An enzyme-linked immunosorbent assay (ELISA) is under development overseas.

1.4.4 Differential diagnosis

Other syndromes which should be considered in the diagnosis of sheep or goat pox are:

- contagious pustular dermatitis (scabby mouth) — lesions usually confined to the mouth and coronet but occasionally elsewhere (lesions are proliferative and do not follow the pox cycle);
- bluetongue — characterised by swelling of the face and coronitis, but ulcerative lesions are found only around the mouth;
- mycotic dermatitis — thick scabby lesions without pox cycle;
- sheep scab — a more chronic slower spreading disease with itchiness;
- mange; and
- photosensitisation — lesions confined to unpigmented and exposed areas.

1.5 Resistance and immunity

Susceptible sheep and goats of all ages can be infected with sheep pox and goat pox virus and develop serious clinical disease. The introduction of sheep pox or goat pox into a totally susceptible population (in a country previously free from the disease) would probably result in high mortalities and the rapid spread of the disease.

1.5.1 Innate and passive immunity

Different breeds of sheep and goats show varying degrees of natural resistance to infection with sheep pox and goat pox. Merino and European sheep breeds present in Australia are very susceptible to sheep pox. Maternal immunity provides protection from sheep pox and goat pox for up to 3 months (Kitching 1986).

1.5.2 Active immunity

Animals that have recovered from capripox virus infection do not remain carriers of the virus and have lifelong immunity.

1.5.3 Vaccination

Cell-cultured attenuated ('live') and inactivated vaccines have been used to prevent sheep pox and goat pox. Inactivated vaccine provides about 5 months protection but there is no commercial source. Live attenuated capripox vaccines are recommended.

It is likely that any of the attenuated sheep pox or goat pox vaccines will be suitable for the prophylaxis of sheep pox, goat pox or lumpy skin disease in an emergency situation. A simple vaccination and challenge experiment, carried out under laboratory conditions at AAHL, would confirm this and is recommended before any widespread campaign is initiated.

A vaccine made from a sheep and goat pox virus, which affected both sheep and goats in Kenya, was shown to effectively immunise sheep, goats and cattle against infection with capripox virus (Kitching et al 1986, Davies 1991b). This attenuated vaccine is produced at the Institut d'Élevage et Médecine Vétérinaire (IEMVT), France and at the Institute of Animal Health, Pirbright, UK.

The Pirbright vaccine is given subcutaneously with no noticeable reaction. The virus is stable and safe and does not transmit horizontally or vertically (Kitching et al 1986). The vaccine provides life long protection with the protection period commencing about 2 weeks after vaccination. The French vaccine is given by scarification and has produced severe reactions in merino sheep.

Vaccinated animals show lower titres of antibody to the serum neutralisation test and the indirect fluorescent antibody test, and a number of animals will be immune to challenge but have no detectable antibody.

Recipient species may react differently to attenuated vaccines. Vaccination of susceptible saanen goats from a disease-free area with a live goat pox virus vaccine resulted in clinical goat pox with 100% morbidity and 41% mortality (Abo-Shehada 1990).

1.6 Epidemiology

1.6.1 Incubation period

The incubation period for sheep pox or goat pox is usually 12 days but may vary from 2 to 14 days. The OIE Code gives the maximum incubation period, for regulation purposes, of 21 days for sheep and goat pox (see Appendix 3).

1.6.2 Persistence of virus

General properties/environment

Capripox viruses are very resistant and can remain viable for long periods on or off the animal host. They are susceptible to sunlight, but survive well at cold temperatures (Davies 1981). They may persist for up to 6 months in a suitable environment, such as shaded animal pens.

The viruses are inactivated after heating for 1 hour at 55°C.

Capripox viruses are large lipid-containing viruses susceptible to a range of disinfectants including detergents (see Section 2.2.8).

Live animals

No carrier state has been demonstrated in recovered animals. The sheep pox and goat pox viruses may remain viable for at least 3 months after recovery in the exudate from skin lesions that has accumulated in wool and hair (Davies 1981).

Animal products and by-products

The sheep pox and goat pox viruses are very persistent and remain viable for at least 3 months in dry scabs on the fleece, skins and hair from infected animals.

There is no evidence of the virus persisting in the meat of infected animals, but it may be isolated from the milk during the early stages of the fever (Davies 1991a).

Fomites

These viruses are readily transported on fomites including clothing and equipment where they may persist for 6 months.

Vectors

The stable fly (*Stomoxys calcitrans*) has been shown to transmit the virus to a susceptible goat 24 hours after it was itself contaminated. Insects act as mechanical vectors of the virus rather than biological. There is no evidence of the virus persisting longer than 4 days in insects.

1.6.3 Modes of transmission**Live animals**

Affected sheep and goats shed the virus at every stage of the disease. Virus is present in secretions and excretions of infected animals, including milk, and in scabs from skin lesions, but these are not considered to be important sources for transmission. Most transmission is by direct contact via the respiratory system, but indirect contact and mechanical transmission by insects also occur.

Short distance aerosol transmission of sheep pox and goat pox from nasal secretions and saliva is an important method of spread (Kitching and Taylor 1985a). Movement of infected animals is the main means by which sheep pox and goat pox is spread to new premises or new areas.

Artificial breeding

No specific information is available for sheep and goat pox (SGP) and semen and embryo transfer can therefore only be considered by comparison with lumpy skin disease (LSD) for which virus has been detected in semen up to 22 days after infection. There is no information on transmission but the possibility is likely due to the nature of the pox virus. There is also little information available on presence in and transmission via embryos. (See the **Artificial Breeding Centres Enterprise Manual**.)

Fomites

The virus persists for at least 3 months in the wool, hair and scabs of infected animals, up to 6 months in the environment, and can be readily spread by fomites.

Insect vectors

Insects can act as mechanical vectors of the sheep pox and goat pox viruses over short distances. The stable fly (*Stomoxys calcitrans*) and *Musca* species flies have been implicated in mechanically transmitting the disease after feeding on exudate from lesions.

1.6.4 Factors influencing transmission

The viruses are not highly infectious and intimate contact is required for transmission, as occurs with the night herding or stabling in endemic areas (Davies 1981). Indirect spread by fomites or insects can, however, result in rapid spread over a large area. In endemic areas spread occurs mainly in summer.

1.7 Manner and risk of introduction

Movement of infected animals is the main means by which sheep pox and goat pox is spread to new premises or new areas. There is, however, little possibility of these diseases entering Australia by this way, as there are currently no importations of live sheep, goats or cattle, or their germplasms from endemic countries.

There is considerable risk of introduction of sheep pox to Australia on fomites, such as in sheep vessels returning from the Middle East, and on clothing, equipment and unprocessed wool products brought in by persons from endemic areas.

Transmission by biting insects seems to be mechanical rather than biological, so insects on planes are probably an insignificant risk.

2 PRINCIPLES OF CONTROL AND ERADICATION

2.1 Introduction

Should sheep or goat pox occur in Australia, the objective would be to eradicate it quickly. Eradication will be achieved by application of strict quarantine procedures on infected and neighbouring premises, the destruction and disposal of infected and in-contact animals and the skins and fleeces derived from infected animals, and the disinfection of infected areas.

2.2 Methods to prevent spread and eliminate pathogens

2.2.1 Quarantine and movement controls

The quarantine of infected and in-contact animals, fleeces, skins and fomites to prevent their movement should be effective in preventing the spread of the disease. Care must be taken to avoid spreading the disease on clothing and equipment. All persons leaving the quarantine area must carry out appropriate disinfection procedures and change clothing and footwear.

The declaration of a restricted area (RA) around the infected premises (IP) will assist in preventing spread by restricting movement in the area of potentially-infected animals and materials that may have had direct or indirect contact with the IP. The declaration of a control area (CA) around the RA forms a buffer zone between the RA and the rest of the industry. (See Appendixes 1 and 2 for further information on declared areas and movement controls.)

All the IPs must be included within an RA. All dangerous contact premises (DCPs) must be within a CA and should be within an RA.

Animals for slaughter must 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 with a maximum of 24 hours.

Zoning

It may be deemed necessary to prohibit the gathering of susceptible animals at sales, shows, etc within 50 km of IPs, or within such other area as is determined, until the extent of spread of the outbreak has been determined.

If the outbreak can quickly be limited to a defined area it should be possible to declare the major part of Australia as a free zone.

2.2.2 Tracing

Detailed tracing of the movements of animals, animal products and feedstuff to and from the IP or DCP needs to be urgently carried out. As a minimum, trace-back procedure should be implemented to apply to all movements that took place during the period from 21 days before the first case seen on the IP.

2.2.3 Surveillance

Daily inspections will be carried out on all DCPs and any suspect premises (SPs) during the first 7 days. All premises in the RA with susceptible animals will be inspected weekly, if possible.

Inspection will consist of clinical examination of all sheep and goats. When a large number of animals is involved, all suspect animals plus a statistically representative sample of all animals on the premises should be examined (see Appendix 4).

2.2.4 Treatment of infected animals

There is no effective treatment for sheep pox or goat pox. Any attempt at treatment would result in maintaining live infected animals that are shedding the virus, thus increasing the risk of disease spread.

2.2.5 Destruction of animals

As soon as practical after the diagnosis of sheep pox or goat pox and valuation of stock has been made all sheep and goats on the IP will be humanely slaughtered. Animals from a DCP that are not viraemic, ie do not show signs and have a normal temperature, may be slaughtered for human consumption, provided they can be moved safely to an abattoir.

2.2.6 Treatment of animal products and by-products

Wool, cashmere, angora fibre, skins and fleeces from susceptible animals will not be permitted to leave the premises without a specific permit. Bales of wool, for example, may be allowed to go to a processing plant if shearing occurred prior to the introduction of disease and there has been no contact with susceptible animals. Skins of little commercial value will be destroyed on the premises. Skins of low risk may be permitted to go to a processing plant.

All wool, skins, and goat fibre that have left the premises within the period 21 days prior to the diagnosis of disease must be traced and suitably treated or destroyed.

Milk from susceptible species and their products must be destroyed on the premises. Milk which has left the premises within the 21-day period prior to the diagnosis of disease must be traced and, if found, suitably treated by heat or chemicals or destroyed.

2.2.7 Disposal

Carcases and any skins, wool or fibre which may have been contaminated will be either burned or buried. Feedstuff and bedding that may have been contaminated will be burned or buried. Milk from susceptible species will be rendered harmless by heat or chemical treatment.

If there is a delay between slaughter and disposal, the carcasses should be sprayed with phenol, covered with straw that is kept wet with phenol, and guarded day and night to prevent interference from vermin or predators. Insects that are potential vectors must also be controlled.

2.2.8 Decontamination

Fomites such as bedding materials, feedstuff, footwear, clothing and stock handling equipment, should be appropriately cleaned and disinfected or destroyed.

All accumulated faeces and fibre must be removed from under all sheds in which sheep or goats are handled. The sheds and yards must be cleaned and disinfected, with special attention being paid to the shearing and fleece-handling areas and to dairies. All potentially contaminated fleeces and woolpacks must be burned or buried. Milk must be acidified and buried.

These pox viruses are susceptible to lipid solvents and to acids, so acids combined with detergents are the disinfectants of choice, particularly for areas where organic matter is prevalent. Hypochlorites and aldehydes are useful for disinfecting clean surfaces, and citric acid, alcohols and iodophors are suitable for personal disinfection. The viruses are inactivated after heating for 1 hour at 55°C.

Further information is available in the **Decontamination Manual, Table 3.17** and in Geering et al 1995.

2.2.9 Vaccination

It is unlikely that vaccination would be used for the control of sheep pox or goat pox in Australia, as the preferred option of quarantine and slaughter should be successful. Ring vaccination around an outbreak may become necessary if an outbreak can not be easily contained. This would provide a buffer zone to contain the virus until control is achieved.

When it is decided that vaccination is to proceed, all sheep and goats within a defined area will be given a single dose of an attenuated vaccine, which is available from the Institute for Animal Health, Pirbright, UK (see Section 1.5.3).

The area to be covered by vaccination will depend upon circumstances and could involve many animals over a large area. If the disease has spread to susceptible feral animals all susceptible domestic animals within the feral animal range, and extending to about 10 km beyond their range should be vaccinated, taking natural boundaries into consideration.

The use of a vaccine should also be considered to protect valuable genetic lines in long-established studs, subject to conditions imposed by the CVO.

2.2.10 Wild animal control

The large feral goat population in Australia represents a potential problem for the control of sheep pox and goat pox. If feral goats exist in the area of a disease outbreak then systematic surveillance and control will be required in the RA and the CA.

If sheep pox or goat pox escapes into the feral goat population the formation of a buffer area around the goat population, either by depopulating the area of goats and sheep or by ring vaccination, would be required to contain the disease.

Vermin, predators and wild birds might act as mechanical carriers. Prompt removal of contaminated or potentially contaminated feedstuff will prevent mechanical spread by birds. Vermin and predators should be controlled in an appropriate manner. See the **Wild Animal Control Manual, in press** for more information on goat control.

2.2.11 Vector control

For sheep pox or goat pox, vector spread is not a great risk, but a knock-down insecticide should be used in all areas where infected animals are held, both before and after slaughter, especially in sheds. Infected sheep may be more susceptible to flystrike, so extra precautions may be warranted if sheep blowflies are active.

The main aim of a vector control program must be to break the transmission cycle by rapid reduction of insect populations that are capable of acting as vectors and by reducing the opportunities for these vectors to feed upon infected animals.

Care should also be taken to ensure that flies are controlled on slaughtered animals prior to burning or burying.

2.2.12 Sentinel and restocking measures

Sentinel animals may be introduced to IPs (and DCPs if they have been depopulated) 21 days after completion of decontamination. These animals will be examined weekly for 6 weeks and tested fortnightly using ELISA testing when available for serum neutralising antibodies. If no indication of the presence of virus is detected, restocking may then take place.

2.2.13 Public awareness

A media campaign must emphasise the importance of inspecting sheep and goats for pox lesions and of reporting suspicious lesions and unusual deaths promptly. The danger of raw wool and skins must be stressed if sheep pox is present. The public must not be panicked into avoiding any meat or milk products.

2.3 Feasibility of control in Australia

It is highly likely that sheep or goat pox would be quickly eradicated in Australia. Virulent sheep pox was eradicated from Britain by 1866 and since then from the rest of Europe. The characteristics of the disease that may assist eradication are:

- there is a high mortality rate so the disease should become apparent soon after introduction in a closely settled area;
- acute cases, as might be generally expected, are easily diagnosed clinically as sheep pox and goat pox;
- recovered animals are solidly immune;
- there is no carrier state; and
- infected or exposed animals can be diagnosed serologically.

Characteristics that may make sheep pox and goat pox difficult to eradicate are:

- the possibility of the disease appearing in a mild or inapparent form;
- the usual incubation period of 12 days is reasonably long;
- the possibility of undetected disease in areas where stock populations are sparse;
- the disease may establish in the feral goat population;
- the long survival period of the virus in the environment; and
- mechanical transmission of the virus by biting flies is more important than previously suggested.

Alternative methods, such as vaccination, will not be used unless the available resources cannot handle a slaughter campaign, such as if feral goats are infected and quick eradication of feral goats is not feasible.

3 POLICY AND RATIONALE

3.1 Overall policy for sheep and goat pox

Sheep and goat pox (SGP) is an OIE List A disease that has the potential for rapid spread and which is important in sheep and goat production and trade.

The policy is to eradicate SGP in the shortest possible period while limiting economic impact using a combination of strategies including:

- ☞ *stamping out*, which involves quarantine, slaughter of all infected and exposed susceptible animals and sanitary disposal of destroyed animals and contaminated animal products, to remove the source of infection;
- ☞ *quarantine and movement controls* on animals, animal products and things in declared areas to prevent spread of infection;
- ☞ *decontamination* of facilities, products and things to eliminate the virus on infected premises and to prevent spread in declared areas;
- ☞ *tracing and surveillance* to determine the source and extent of infection and to provide proof of freedom from the disease;
- ☞ *zoning* to define infected and disease-free areas;
- ☞ *a public awareness campaign* to facilitate cooperation from industry and the community; and
- ☞ *ring vaccination*, which could be approved as part of a modified stamping-out strategy.

It is anticipated that an outbreak of sheep and goat pox could have a devastating effect on our highly susceptible sheep and goat population and that high morbidity and mortality would result if the disease was not detected early and control measures implemented. As the disease can be transmitted mechanically, the control of insect vectors in the initial stages of an outbreak is recommended.

The export trade in live sheep and goats, wool and fibre would be expected to be affected until the limits of the infection are defined.

SGP is not included in the Commonwealth/States cost-sharing agreement.

The CVO(s) in the State(s)/Territory(s) in which the outbreak(s) occurs will be responsible for implementing disease control measures (in accordance with relevant legislation), and will make ongoing decisions on follow-up disease control measures in consultation with the Consultative Committee on Exotic Animal Diseases (CCEAD), the State/Territory and Commonwealth governments, and representatives of the affected industries. The detailed control measures adopted will be determined using the principles of control and eradication (Section 2) and epidemiological information about the outbreak. For further information on the responsibilities of the State/Territory disease control headquarters and local disease control centre(s), see the **Control Centres Management Manual, Part 1, Sections 3 and 4**.

3.2 Strategy for control and eradication

Control measures for sheep pox or goat pox will be aimed at regaining any lost markets as quickly as possible. The OIE Code considers a country to be free from sheep pox or goat pox six months after the occurrence of the last case if a stamping-out policy is practised, with or without vaccination against the disease (see Appendix 3).

If a stamping-out policy is not practised the country may be considered to be free when it has been shown that the disease has not been present for three years.

The requirement for a quick return to international trade highlights the need for rapid eradication by the stamping-out strategy and to combine this with quarantine of infected and suspect premises and to quickly determine the source of infection and the extent of spread so that proper and adequate control measures can be applied.

Any animal disease eradication/control program must include close liaison and information exchange with industry, the media and the public.

3.2.1 Stamping out

The primary selected strategy is radical stamping out. Stamping out will involve slaughter and depopulation of susceptible ruminants on IPs and the dangerous contact animals on DCPs.

Stamping out action on properties to which dangerous contacts have been traced will depend on tactical decisions taken according to the perceived risk of infection having spread to in-contact animals and the compensation bill. If a DCP contains relatively few susceptible animals in addition to the dangerous contacts, all may be slaughtered. If, on the other hand there is a large number of stock, only the dangerous contact animals would be slaughtered and the other animals on the premises quarantined and observed for any transmission that may occur. Such a strategy will depend to a large extent on the degree of separation and the possibility of mechanical transfer by insect vectors or other means.

3.2.2 Quarantine and movement controls

As the main form of transmission is by direct contact with infected animals, contaminated products and things, the imposition of quarantine and movement controls will prevent the rapid spread of disease. The infected premises, dangerous contact premises and suspect premises will immediately be declared.

An RA, which will contain all IPs and DCPs and as many SPs as possible, will be determined from the tracing and surveillance. The RA should have its boundary at least 5 km from the IP with at least two stock-proof fences between the IP and the boundary. The size of the RA will be determined by the presence of possible vectors and feral animals within the area of the RA and will probably be much larger than indicated above.

The CA will be formed around the RA with its boundary at least a 5 km from the RA boundary. To be realistic this area should be as large as possible to enable the marketing and processing of animals within the area to be undertaken. It would be preferable to try to include a meat and skin processing establishment within the area.

All movement of susceptible animals within the RA will be prohibited for a period of at least 21 days to enable the animals within the area to be observed by direct physical examination and serology. Animals on DCPs and SPs will be examined daily for the first week and then at weekly intervals. Other properties in the RA will be examined weekly.

Milk, skins and fibre are high risk products. Milk from DCPs will be destroyed until the premises is cleared and the other products must be subjected to treatment adequate to kill the virus.

After this period of observation animals from the DCPs and IPs may be sent for slaughter, under permit, to approved abattoirs. Movement controls within the CA will be less restrictive but live animal movements out of the area will be prohibited for the 21 days incubation period.

For further details of declared areas and movement controls see Appendixes 1 and 2.

Zoning

The major part of Australia could be declared a sheep pox and goat pox free zone after the extent of initial spread has been defined. The OIE Code allows an infected zone to be declared free at least 21 days after the last case has been reported and following the completion of a stamping-out policy and disinfection procedures (see Appendixes 3 and 4 and Section 3.4).

The size of the infected zone must comply with OIE generic recommendations, ie a 10 km radius around the IPs in an intensive production area, and a 50 km radius in an extensive production area.

It may be difficult to establish a disease-free zone due to the presence of insect vectors. There would need to be ongoing surveillance to provide the confidence that international trading partners would require to ensure spread by this means was not occurring and that movement controls were working effectively.

3.2.3 Treatment of infected animals

Infected or dangerous contact animals will not be treated.

3.2.4 Treatment of animal products and by-products

Animal products from infected animals will be destroyed. Milk from suspect animals under observation will be destroyed by heat or acid and buried. Animals, after the period of observation has cleared them, may be sent to slaughter and the meat released for human consumption.

Fibres and skins may be treated and processed at approved premises. The virus may remain viable on skins and fibre for some months.

Accumulated faeces, fibre and skin pieces around and under sheds, where infected and suspect animals have congregated, must be destroyed and buried.

Semen and embryos must not be collected from animals that are subject to restrictions. Stored product may be released depending on the time of collection and other factors that may need to be considered.

3.2.5 Vaccination

If a disease outbreak outstrips the resources available to control it by slaughter, a ring vaccination program will provide a buffer zone of immune animals around the disease area until the outbreak can be brought under control. It is most unlikely that Australia will use vaccine except as a last resort.

If the disease gets into the feral goat population and these cannot be eliminated, it may be necessary to institute a ring vaccination program around the feral groups to contain the disease while reducing numbers and density of the ferals.

Countries with endemic capripox have used vaccines produced under varying conditions, and some have been contaminated by bovine viral diarrhoea or peste des petits ruminants. A suitable attenuated vaccine is available from the Institute for Animal Health, Pirbright, UK, which is considered to be stable, safe and effective and will provide life-long immunity (see Sections 1.5.3 and 2.2.9).

3.2.6 Tracing and surveillance

Tracing of suspect animals, products, people and things must take in the period for at least 21 days prior to the first signs of clinical disease on the IP and up to the time the premises was placed under quarantine. As the sheep and goat pox virus may persist on inanimate materials and survive outside of the host for some time it is important that the tracing is thorough and detailed.

Surveillance must include an epidemiological study of the possible vectors that may play a role in transmission of the virus and the factors likely to influence their distribution. This information will assist in deciding on the size of the RA by taking into consideration the possible spread by insect vectors. As sick animals are more likely to attract blow flies detailed attention will be required for the examinations that will be undertaken on suspect animals.

Animals on the DCP and SP will be physically examined on a daily basis for the first 7 days and weekly thereafter as will all animals in the RA, or a statistical sample where large numbers of susceptible animals are involved.

Sentinel animals may be introduced to the IP and DCPs after a period of 21 days when stamping out and decontamination has been completed. These will be subjected to examination and serological testing over a period of at least 6 weeks. Repopulation may occur after this time if all findings are negative. The repopulated animals will also be subjected to surveillance for at least a further 3 months. For further details of surveillance see Appendix 4.

3.2.7 Vector control

The epidemiological investigation team, which will include an entomologist, will identify the vectors that can possibly play a role in the transmission of the disease and enable a targeted approach to vector control. A range of treatments may be used to control the vectors with a knockdown spray possibly being the most useful and effective in and around areas where infected animals have been held. Other treatments could include aerial and ground spraying and the individual treatment of animals with an external parasiticide or a systemic product such as ivermectin.

While insect vectors may only mechanically transmit the virus they may be important if large numbers are present. If a range of vectors are involved, varying control measures may be required. Once the infection has been eliminated there will be no transfer of infection to the next generation of insects as the virus only survives for a few days on insect vectors.

Surveillance for vectors both in the free and infected areas will be ongoing to ensure that the disease is not being spread by this method (see Section 2.2.11).

3.2.8 Decontamination

A detailed and thorough decontamination program is required because of the persistence of the virus outside of the host. Fomites play an important role in transmission of sheep and goat pox. Decontamination must include pens and yards where infected or suspect animals have been held. Where items cannot be satisfactorily decontaminated they must be treated and subject to disposal.

The movement of vehicles and people on and off the premises require special attention.

3.2.9 Media and public relations

The entry of the disease into highly susceptible sheep and goat populations is likely to result in high morbidities and mortalities. Many animals will need to be slaughtered if infection occurs in a number of herds/flocks even if the disease is mild or subclinical. The disease is not in the cost-sharing agreement (see Section 3.5) and opposition to the stamping-out strategy can be expected. It will be essential to ensure that industry is aware of the control measures and that regular liaison is undertaken. The media can play a role in conveying information to the public to assist in maintaining confidence in the product and explaining the necessity of the control measures.

3.3 Social and economic effects

An uncontrolled outbreak of sheep pox or goat pox will cause serious stock losses in the goat and sheep industries. The resulting financial losses would have a serious effect on the local economy in the area of the outbreak.

If sheep pox or goat pox became endemic, continuing economic loss would occur due to loss of animals and the cost of preventative vaccination. Permanent loss of some export markets would also be expected with associated down turn in the rural economy and possibly increased rural unemployment. In the worst case scenario, our major wool markets will be lost. This may be assuaged if zoning is accepted.

Movement restrictions within the RA and CA will cause loss of market opportunities and associated financial losses to non-affected properties in the area and also short-term losses to support industries such as stock transport. Some industries not directly affected by sheep pox or goat pox, such as the cattle industry, may also be subject to movement restrictions.

The implementation of a slaughter-out policy may not lead to the loss of many more stock on IPs than would be expected if the disease was not controlled. As capripox diseases are not included in the Commonwealth/States cost-sharing agreement for the eradication of certain exotic animal diseases, there is no guarantee that compensation will be paid for the destroyed animals. Prevention of restocking until after the prescribed period has elapsed will impose serious problems on the cash flow of the IPs and DCPs involved.

Although goat and sheep meat and goat milk supplies in the area near the outbreak would be disrupted, consumers could get adequate supplies of cows milk and beef.

Embargoes may be placed by importing countries on Australian primary produce, particularly wool, goat fibre and skins. This could have a major effect on the whole Australian economy. It is therefore necessary to act immediately to control and then eradicate the disease, and to quickly establish Australia's freedom from it so as to re-establish the export trade in animal products.

If the outbreak occurs late in the vector season, eradication will be assisted if the cold weather kills the vectors and infected animals are destroyed and disposed of quickly.

3.4 Criteria for proof of freedom

Australia would be considered free from sheep pox or goat pox six months after the occurrence of the last case if a stamping-out policy is practised (see Appendix 4). In order to further demonstrate that the disease has been successfully contained and eradicated it is essential that we embark on a systematic and accurate disease and vector surveillance program during that six months.

As it is possible that the diseases may appear as subclinical or inapparent infections, serological tests will be necessary to survey for the presence of disease as described in Appendix 4. Physical examinations of flocks and herds will assist in providing proof of freedom.

Surveillance will have to be adequate to provide the necessary confidence for our overseas trading partners, that the disease is in check or eradicated, that the free area is safe, that quarantine and movement controls are effective and that infection is not present in the insect populations in both the free and infected area.

3.5 Funding and compensation

As sheep and goat pox is not included in the Commonwealth/States cost-sharing agreement for the eradication of certain exotic animal diseases, funds to pay the costs of eradication, including compensation, will have to be found from other sources. Possible sources are:

- State government funds;
- State disease compensation funds;
- Commonwealth government funds; and
- special industry levies;

- other agreed arrangements.

Alternatively, the costs and losses might have to be borne by individual owners.

3.6 Strategies if the disease becomes established

It is unlikely that an outbreak of sheep pox or goat pox would not be eradicated. However, if the size of an outbreak outstripped the resources available for control, and ring vaccination of all susceptible animals was not able to contain the disease, then it could become established.

If sheep pox or goat pox become established in Australia they would be controlled by vaccination with an appropriate vaccine of all susceptible animals in areas where the disease occurred. Vaccination of the entire susceptible population against sheep pox or goat pox should result in the field virus dying out, allowing widespread vaccination to be discontinued after only a couple of years, and be replaced by ring vaccination. Adequate movement restrictions would have to be instituted to prevent movement of susceptible animals and materials from the infected areas.

If the infection gets into the insect populations it may be difficult to eradicate and vaccination may have to be continued for a prolonged period. Provided infection in animals can be restricted, then infection in insects should decrease and disappear.

APPENDIX 1 Guidelines for classifying declared areas

Infected premises (IP)

Premises classified as an IP will be any property on which clinical disease is diagnosed or believed to exist. IPs will be subject to quarantine served by notice and to eradication or control measures.

Dangerous contact premises (DCP)

Premises classified as DCPs will be:

- all neighbouring properties on which susceptible animals have been sharing a common fenceline with infected animals on an IP and where it is considered necessary to impose disease control measures;
- all properties to which susceptible animals have moved from an IP within 21 days prior to the first appearance of symptoms on the IP and where it is considered necessary to impose disease control measures; and
- all other properties owned or managed in conjunction with an IP.

DCPs will be subject to quarantine and to eradication or control measures.

Suspect premises (SP)

Premises classified as SPs will be:

- other neighbouring properties containing susceptible animals;
- all properties that people have visited after handling or having close contact with susceptible animals on the IP during 21 days prior to the initial appearance of lesions, and where it is considered that subsequent transmission of disease is possible; and
- all premises where it is considered that disease could possibly have spread to susceptible animals from an IP by way of the movement of vehicles, equipment or feedstuff during the period 21 days prior to the first appearance of lesions.

SPs will be subject to quarantine and intensive surveillance.

Restricted area (RA)

The boundary of the RA should be at least 5 km from the boundary of the IP or DCP, and there should be at least two stockproof barriers between the two. Where stockproof barriers do not exist the RA should also include an area substantially greater than the home range of any susceptible feral species that may come into contact with the IPs or DCPs. Consideration should be given to any natural geographic features in setting boundaries of these areas.

Control area (CA)

The boundary of the CA should be at least 5 km from the boundary of the RA, and there should be at least two stockproof barriers between the two. The CA may need to be extended to include the destination of animal products from within the CA, such as a wool scouring plant, goat dairy factory or an abattoir. The CA must also substantially exceed the home range of any susceptible feral animals that may enter the area.

Initially the CA may be a much larger area pending determination of the extent of the outbreak.

APPENDIX 2 Recommended quarantine and movement controls

Infected and dangerous contact premises

Movement out of susceptible animals:

Prohibited. All susceptible animals on IPs and all dangerous contact animals on DCPs to be slaughtered.

Movement in of susceptible animals:

Prohibited (1).

Movement out of wool, fibre, skins, etc:

No skins, hides, wool or fibre from susceptible species are to be moved off the premises without permission (2).

Movement out of milk products:

Movement of milk products from susceptible species prohibited.

Movement out of other animals:

May be allowed under permit (4).

Movement in and out of people

No personnel will enter or leave the premises without authority (5).

Movement in and out of vehicles and equipment:

All vehicles and equipment entering or leaving the IP or DCP will undergo appropriate cleaning and disinfection.

Movement out of crops and grains:

Allowed under permit (6).

Suspect premises

Prohibited (3).

Prohibited (3).

Prohibited (2) and (3).

As for IP/DCP (3).

Permit required.

No restriction, but if they have close contact with suspect animals they must undergo appropriate decontamination.

Vehicles and equipment that have had close contact with suspect animals must be cleaned and disinfected before movement out.

Allowed under permit (6).

Restricted area*Movement out of susceptible stock:*

Prohibited (7).

Movement in of susceptible stock:

Allowed under permit (8).

Movement within of susceptible stock:

Allowed under permit (8).

Movement through of susceptible stock:

May be allowed under permit (8). Strict conditions would apply (9).

Movement of wool, fibre, skins, etc:

Movement of wool, fibre or skins of susceptible species may be allowed under written permit.

Movement of milk products:

Milk from susceptible species prohibited unless authorised by permit.

Movement of other animals, people, equipment:

Allowed as long as the equipment is disinfected and inspected at the exit point and found to be clean.

Vehicles:

As long as vehicles are clean they should be permitted free movement from an RA.

Risk enterprises:

Skin dealers and shearers would be banned from operating in the RA or CA.

Sales, shows, etc:

No shows or sales involving susceptible species within the RA or CA would be permitted.

Stock routes, rights of way:

Prohibited.

Control area

Prohibited (7).

Allowed under permit (8).

Allowed under permit (8).

May be allowed under permit (8). Strict conditions would apply (9).

As for RA.

Allowed under permit.

Allowed.

Allowed.

Prohibited.

Notes:

- (1) Sentinel animals may be moved on to the premises 21 days after the finish of clean up operations. Restocking will not be permitted until 6 weeks after the sentinel animals are introduced.
- (2) Bales of wool may be disinfected and permitted to leave if it can be shown that they were harvested well before the time the infection was deemed to have arrived on the premises, and that no contact with infected animals or things was possible. It may be possible to salvage material of low risk via a designated processing works.
- (3) It is expected that quarantine may be lifted after 42 days.
- (4) The movement of animal species not susceptible to the disease will be prohibited unless steps can be taken to prevent these animals from mechanically transmitting the virus. This may include movement to another 'safe' area until transmission is impossible.
- (5) Subject also to appropriate cleaning and disinfection to the satisfaction of the gate control officer.
- (6) If the crop is considered to be potentially contaminated, disinfection will be required. It shall not be used as bedding or fodder for susceptible animals, and this must be specified in the permit.
- (7) Permits may be given to send animals direct for slaughter under certain conditions.
- (8) Animals permitted to enter or move within the RA or CA that later contract the disease will be subject to compensation, so care should be taken in issuing such permits.
- (9) Vehicles must move directly through the area without stopping.

APPENDIX 3 OIE International Animal Health Code for sheep and goat pox

[NB The following text is taken directly from the OIE International Animal Health Code (1992); Chapter 2.1.10. For definitions, Appendixes, etc see the original text. The OIE Codes are amended every year in May. There have been no amendments to the code for sheep and goat pox in 1993, 1994 or 1995.]

Preamble: For vaccine standards, reference should be made to the *Manual* (A10) [see OIE publications under References].

Article 2.1.10.1.

For the purposes of this *Code*, the *incubation period* for sheep pox and goat pox shall be 21 days.

Article 2.1.10.2.

For the purposes of this *Code*:

Sheep pox and goat pox: free country

A country may be considered free from sheep pox and/or goat pox when it has been shown that sheep pox and/or goat pox has not been present for at least the past three years.

This period shall be six months after the occurrence of the last case of sheep pox and/or goat pox for countries in which a *stamping-out policy* is practised, with or without vaccination against sheep pox and/or goat pox.

Sheep pox and goat pox: infected zone

A sheep pox and/or goat pox infected zone shall be considered as such until at least 21 days have elapsed after the last case has been reported and following the completion of a stamping-out policy and *disinfection* procedures, or six months after the clinical recovery or death of the last affected animal if a stamping-out policy is not practised.

Article 2.1.10.3.

Veterinary Administrations of sheep pox and/or goat pox *free countries* may prohibit importation or transit through their territory, directly or indirectly, from countries considered infected with sheep pox and goat pox of:

domestic sheep and/or goats.

Article 2.1.10.4.

When importing from sheep pox and/or goat pox *free countries*, *Veterinary Administrations* should require:

for domestic sheep and/or goats

the presentation of an *international animal health certificate* attesting that the animals:

- 1) showed no clinical sign of sheep pox and/or goat pox on the day of shipment;
- 2) were kept in a sheep pox and/or goat pox free country since birth or for least the past 21 days.

Article 2.1.10.5.

When importing from countries considered infected with sheep pox and/or goat pox, *Veterinary Administrations* should require:

for domestic sheep and/or goat pox

the presentation of an *international animal health certificate* attesting that the animals:

- 1) showed no clinical sign of sheep pox and/or goat pox on the day of shipment;
- 2) were kept since birth, or for at least the past 21 days, in an *establishment* where no *case* of sheep pox and/or goat pox was officially reported during that period, and that the establishment of origin is not situated in a sheep pox or goat pox *infected zone*; or
- 3) were kept in a *quarantine station* for the 21 days prior to shipment;
- 4) have not been vaccinated against sheep pox and/or goat pox; or
- 5) were vaccinated using a vaccine complying with the OIE standards not less than 15 days and not more than four months prior to shipment (the nature of the vaccine used: inactivated/modified live virus vaccine and the virus types and strain included in the vaccine shall also be stated in the certificate).

Article 2.1.10.6.

When importing from sheep pox and/or goat pox free countries, *Veterinary Administrations* should require:

for semen of sheep and/or goats

the presentation of an *international animal health certificate* attesting that the donor animals:

- 1) showed no clinical sign of sheep pox and/or goat pox on the day of collection and for the following 21 days;
- 2) were kept in a country free from sheep pox and/or goat pox.

Article 2.1.10.7.

When importing from countries considered infected with sheep pox and/or goat pox, *Veterinary Administrations* should require:

for semen of sheep and/or goats

the presentation of an *international animal health certificate* attesting that the donor animals:

- 1) showed no clinical sign of sheep pox and/or goat pox on the day of collection and for the following 21 days;
- 2) were kept in the *exporting country*, for the 21 days prior to collection, in an establishment or *AI centre* where no case of sheep pox and/or goat pox was officially reported during that period, and that the establishment or AI centre is not situated in a sheep pox and/or goat pox infected zone;
- 3) have not been vaccinated against sheep pox and/or goat pox; or

- 4) were vaccinated using a vaccine complying with the OIE standards (the nature of the vaccine used: inactivated/modified live virus vaccine and the virus types and strains included in the vaccine shall also be stated in the certificate).

Article 2.1.10.8.

When importing from countries considered infected with sheep pox and/or goat pox, *Veterinary Administrations* should require:

for products of animal origin (from sheep and goats) (skins, fur, wool, hair) destined for industrial use

the presentation of an *international sanitary certificate* attesting that these products:

- 1) come from animals which have not been kept in a sheep pox and/or goat pox *infected zone*;
- 2) have been processed to ensure the destruction of sheep pox and/or goat pox virus, in premises controlled and approved by the Veterinary Administration of the *exporting country*.

APPENDIX 4 Procedures for surveillance and proof of freedom

At the first clinical signs, the diseases must be compulsorily notifiable. Farmers, veterinarians and meat workers must be alert and report suspicion of disease.

Australia's freedom from sheep pox or goat pox infections will be considered after a period of six months in which no disease is detected. All at-risk properties (1) must therefore be kept under close surveillance for six months.

Detection of disease is to be from physical examination of flocks as well as from applying serological tests.

On IPs, and DCPs that have been destocked, sentinel animals may be introduced about 28 days after decontamination is completed. These should undergo weekly physical inspection with fortnightly serological testing for 6 weeks, when restocking may occur (4). At 1 month intervals for 3 months the flock should be inspected and a sample tested for antibodies (2). If no suspicion of disease is detected by then (about 6 months after the completion of cleaning and disinfection) the property may be released from quarantine.

On other properties in the RA, physical inspection surveillance visits (3) should be made as soon as possible after the first IP is declared in the RA and then 1, 2, 3 and 6 weeks later. Other SPs should be visited as soon as possible after declaring the contact with the IP, and 1, 2, 3 and 6 weeks later.

A statistical serological survey (2) is recommended on all at-risk premises (1) 6 weeks after the last case, and any positive-testing animals should be destroyed.

Provided any necessary decontamination on the risk property is completed, satisfactory results from physical inspection and serological surveillance for a period of 6 weeks from the date of last contact with the IP should be sufficient to certify that no residual infection remains on the property.

A final inspection and another serological survey may be needed 6 months after the last case.

Notes:

- (1) Premises considered to be at risk are all premises within the RA with susceptible animals, IPs, DCPs and other properties considered to have had significant contact with an IP.
- (2) A statistical sample, sufficient to detect at least one seropositive animal with 99% confidence if the prevalence of seropositive reactors is 10%, of all susceptible animals on all premises considered to be at risk will need to be tested for antibodies by the serum neutralisation test (see Cannon and Roe, 1982, page 17). Depending on the results of transmission tests, cattle may also need to be included in the sheep pox or goat pox serological survey.
- (3) At physical inspection surveillance visits every mob of susceptible animals must be inspected and numbers accounted for. In extensive grazing areas, where the degree of contact between groups of animals in a flock may be low, care must be taken to ensure that all groups of animals are present and healthy.
- (4) Animals dying within 12 months after repopulation of IPs must be autopsied and appropriate samples taken for virus testing.

Summary of surveillance program for sheep pox or goat pox

Error! Bookmar k not defined.	Infected premises	Restricted area
Day 0	decontamination completed	
Week 1		clinical exam
Week 2		clinical exam
Week 3		clinical exam
Week 4	introduce sentinel animals	
Week 5	clinical exam	
Week 6	clinical exam + serotest	clinical exam + serosurvey release from quarantine
Week 7	clinical exam	
Week 8	clinical exam + serotest	
Week 9	clinical exam	
Week 10	clinical exam + serotest, restock	
Month 4	flock inspection + serosurvey	
Month 5	flock inspection + serosurvey	
Month 6	flock inspection + serosurvey remove quarantine	serosurvey

GLOSSARY

Animal by-products	Products of animal origin destined for industrial use, eg raw hides and skins, fur, wool, hair, feathers, hooves, bones, fertiliser.
Animal products	Meat products and products of animal origin (eg eggs, milk) for human consumption or for use in animal feeding.
AUSVETPLAN	A series of documents that describe the Australian response to exotic animal diseases, linking policy, strategies, implementation, coordination and counter-disaster plans.
Consultative Committee on Exotic Animal Disease	A committee of State/Territory CVOs, AAHL and CSIRO, chaired by the CVO of Australia (Cwlth DPIE), to consult in emergencies due to the introduction of an exotic disease of livestock, or serious epizootics of Australian origin.
Control area	A declared area in which defined conditions apply to the movement into, out of, and within, of specified animals or things. Conditions applying in a control area are of lesser intensity than those in a restricted area (<i>see</i> Appendix 1).
Dangerous contact animal	An animal showing no clinical signs of disease but which, by reason of its probable exposure to disease, will be subjected to disease control measures.
Dangerous contact premises	Premises containing a dangerous contact animal(s) (<i>see</i> Appendix 1).
Declared area	A defined tract of land for the time being subject to disease control restrictions under exotic disease legislation. Types of declared areas include <i>restricted area</i> ; <i>control area</i> ; <i>infected premises</i> ; and <i>dangerous contact premises</i> .
Decontamination	Includes all stages of cleaning and disinfection.
ELISA	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.
Erythema	Superficial redness of the skin due to dilation of the capillaries.
Fomites	Inanimate objects (eg boots, clothing, equipment, vehicles, crates, packagings) that can carry the exotic agent and spread the disease through mechanical transmission.
Immunodiffusion	A serological test to identify antigens or antibodies by precipitation of antibody–antigen complex after diffusion through agar gel.
Incubation period	The period which elapses between the introduction of the pathogen into the animal and the occurrence of the first clinical signs of the disease.

Indirect immunofluorescence	A technique in which the presence of antigen or antibody in a sample can be detected by binding of a specific antibody bound to a fluorescent marker molecule which is visible under a fluorescence microscope.
Infected premises	A defined area (which may be all or part of a property) in which an exotic disease exists, is believed to exist, or in which the infective agent of that exotic disease exists or is believed to exist. An infected premises is subject to quarantine served by notice and to eradication or control procedures.
Local disease control centre	An emergency operations centre responsible for the command and control of field operations in a defined area.
Movement controls	Restrictions placed on movement of animals, people and things to prevent dissemination of disease.
Premises	A defined area or structure, which may include part or all of a farm, enterprise or other private or public land, building or property.
Quarantine	Legal restrictions imposed on a place, animal, vehicle or other things limiting movement.
Restricted area	A declared area in which defined rigorous conditions apply to the movement into, out of, and within, of specified animals, persons or things (<i>see</i> Appendix 1).
Risk enterprise	A livestock or livestock-related enterprise with a high potential for disease spread, eg an abattoir, milk factory, artificial breeding centre or livestock market.
Sentinel animals	Animals of known health status monitored for the purpose of detecting the presence of a specific exotic disease agent.
Seroconversion	Appearance in the blood serum of antibodies following vaccination or natural exposure to a disease agent.
Serosurveillance	Surveillance of an animal population by testing serum samples for the presence of antibodies to disease agents.
Serum neutralisation test	A type of serological test designed to detect and measure the presence of antibody in a sample. The test is based on the ability of an antibody to neutralise the biological activity of an antigen.
Stamping out	Eradication procedures based on quarantine and slaughter of all infected animals and animals exposed to infection.
State/Territory disease control headquarters	The emergency operations centre that directs the disease control operations to be undertaken in the State/Territory.
Surveillance	A systematic program of inspection and examination of animals or things to determine the presence or absence of an exotic disease.

Suspect animals	An animal which may have been exposed to an exotic disease such that its quarantine and intensive surveillance is warranted; OR an animal not known to have been exposed to a disease agent but showing clinical signs requiring differential diagnosis.
Suspect premises	Premises containing suspect animals (<i>see</i> Appendix 1).
Tracing	The process of locating animals, persons or things that may be implicated in the spread of disease, so that appropriate action may be taken.
Vaccine	
– attenuated	A vaccine made from a live virus which has been altered so that it does not cause disease.
– inactivated	A vaccine made from a killed virus.
Vector	A living organism (frequently an arthropod) that transmits an infectious agent from one host to another. A <i>biological</i> vector is one in which the infectious agent must develop or multiply before becoming infective to a recipient host. A <i>mechanical</i> vector is one that transmits an infectious agent from one host to another but is not essential to the life cycle of the agent.
Viraemia	The presence of viruses in the blood.
Zoning	The process of defining disease-free and infected zones in accord with OIE guidelines, in order to facilitate trade. A high level of movement control between zones will apply.

Abbreviations

AAHL	CSIRO Australian Animal Health Laboratory, Geelong
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
CA	Control area
CCEAD	Consultative Committee on Exotic Animal Diseases
CVO	Chief veterinary officer
DCP	Dangerous contact premises
ELISA	Enzyme-linked immunosorbent assay
IEMVT	Institut d'Élevage et Médecine Vétérinaire
IP	Infected premises
OIE	World Organisation for Animal Health [Office International des Epizooties]
RA	Restricted area
SP	Suspect premises

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Video/training resources

Capripox (sheep and goat pox and lumpy skin disease) (video), AAHL 1992 (available from the Animal Diseases/Incidents Section, DPIE, Canberra; or AAHL).

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

OIE publications

OIE Code (1992). *International Animal Health Code* (6th edition), OIE, Paris, France.

OIE Manual (1992). *Manual of Standards for Diagnostic Tests and Vaccines* (2nd edition), OIE, Paris, France.

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