AUSTRALIAN VETERINARY EMERGENCY PLAN

AUSVETPLAN

1996

Operational Procedures Manual

Disposal

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 Operational Procedures Manual forms part of:

AUSVETPLAN Edition 2.0, 1996

[AUSVETPLAN Edition 1.0, was published in 1991]

This document 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 **Operational Procedures Manual** for **disposal procedures** is an integral part of the Australian Veterinary Emergency Plan, AUSVETPLAN (Edition 2.0). AUSVETPLAN structures and functions are described in the AUSVETPLAN **Summary Document**.

This manual sets out the disease control procedures which were approved in February 1991 by the then Australian Agricultural Council, out-of-session at meeting 135, for use in an animal health emergency in Australia. It has been upgraded and approved by the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) out-of-session in January 1996.

Technical information and policies for individual diseases is provided in the AUSVETPLAN **Disease Strategies.** The **Management Manuals** and other **Operational Procedures Manuals** provide information on the field implementation of strategies. Cross-references to strategies, manuals and other AUSVETPLAN documents are expressed in the form:

Document Name, Section no.
For example, **Decontamination Manual, Section 3**. This manual sets out the disease

The manual 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 manual. 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 INTRODUCTION

The primary objective of disposal of carcases, animal products, materials and wastes is to prevent the dissemination of infection. This process is therefore an essential part of an animal disease eradication program; it is also important from an aesthetic point of view. Disposal should be completed as soon as possible after destruction to minimise opportunities for infectious material to disperse. Furthermore, carcases are much easier to handle before decomposition has set in.

This manual outlines disposal methods appropriate for the exotic diseases that are most readily transmitted by fomites (ie foot-and-mouth disease, Newcastle disease and avian influenza) and zoonotic diseases. Less rigorous disposal methods may be appropriate for less readily transmitted diseases and non-zoonotic diseases. Carcases and other items awaiting disposal should be guarded to prevent unauthorised access and to prevent domestic pets, wild animals and birds removing potentially infectious material. Control of insects should be considered if there is a risk of passive transmission by insects to nearby susceptible species. If disposal is delayed, carcases should be thoroughly sprayed with an approved disinfectant (see the **Decontamination Manual, Tables 2.1 - 2.15**).

Before commencing disposal work, personnel should be fully briefed. The nature of the disease and any specific hygiene requirements associated with zoonotic diseases should be explained on site. Management of the disposal operations is described in the **Control Centres Management Manual, Part 1; Section 3.3.**

Respirators should be supplied on request to personnel when there is any risk to humans from the organism involved, or if large amounts of dust are generated.

2 SELECTION OF DISPOSAL METHOD AND SITE

2.1 Disposal on the infected premises (or dangerous contact premises)

Under Australian conditions, burial will most likely be the preferred method of disposal because it is:

- quicker;
- cheaper;
- environmentally cleaner; and
- easier to organise, ie less outside resources required (see Section 3.1).

General factors to be considered are:

- nature and amount of material for disposal;
- availability of sites suitable for burial or cremation adjacent to the destruction site;
- accessibility to disposal site by heavy transport vehicles;
- nature of soil/rock formation in the available area;
- level of water-table;
- proximity to water catchment areas, bores and wells;
- presence of underground services, eg water, gas, electricity, telephone lines, drainage, sewerage, other improvements or structures, including aerial lines;
- proximity to built up areas and dwellings (particularly in the case of cremation);
- fire restrictions, hazards (in the case of cremation);
- other weather conditions including prevailing winds (it may be easier to cremate in excessively wet conditions);
- availability of plant for burial;
- availability of supplies of suitable fuel for cremation;
- presence of overhead structures such as power lines; these must be avoided when selecting both burial and cremation sites;
- quantities of carcases and other material for disposal; and
- subsequent plans for the use of the area, eg the soil may be unstable where burial pits are placed.

Disposal of animal carcases and other infectious material may involve some adverse environmental consequences. It is important for the environmental aspects of proposed disposal activities to be properly considered, with advice from environmental agencies where possible, so as to ensure that the impact of such consequences be minimised. Consultation with relevant authorities, eg environmental protection agencies, will be necessary to obtain specific information on a number of these factors. These consultations should be arranged through the local disease control centre (LDCC).

Under remote conditions, alternative methods of carcass disposal may need to be considered. For example, the presence of feral pig populations, seasonal conditions; and the extensive densities may indicate a strategy of delaying the operations (that is, until virus excretion is reduced and access is improved).

2.2 Disposal off the infected premises (or dangerouscontact premises)

Where burial, cremation or rendering are not considered practical or difficult to carry out on the infected premises (IP) or dangerous contact premises (DCP), permission should be sought from the State/Territory disease control headquarters (SDCHQ), through the LDCC controller, to transfer carcases and/or infectious material to another site for disposal by burial, cremation or rendering. This may be necessary when considering the disposal of materials from laboratories and in situations where site limitations, such as available space or water-table, effectively prevent on-site disposal. Furthermore, in some circumstances, such as with large volumes of material from feedlots, it may be preferable to dispose of carcases by rendering if suitable facilities are available locally or can be transported to the site.

If IPs and DCPs are adjacent or in close proximity a common disposal site may be used.

Transport should be in a leak-proof container, such as a large skip, covered with tough polyethylene covers and sealed at the top. It should not be overloaded — half a metre or more (depending on distance to be travelled and temperature) should be left clear for expansion of carcases. **Carcases should not be slashed before loading**. Vehicles should travel slowly to avoid splashing of contaminated material and should be accompanied by a police vehicle and a departmental officer to minimise the chances of accidents and to prevent breaches of biosecurity. The escorting officer must carry a supply of an approved disinfectant and basic equipment to deal with minor spills en route. All vehicles must be cleaned and disinfected before leaving the IP (or DCP) and after unloading.

The departmental officer escorting the consignment should report to the LDCC (or SDCHQ) when the operation has been successfully completed, or immediately there has been any possible breach of biosecurity.

3 METHODS OF DISPOSAL

3.1 Burial

3.1.1 Site selection

Important considerations for burial site selection include;

- *access to the site* — for both equipment to dig the burial pit and for the delivery of livestock, carcases or other materials to be buried;
- *environmental* — distance to watercourses, bores and wells; height of water-table; proximity to buildings, especially houses; proximity to neighbours or public lands including roads; slope of the land and drainage to and from the pit; permeability of soil; sufficient space for temporary storage of overburden; and direction of prevailing wind (odour);
- *construction considerations* — avoid rocky areas (slows digging and increases costs) but select soils with good stability capable of withstanding the weight of equipment used to construct and fill the pits. Surface runoff should be prevented from entering the pit by the construction of diversion banks if required. Similar banks should be constructed to prevent any liquids escaping from the burial site. Fencing may be necessary to exclude animals until the site is safe for use.

3.1.2 Earthmoving equipment

The preferred equipment for digging burial pits is an excavator. This equipment is the most efficient available for the construction of long, deep, vertically sided pits. Other advantages include the ability to easily store topsoil separate to subsoil and the equipment can be used if required to fill the pit with carcases or other materials and closing the pit without disturbance of the carcases.

Loaders, bulldozers, road graders and backhoes (for small jobs) may be used if excavators are unavailable. With the exception of backhoes, all other equipment requires the continual movement of the machine over the site while digging the pit. Excavators and backhoes essentially remain in a fixed position while digging, hence they move soil faster, with less cost and less damage to the site surrounding the pit. Most excavators have an attachable hammer for rock work if necessary.

3.1.3 Burial pit construction

The dimensions of the burial pit will be dependant on the equipment used, site considerations and the volume of material to be buried. The preferred dimensions are for pits to be as deep as practically possible (reach of machinery, soil type and water-table level being the usual constraints), with vertical sides. The pit should be no wider than can be filled evenly with the material to be buried with the available equipment. For example if a dozer is used to dig a pit, then it should be no more than one blade width, say 3 metres, because it may be very difficult to push carcases into the pit from one side and evenly fill the pit. The aim should be to avoid having to move carcases once they are in the pit. The length of the pit will be determined by the volume of material to be buried.

Pit dimensions

In designing the dimensions of the pit, consideration needs to be given to the method to be used to fill the pit with carcases or other material. Generally carcases will be unloaded (out of tip trucks) or pushed into the pit (loader or dozer) from one of the long sides. Excavators can be used to fill pits with carcases placed close by the pit. This is especially useful if soil stability does not permit trucks or other heavy equipment to operate close to the pit edge.

The following guidelines may be of assistance in determining the pit volume required. The base of the pit must be at least 1 metre above the water-table. On average, allow a fill capacity of about 1.5 cubic metres for each adult beast or 5 adult sheep. In addition, at least 2 metres of soil is required to cover carcases to ground level. For example, a pit 3 metres wide and 5 metres deep filled with carcases to within 2.5 metres of ground level will accommodate 5 adult cattle per linear metre (ie 3 x 2.5 x 1 = 7.5 cubic metres; 7.5/1.5 = 5 cattle or 25 sheep).

When closing the pit, surplus soil should be heaped over the pit as overfill. The weight of soil acts to stop carcases rising out of the pit due to gas entrapment, prevents scavengers digging up carcases, helps filter out odours and assists in absorbing the fluids of decomposition. After pit subsidence it will be necessary to replace any topsoil not utilised during pit closure.

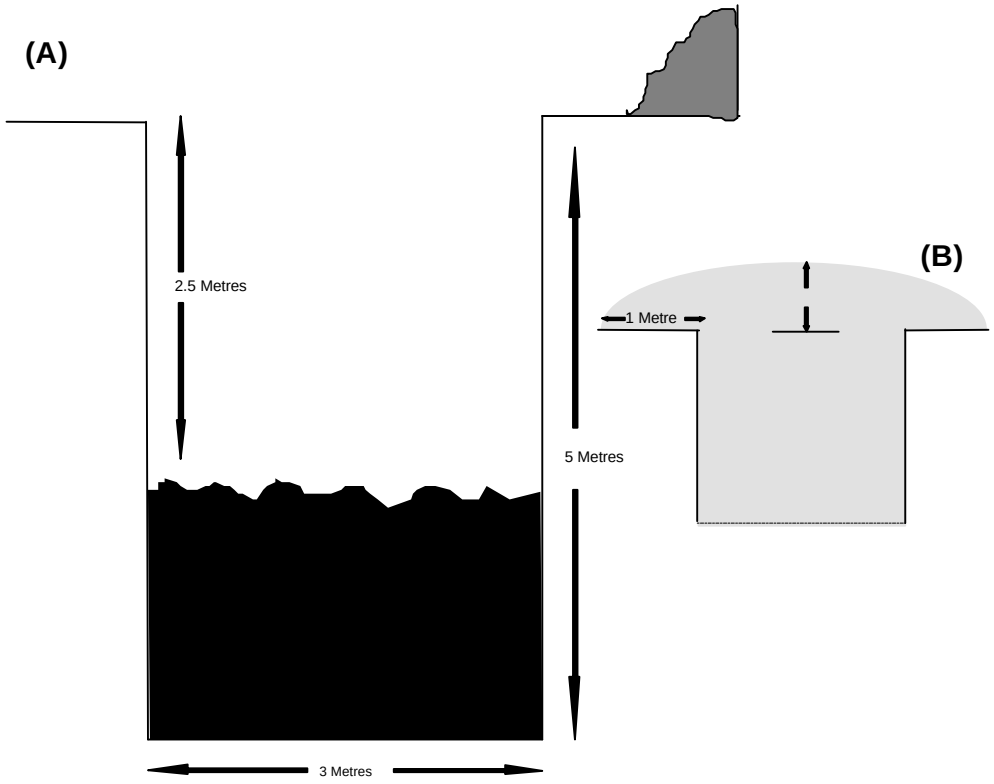

Figure 1 Disposal of carcases by burial; (A) open pit; (B) freshly closed pit

In the case of poultry, destruction will normally be in a container such as a skip or body of a truck and the dimensions of these containers should be used as a guide to the volume of the pit required.

For information on the disposal of bee hives see the **Bee Diseases, Section 2.3.**

3.1.3 Other considerations

Gas production

Gas production from decomposition within unopened carcases may result in considerable expansion in the volume of the buried material to the extent that the surface of the closed pit may rise and carcases may be expelled from the pit. **It is recommended that large animal carcases be opened by slashing the rumen of cattle or the caeca of horses** to permit escape of gas. There appears to be little benefit in opening small animal carcases. If carcases are to be opened this should be undertaken at the side of the pit, under no circumstances should personnel enter the pit during filling.

Lime may be added to pits to prevent earthworms bringing contaminated material to the surface after pit closure. Cover the carcases with soil, 400 mm is suggested, and add an unbroken layer of slaked lime [$Ca(OH)_2$] before filling is completed. Lime should not be placed directly on carcases because it slows, and may prevent, decomposition.

Site inspection

Inspection of the burial site after closure is recommended so that appropriate action can be taken in the event of seepage or other problems. The objective is that the site should return to its original condition. Before restocking is permitted the burial site should be again inspected to ensure there is no possible biological or physical danger to stock.**This would normally be several months following pit closure.**

Safety considerations

Safety of personnel is an overriding consideration. Aspects to consider include: hygiene of the personnel working on the site; the availability of rescue equipment if a person falls into the pit or if the pit wall collapses; hearing and dust protection. All operations should be controlled by the site supervisor and staff properly briefed before the commencement of operations.

3.2 Cremation

Cremation should be considered only when burial is not possible. Available methods include funeral pyres, existing incinerators and pit burning.

3.2.1 Pyres

The principle is to place carcases on top of sufficient combustible material, ensuring the arrangement of fuel and carcases allows adequate air flow to enter the pyre from below, so thus achieving the hottest fire and the most complete combustion in the shortest time.

3.2.2 Site selection

Important considerations are:

- *location* — consider the possible effects of heat, smoke and odour that will be generated by the fire on nearby structures, underground and aerial utilities, roads and residential areas;
- *access to the site* — for both equipment to construct the pyre and maintain the fire and for the delivery of fuel and livestock, carcases or other materials to be burnt;

- environmental — ensure there is an adequate fire break around the pyre — consult with local bush fire brigades for advice, permits if required and for fire appliances to be on site during the burn;
- *fuel* — pyres require considerable fuel to achieve complete cremation. The amount and type of fuels available will vary considerably, all required fuel should be on site before the burn is commenced.

3.2.3 Preparation of fire-bed

The fire line should be sited at 90 degrees to the direction of the prevailing wind to maximise ventilation. Air space can be provided by digging trenches under the pyre and/or elevating the fire-bed. Fuel supplies should be stacked and the fire built from the upwind side and carcases loaded from the opposite side.

- *Width* of the fire-bed is governed by the size of carcases to be burnt, for adult cattle allow 2.5 metres.
- *Length* — allow 1 metre per adult beast.

If building the fire-bed on the ground, dig trenches, (30 cm x 30 cm) to act as air vent channels, in the same direction as the prevailing wind at about 1 metre intervals under the length of the proposed fire-bed. If elevating the fire-bed lay rows of baled straw and heavy timbers parallel to the prevailing wind and then another layer of timbers crossing the bottom layer with a gap of about 20 cm between timbers. Then lay other fuel, such as lighter timber or straw bales, over this timber support.

Stack carcases across the fire-bed with larger carcases on the bottom and smaller carcases on top (see Figure 2), preferably with the carcases on their backs and alternating head to tail, if possible. Excavators or front-end loaders are best, but lifting jibs, tractor fork-lifts or cranes and chains can be used. After placing carcases on the fire-bed the extensor tendons may be cut to prevent legs being extended during burning.

When loading of the carcases is complete and weather conditions suitable, saturate the fire-bed and carcases with diesel or heating oil (NOT PETROL) and prepare ignition points about every 10 metres along the length of the fire-bed. These can be made of rags soaked in kerosene.

Remove all vehicles, personnel and other equipment well away from the fire-bed. Start the fire by walking into the wind and lighting the ignition points along the way.

The fire must be attended at all times and be re-fuelled as necessary, use a tractor with a front mounted blade or a front-loader. Ensure any carcases or parts thereof that fall off the fire are replaced on the fire. A well constructed fire will burn all carcases within 48 hours. The ashes should be buried and the site restored as well as possible.

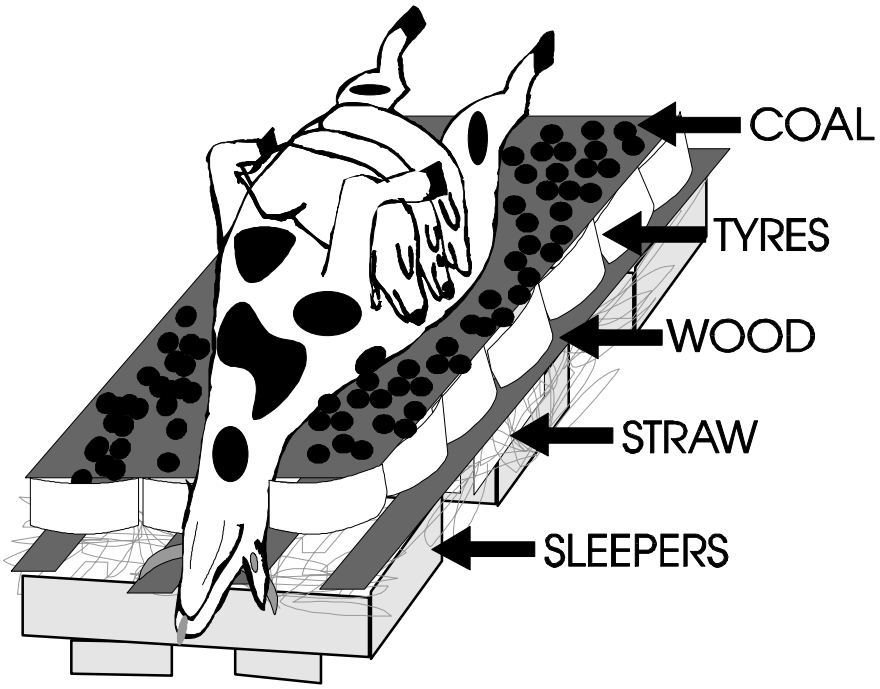

Figure 2 Disposal of carcases by cremation

3.2.4 Fuel requirements

Local availability will govern the type and amount of various fuels required. The following can be used as a guide (per adult beast);

- heavy timber (eg sleepers) 3 pieces, 2.5 m x 100 mm x 75 mm
- straw 1 bale
- small timber 35 kg
- coal 200 kg
- liquid fuel 5 litres

For fuel estimation, one adult cattle carcase is equivalent to 4 adult pigs or shorn sheep, or 3 adult woolly sheep.

3.3 Incinerators

Biological incinerators are a very efficient carcase disposal system, achieving safe and complete disposal with the absence of virtually any pollution. However, their cost (establishment and operation) and lack of portability means they are unlikely to be readily available or easily accessible in most situations. Incinerators are usually only suited to disposal of small amounts of material. Special procedures must be followed in connection with the transportation of infected material off IPs to the incinerators and the disinfection of containers and vehicles.

3.4 Pit burning

Pit burning (also known as air curtain incineration) is a technique for burning material in a pit aided by fan-forced air. Pit burners are used by some local councils to burn vegetable matter with a high moisture content. The equipment consists of a large capacity fan (usually driven by a diesel engine) and ducting to deliver the air, which may be preheated, down into the long side of a trench. The angle of the airflow results in a curtain of air acting as a top for the incinerator and provides oxygen that produces high burn

temperatures. Sufficient hot air recirculates within the pit achieving complete combustion. Additional fuel is required to initially establish combustion, but once operating the continuing fuel requirement is reduced. Pit burners would be suitable for continuous operation on a relatively small scale and have the advantage of being transportable. They would appear to be especially suited to pigs and fat sheep.

3.5 Rendering

SDCHQ will coordinate all arrangements associated with the disposal of carcases at rendering plants and will liaise with the companies concerned. Only plants using a high temperature batch rendering process will be approved. A satisfactory rendering process would involve grinding the raw product, solvent extraction of lipids at about 100 °C for one hour and high temperature (160 °C) treatment of both meatmeal and tallow for at least a further 40 minutes (see the relevant AUSVETPLAN **Disease Strategy** and the **Red meat Manual,** for information on temperatures required).

The end product of rendering must pass relevant microbiological tests before release.

3.6 Composting

Where there is a minor risk of fomite spread, composting of stable manure, feeds, hay, litter and bedding is a possible alternative to burial or burning. Composting should be done in a secure area not accessible to susceptible animals.

4 ITEMS REQUIRING SPECIAL CONSIDERATION

All contaminated and potentially-contaminated carcases, animal products, materials and wastes will be disposed of by one of the methods outlined in Section 3. However specific disposal considerations apply to the materials listed below.

4.1 Milk and dairy products

The disposal of milk products presents particular difficulties because large volumes are often involved. It is essential that milk should be treated to inactivate any virus before disposal (see the **Decontamination Manual, Section 6**). Following inactivation, disposal options need to be considered. Usually milk held on farm is in small quantities and can be disposed of in the burial pit. On those properties where carcases are cremated, milk should be disposed of in the effluent pit.

Where there are large volumes of contaminated milk at dairy factories or in tankers this should always be inactivated then pumped into a shallow fenced-off pit, which is covered over after the milk has evaporated or seeped into the surrounding soil.

Effluent (washing from dairy factories) presents special problems because of sheer volume. Chemical treatment of large volumes of effluent may render it unacceptable to a sewage disposal unit but 0.2% citric acid should cause no problems. The actual danger from effluent is greatly reduced by dilution and the free use of above normal quantities of water in the usual cleaning processes will further reduce the danger.

Where effluent is normally irrigated over pastures these should not be grazed for two weeks (or such period as described in the relevant Disease Strategy) after irrigation. Rennet, casein, whey or other wastes must not be sprayed over pastures, discharged into drains, or fed to animals, unless treated with disinfectant, as for milk (see the **Dairy Enterprise Manual** for more detail).

4.2 Hatching eggs and hatchery waste

Before disposal of hatching eggs and hatchery waste into burial pits, all material should be macerated to ensure extinction of all life. Assistance of the poultry industry should be sought for supply of suitable equipment and guidance on its use.

4.3 Effluent

Small amounts of solid manure may be disposed of by burial or cremation. See **Decontamination Manual, Section 6**.

4.4 Wool and mohair

If required, these by-products should always be buried because they do not burn well.

4.5 Semen and ova

Where genetic material is stored on premises classified as IPs or DCPs, the existence of such material should be brought to the attention of the LDCC controller who will determine if the material constitutes a risk and if it is required to be destroyed. Because of the potential value of such material, no action should be taken to dispose of it without the express authorisation of the LDCC controller (see the **Artificial Breeding Centres Manual, Section 4.4**l).

4.6 Laboratory wastes

See the **Laboratory Preparedness Manual**

GLOSSARY

Animal by-products	Products of animal origin destined for industrial use, eg raw hides and skins, fur, wool, hair, feathers, hoofs, 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 emergency-management plans.
Consultative Committee on Exotic Animal Diseases	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.
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 dangerous contact animals.
Decontamination	Includes all stages of cleaning and disinfection.
Fomites	Inanimate objects (eg boots, clothing, equipment, vehicles, crates, packagings) that can carry the exotic agent and spread the disease through mechanical transmission.
Infected premises	A defined area (which may be all or part of a property) in which an exotic disease or disease agent exists or is believed to exist.
Local disease control centre	An emergency operations centre responsible for the command and control of field operations in a defined area.
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.
Rendering	Processing by heat to inactivate infective agents. Rendered material may be used in various products according to particular disease circumstances.
Restricted area	A relatively small declared area (compared to a control area) around an infected premises that is subject to intense surveillance and movement controls.

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.
Salvage	Recovery of some (but not full) market value by treatment and use of products, according to disease circumstances.
Stamping out	Eradication procedures based on quarantine and slaughter of all infected animals and animals exposed to infection.
State disease control headquarters	The emergency operations centre that directs the disease control operations to be undertaken in the State/Territory.
Susceptible animals	Animals that can be infected with the disease .
Suspect animals	An animal that 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.
Swill	Food scraps of placental mammal origin that have not been obtained from approved slaughter facilities or treated by an approved process.
Swill feeding	Swill feeding is the feeding of swill to pigs; unlicensed swill feeding is illegal in Australia.
Tracing	The process of locating animals, persons or things which may be implicated in the spread of disease, so that appropriate action be taken.
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.
Zoonosis	Disease that can affect humans as well as animals.

Abbreviations

AAHL	CSIRO Australian Animal Health Laboratory, Geelong
AUSVETPLAN	Australian Veterinary Emergency Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CVO	Chief veterinary officer
DCP	Dangerous contact premises
DPIE	Department of Primary Industries and Energy (Cwlth)
IP	Infected premises
LDCC	Local disease control headquarters
SDCHQ	State/Territory Disease Control Headquarters

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McDaniel, H. A. (1991). Environmental protection during animal disease eradication programmes. OIE Revue Scientifique et Technique, 10: (3): 867-884

Pryde, L.C. (1990) Slaughter and disposal of sheep. Agnote Reg 3/15, NSW Agriculture.

Training resources

First things first – slaughter and disposal of sheep, cattle and horses (video), AAHL 1993 (available from the Animal Diseases/Incidents Section, DPIE, Canberra; or AAHL)

First things first – slaughter and disposal of pigs (video), AAHL 1993 (available from the Animal Diseases/Incidents Section, DPIE, Canberra; or AAHL)

First things first – slaughter and disposal of poultry (video), AAHL 1993 (available from the Animal Diseases/Incidents Section, DPIE, Canberra; or AAHL)

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