

AUSTRALIAN VETERINARY EMERGENCY PLAN

AUSVETPLAN

1998

Enterprise Manual

Zoos

AUSVETPLAN is a series of technical response plans that describe the proposed Australian approach to an emergency 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 Enterprise Manual forms part of:**AUSVETPLAN Edition 2 1996**

[AUSVETPLAN Edition 1 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:

[AUSVETPLAN Edition 2.0 Interim Document was published in 1996]

[AUSVETPLAN Version 2.1 Final Document was published in 1998]

© Commonwealth of Australia and each of its States and Territories 1996

ISBN 0 642 24506 1

This work is copyright and apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced without the written permission from the publisher, the Department of **Agriculture, Fisheries and Forestry - Australia**, acting on behalf of the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ). Requests and inquiries concerning reproduction and rights should be addressed to the AUSVETPLAN Coordinator.

The Commonwealth/States/Territories gives no warranty that the information contained in *AUSVETPLAN* is correct or complete. The Commonwealth shall not be liable for any loss howsoever caused whether due to negligence or other arising from use or reliance on this code.

PREFACE

This **Enterprise Manual for zoos (zoological gardens, circuses and animal theatres)** forms part of the **Australian Veterinary Emergency Plan**, or AUSVETPLAN Edition 2. AUSVETPLAN is an agreed management plan and set of operational procedures, which would be adopted in the event of an emergency animal disease outbreak in Australia. The procedures are briefly outlined in the **Summary Document** and details are given in the individual **Disease Strategies**. The manuals are written with specific reference to certain animal industries where a greater than normal risk of harm could be expected from an emergency disease outbreak.

The purpose of this manual is to provide guidance to the range of people who would be involved in managing a disease emergency involving a zoo. Areas where zoos differ from other animal establishments are highlighted. For this manual to become an effective document it is important that the proposed strategies are incorporated in routine zoo training. Individual zoos should also develop their own specific subplans to add to this plan.

This manual is being released as a final document following full industry/government consultation and with the approval of the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ).

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**.

The resource book *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 (AUSVETPLAN **Exotic Diseases Field Guide**) has been a source for some of the information about the aetiology, diagnosis and epidemiology of the diseases. It should be used as a field guide for veterinarians and other animal health personnel associated with exotic disease diagnosis and management in livestock enterprises, including zoos.

The manuals will be revised and updated from time to time to ensure that they keep pace with the changing circumstances of the particular industry they cover. Comments and suggestions are welcome and should be addressed to:

The AUSVETPLAN Coordinator
National Office of Animal Plant & Fish Health
Agriculture, Fisheries and Forestry – Australia
GPO Box 858
CANBERRA ACT 2601
Tel: (02) 6272 5540; Fax: (02) 6272 3372

Membership of writing group

Graham Wilson (convenor)	Department of Primary Industry and Fisheries, NT
Kevin Langham	Tipperary Sanctuary, NT
Ian Denny	Western Plains Zoo, NSW
Bernie Robinson	Department of Primary Industries and Energy (Cwlth), ACT
David Schultz	Adelaide Zoo, SA
Tim McManus	Department of Primary Industry and Fisheries, TAS

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.

CONTENTS

PREFACE	1
Membership of writing group	iv
CONTENTS	v
1 NATURE OF ENTERPRISE	1
1.1 Description of enterprise.....	1
1.1.1 Zoos	1
1.1.2 Fauna parks and sanctuaries.....	3
1.1.3 Circuses, animal theatres and travelling shows	4
1.1.4 Movement conditions review.....	5
1.1.5 Relevant legislation and documents	5
1.2 Emergency diseases of concern	6
1.2.1 Major emergency diseases of relevant species.....	6
1.2.2 Other diseases	10
1.2.3 AUSVETPLAN strategy and OIE requirements for each disease ¹²	
1.3 Inputs	14
1.3.1 Animals.....	14
1.3.2 Feed.....	14
1.3.3 Biological specimens	14
1.3.4 Vehicles and equipment.....	14
1.3.5 People.....	14
1.4 Outputs.....	14
1.4.1 Animals.....	14
1.4.2 Animal wastes and effluent.....	15
1.4.3 Diagnostic specimens	15
1.4.4 Carcasses	15
1.4.5 Vehicles and equipment.....	15
1.4.6 People.....	15
1.5 Media.....	15
2 RISK REDUCTION TECHNIQUES	16
2.1 Management of imports.....	16
2.2 Veterinary services	16
2.3 Training of staff	17
2.4 Early detection of diseases.....	18
2.4.1 High risk species.....	18
2.4.2 Regular sampling	18
2.4.3 Laboratory submissions	18
2.4.4 Routine screening of deaths	18
2.5 Zoo design	18
2.6 Work practices and staff hygiene.....	19
2.7 Disposals systems review	19
2.8 Creation of high security isolation area	20

2.8.1	Isolation premises for small animals or birds	20
2.8.2	Isolation premises for large animals	20
2.9	Media and public relations	20
3	RESPONSE PLANS IN A DECLARED AREA	22
3.1	Introduction.....	22
3.1.1	Declared areas.....	22
3.1.2	Local disease control centre.....	22
3.2	Can the enterprise continue to operate in a declared area?.....	22
3.3	Minimisation of risks associated with maintaining operations	23
3.3.1	Animals.....	24
3.3.2	Animal feeds.....	24
3.3.3	By-products.....	24
3.3.4	Vehicles	24
3.3.5	Equipment and materials	25
3.2.6	Personnel.....	25
3.2.7	Vermin and feral animals.....	25
3.2.8	Buildings and structures.....	25
3.3	Media and public relations	26
4	RESPONSE PLANS IN AN INFECTED OR DANGEROUS CONTACT PREMISES	26
4.1	Introduction.....	26
4.2	Can the enterprise continue to operate if declared an infected or dangerous contact premises?	26
4.2.1	Vesicular and pox diseases	26
4.2.2	Newcastle disease	27
4.2.3	Avian influenza.....	27
4.2.4	Screw-worm fly/rabies.....	27
4.2.5	Arbovirus infections	27
4.3	Elimination of the disease — animals	28
4.4	Decontamination — products and facilities	34
4.4.1	Products	34
4.4.2	By-products.....	34
4.4.3	Discharges.....	34
4.4.4	Vehicles	34
4.4.5	Equipment and materials	34
4.4.6	Personnel.....	35
4.4.7	Vermin and feral animals.....	35
4.4.8	Buildings and structures.....	35
4.5	Tracing requirements	35
4.5.1	Existing zoo tracing capabilities	35
4.5.2	Tracing actions for emergency diseases.....	36
4.6	Proof of freedom.....	37
4.7	Media and public relations	37
	Glossary.....	42
	Abbreviations	45

References	45
Training resources	46
OIE publications	47

1 NATURE OF ENTERPRISE

Zoos have been widely perceived as being at risk of being involved in the introduction of exotic diseases into Australia. As such they are specifically referred to under the Commonwealth *Quarantine Act 1908* (as zoological gardens, theatres and circuses) and licensed under this Act to hold animals in quarantine as A and B class establishments with a range of attendant conditions (see Section 1.1, below). The key feature in relation to the perceived risk is the importation and holding of exotic species of wild and undomesticated animals.

Some specific areas of risk are:

- a wide range of species potentially susceptible to many diseases, including animals where there is little information on the susceptibility, likely signs or severity of disease;
- frequent animal movements between zoos internationally and within Australia; and
- a high level of interface between zoo animals and international tourists.

Appropriate quarantine and security along with good records and animal observations can reduce the risk, but effective contingency plans and appropriate risk reduction techniques are also essential. Training of zoo staff in these areas is vital.

An important issue for dealing with an outbreak of an emergency animal disease in a zoo is the high public profile of zoos and the attendant media interest. This is of particular concern in dealing with endangered or highly aesthetic species, particularly if destruction of animals becomes necessary. Effective management of the wide range of public interest groups and the media will be one of the most critical aspects of successful disease eradication.

1.1 Description of enterprise

The enterprises covered by this document include all premises defined in the Commonwealth *Quarantine Act 1908* as zoological gardens, circuses and animal theatres. The Quarantine (Animal) Regulations Part V apply to: '(a) wild or domesticated animals imported for exhibition purposes'; and '(b) all animals on any premises registered ...as a zoological garden, circus or theatre' [Regulation 51(1)].

- **A class** establishments are administered by a board of directors and are adjacent to a port of entry. All A class institutions are designated quarantine stations.
- **B class** establishments are all other zoological gardens, circuses and animal theatres that have been registered under the quarantine regulations.

Different types of zoos, fauna parks and sanctuaries have unique characteristics that have a strong bearing on the risk assessment and subsequent approach taken in the event of an emergency disease outbreak.

1.1.1 Zoos

A class

As a group the A class zoos have the greatest risk of an emergency disease outbreak because many specimens are directly imported from facilities outside Australia, under special quarantine protocol. There are four A class zoos in Australia: Perth, Taronga Park (Sydney),

Melbourne and Adelaide. These zoos are each administered by a board of directors and have the following characteristics:

- large collections of both exotic and native fauna, with regular importation of exotic species from overseas institutions;
- specimens that are intensively managed on a daily basis and housed/maintained in close proximity to each other (less than 1 ha) with small buffer zones;
- limited free-range (fauna) populations, in particular birds, which may be in contact with animals held within the collection;
- surrounded by built-up urban areas with access to a port facility (criterion for A class quarantine status);
- high staffing levels, with significant support structures in place, including staff with specialised expertise;
- high visitation levels, with visitors (local and international) being able to approach animals at close range, and in some cases have contact with the animals (0–10 metres); and
- a disposal system based on removal of waste material from the property.

All A class institutions are designated quarantine facilities and have staff with the skills necessary to satisfy importation protocol/requirements. They are sometimes used as quarantine clearing areas for animals imported by B class facilities, or for animals illegally imported into the country and confiscated by customs/quarantine officers.

An important aspect of the quarantine regulations is that all animals imported into Australia must be positively identified at all times and records maintained using the International Species Information System (ISIS) package known as the Animal Records Keeping System (ARKS). Every specimen within a collection (of an ISIS subscriber) has an individual identification number (accession number) and file, which remains with that animal, and is part of a range of international database systems such as ARKS or Single Population Animal Records Keeping System (SPARKS) to assist species facing the threat of extinction. The information is sent to the United States (via ISIS) on a monthly basis. All specimens held by the A class zoos are also registered and managed as part of the Australasian Species Management Program (ASMP).

Imported specimens fall into two categories:

- those which are part of international and regional breeding programs, which are largely endangered species, or those in need of assistance to save them from the threat of extinction; and
- those imported as part of exhibition and educational programs.

Surplus stock

If the A class zoos have surplus stock it is generally relocated to ASMP member organisations, the major exceptions being:

- export of managed species (endangered) to overseas institutions as part of international programs;
- animals may be culled and fed to carnivores within the collection.

The relocation of native fauna to other institutions within Australia or overseas and relocation of other species to private establishments both occur from time to time.

Feed

All animal feed used by A class zoos is obtained from standard outlets (hay/concentrates/pet meat). Institutions may breed 'live' feed (mice/rats/insects) for use within the facility. Some institutions have used, and may continue to use, surplus stock as feed for carnivores.

B class

Zoological gardens registered as B class include four major zoos in Australia. These are the Western Plains (Dubbo NSW), Werribee (VIC), Tipperary (NT) and Monarto (SA) wildlife parks, which all have the following characteristics:

- collections of both exotic and native fauna, maintained and managed/displayed in large enclosures (open range);
- animals often held in enclosures containing more than a single species (mixed exhibits);
- an emphasis on the 'mega fauna';
- sometimes import exotic species from institutions overseas;
- buffer zones between enclosures are often significant, with less dense populations than the metropolitan zoos;
- less intensive daily management of the collections;
- significant populations of free-ranging native and feral animals, which may be in close contact with collection specimens;
- surrounded by rural/agricultural areas;
- medium staffing levels, often supported by staff from A class zoo;
- fewer visitors — generally separated from the animals by larger distances (10–200 metres) than in A class zoos;
- waste disposal systems that are largely confined to the property.

The larger B class zoos may be used for post-arrival quarantine clearance and in some cases animals may be imported directly by them, this being approved on a case-by-case basis.

As for A class zoos, all specimens are registered with ASMP. Most specimens are individually identified, with records maintained on the ARKS database system. Records are sent to the United States (via ISIS) on a monthly basis.

Management of animal feed and surplus stock is the same as described for A class facilities.

All other zoological gardens and circuses that are registered under the Quarantine Regulations are also B class. These vary considerably in size and complexity and included fauna parks sanctuaries and marine parks.

1.1.2 Fauna parks and sanctuaries

Fauna parks and sanctuaries holding limited numbers of exotic species are likely to constitute low-level risks, because the exotic specimens held are not imported, but originate from either A and B class institutions as surplus stock (bred in Australia) or from circuses.

Some fauna parks hold commercial (exotic) species, and species that are currently feral in Australia. They generally have the following characteristics:

- small collections, with no specific breeding program;
- not part of any active conservation program and do not import animals from overseas institutions;
- specimens usually maintained in a range of small enclosures (less than 1 ha);
- wide variation in disposal of waste material;
- may have high levels of free-range native animals;
- may have very limited record-keeping systems;
- a small staff (do not normally employ staff veterinarians);
- visitations levels are variable and tend to be largely aimed at the domestic market; and
- surplus stock of native species may be relocated to a range of similar institutions or to private holders (aviculture), however exotic species are limited by a range of conditions (loan agreements/Vertebrate Pests Committee).

Native fauna parks and sanctuaries constitute a low risk because they do not have exotic species and there is no direct import of animals. Native fauna parks, including marine parks and sanctuaries, include a range of public and private facilities, with the following characteristics:

- only native species are maintained and displayed, and in some cases those species that have established feral populations within Australia;
- specimens are not imported from overseas institutions; and
- specimens of native species that may have been in contact/close proximity to exotic species are sometimes received from A and B class zoos.

Some native fauna parks, such as Healesville, Currumbin and the Territory Wildlife Park, are members of the Australasian Species Management Program (ASMP), and use the ISIS programs (ARKS/SPARKS).

1.1.3 Circuses, animal theatres and travelling shows

Given that most Australian circuses are not actively involved in the importation of fauna, in most cases they only constitute a low risk of an exotic disease outbreak.

An exception to this is the importation of animals by international circuses (eg the Russian Circus), which by the nature of their enterprise could constitute a real risk because they travel widely with limited processing of the waste material.

Circuses, animal theatres and travelling shows vary greatly but the following list shows some general characteristics:

- may hold a range of exotic, native, commercial and domestic species;
- rarely import animals;
- may import shows from outside of this region;
- travel around the country, and move animals through a range of urban and rural areas;
- animals are maintained in small areas, under intensive day-to-day management;
- animals are displayed close to the public and in some cases there is contact with visitors;
- relatively large staffing levels, but do not usually employ staff veterinarians;
- animal records are usually less sophisticated than for zoos;
- animal identification is largely based on knowledge/recognition by trainers (have no tags etc);
- visitation levels are in most cases high but may not involve many overseas visitors; and

- disposal of waste material varies widely and is not governed by universal guidelines (but is subject to quarantine control if imported animals).

1.1.4 Movement conditions review

Zoo quarantine practices covered by the Commonwealth *Quarantine Act 1908* are currently under review. A key consideration are the conditions under which zoo animals are permitted to move into and out of zoos as this has a large impact on the likelihood of introduction of an emergency disease agent into zoos or its spread from zoos to other animal holding establishments. Once this review process is completed the revised conditions should be added to this manual as an appendix and incorporated into regular emergency disease training in zoos to ensure that staff are aware, and comply with, the revised conditions.

1.1.5 Relevant legislation and documents

Legislation

Legislation both at the Commonwealth Government and State/Territory levels has been enacted for the purpose of controlling emergency animal diseases. The federal legislation is primarily concerned with preventing the introduction and establishment of disease or of things that may carry disease. Legislation exists in all States/Territories aimed at the control and eradication of disease in animals, and establishes controls over the whole field of animal movement, treatment, decontamination, slaughter and compensation. Wide powers are conferred on government inspectors, including the power to enter premises, to order stock musters, to test animals and order the destruction of animals and products that are suspected of being infected or contaminated.

The *Quarantine Act 1908* (Cwlth) and the Quarantine (Animals) Regulations cover a 'quarantine incident' and give wide powers to Commonwealth officers to contain an emergency disease.

The States and Territories all have Acts relating to zoos, wildlife, animal welfare and agricultural protection. There is a need for a summary of legislation as applicable on a State-by-State basis to be compiled by State bodies and zoological institutions.

Codes of practice/guidelines

There is a range of other codes of practice and guidelines that are not supported by legislation, but which may be useful to consider. These include:

- the Australian Veterinary Association Code of Ethics and Guide to Professional Conduct;
- the Guidelines for Control of Exotic Vertebrate Animals determined by the Vertebrate Pests Committee (VPC) of the Standing Committee on Agriculture (CSIRO 1991); and
- the Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA) Code of Ethics.

The Australasian Species Management Program (ASMP) generates species management recommendations for all A and B class institutions, and those native fauna parks that are participating institutions.

The Regional Census and Plan is published on an annual basis and provides information relating to the following:

- species currently held in the region and the number of specimens held by each institution;

- an outline of proposed management for this species including importation from outside of Australia and relocation within the region;
- the status of the species including categorisation by the following, the World Conservation Union (IUCN), the Convention on International Trade in Endangered Species (CITES), and the ASMP; in addition information on the Mace Lande classification, Global Captive Action Plan (GCAP) and the Conservation Assessment and Management Plan (CAMP) are also included;
- details of the pathology register held at Taronga Zoo, giving numbers of specimens within each family and the type of specimens held — a unique collection (over 4400 cases) of material relating to diseases seen in non-domestic animals; and
- a directory of all participating institutions and key personnel within those organisations.

Accreditation

An ARAZPA accreditation system is also under development that will require members to comply with uniform standards throughout the industry.

1.2 Emergency diseases of concern

As zoos may contain animal species from all classes, all emergency diseases of concern need to be considered. For more information about the listed diseases see the **Exotic Diseases Field Guide** (Geering et al 1995).

1.2.1 Major emergency diseases of relevant species

The diseases of most importance to zoos that are currently included in AUSVETPLAN disease strategies are shown in below.

African horse sickness

An infectious, insect-borne viral disease of horses and mules with other equines only slightly affected. It is frequently fatal in susceptible horses, with clinical signs and lesions resulting from selective increased vascular permeability, resulting in an impairment of the respiratory and circulatory systems. In nature the virus is transmitted by midges (*Culicoides* spp) causing a seasonal incidence in temperate climates.

Zebras and elephants in enzootic areas have a high prevalence of antibodies but are not generally clinically infected. Zebras may be important epidemiologically. Rhinoceros may possibly be infected subclinically but antibody prevalence appears to be low. Dogs may be infected.

African swine fever

A highly contagious, generalised virus disease of pigs. No other mammalian hosts occur. It is transmitted by direct contact, inanimate objects and ticks. The virus is very resistant to inactivation. The acute form of the disease is characterised by pronounced haemorrhage of internal organs and a mortality of up to 100% in infected herds. Milder forms of the disease also occur.

The disease occurs as clinical disease in the European wild boar and subclinically in warthogs, bush pigs and giant forest hogs.

Aujeszky's disease

Also known as pseudorabies, this disease is caused by a herpesvirus that infects the nervous system and other organs such as the respiratory tract in virtually all mammals except humans

and the tailless apes. It is primarily associated with swine, which may remain latently infected following clinical recovery. Sporadic cases have been seen in domestic ruminants, dogs, cats, mink, foxes, raccoons and some rodents.

Virulent avian influenza (fowl plague)

A lethal, generalised disease of poultry caused by specific types of avian influenza virus. Disease outbreaks occur most frequently in chickens and turkeys. Many wild bird species, particularly waterbirds, are also susceptible, but infections in these birds are generally subclinical.

Bluetongue

A viral disease of ruminants transmitted only by specific species of biting midges (*Culicoides* spp). Sheep are the most severely infected, the disease being characterised by inflammation of the mucous membranes, widespread haemorrhages and oedema. Naturally occurring disease has not been seen in Australia, although some serotypes of the virus, some pathogenic, have been detected in northern and eastern Australia.

Buffalo, antelopes and deer are also susceptible to bluetongue. Severe disease can occur in some deer, eg white-tailed deer in the United States. These deer are also susceptible to epizootic haemorrhagic disease (EHD).

Bovine spongiform encephalopathy (BSE)

A fatal neurological disease of adult cattle, characterised by a long incubation period, followed by progressive degeneration. Typical signs are abnormal posture, development of violent behaviour, heightened sensory perception, decreased milk production, weight loss (despite a good appetite), and death.

The disease was first recognised in the United Kingdom in 1986, and probably arose because changed practises in processing meatmeal permitted transmission of the scrapie agent to cattle.

In Australian zoos spongiform encephalopathies are most likely to be seen in hoofstock or carnivores imported from the UK in the last decade. An occurrence or outbreak of scrapie or bovine spongiform encephalopathy in Australian livestock would pose little threat to zoo animals. Animal-to-animal transmission is unlikely to occur here.

Classical swine fever (hog cholera)

A highly contagious disease capable of spreading rapidly in susceptible pig populations. In the acute form, the disease is characterised by fever, severe depression, multiple haemorrhages, and rapid deaths. Strains of the virus of lower virulence cause subacute and chronic forms of the disease that include complications of pneumonia and diarrhoea. The pig is the only natural host.

Equine influenza

An acute respiratory viral disease, that may cause rapidly spreading outbreaks in congregated horses. It is caused by two members of the genus *Influenzavirus*. Other equines are susceptible, but the disease is seen mainly in horses. Whether other perissodactyls may carry and spread infection is not known.

Foot-and-mouth disease (FMD)

An acute, highly contagious viral infection of domestic and wild cloven-hoofed animals. It is characterised by fever and vesicles in the mouth, nose, feet and teats. Serious production losses can occur, but deaths are unlikely except among young animals.

Equines are not affected by FMD but the disease has been recorded in tapirs, elephants, hedgehogs and some rodents. Humans may harbour virus in the nasopharynx for 24 hours or more. The susceptibility of many species to FMD is unknown. It is probably safest to assume most artiodactylids may become infected.

Japanese encephalitis

Is a mosquito-borne viral disease of humans and animals and occurs throughout much of Asia causing encephalitis in humans and horses in some cases, but these are normally accidental hosts. Adult pigs normally show no clinical signs but pregnant sows may abort or produce mummified fetuses, stillborn or weak piglets. In horses the clinical signs may vary from a mild transient fever to high fever, blindness, collapse and deaths ranging from 5% to as high as 30-40%.

The virus does not persist outside of infected animals and mosquitos and is not a concern with animal products.

Waterbirds (herons and egrets) are the main reservoir and amplifying hosts for the virus. Pigs are also important amplifying hosts. Inapparent infections, and very occasional clinical cases, occur in cattle, sheep and goats. Inapparent infections also occur in other species including dogs, cats, rodents, bats, snakes and frogs.

Lumpy skin disease

An acute, generalised viral skin disease of cattle. It is highly infectious and is characterised by fever, ocular and nasal discharges, the eruption of cutaneous nodules, swelling of superficial lymph nodes and oedema of the limbs. It is caused by the same virus - capripox - that causes sheep and goat pox.

Cattle are the only livestock species affected. Giraffe are highly susceptible. Antibodies have been found in African buffalo in Kenya and a low prevalence of serological reactors has been found in some antelope species.

Newcastle disease

A highly contagious lethal viral disease of chickens, turkeys and other birds. Virus strains vary widely in their virulence. Severe strains cause rapid death and are characterised in chickens by respiratory distress and swelling of the head around the eyes.

Newcastle disease virus strains are classified as velogenic (highly virulent), mesogenic (moderately virulent) or lentogenic (lowly virulent). Avirulent, lentogenic strains are enzootic in poultry flocks in Australia and present in some wild bird species. Velogenic Newcastle disease has occurred twice in Australia, in 1930 and 1932.

Newcastle disease occurs in domestic poultry and a wide range of wild bird species are also susceptible. Occasional human infections, with conjunctivitis, occur.

Peste des petits ruminants (PPR)

PPR in sheep and goats resembles rinderpest of cattle and is caused by a virus closely related to the virus of rinderpest. It is characterised by fever, enteritis, high morbidity and mortality.

Other artiodactylids are either not susceptible or are only subclinically infected and apparently play no part in the epidemiology of the disease.

Rabies

Rabies is an almost invariably fatal viral encephalitis affecting all warm-blooded animals, including humans. It has a long and variable incubation and is transmitted by the bite of a rabid animal. The main reservoir species include members of the canids (dogs, foxes, jackals,

wolves), mustelids (skunks, martens, weasels, stoats), viverrids (mongooses, meerkats), procyonids (raccoons) and chiroptera (bats).

Rift Valley fever

This is a mosquito-borne disease of cattle, sheep, goats and humans, characterised by a high rate of abortion and a high rate of mortality in young animals. Severe disease can occur in man requiring special safety precautions. Camels are also major hosts and monkeys, rodents, dogs and cats are all susceptible.

Rinderpest

An acute, highly contagious disease principally of cattle ('cattle plague'), characterised by high fever, nasal and ocular discharges, laboured breathing, severe often bloody diarrhoea and death. The virus, which is not stable in the environment, is related to measles, canine distemper, and peste des petits ruminants.

Buffalo are also highly susceptible but it is rare in sheep and goats (does occur in India). Many cloven-hoofed wild African species are susceptible, eg Cape buffalo, eland, kudu, giraffe and warthog.

Catastrophic episodes have affected major zoos overseas, eg Paris in 1865; Calcutta in 1943; Lucknow in 1948; Rome in 1950. The Rome outbreak was only brought under control by slaughtering all the ungulates and pigs.

Scrapie

Scrapie occurs in sheep and goats. Infection is usually passed from ewe to lamb and can occur between unrelated animals, especially when lambing occurs in confined areas. Scrapie has a prolonged incubation from 1–3 years or longer. Clinical signs of pruritus and incoordination progress to depression, recumbency and death. Animals that never develop clinical signs can still be a source of infection to others.

Screw-worm fly

Myiasis caused by larvae of the screw-worm fly is characterised by larvae feeding on living tissues in open wounds of any warm-blooded animal host, resulting in debility and some deaths. The flies prefer warm, moist conditions and temperature ranges from 16–30°C.

There are two species of screw-worm fly (SWF), the Old World SWF (*Chrysomya bezziana*) and the New World SWF (*Cochliomyia hominivorax*). Both are obligate parasites of warm-blooded animals, and they have very similar life cycles and biological characteristics.

All domestic livestock and companion animal species are susceptible and strikes have also been recorded in various wildlife species and occasionally in humans.

Sheep and goat pox

Highly contagious skin diseases of small ruminants, characterised by fever, salivating papules, vesicles, and pustules on exposed body surfaces, often with a high mortality rate. The virus is very resistant to inactivation in the environment, but the degree of host specificity does vary.

Swine vesicular disease

Swine vesicular disease is caused by an enterovirus closely related to the human Coxsackievirus B5. It is characterised by fever and lameness due to vesicles and erosions on the feet. It is clinically indistinguishable from foot-and-mouth disease.

Transmissible gastroenteritis

An enteric virus disease of pigs, caused by a coronavirus that results in rapid dehydration, profuse diarrhoea and rapid death in piglets under three weeks of age. This disease only occurs in pigs, although dogs, cats and foxes may be infected.

Vesicular exanthema

An acute disease characterised by vesicles on the snout, in the mouth and on the feet. The clinical disease is indistinguishable from foot-and-mouth disease. The vesicular exanthema virus is very closely related to viruses isolated from marine animals and has been associated with the feeding of contaminated food scraps containing marine animal product.

Caliciviruses of the vesicular exanthema/San Miguel sea lion complex of viruses have been isolated from asymptomatic calves and primates, and from a number of marine species including sea lions, fur seals, walruses and whales, in which species they may cause flipper vesicles and abortions. Serological evidence of infection has been found in feral pigs and donkeys, buffaloes, sheep and foxes in North America.

Vesicular stomatitis

Vesicular stomatitis is principally a disease of cattle, horses, and pigs. It can cause signs indistinguishable from foot-and-mouth disease, except horses are infected. The disease has only been seen in North, Central and South America. The epidemiology of the disease is still unclear, but transmission cycles between insects and small wild ruminants is known to occur.

Many wildlife species are susceptible including deer, raccoons, monkeys, sloths, rodents and bats. Human infections can occur causing an influenza-like disease.

NB The vesicular diseases (foot-and-mouth disease, vesicular stomatitis, vesicular exanthema and swine vesicular disease) all have similar clinical syndromes. Most affect more than one species. Differential diagnosis is therefore important in determining the appropriate response in an outbreak of disease.

1.2.2 Other diseases

Other important diseases that could occur in zoos, fauna parks, etc but are not currently included, or planned for inclusion, in the AUSVETPLAN **Disease Strategies** include those described below.

Contagious bovine pleuropneumonia

Cattle are the main hosts but the disease has also been recorded in buffalo, yak, bison, reindeer and antelope.

Tuberculosis

Many species including humans are susceptible. Most mammalian infections are due to *Mycobacterium tuberculosis* or *M. bovis*. Mammals are relatively resistant to *M. avium* although exposure to *M. avium* and related mycobacteria may complicate disease testing. Ungulates and primates are the mammalian species most commonly infected with tuberculosis in zoos.

- The New Zealand experience, where possums are a major continuing source of infection for cattle and deer, highlights the potential epidemiological importance of non-domestic species.

Brucellosis

The brucellae have a wide host range but are not readily transmitted from their preferred host to dissimilar hosts. Wild animals do not appear to constitute a serious or threatening reservoir of infection.

- *B. abortus* mainly infects bovids but occasionally infects humans (causing undulant fever), sheep, horses, pigs and dogs, and has been recorded in a number of wild species including bison, elk, deer, moose, camels and other wild ruminants.
- *B. melitensis* causes brucellosis mainly in goats and, to a lesser extent, sheep, but is capable of infecting other species of domestic animal, dogs and a number of wild animal species. Zoonotic infection is important.
- *B. canis* causes brucellosis in dogs and may also infect humans.
- *B. suis* causes brucellosis in pigs and is pathogenic for humans. Cattle and horses may occasionally become infected and the organism has been isolated from wild rats and hares.

Trypanosomiasis

- The tse-tse borne trypanosomiasis (nagana) include infection by *T. brucei*, *T. congolense* and *T. vivax*. All will infect a range of mammalian species, some of which may be important carriers, but cause disease mainly in cattle. *T. vivax* may be transmitted by other biting flies (*Stomoxys* and tabanids) and is therefore the only one likely to be of concern in Australia. *T. simiae* is also tse-tse transmitted but causes disease mainly in pigs and, to a lesser extent, in sheep.
- Dourine is a venereally transmitted disease of Equidae caused by *T. equiperdum*.
- Surra affects many animal species but is most important in camels and horses. It is caused by *T. evansi* and is transmitted by biting flies.
- Chagas' disease, caused by *T. cruzi*, occurs in humans and in most domestic animals, particularly dogs, cats and pigs. *T. cruzi* also infects many wildlife species. Important reservoir species include opossums, armadillos (in South America) and wood rats and raccoons (in North America).

Theileriosis — East Coast fever and Mediterranean theileriosis

A tick-borne protozoal disease of cattle, African buffalo and water buffalo caused by *Theileria parva* (*T. parva parva*, *T. parva lawrencei* and *T. parva bovis*). Mediterranean theileriosis, caused by *T. annulata*, affects mainly cattle.

Heartwater

Cattle, water buffalo, sheep, goats, and many species of wild ruminants, including antelope and African buffalo, are natural hosts.

Equine piroplasmiasis

Equine piroplasmiasis (equine babesiosis) occurs in horses, donkeys and mules. Zebras are also susceptible to *Babesia equi* and act as an important reservoir of infection in Africa.

Equine viral encephalomyelitis — eastern (EEE), western (WEE) and Venezuelan (VEE)

From the point of view of clinical disease, horses and humans are the most important natural hosts for each of the viruses. Donkeys and mules are as susceptible as horses. EEE virus has caused mortalities in domestic pheasants in the United States. WEE virus very occasionally causes clinical encephalitis in pigs. Each of the viruses infects a wide range of mammalian,

bird and other animal species. Such infections are subclinical but some are of epidemiological significance.

Borna disease

Horses and sheep are the main natural hosts but occasional cases of borna disease occur in cattle, goats and deer.

Glanders

The main hosts are horses, mules and donkeys. Occasional cases occur in humans and small carnivores.

Trichinosis

All mammals are susceptible to trichinosis, but infection is most common in omnivores and carnivores. Of the livestock species, pigs are the main host followed by dogs and cats, although the incidence in horses is increasing. In wild animal species, infestations of bears, walruses, wild pigs, foxes, rats and mice are of epidemiological significance. Humans are quite susceptible.

Primate diseases

As well as tuberculosis and other diseases mentioned above, Kyasanur Forest disease (a zoonotic arboviral infection) and Virus B herpetic stomatitis (*Herpesvirus simiae*) of monkeys may be of concern.

Other diseases

There are many other significant infectious diseases of animals exotic to Australia that may affect zoo animals including wildebeest-associated malignant catarrhal fever, contagious equine metritis, epizootic lymphangitis and porcine reproductive and respiratory syndrome, and a number of diseases of birds, lagomorphs, rodents and fish.

1.2.3 AUSVETPLAN strategy and OIE requirements for each disease

Table 1 provides a concise summary of the proposed strategy in Australia if there is an outbreak of one of the emergency diseases covered by AUSVETPLAN. More details are provided in the individual **Disease Strategies**. Some of the emergency diseases are covered by a cost-sharing agreement whereby the Commonwealth and States/Territories share the eradication and compensation costs (see the AUSVETPLAN **Summary Document, Appendix 3**).

The Office International des Epizooties (OIE) is the world organisation for animal health. The OIE, established in 1924 in order to promote world animal health, provides guidelines and standards for health regulations in the international trade of animals and animal products. Diseases that spread rapidly, have particularly serious socioeconomic or public health consequences and are of major importance in international trade, have been designated by OIE as List A diseases. List B diseases are similar to List A, but are considered less invasive across political borders, and to be 'significant' diseases only for international trade considerations. The OIE International Animal Health Code for each disease is shown in the Disease Strategy, Appendix 3.

Table 1 OIE classification, cost-sharing agreement and eradication strategies for the AUSVETPLAN diseases

DISEASE	OIE	CSA	ERADICATION STRATEGY*						
			S	L	C	D	I	V	H
African horse sickness	A		S				I	V	H
African swine fever	A	✓	S			D			
Aujeszky's disease	B			L		D		(V)	
Virulent avian influenza	A	✓	S			D			
Bluetongue	A	✓					I	V	H
Bovine spongiform encephalopathy	B				C				
Classical swine fever	A	✓	S			D		(V)	
Equine influenza	B					D		V	H
Foot-and-mouth disease	A	✓	S			D		(V)	
Japanese encephalitis	B							(V)	
Lumpy skin disease	A		S			D	I	(V)	
Newcastle disease	A	✓	S			D		(V)	
Peste des petits ruminants	A		S			D			
Rabies	B	✓			C			V	
Rift Valley fever	A						I	V	
Rinderpest	A	✓	S			D			
Scrapie	B				C				
Screw-worm fly	B	✓					I		H
Sheep and goat pox	A		S			D	I	(V)	
Swine vesicular disease	A	✓	S			D			
Transmissible gastroenteritis	B			L		D		(V)	
Vesicular exanthema		✓	S			D			
Vesicular stomatitis	A	✓		L		D	I		H

* Quarantine and movement controls are part of all the eradication procedures.

KEY:

OIE List A or List B disease
CSA Cost-sharing agreement

Strategies:

S Slaughter infected and at risk animals to remove the major source of the virus
L Eradication program including limited slaughter according to circumstances
C Slaughter of clinically-affected or dangerously exposed animals
D Decontamination essential to eliminate the presence of the virus on infected premises
I Insect vector control
V Vaccination of susceptible animals to prevent the disease
(V) Vaccination may be considered
H Husbandry, including treatment of affected animals that will assist the eradication program

1.3 Inputs

Inputs into zoological institutions vary depending on the type of facility (see descriptions in Section 1.1). The following general principles apply.

1.3.1 Animals

Animal inputs include:

- animals introduced from other institutions, either from within Australia, or imported from overseas;
- fauna confiscated by customs/quarantine officers; sick or injured animals brought in by members of the public;
- free-range fauna, which may be either native, or feral (including cats and dogs) from adjoining properties; and
- animals imported from commercial properties (see Section 1.1.4 on a review of movement restrictions).

1.3.2 Feed

Feed inputs include dry processed preparation (concentrates, hay, pellets, seed) and feed in the form of wet feed, including fresh fruit, fish, meat, vegetables and pasture silage.

1.3.3 Biological specimens

Biological specimens confiscated by customs and quarantine officers are sometimes brought to zoos for identification. Semen and embryos may be imported as the techniques are refined.

1.3.4 Vehicles and equipment

Various vehicles move into the facility and may be contaminated. Other materials entering the facility include materials used during the importation of the animals (hay, sawdust, crates).

1.3.5 People

Staff enter the premises for normal work purposes and may have contact with other animals (pets/commercial species) outside of work hours. Local and international visitors pass through the premises on a daily basis.

1.4 Outputs

As with inputs, the outputs from zoological institutions will range widely and reflect the nature of the operation. Some generalisations are included in the following descriptions.

1.4.1 Animals

Animals may leave the facilities for a number of reasons including:

- overseas export of both exotic and native species;
- relocation of animals to other facilities within the country;
- use of animals in public relations exercises, ie animals taken to shows, shopping centres, schools and television stations;

- animals taken home by staff for hand rearing;
- free-ranging of native and feral animals, including cats and dogs that may have had contact with animals/animal waste.

The sale of surplus animals to commercial operators is not permitted under the Quarantine (Animal) Regulations.

1.4.2 Animal wastes and effluent

Waste materials that have to be removed from the premises include: hay and composted faeces ("Zoo Poo"), which is sold to commercial outlets; effluent, some of which has secondary treatment, and a small portion with tertiary treatment; stormwater run-off.

1.4.3 Diagnostic specimens

Biological specimens and faeces are sent to laboratories for testing and biological specimens are sometimes also sent to museums, veterinary schools etc.

1.4.4 Carcasses

In some institutions, offal and carcasses are taken off the property for disposal.

1.4.5 Vehicles and equipment

Vehicles, crates and packing material used in the transportation of animals are all regularly moved off the premises.

1.4.6 People

People movements out of the facilities include:

- staff who have been in contact with animals and waste products (contaminated clothing and footwear); and
- visitors who may have been in contact with animals.

1.5 Media

Because of concerns about animal welfare, endangered species and valuable exotic animals held in zoo collections, the media will inevitably take great interest in any emergency disease outbreak either in or associated with a zoo. Handling of media and public relations, which is always an aspect of zoo administration, will therefore assume a high priority in the event of an emergency disease outbreak.

A complete and frank exchange of information between the authorities and zoo staff, media personnel and the public at large will make a valuable contribution to the overall success of any control program. Calculated, but prompt responses to media inquiries will serve to establish mutually productive links between authorities and media personnel.

Acceptance of the media's rightful role in publicising an outbreak, especially at a location such as a zoo, will ensure a more harmonious liaison between parties involved in the affair. See Sections 2.8, 3.3, 4.6.

2 RISK REDUCTION TECHNIQUES

2.1 Management of imports

In addition to the sound management of post-arrival quarantine conditions, the implementation of the following management strategies will significantly reduce the risk of an emergency disease outbreak, maximise early detection and assist in control measures.

- All imported animals must be identified at all times and detailed records kept (see Section 1.1 and 4.5).
- The chief quarantine officer (CQO) (A) should be provided with details of all imported animals held by the institution on an annual or 6-monthly basis.
- The CQO (A) should be provided with details of all progeny out of and by animals imported.
- The CQO (A) should be advised of the relocation of any imported animal separately to the application to move stock.
- CQO (A) should be advised of the death of any imported animal as soon as possible after the postmortem examination. A full postmortem examination should be carried out on all imported animals.
- Animals imported from overseas institutions must either remain within an A or B class (quarantine) facility or be re-exported.
- Animals imported should not be used as feed for carnivores even where they may be culled as surplus stock.
- During post-arrival quarantine, access to 'imported' animals should be limited to essential staff (media, public relations, casual staff, visitors should all be prohibited and a buffer zone created).
- Waste material from animals in post-arrival quarantine should be treated separately and kept under conditions that limit access by all other fauna (including free-range animals/birds).
- Biological specimens from animals in post-arrival quarantine may need to be treated (handled/transported/stored) under separate conditions.
- There may be a need to consider the spatial requirements (distance) between animals in post-arrival quarantine and those that have been cleared. For example, most zoo quarantine areas also serve as recovery areas for sick/injured/orphaned animals.
- When animals are in quarantine an all-in-all-out policy should be adopted.

2.2 Veterinary services

Veterinary services to the zoo should be planned with emergency disease preparedness in mind. If a regular veterinarian is employed, he/she should be familiarised with all relevant aspects of animal handling and zoo management practices so as to enable more informed decisions to be made if an emergency disease is suspected. The veterinarian should be aware of emergency diseases and have attended post-graduate training. The veterinarian should be

involved in basic training of staff in what to do (and not to do) to minimise the spread of disease (see Section 2.3) .

2.3 Training of staff

The main objective of training is to prepare all zoo staff for an emergency disease emergency, including training for specific individual roles and information about and recognition of emergency diseases most likely to occur in a zoo. Emphasis should be placed on the need for staff to report promptly any abnormalities in animals under their care.

Training should also indicate the importance of collecting pathological material from zoo animals whenever possible, to extend and enhance the collection initiated by Dr Bill Hartley at Taronga Zoo.

Implementation

- Development and distribution of job cards to all staff, relevant to their respective roles in an emergency disease emergency at their zoo.
- Instruction of animal handlers in the recognition and understanding of emergency diseases relevant to them (see Section 1.2).
- Training of animal handlers to restrain and examine their animals and birds for emergency disease diagnostic purposes, and in the collection and dispatch of laboratory specimens.
- Mandatory routine screening of diseased and dead zoo animals, with emergency diseases in mind.
- Instruction for zoo staff on the collection of animal sera, whenever possible, for routine emergency disease screening and for the establishment of reference serum banks.
- Instruction in emergency disease disinfection procedures and the importance of preventing cross-infection.
- Regular internal simulation exercises for zoo staff to test and reinforce their roles relevant to possible emergency mammalian and avian diseases.
- Occasional multiple simulation exercises involving external agencies and the media, to test emergency disease preparedness at individual zoos.
- Participation in at least one emergency disease training course at the Australian Animal Health Laboratory (AAHL) in Geelong by every veterinary surgeon attached to or advising a zoo.
- Attendance at an advanced TAFE college training course by the zoo director and selected zoo staff to develop their communications, media and public relations skills.
- Occasional visits by international experts, with both zoo and emergency disease experience, to assess preparedness at Australian zoos.

Further information on training materials, including videos and slides can be found in the **Summary Document, Appendix 2**.

2.4 Early detection of diseases

Zoos are well positioned to detect an emergency disease early, since it is normal practice to inspect each animal daily, usually as they move from night to day yards or vice versa.

2.4.1 High risk species

The zoo animals that are most at risk of contracting an emergency disease are waterbirds, deer, buffalo, bison, and farmyard animals often maintained in a 'children's zoo' (eg pigs, lambs or calves) because these species are susceptible to many of the diseases outlined in Section 1.2.

Zoos present some increased risks of emergency disease spread due to a number of factors such as the encouragement of free-ranging birds into waterways due to feeding practices and the access to zoo's wildlife clinics for outside animals. However these animals are generally Australian natives, which do not present high emergency disease risks.

2.4.2 Regular sampling

Regular sampling of major types of zoo animals for a range of diseases by faecal, urine or blood analyses is normal practice in the major zoos. Use should be made of these opportunities to include serological and other testing for significant emergency diseases. In the event of a suspected emergency disease these 'baseline' values will greatly assist the diagnosis. Potential exists for deliberate surveys for diseases of concern.

2.4.3 Laboratory submissions

Zoo veterinarians should be encouraged to include emergency disease in their differential diagnoses and submit appropriate samples to the State veterinary laboratory for diagnosis (these may then be forwarded to AAHL). This will provide samples for diagnostic laboratories including AAHL to use as baseline data as well as giving zoo veterinarians and other staff the necessary experience in submission of useful samples. Diagnostic laboratory staff would also gain experience in dealing with emergency animal tissues.

2.4.4 Routine screening of deaths

It is normal practice for all animals that die in a zoo to be autopsied, whether these animals are part of the animal collection or not. This provides a check on the disease status of zoo animals. This practice should be continued and further supported with submission of samples to the Animal Pathology Register maintained at Taronga Zoo.

2.5 Zoo design

To reduce the risk of disease spread it is strongly recommended that:

- animals do not have direct contact between exhibits (minimum of 5 metres);
- animals of the same orders are not placed in too close proximity; and
- all exhibits/aviaries have efficient catching/trapping facilities to enable monitoring of any inmates.

2.6 Work practices and staff hygiene

It is desirable that the following routine practices are followed:

- work clothes, including footwear, stay at work;
- minimisation of contact between animals kept at home and zoo animals (at a minimum, hand washing should be carried out before starting work and finishing work); and
- close monitoring of the health of home animals and where possible, diagnostic tests should be encouraged.

For some diseases, in the event of the zoo being in a declared area, a number of other practices may become mandatory (see Section 3).

2.7 Disposals systems review

The possibility that a serious emergency disease could occur in an Australian zoo, particularly among herbivorous mammals, underlines the need for strategically located disposal facilities to be designated well in advance of such an event.

Burial is the obvious option and it is the only practical one at zoos in rural locations, for example Western Plains. More information on the size of pits is given in the **Disposal Manual, Section 3.1**.

Rendering is a safe, rapid and convenient alternative, assuming such a service is available and appropriate precautions can be enforced during the collection and transport of carcasses — which, of necessity, would have to be intact.

Generally, rendering is only applicable to carcasses of large mammals. If by-products, such as blood and bone fertiliser, were to be the end result, a check on the maximum temperature of the process would have to be made to ensure transmissible encephalopathy agents could not survive it. Suitable protective clothing, handling and disinfection procedures would have to be developed before and during rendering to ensure infective agents could not escape into the environment.

Any disposal procedure that necessitates the transport of carcasses from inside an infected premises to a distant location could be risky and requires constant monitoring. This applies to the occasional use of carcasses or portions of carcasses of animals dying in zoos for teaching purposes or as museum exhibits. It also applies to the transport of carcasses of animals too large to undergo a postmortem examination at the zoo and which have to be transported to an outside facility.

A relatively safe procedure, presently being adopted by one Australian metropolitan zoo, utilises commercial facilities provided by a private company responsible for disposing of infected waste from premises such as hospitals and veterinary surgeries. An employee collects the material already enclosed in sealed drums from the various premises, and carts it away. Drums and contents are incinerated in an industrial furnace.

Although this procedure is quite satisfactory under normal circumstances, which routinely include postmortem examination and dismembering of the dead animal, it would not be suitable for removing entire carcasses, dead or slaughtered, as a consequence of an emergency disease. On-site incineration also does not appear to be an option except for small animals and birds.

Disposal of faeces is another consideration. In a mammalian emergency disease emergency, 'Zoo Poo' sales would have to cease unless the material could be autoclaved in some way. Used hay would have to be burnt on-site. Non-infective faecal material, ie from animals not involved, could possibly be composted in bulk under instructions from, and with the permission of the State/Territory chief veterinary officer (CVO). It might also be necessary to intercept or divert the normal effluent outflow from zoos into drains or the domestic sewage system. In passing, it must be mentioned that a risk already exists because faecal waste from recently-imported animals still in quarantine, is not always kept separate or sterilised by the eight Australian zoos presently involved.

Sale of surplus animals as pets or to commercial outlets, such as deer and alpaca farms, is illegal under the Quarantine (Animal) Regulations.

Care must be routinely exercised to ensure all food (living or dead) brought into the zoo to feed carnivorous animals originates only from safe sources.

2.8 Creation of high security isolation area

2.8.1 Isolation premises for small animals or birds

Isolation premises for small species must be indoors and bird, vermin, and insect-proof. Such premises should also have no wind currents (ie have static air); change room facilities preferably with showering, washing facilities; footbaths; efficient waste collection and disposal; and dedicated utensils, instruments and clothing.

2.8.2 Isolation premises for large animals

Large animal isolation premises must be in a distant part of the property with as wide a buffer as possible, a minimum of 5 metres from other stock or having solid walls and be of robust construction. They must also have change and washroom facilities; footbaths; dedicated utensils, instruments and clothing; and be the last facility tended each day.

2.9 Media and public relations

The **Public Relations Manual** contains detailed information on preparedness for media and public relations for emergency disease outbreaks.

As stated in Section 1.5, in the event of an emergency disease emergency, a zoo would inevitably be the target of intense media interest. In preparation for a possible emergency disease incident, therefore, a senior staff member needs to be designated as the zoo media officer (ZMO) and premises identified that could be used as a news conference room/media and public relations unit. The ZMO should be advised immediately, and kept up-to-date on any incident likely to result in the declaration of a zoo emergency disease emergency, so that preliminary planning can begin.

Media and public relations activities relating to a zoo or similar facility should be able to ensure:

- rapid and effective information flow and media operations in the event of an emergency disease affecting or threatening to affect an Australian zoo;
- an up-to-date, constant flow of accurate information to

- staff within the affected premises,
- staff at other zoos,
- media outlets and, via them, the general public,
- circus operators;
- ensuring the cooperation of zoo staff by keeping them fully informed about what is happening and what is likely to happen in the context of animal management and premises activity generally.

The person responsible for this will be the ZMO and it is his or her duty to ensure all relevant zoo staff receive priority in the flow of media and public relations information. While it may not always be possible, the ideal person to fulfil the role of ZMO during a zoo emergency disease emergency will be the director of the zoo concerned, or a senior staff member nominated by the director.

The range of emergency diseases likely to affect Australian zoos is limited. Plain language technical information for zoo staff and media should be prepared in advance to cover possible infections (maximum of one A4 page per disease). Emergency diseases to receive information priority should comprise those in Lists A and B of the OIE Code, that are currently included in the AUSVETPLAN **Disease Strategies**, plus other relevant emergency diseases (see also Section 1.2). The **Summary Document** contains one page summaries of the diseases covered by AUSVETPLAN. Film footage and photographs of the animals should all be prepared for use in the event of an emergency disease emergency.

3 RESPONSE PLANS IN A DECLARED AREA

3.1 Introduction

This section addresses the situation where a zoo, although not having any clinical or suspected cases of an emergency disease itself, is within either a restricted or a control area due to an outbreak on another property.

3.1.1 Declared areas

The term *declared area* is used to cover both *restricted* and *control areas*. These are defined below but it should be noted that the definitions may vary in particular situations or that such areas may not necessarily be declared for specific diseases.

A *restricted area* (RA) is a relatively small area around an infected premises that is subject to intense surveillance and movement controls. Movement out of the area will in general be prohibited, while movement into the restricted area would only be by permit. Multiple *restricted areas* may exist within one *control area* (CA). Guidelines for establishing restricted areas are provided in Appendix 1 of each disease control strategy and the OIE animal health code.

A CA will be a buffer between the RA and areas free of disease, where restrictions will reduce the chance of the disease spreading further afield. The control area should reduce in size as confidence about the extent of the outbreak becomes clearer (generally to a minimum 10 km radius for an intensive livestock-raising region and 50 km for an extensive livestock-raising region). In principle, animals and specified product will only be able to be moved out of the control area into the free area by permit.

3.1.2 Local disease control centre

In the event of an outbreak of emergency disease, each State or Territory is responsible for its own disease control activities under the direction of the State/Territory CVO. A local disease control centre (LDCC) will be established and will be responsible for all activities within the declared area, including disease investigation, collection of specimens, quarantine of properties, valuation, slaughtering and disposal of livestock, and decontamination of properties.

Zoo managers should be in contact with the LDCC controller and all support staff must be made fully aware of LDCC requirements and of all arrangements made to control and eradicate the disease.

3.2 Can the enterprise continue to operate in a declared area?

Zoos generally have a higher level of security than most other livestock enterprises with the exception of some intensively managed species. They are usually characterised by fencing constructed to exclude both livestock and feral animals. Gate entry is under close supervision by staff during opening hours and is usually key operated after hours. Automatic or mechanically operated gates are used in some zoos. Trader and non-visitor entrances are usually similarly secure. Electric fencing is a feature of the outside of zoo fencing in the major zoos and is usually sunken into the ground to prevent burrowing entry or exit. Regular

fence inspections are routine in the major zoos. Levels of security are likely to be higher in A class zoos than in B class zoos, fauna parks and sanctuaries.

Zoos in declared areas can be quickly contained since the physical and management barriers required are already in place. Emergency procedures are readily available since many of these are applicable to animal escapes and can be quickly applied to, or modified for, disease control purposes. There are also established 'chains of command' and communication procedures ensuring adherence to emergency procedures.

Animal food is generally held in sufficient quantities for weeks or longer, except in the case of fresh fruit, vegetables or meat.

Animal keepers generally have some training in the prevention of cross-contamination and in decontamination. Their daily records are available to supervising veterinarians and are regularly reviewed thus allowing for early recognition of any suspected emergency disease.

Therefore if the zoo, fauna park, sanctuary or circus is in a declared area it will be possible to continue operations but the following restrictions on staff and public entry should be observed.

Staff entry

Staff entry will be necessary because of routine maintenance of animals in the collection. They must perform routine disinfection, if required, on entering and leaving the declared area.

Public entry

Vesicular and pox diseases. Entry of visitors permitted after a screening process such as investigation of previous whereabouts. A holding facility for people plus vehicles, and facilities for routine disinfection are required.

Newcastle disease. Entry of visitors permitted but contact with birds should not be allowed.

Other emergency diseases. Public entry permitted.

3.3 Minimisation of risks associated with maintaining operations

The AUSVETPLAN disease strategy manuals set out the relationships between the enterprise affected by the disease and the local disease control centre (LDCC). Head or supervising keepers should be placed in charge of controlling staff coming into the zoo. His/her duties should also include:

- communicating with LDCC;
- preventing movement of stock into the zoo except with LDCC coordinator's permission;
- enforcement of decontamination procedures of staff and vehicles moving into and out of the zoo;
- rostering work and staff movements, with high-risk animals being dealt with last;
- decontamination/disinfection of zoo vehicles; and
- prompt reporting of any unusual signs in the animals.

Movements of people will be restricted according to the disease. For highly virulent diseases and those spread by fomites, visitor access should be denied unless they can demonstrate they have not come from an infected or dangerous area or can be decontaminated (see Section 3.1). The period of this level of control should be decided by consultation between senior zoo managers and the LDCC. Automatic gates should be converted to manual operation while the zoo is in a restricted area.

3.3.1 Animals

The curator and zoo veterinarian should prepare a list of all the potentially susceptible animals within the zoo divided into high and low-risk groups. A schedule of regular surveillance of these animals for the presence of the disease should be developed. The methods and frequency should be appropriate for the species involved and the disease. Instructions should then be given to relevant staff, such as keepers, to carry out these surveillance procedures and report the results to the veterinary section.

It may be desirable to withdraw any high-risk or high value susceptible species from public display while restrictions are in place.

Animal movement controls

All routine movements of susceptible species within and into the zoo should cease. Further internal movements within the zoo should only occur with the permission of the zoo veterinarian. Movements into the zoo should only occur with the approval of the controller of the LDCC set up to manage the outbreak. Regardless of any approvals, however, all zoo livestock movements should be kept to an absolute minimum. Any ASMP category 1 or category 2 susceptible species or other very valuable species should be moved to the most secure facilities available within the zoo and kept there in isolation from all other susceptible species. Where possible zoo staff involved in their care should not have contact with other susceptible species where any diseases of a highly infectious nature are involved.

If animals are already in transit and have to be admitted to the zoo for lack of other suitable holding facilities, then they should be held in isolation from other susceptible species until it is clear that there is no risk of disease transmission involved.

3.3.2 Animal feeds

Recent food introductions should be traced immediately. If any uncertainty exists regarding the source of food it should not be fed to susceptible species. If the risk of contamination is considered significant then the food should be destroyed following the procedures in the **Disposal Procedures Manual**.

Further food brought in to the zoo should only be sourced from outside the declared area.

3.3.3 By-products

As a matter of priority the LDCC should determine the conditions of disposal of zoo organic products. If they cannot be disposed of normally then they must either be stockpiled in the zoo or removed and transported (in a manner approved by the LDCC) to a suitable disposal site.

For non-organic product or materials leaving the zoo, advice should also be sought from the LDCC as to the need for any disinfection or restriction on movement of such products. All movements of products out of the zoo should be minimised.

3.3.4 Vehicles

Any recent vehicle movements into the zoo proper (not just into visitor carparks) should be traced. Where such vehicles are still within the zoo and there is any risk of them being contaminated they should be withdrawn from use until decontaminated. A check-point should be set up for all future vehicle entries into the zoo proper. Only vehicles that have not originated from within the declared area and have appropriate permits from the LDCC should

be allowed entry. It may be desirable to set up a vehicle disinfection point at the entry to the zoo to allow any essential vehicles to be disinfected.

3.3.5 Equipment and materials

Tracing of all recently introduced equipment and materials should be carried out. Where there is any uncertainty as to whether it may have been in contact with the infectious agent then it must be immediately decontaminated, along with sites where it has been held and people who have handled it, following the procedures given in the **Decontamination Manual, Section 4**. If decontamination cannot be effectively performed then such material should be destroyed (with likely compensation) following the appropriate procedures in the above manual.

All routine entry of equipment and materials from other parts of the declared area should cease, except where the LDCC has approved movement on a case-by-case basis.

3.2.6 Personnel

An initial joint briefing should be given to the staff jointly by a senior zoo officer and a representative of the LDCC. This should concentrate on eliminating contact between people and susceptible species outside the zoo. Staff who must have contact with susceptible species in the restricted or control area outside the zoo should not have direct contact with susceptible species within the zoo. Staff should be advised to keep direct contact between susceptible species and people to a minimum. They should also pay particular attention to hygiene in food preparation and between handling different animals to minimise risk of disease spread. It may be desirable for a separate area to be set up for food preparation for ASMP category 1 and 2 animals and for staff handling these animals to shower, change clothes or undergo personal disinfection before handling these animals.

Depending on the disease involved the following precautions would also be helpful:

- keepers to shower when leaving the premises;
- no contact between keepers and home animals either directly or indirectly (including clothing);
- the institution to take over laundering of uniforms;
- car parking relocated elsewhere than within the zoo grounds.

3.2.7 Vermin and feral animals

Immediate action should be taken to control any vermin or feral animals that could spread the disease agents. This may include rodents, wild birds and a variety of wild mammals (see the **Wild Animal Control Manual, in press**). For control of insects, an entomologist with the department of agriculture or primary industry should be consulted, as well as the appropriate **Disease Strategy**.

In addition attention should be paid to the security of boundary fencing and enclosures to prevent the entry of animal vectors. Particular attention should be paid to enclosures holding any ASMP category 1 and 2 susceptible species.

3.2.8 Buildings and structures

A general clean-up of all building and enclosures should occur with any accumulated rubbish removed. Particular attention should be paid to removal of any accumulated organic material that may either harbour microorganisms or act as insect or vector breeding grounds.

3.3 Media and public relations

In the event that a zoo or similar facility is within a designated declared area for control of an emergency disease, some media attention would be inevitable. The designated ZMO would be responsible and must liaise with the local disease control centre to provide media releases as necessary (see Section 2.9).

4 RESPONSE PLANS IN AN INFECTED OR DANGEROUS CONTACT PREMISES

4.1 Introduction

This section covers the situation where a zoological gardens park either has infected animals on the premises or has animals known to have been in direct contact with infected animals.

Declared premises proclaimed in the event of an outbreak of an emergency disease by the State/Territory CVO under the relevant State diseases legislation, are described below.

Infected premises (IP): an area (which may be all or part of a property) in which an emergency disease exists, is believed to exist, or in which the infective agent of that emergency disease exists or is believed to exist.

Dangerous contact premises (DCP): premises containing animals showing no clinical signs of disease but which, by reason of its probable exposure to disease, will be subjected to disease control measures.

Suspect premises (SP): an area containing animals that might have been exposed to an emergency disease through possible contact with infected animals or facilities, people, equipment, semen or embryos, and currently show no symptoms; OR where the disease symptoms are evident, but the diagnosis is yet to be confirmed.

The declaration by the CVO of an IP, DCP or SP is determined by the AUSVETPLAN **Disease Strategies** in order to minimise the spread of disease.

4.2 Can the enterprise continue to operate if declared an infected or dangerous contact premises?

The ability for a zoo to continue operation in the event that there is an infection on the premises depends on the type of disease and the nature of the outbreak itself. The following general conditions may apply.

4.2.1 Vesicular and pox diseases

Staff entry

Staff entry is necessary for maintenance of other animals in the collection. Staff will be required to perform routine disinfection on entering and leaving the declared area. For staff associated with animals in the infected premises special disinfection practices need to be followed.

Public entry

There is potential for large amounts of virus to be produced if a large herd is infected. Public entry into the declared area is prevented after a time has elapsed exceeding the survival time for the virus under the prevailing conditions, or the area has been disinfected to the satisfaction of the CVO.

4.2.2 Newcastle disease**Staff entry**

As for vesicular diseases.

Public entry

Due to low bird numbers, the potential for production of large amounts of virus is minimal. Public entry should be prevented into the infected area only, until a time has elapsed exceeding the survival time for the virus under current conditions, or the area has been disinfected to the satisfaction of the CVO.

4.2.3 Avian influenza**Staff entry**

As for vesicular diseases.

Public entry

Due to low bird numbers and unlikely contact between wild ducks and gallinaceous birds, the potential for production of large amounts of virus is minimal. Public entry should be prevented into the infected area only, until a time has passed which exceeds the survival time for the virus under current conditions, or the area has been disinfected to the satisfaction of the CVO.

4.2.4 Screw-worm fly/rabies

No restrictions on entry by staff or public into zoo.

4.2.5 Arbovirus infections

Prevention of the spread of the insect-borne diseases will present particular challenges in zoos. Techniques available to reduce risks will be more limited than in domestic livestock situations since many of the target animals can only be handled using anaesthetic or sedation techniques.

Techniques available to minimise insect-borne disease spread include:

- use of the anthelmintic/insecticide ivermectin (bovidae)
- insecticide through spray races (portable or permanent)
- pour-ons
- misting of night houses with insecticide
- spraying of night houses
- housing of susceptible animals at night

The assistance of epidemiologists and entomologists should be sought to establish insect traps within the zoo for insect identification and virus isolation.

4.3 Elimination of the disease — animals

Zoos are usually characterised by an external containment fence to keep their animals secure and also to prevent entry of feral or other animals. The extent of internal fencing is usually determined by the type of animals being kept. Smaller nature reserves are likely to have fewer internal fences than A or B class zoos. However, the exhibited animal legislation of the various States and Territories prescribe holding areas of some sort.

Zoos feature a range of single species and mixed species exhibits. In the case of mixed exhibits the animals are likely to be those that coexist in the wild. Most exhibits have night or holding facilities to enable regular observation and handling of animals. The majority of zoo animals will require specialised handling, either by trained keeping staff or by veterinarians experienced in the use of a variety of tranquilisers or other restraining drugs.

As the zoo is a repository for endangered and valuable species, it is necessary to move such birds or animals not in direct contact with an infectious agent, to an isolation premises for regular health monitoring. Animals deemed valuable are those of ASMP categories 1 and 2, and in some cases this may also apply to those that are founder animals for a captive population, which are rare in captivity, difficult to obtain or get established. Isolation premises are described in Section 2.6. As a general rule movement of animals within the zoo should be minimised in the event of an emergency disease. The conservation or other value of the animal(s) will sometimes be a consideration since much of the genetic material represented in zoo animals is irreplaceable.

Surveillance of birds in surrounding areas is enhanced by efficient trapping or catching facilities. In those institutions with inadequate recording systems a higher degree of surveillance and movement control may be instituted.

All livestock will be held in quarantine within the zoo until advised that this is no longer required by LDCC controller.

Tests as required by the LDCC controller and AAHL will be carried out on any at-risk or susceptible species to determine when they no longer present any risk of harbouring disease organisms.

Staff or other people handling or feeding animals, cleaning enclosures or otherwise coming into contact with susceptible species will not be permitted to have contact with any other groups of susceptible species until they have showered, changed clothes and disinfected any other material or equipment required. As far as possible, different people will be used in the handling of each separate group of susceptible species.

Table 2 provides some management guidelines in the event of the zoo becoming an infected property. The information assumes that the zoo can be readily secured.

Table 2 Recommendations for action by animal type

Disease	Ungulates	Carnivores	Primates	Birds	Rodents	Marsupials/ monotremes	Reptiles/ amphibia	Others
FMD	Destroy infected and all direct contacts with infected animals. Isolate and monitor other at risk/susceptible spp.	Isolate	Isolate	Nil	Isolate & destroy infected	Nil	Nil	Isolate
Vesicular stomatitis	As for FMD	Nil	Isolate	Nil	As for FMD	Nil	Nil	Isolate
Vesicular exanthema	Destroy porcine; isolate & observe others	Nil	Isolate	Nil	Nil	Nil	Nil	Isolate & observe marine mammals
Swine vesicular disease	As for VE	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Rinderpest	As for FMD	Nil	Nil	Nil	Nil	Nil	Nil	Nil
PPR	As for FMD	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Lumpy skin disease	As for FMD Vector protect	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Rift Valley fever ¹	Destroy infected, isolate & observe others. Vector protect	Nil	Observe, isolate and treat	Nil	Nil	Nil	Nil	Nil
Bluetongue	Destroy only for initial diagnosis, and for welfare reasons, observe rest; vector protect	Nil	Nil	Nil	Nil	Nil	Nil	Nil

¹ Zoonotic

Table 2: cont

Disease	Ungulates	Carnivores	Primates	Birds	Rodents	Marsupials/ monotremes	Reptiles/ amphibia	Others
Epiz. haem disease of deer (EHD)	Destroy only for initial diagnosis, and for welfare reasons, observe rest; vector protect	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Sheep & goatpox ¹	As for FMD Vector protection	Nil	Observe, isolate and treat as required	Nil	Nil	Nil	Nil	Nil
African horse sickness	Vector protection & Isolate equines	Observe canines	Nil	Nil	Nil	Nil	Nil	Nil
Swine fevers	Isolate and destroy porcines	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Avian influenza	Nil	Nil	Nil	Destroy infected birds but isolate & observe in-contact birds. Remove feral birds	Nil	Nil	Nil	Nil

¹ Zoonotic

Table 2: cont

Disease	Ungulates	Carnivores	Primates	Birds	Rodents	Marsupials/ monotremes	Reptiles/ amphibia	Others
Newcastle disease	Nil	Nil	Nil	Destroy. infected & in-contact birds. Remove feral birds	Nil	Nil	Nil	Nil
Aujeszky's disease	Destroy porcine; isolate other	Isolate	Nil	Nil	Isolate	Nil	Nil	Nil
Rabies ¹	Isolate & observe	Destroy all infected; observe rest	As for carnivores	Nil	As for carnivores	As for carnivores	Nil	As for carnivores
Screw-worm fly	Isolate & treat strike wounds, rest in insect proof facility	As for ung	As for ung	Nil	As for ung	As for ung	Nil	As for ung
SEs	Destroy affected & animals in the same group with similar history	As for ung	Nil	Nil	Nil	Nil	Nil	Nil
Equine influenza	Isolate infected & vaccinate equines; observe others	Nil	Nil	Nil	Nil	Nil	Nil	Nil
TGE	Destroy porcine	Isolate & observe	Nil	Nil	Nil	Nil	Nil	Nil
Cont Bov PP.	Destroy infected bov; isolate and observe other	Nil	Nil	Nil	Nil	Nil	Nil	Nil

¹ Zoonotic

Table 2: cont

Disease	Ungulates	Carnivores	Primates	Birds	Rodents	Marsupials/ monotremes	Reptiles/ amphibia	Other
Tuber- culosis ¹	Destroy infected. Test in-contact animals	Nil	Isolate test and treat	Destroy infected; isolate others	Isolate, test and destroy infected	Nil	Nil	Nil
Brucellosis abortus ¹	Destroy and test	Nil	Test; isolate and treat	Nil	Observe	Nil	Nil	Nil
Brucellosis melitensis ¹	Destroy infected ovine and caprine; isolate and observe rest	Observe	Test; isolate and treat	Nil	Observe	Nil	Nil	Nil
Brucellosis suis ¹	Destroy infected porcine; observe others	Nil	Test; isolate and treat	Nil	Observe	Nil	Nil	Nil
Brucellosis canis	Nil	Destroy & isolate contacts	Nil	Nil	Nil	Nil	Nil	Nil
Trypanoso- miasis	Isolate & treat infected; insect proof	Test & treat infected	Test & treat infected	Nil	Test & treat infected	Nil	Test & treat infected	Nil
Theileriosis	Treat and isolate Infected; test & observe other	Nil	Nil	Nil	Nil	Nil	Nil	Nil

¹ Zoonotic

Table 2: cont

Disease	Ungulates	Carnivores	Primates	Birds	Rodents	Marsupials/ monotremes	Reptiles/ amphibia	Other
Heartwater	Test, treat and isolate ruminants	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Equine piroplasmiasis	Test, treat and isolate equines	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Equine viral encephalomyelitis (EEE, WEE, VEE)	Destroy infected equines; isolate & observe others	Nil	Observe (end host)	Isolate	Isolate	Nil	Nil	Nil
Borna disease	Isolate, treat and observe equines, ovine and other	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Japanese encephalitis	Isolate, particularly pigs & equine	Nil	Nil	Isolate & observe	Nil	Nil	Nil	Nil
Glanders	Destroy infected equines	Observe	Observe	Nil	Nil	Nil	Nil	Nil
Trichinosis	Isolate	Isolate	Isolate	Isolate	Isolate	Isolate	Nil	Nil

4.4 Decontamination — products and facilities

4.4.1 Products

Advice will be sought from the LDCC as to whether any biological products within the zoo constitute a disease transmission risk. If they do they will be disposed of in the manner directed by the infected premises section of the LDCC or in a manner directed by the **Disposal Procedures Manual**. For cost-sharing diseases (that is those diseases included in the Commonwealth/States cost-sharing agreement for certain emergency animal diseases) commodities with a commercial value, which are required to be destroyed, will be valued in accordance with the procedures in the **Valuation and Compensation Manual**.

Where an infectious disease agent requires the disposal of large numbers of animal bodies, which are unable to be disposed of within the zoo (eg in a metropolitan zoo), then they must be transported in sealed leak-proof containers to a suitable location identified by the infected premises operations section of the LDCC. Advice will be sought from the LDCC controller on whether such transportation requires police escort.

Any other products from within the zoo will be decontaminated in accordance with the relevant AUSVETPLAN strategies/manuals.

4.4.2 By-products

By-products will be treated in such a manner as is necessary to destroy the respective disease agents or, if this is not practicable, destroyed or disposed of according to the relevant AUSVETPLAN manuals. In the event of uncertainty regarding the most appropriate method, the advice of the head of the infected premises operations section of the LDCC will be sought.

4.4.3 Discharges

Wherever possible discharges will be contained within the secure area of the zoo until it is certain that they are not infectious. Discharges should be prevented from entering any local watercourses. Where discharges that constitute a risk cannot be held on the zoo premises they will be transported in secure leak-proof containers to a suitable disposal site.

4.4.4 Vehicles

Vehicle entry will be kept to an absolute minimum within the secure area of the zoo. As far as possible different vehicles will be used within the infected area and the other parts of the zoo. Disinfection of people and equipment or material is to occur between the infected area and clean area vehicles. Where it is necessary to remove vehicles from the infected areas of the zoo, they will be thoroughly disinfected at the boundary of the area following the procedures in the **Decontamination Manual, Section 4**. Drivers of such vehicles will be advised to avoid contact with susceptible species outside the zoo. Staff vehicles should not be parked within the internal zoo premises. As far as possible within the infected premises vehicle usage should be kept to an absolute minimum.

4.4.5 Equipment and materials

These will be either disposed of or decontaminated as specified in the **Decontamination Manual** and the **Disposal Procedures Manual**). In the event of uncertainty regarding the

most appropriate method, advice will be sought from of the manager of the infected premises operations section at the LDCC.

4.4.6 Personnel

An initial briefing on the situation should be provided to the staff jointly by an LDCC representative and senior zoo officer (normally director or senior media officer). This should concentrate on eliminating contact between people and susceptible species outside the zoo. Staff who must have contact with susceptible species in the infected area of the zoo should not have direct contact with susceptible species in other parts of the zoo. Staff should be advised to keep direct contact between susceptible species and people to a minimum and also to pay particular attention to hygiene in relation to food preparation and handling from animal to animal in order to minimise risk of disease spread. It may be desirable for a separate area to be set up for food preparation for ASMP category 1 and 2 animals; and for staff handling these animals to shower, change clothes or undergo personal disinfection before handling other animals.

4.4.7 Vermin and feral animals

There is a need to control vermin and feral animals and also ensure that boundaries to the zoo and enclosures of susceptible species are of maximum security to exclude all other creatures such species regardless of whether they are likely to be active disease carriers or not. If poisoning is used as a control technique, caution needs to be exercised to avoid the problem of widespread non-target poisoning. Techniques for controlling many vermin species and feral animals are contained within the relevant sections of the **Wild Animal Control Manual, in press**.

4.4.8 Buildings and structures

These should be decontaminated following the techniques outlined in the **Decontamination Manual, Section 4**. Highly contaminated structures, which cannot be effectively cleaned, should be valued for compensation purposes, if applicable, and destroyed according to correct procedure.

4.5 Tracing requirements

4.5.1 Existing zoo tracing capabilities

As discussed in Section 1.1 all animals imported into Australia must be positively identified at all times using an accepted method (ear tag, brand, microchip implant, tattoo) and records relating to that animal be maintained using ARKS (see Section 1.1.1). All records relating to animals imported into Australia and their offspring must be kept up-to-date and be available to quarantine officers at short notice. All progeny (2 generations) of an animal imported into Australia, must be identified using an accepted method and records relating to that animal also be maintained using ARKS.

The system allows individual animals and their offspring to be traced with little difficulty and in addition, the following data can be retrieved at very short notice:

- an inventory report for each institution that provides status data, with breakdowns for births, acquisitions, deaths and translocations;

- a taxon report that lists all the specimens of a given species held by that institution, their identification, parentage, date of birth, location and origin;
- a specimen report that shows the animals parentage, origin date of birth, identification, location, treatment and movements both within the institution as well as from one institution to another;
- transaction reports that detail all movements for any given period;
- enclosure reports (with historical option) to show the location of the animals and any animals that have shared that enclosure;
- management reports that include:
 - age pyramids for any given taxon;
 - fecundity and mortality; and
 - local inbreeding.
- specimen relationship that include:
 - pedigree charts;
 - sibling tables, which list both full and half siblings for any given specimen; and
 - reproductive history of any individual, male or female.

A higher degree of surveillance may be applied in cases where the level of tracing does not meet the above standards.

4.5.2 Tracing actions for emergency diseases

Through the institution executive officer, the records officer must be contacted to request the following information:

- inventory report for the collection, providing a summary of all transactions for any stipulated period (to include births, deaths, imports, exports and status);
- taxon report for all specimens of the species in which the outbreak has occurred;
- enclosure report showing all specimens that have been maintained in the enclosure in which the outbreak occurred over a stipulated period of time. An enclosure report for adjoining enclosures may also be appropriate;
- specimen reports for those individuals in which the outbreak has been detected.

With the above reports it will be possible to identify any trend that may occur, and identify areas in which further information will be required ie siblings, parentage, treatment records, postmortem reports, location of animals removed from the property.

Using information from the above request, as appropriate, tracing of the following factors:

- all material (hay/faeces/bedding) removed from the enclosures in which the outbreak has occurred (stipulate period);
- the location of any crates or containers that may have been used to transport the animals;
- the identification of staff that may have had direct contact with the animals or area in which the outbreak occurred (check rosters etc);
- any contact between staff that have been exposed to animals/areas and contact with domestic/commercial/pet animals outside the institution in which the outbreak occurred; and

- the location of any biological samples that have been removed from the property during a specified period.

4.6 Proof of freedom

The **Disease Strategies** give details of how proof of freedom can be re-established for each disease. The OIE Codes (**Disease Strategies, Appendix 3**), set international requirements for freedom from a wide range of diseases. These should be referred to for advice relating to requirements for specific diseases not covered by the AUSVETPLAN strategies. Ultimately the decision to declare freedom from a particular disease and cessation of disease control activities, will be made by the Consultative Committee on Emergency Diseases (CCEAD) and the State CVO based on information assessed at the time.

4.7 Media and public relations

In the event that zoo animals are involved in an emergency disease outbreak, media interest would be intense (see Section 2.9). As with other emergency disease emergencies, a proactive approach is necessary to manage the media when such an event affects a zoo, probably more so due to the emotion that can build up with suggestions that zoo animals could die or might have to be slaughtered. Anxieties of zoo staff must also be allayed.

Once the presence of an emergency disease within or threatening a zoo has been confirmed, operation of a media and public relations unit should commence within the zoo to handle media and public relations directly concerning the zoo (the LDCC and State disease control headquarters, SDCHQ, will be responsible for the overall disease control and media/public relations operations). It may be important to set up a news conference room. It should be identified and ultimately furnished according to the **Public Relations Manual, Section 2.1**. Staffing arrangements for this unit should be made immediately.

The media can be both intrusive and, if handled properly, extremely helpful in the hectic first hours of an emergency disease emergency, particularly in such a potentially emotive place as a zoo. Critical to obtaining the cooperation, both of news hungry media reporters and flustered zoo staff, is the rapid dissemination of accurate preliminary information, which should be as detailed as circumstances permit.

All zoo staff should be thoroughly briefed so they know what to expect, and to enable them to make any personal arrangements necessary to facilitate their subsequent cooperation with disease control authorities.

The ZMO must also keep the CVO informed about events and ensure he/she receives immediate copies of all media releases. In addition to liaising with zoo staff and the media, the ZMO also has the duty to provide information, on a need-to-know basis, to other participating organisations.

Of major concern during an emergency disease operation at a zoo is that if media people, especially television crews, are unable to obtain the face-to-face interviews and on-site pictures they want, they will either find an alternative (and possibly ill-informed) 'expert' to comment, or manufacture the footage or both.

To obviate such an undesirable outcome only factual information should be released with no speculation or dramatisation of events. How public access and zoo programs will be affected

by the crisis should be outlined and everybody's cooperation sought. The CVO should be kept informed so he/she knows well in advance what is likely to appear in the media.

The **Public Relations Manual, Section 3.4** is applicable to the operation of a public relations/media unit associated with an emergency disease emergency in a zoo. An extra consideration is that all zoos have a legally designated air space, usually a ceiling of 5000 feet above their establishments. Attention should be drawn to this, particularly in early media releases, so that all concerned are aware of the fact that aircraft movement in this area can be prohibited.

APPENDIX 1 List of AUSVETPLAN diseases

African horse sickness
African swine fever
Aujeszky's disease
Bluetongue
Bovine spongiform encephalopathy (BSE)
Classical swine fever (hog cholera*)
Equine influenza
Foot-and-mouth disease
Lumpy skin disease
Newcastle disease
Peste des petits ruminants
Rabies
Rift Valley fever
Rinderpest
Scrapie
Screw-worm fly
Sheep and goat pox
Swine vesicular disease
Transmissible gastroenteritis
Vesicular exanthema
Vesicular stomatitis
Virulent avian influenza (fowl plague*)
Bee diseases:
 Braula fly (*Braula coeca*)
 tracheal mite (*Acarapis woodi*)
 tropilaelaps mite (*Tropilaelaps clarae*)
 Varroa mite (*Varroa jacobsoni*)

* this term is not used in AUSVETPLAN

APPENDIX 2 Role descriptions

Emergency diseases in or threatening zoos will present challenges due to the variety of animals involved and the untamed nature of most animals. However zoos have specifically trained staff usually with a high level of technical training in the handling of the various species and the running of the zoo. Furthermore they are very highly committed to both their zoo and their animal charges.

The following role descriptions for the usual staff employed in zoos should assist in defining the various roles to be undertaken in an emergency disease emergency. These role descriptions should be viewed as complementary to the normal statement of duties. A generic structural diagram is included so that the managers of the emergency disease response without any zoo experience have an understanding of who has what role and responsibility in the zoo. There will be undoubtedly variation between zoos.

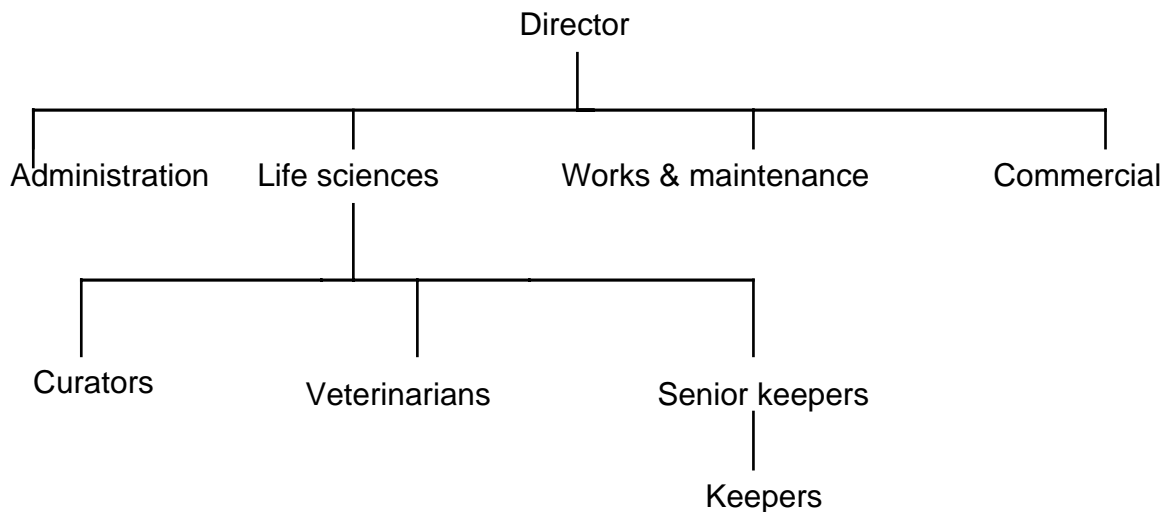


Figure 1 Typical zoo structure

ZOO DIRECTOR

Responsible to the chief executive officer/board as relevant.

Responsible for:

- coordinating zoo staff participation in disease eradication and control within the zoo;
- advising LDCC of visitor movements before, during and that expected following the emergency disease;
- provision of facilities and support within the zoo to enable disease control measures to be carried out;
- ensuring adequate animal husbandry is maintained during the emergency disease emergency;
- coordinating media releases and announcements in conjunction with LDCC;
- regularly communicating with LDCC; and

- ensuring zoo staff comply with people and animal movement controls as directed by LDCC.

CURATOR

Responsible to the life science manager/director (as appropriate in individual zoos).

Responsible for:

- providing to the director accurate data on composition of animal collection;
- supplying details of past animal movements as requested;
- advising local emergency disease control centre, through the director, the breeding value of individual animals in the collection; and
- obtaining information on the space available in the zoo for animals, which need to be isolated.

KEEPER

Responsible, through supervising keepers/life science managers, to the director

Responsible for:

- checking each animal for signs of disease and reporting to supervisors immediately;
- assisting emergency disease staff in animal treatments and examinations;
- carrying out animal movements as directed by their supervisors;
- disinfection of yards and facilities as instructed;
- maintaining personal hygiene standards and self disinfection as instructed;
- complete written reports submitted in a timely manner; and
- ensuring that barriers put in place as part of emergency disease control measures are maintained effectively.

ZOO VETERINARIAN

Responsible to director.

Responsible for:

- reporting all signs of changes in health status to LDCC;
- immobilising animals as requested by emergency disease staff (LDCC);
- administering treatments as requested by LDCC; and
- providing past information related to health of animal collection and of individuals within it.

SPECIES COORDINATOR

Responsible to Taxonomy Advisory Group (TAG) coordinator of ASMP.

Responsible for:

- providing species movement information to zoo director;
- advising zoo director of greater importance of individuals in animal collection; and
- coordinating receipt of information from other institutions holding the same species.

Note: That the species coordinator will often not be a member of staff of the zoo concerned in the emergency.

Glossary

Arbovirus	<i>Arthropod-borne virus</i> (generally transmitted by insects or ticks).
ANEMIS	<i>Animal Health Emergency Information System</i> . A system for the collection, assimilation, actioning and dissemination of essential disease control information using paper documentation and Automatic Data Processing assistance.
Australian chief veterinary officer	The nominated senior Commonwealth veterinarian in the Department of Primary Industries and Energy who manages Australia's international animal health commitments and the Commonwealth's response to an emergency animal disease incursion.
AUSVETPLAN	A series of documents that outline the Australian approach to the eradication/control of the more important animal diseases not presently occurring in this country; linking policy, strategies, implementation, coordination and emergency-management agency plans.
Chief veterinary officer	The veterinarian of each State or Territory animal health authority who has responsibility for animal disease control in that State or Territory.
Consultative Committee on Emergency 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 emergency disease of livestock, or serious epizootics of Australian origin.
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).
Declared area	A defined tract of land for the time being subject to disease control restrictions under emergency 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> .
Disease strategy	The principles on which control of a disease is based.
Disinfectant	An agent used to destroy microorganisms outside a living animal.
Disposal	Sanitary removal of animal carcasses and things by burial, burning or some other process so as to prevent the spread of disease.
Emergency animal disease	Includes exotic animal diseases and endemic diseases that warrant a national emergency response.
Exotic animal disease	Disease affecting animals (which may include humans) and which does not presently occur in Australia.
Infected premises	A defined area (which may be all or part of a property) in which an emergency disease exists, is believed to exist, or in which the infective agent of that emergency disease exists or is believed to exist. An infected premises is subject to quarantine served by notice and to eradication or control procedures.

Job card	A written list of tasks to be carried out by an individual as part of an emergency response.
Local disease control centre	An emergency operations centre responsible for the command and control of field operations in a defined area.
Movement control	Restrictions placed on movement of animals, people and things to prevent spread of disease.
National disease control headquarters	A centre established in Canberra from which national disease control actions are coordinated in an emergency animal disease emergency.
Officer-in-charge	A person charged with the management of a defined operation.
Operational procedures manual	Document containing specific, instructions on carrying out operational procedures such as valuation, slaughter, decontamination.
Premises	See 'Infected Premises'.
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.
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.
Road block	Road check point or barricade to maintain compliance with movement control restrictions.
Role description	Statement of functions of an officer within the overall operation.
Salvage	Recovery of some (but not full) market value by treatment and use of products, according to disease circumstances.
Sentinel animals	Animals of known health status monitored for the purpose of detecting the presence of a specific emergency disease agent.
Stages of activation	Investigation; alert; operational; stand-down.
– investigation	exists when a report assessed as being a low probability of an emergency disease is being investigated by animal health authorities.
– alert	exists when the CVO notifies key members of the animal health authority and the coordinator of the State Emergency Plan that an animal disease emergency may be imminent, or exists in another State.
– operational	exists when the CVO notifies the coordinator of the State Emergency Plan that an animal disease emergency exists in the State.
– stand-down	exists when the CVO notifies the coordinator of the State emergency-management plan that an animal disease emergency no longer exists.

State/Territory disease control headquarters	The office from which all State emergency disease control actions of that State are coordinated and in which all significant decisions are taken or confirmed.
Stamping out	Eradication procedures based on quarantine and slaughter of all infected animals and animals exposed to infection.
Support agency	An agency having a defined role to assist the lead combat agency to give effect to animal disease emergency-management plans.
Surveillance	A systematic program of inspection and examination of animals or things to determine the presence or absence of an emergency disease.
Survey	A program of investigation designed to establish the presence, extent of, or absence of disease.
Suspect animal	An animal that is likely to have been exposed to an emergency disease such that its quarantine and intensive surveillance, but not pre-emptive slaughter, are warranted; OR an animal not known to have been exposed to a disease agent but showing clinical signs requiring differential diagnosis.
Suspect materials or things	Materials or things suspected of being contaminated by an emergency disease agent.
Suspect person	A person who is likely to have been contaminated by an emergency disease agent.
Suspect premises	Premises containing suspect animals that will be subject to quarantine and intensive surveillance.
Tracing	The process of locating animals, persons or things that may be implicated in the spread of disease, so that appropriate action can be taken.
Zoological gardens	Zoos, fauna and marine parks, and sanctuaries.
Zoonosis (Zoonotic)	Disease that can affect humans and animals.

Abbreviations

AAHL	CSIRO Australian Animal Health Laboratory, Geelong
ARKS	Animal Records Keeping System
ARAZPA	Australian Regional Association of Zoological Parks and Aquaria
ASMP	Australasian Species Management Program
ANEMIS	Animal health emergency information system
AUSVETPLAN	Australian Veterinary Emergency Plan
CA	Control area
CAMP	Conservation Assessment and Management Plan
CITES	Convention on International Trade in Endangered Species
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CQO	Chief Quarantine Officer
CVO	Chief Veterinary Officer
DCP	Dangerous contact premises
FMD	Foot-and-mouth disease
GCAP	Global Captive Action Plan
IP	Infected premises
ISIS	International Species Information System
IUCN	World Conservation Union
LDCC	Local disease control centre
OIE	World Organisation for Animal Health [Office International des Epizooties]
PPR	Peste des petits ruminants
RA	Restricted area
SDCHQ	State disease control headquarters
SP	Suspect premises
SWF	Screw-worm fly
TGE	Transmissible gastroenteritis
VPC	Vertebrate Pests Committee
ZMO	Zoo media officer

References

- Geering W.A. and Forman A.J., Nunn, M.J. (1995). *Exotic Animal Diseases: A Field Guide for Australian Veterinarians*, Bureau of Resource Sciences, Department of Primary Industries and Energy, Australian Government Publishing Service, Canberra.

Training resources

AAHL (available from the Animal Diseases/Incidents Section, DPIE, Canberra; or AAHL)

Video resources

EXOTIC DISEASE -AWARENESS SERIES

1991

Think the Worst First

The Nation's Nightmare

To Market To Market

Stop the Spread

Vital Signs

RECOGNISING EXOTIC LIVESTOCK DISEASES SERIES

On alert for bluetongue

1991

Two of a kind — avian influenza and Newcastle disease

1992

A tale of transmission — scrapie & BSE

1992

A strange kind of madness (rabies)

1992

Capripox (sheep pox, goat pox, and lumpy skin disease)

1992

Hypothetical – Rift Valley fever

1992

Screw-worm fly

1992

Exotic diseases of pigs

1993

Out of Africa – rinderpest and other erosive diseases

1993

FMD – the front line

1993

Many other videos about emergency diseases are available from the Animal Diseases/Incidents Section, Department of Primary Industries and Energy or AAHL.

CONTROLLING AN EMERGENCY DISEASE OUTBREAK SERIES - OUTBREAK CONFIRMED!

Stamping it out — an introduction to disease control

1993

First things first — slaughter and disposal of sheep, cattle and horses

First things first — slaughter and disposal of pigs

First things first — slaughter and disposal of poultry

Cleaning it up — decontamination of property and equipment

SWILL FEEDING

1993

A pig's tale — Why swill feeding is banned

Slide sets

On alert for Bluetongue (48 slides)

Two of a kind - avian influenza & Newcastle disease (47 slides)

Screw-worm fly (32 slides)

Emergency diseases of pigs (56 slides)

Erosive diseases – Rinderpest and others (50 slides)

Foot-and-mouth disease and other vesicular diseases (72 slides)

OTHER DIAGNOSTIC RESOURCES

Emergency Diseases of Animals: A Field Guide for Australian Veterinarians by W.A. Geering, A.J. Forman and M.J. Nunn (Australian Government Publishing Service, 1995) 1995

A Manual for the Diagnosis of Screw-worm Fly by P.B. Spradbery, Australian Government Publishing Service, 1991) 1991

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.