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Department of Agriculture, Fisheries and Forestry

Importation of zoo elephants from approved countries

Final policy review

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Acronyms and abbreviations

AGID	agar gel immunodiffusion
ALOP	appropriate level of protection
ARAZPA	Australasian Regional Association of Zoological Parks and Aquaria
C-ELISA	competitive ELISA
CATT	card agglutination test
CFT	complement fixation test
Code	OIE Terrestrial Animal Health Code
DAFF	Australian Government Department of Agriculture, Fisheries and Forestry
EEHV	elephant endotheliotropic herpesvirus
ELISA	enzyme-linked immunosorbent assay
FMD	foot-and-mouth disease
HS	haemorrhagic septicaemia
IATA	International Air Transport Association
IFAT	immunofluorescent antibody test
IRA	import risk analysis
OIE	World Organisation for Animal Health (formerly known as the Office International des Epizooties)
OIE Manual	OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals
PCR	polymerase chain reaction
QAP	quarantine approved premises
SOPs	standard operating procedures
SPS Agreement	WTO agreement on the Application of Sanitary and Phytosanitary Measures.
WTO	World Trade Organization
ZAA	Zoo and Aquarium Association

Summary

This policy review considers the biosecurity risks for Australia associated with the importation of zoo elephants from approved countries. The last review of biosecurity measures for the importation of zoo elephants into Australia was conducted in 2004. The import conditions were suspended in 2008 pending review to take into account new scientific information.

This policy review for zoo elephants from approved countries was undertaken by the Department of Agriculture, Fisheries and Forestry (DAFF) with the assistance of technical and scientific experts. It reviews the hazard list and assesses the risks of introduction and spread of potential disease agents associated with the importation of zoo elephants from approved countries and, where appropriate, recommends biosecurity measures in accordance with Australia's risk-based approach to biosecurity.

Countries, administrative regions and territories from which Australia previously permitted the importation of zoo elephants were Indonesia, Singapore and Thailand. The countries, administrative regions and territories considered in this policy review are referred to as approved countries and comprise: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Indonesia, Ireland, Italy, Luxembourg, the Netherlands, New Zealand, Portugal, Singapore, Spain, Sweden, the United Kingdom and the United States.

This policy review recommends the biosecurity measures necessary to achieve Australia's appropriate level of protection (ALOP) for the importation of zoo elephants from approved countries. Other than minor editorial corrections, no changes to the policy review were made following comments from stakeholders.

The hazard identification chapter lists potential disease agents of elephants. This policy review concludes that risk management is warranted for the following diseases:

- anthrax
- elephant endotheliotropic herpesvirus
- elephant pox
- foot-and-mouth disease
- haemorrhagic septicaemia
- rabies
- screw-worm-fly myiasis
- surra
- trematode infestation
- trypanosomosis
- tuberculosis

The biosecurity measures for the importation of zoo elephants into Australia differ from previous biosecurity measures for several diseases. Diseases that did not previously require biosecurity measures are anthrax, rabies, screw-worm-fly myiasis and *Trypanosoma vivax*. For theileriosis it was determined that elephants do not play a significant role in the epidemiology of this disease and therefore biosecurity measures are no longer required.

This policy review is also based on general risk management measures common to most current import policies for zoo animals, including:

- the animal must be resident in an approved, licensed or registered zoo or wildlife park in the exporting country since birth or for at least 12 months immediately before export, unless otherwise approved by DAFF; the residency requirement may be achieved in more than one approved country or holding institution if specifically authorised by DAFF and the conditions for each country of residence and holding institution must be met
- the premises of origin (zoo or wildlife park) must provide separation from other animal populations, be under veterinary supervision and have a health monitoring program
- the animal must be held in pre-export quarantine for at least 30 days, during which it is inspected at least daily for signs of disease, treated for internal and external parasites, and tested for diseases in accordance with recommendations arising from the policy review
- the animal must be transported to a quarantine approved premises in Australia in a manner that ensures no direct exposure to Australian animals en route, and must undergo a period of post-arrival quarantine of at least 30 days
- the receiving institution must be approved under relevant Australian state or territory legislation to hold the species being imported.

DAFF recognises that there might be new scientific information and technologies, or other combinations of measures that may provide an equivalent level of biosecurity protection for the diseases identified as requiring risk management. Submissions supporting equivalence measures will be considered on a case-by-case basis.

1 Introduction

1.1 Background

Elephants are classified in the order Proboscidea and are divided into two species in the family Elephantidae:

Loxodonta africana – the African elephant.

Elephas maximus – the Asian elephant.

African elephants are distributed in most of the African continent south of the Sahara and are mostly limited to the protected areas of national parks and game reserves. There are two subspecies which differ in their geographic location, tusk length, and weight. Forest elephants (*Loxodonta africana cyclotis*) typically reside in rainforests. Savannah/desert elephants (*Loxodonta africana africana*) are usually found in grasslands.

In general, Asian elephants are smaller than African elephants. They inhabit grasslands and forests in Southeast Asia from India to Borneo. There are three subspecies of Asian elephants — *Elephas maximus maximus* from Sri Lanka, the Indian elephant or *E. m. indicus* from mainland Asia, and *E. m. sumatranus* from the island of Sumatra.

As of 2013, Australian zoos held several Asian elephants and a single African elephant. In order to introduce new genetic material for zoo breeding programs, captive management plans, global species management programs and species survival programs, future importation of elephants is desirable.

It is standard procedure for elephants to be housed in small groups isolated from domestic animals, allowing the animals to be closely monitored by zoo staff. Generally, zoological institutions have well developed preventative health programs with well maintained, written health and husbandry records for each individual animal. In Australia, elephants do not enter the food chain and all zoo animal deaths are thoroughly investigated via post mortem examination and appropriate testing to reach a diagnosis.

Australia's previous biosecurity measures required risk management for elephants for the following diseases: elephant endotheliotropic herpesvirus, elephant pox, foot-and-mouth disease, haemorrhagic septicaemia, surra (*Trypanosomsa evansi*), theileriosis (*Theileria annulata*) and tuberculosis.

In this policy review, Australia's previous biosecurity measures for elephants were reviewed by the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF), with due regard to their appropriateness to achieve Australia's appropriate level of protection (ALOP).

1.2 Australia's biosecurity policy

Australia's biosecurity policies aim to protect Australia against risks that may arise from exotic diseases and pests entering, establishing and/or spreading, thereby threatening Australia's unique flora and fauna, as well as agricultural industries that are relatively free from serious diseases and pests.

DAFF is responsible for developing and reviewing biosecurity policy for the importation of animals and their products. This is done through a science-based risk evaluation process. At the completion of the process and following consideration of stakeholder comments, DAFF is responsible for implementing the import protocol, including any risk management measures.

Australia's science-based risk analysis process is consistent with Australian Government policy and Australia's rights and obligations under the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement).

Australia implements a risk-based approach to biosecurity management. This approach is expressed in terms of Australia's ALOP, which reflects community expectations through government policy and is currently aimed at reducing these risks to a very low level, but not to zero.

If the risks exceed Australia's ALOP, risk management measures are proposed to reduce the risks to an appropriate level. However, if it is not possible to reduce the risks to an appropriate level, then no trade will be allowed.

1.3 Scope

This policy review considers the biosecurity risks posed by disease agents associated with the importation into approved Australian zoos of elephants from approved, licensed or registered zoos or wildlife parks in Austria, Belgium, Denmark, Finland, France, Germany, Greece, Indonesia, Ireland, Italy, Luxembourg, Netherlands, New Zealand, Portugal, Singapore, Spain, Sweden, the United Kingdom and the United States. These countries are recognised by Australia as free from foot-and-mouth disease and are hereafter referred to as approved countries.

1.4 Previous import conditions

Biosecurity measures for the importation of elephants to Australian zoos were finalised in 2003, with amendments in 2004. The import conditions applied to government-registered zoos/wildlife parks in Indonesia, Singapore and Thailand. The import conditions were suspended in 2008 pending review to take into account new scientific information.

Australian zoos and the Zoo and Aquarium Association (ZAA), formerly the Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA), have requested access to elephants to introduce new genetic material in line with captive management plans, global species management programs and species survival programs.

2 Method

2.1 Background

The World Organisation for Animal Health (OIE) in its Terrestrial Animal Health Code (OIE 2012), hereafter referred to as 'the Code', describes 'General obligations related to certification' in Chapter 5.1.

The Code states at Article 5.1.2 that:

> 'The import requirements included in the international veterinary certificate should assure that commodities introduced into the importing country comply with the OIE standards. Importing countries should restrict their requirements to those necessary to achieve the national appropriate level of protection. If these are stricter than the OIE standards, they should be based on an import risk analysis.'

Article 5.1.2 further states that:

> 'The international veterinary certificate should not include measures against pathogens or diseases which are not OIE listed, unless the importing country has demonstrated through import risk analysis, carried out in accordance with Section 2, that the pathogen or disease poses a significant risk to the importing country.'

The components of a risk analysis, as described in Chapter 2.1 of the Code, are:

- hazard identification
- risk assessment (release assessment, exposure assessment, consequence assessment and risk estimation)
- risk management
- risk communication.

Hazard identification, risk assessment and risk management are sequential steps within a policy review and risk communication is conducted as an ongoing process, and includes both formal and informal consultation with stakeholders.

2.2 Risk review

Although not defined or described in the Code, risk review is recognised by risk analysts as an essential component of the risk analysis process (Barry 2007; FSA 2006; Purdy 2010).

Australia applies a process of risk review to the biosecurity risks associated with the importation of an animal commodity (animal product or live animal) for which biosecurity measures have already been developed.

Risk review differs from *the monitoring and review* component of risk management, as described in the Code, in that each component of the risk analysis process (hazard identification, risk assessment and risk management) is reviewed under the risk review process. If a change (either increase or decrease) in the biosecurity risk associated with importation of a live animal or animal product that is imported into Australia is identified, risk management measures can be revised accordingly. This would be on the basis of relevant updated scientific information, including expert advice where available.

This policy review has drawn on the following sources of information (not exhaustive):

- *Terrestrial Animal Health Code 2012* (OIE 2012).
- previous requirements for the importation of elephants into Australia
- a review of the relevant scientific literature
- expert opinion coordinated through the Australasian Zoo and Aquarium Association

2.3 Review of hazard identification

Hazard identification is described in the Code (Article 2.1.2) as a classification step that is undertaken to identify potential hazards that may be associated with the importation of a commodity.

In accordance with the Code, a disease agent was considered to be a potential hazard relevant to the importation of elephants if it was assessed to be:

- appropriate to the species being imported
- OIE-listed, emerging and/or capable of producing adverse consequences in Australia.

Diseases in previous policy reviews and import conditions of elephants, conducted by DAFF, were also considered as potential hazards.

A hazard was retained for further review (hazard refinement) if:

- it was not present in Australia, or present in Australia and a notifiable disease, or subject to official control or eradication
- it was present in the country of export (approved countries).

OIE-listed diseases not present in the country of export were subject to further review if there were biosecurity measures for other zoo animal species and evidence to associate elephants with disease transmission.

Where evidence for the inclusion or exclusion of a particular disease agent was equivocal, a judgement was made based on the strength of the available evidence to implicate elephants in disease transmission.

2.4 Review of risk assessment

Details of the risk assessment process relevant to live animals are provided in Chapter 2.1 of the Code.

A review of risk factors relevant to the release, exposure and consequence assessment of hazards identified for further review was conducted to identify any significant changes in disease agent attributes and/or geographic distribution that would be relevant to biosecurity considerations for Australia.

A literature review was conducted for each hazard retained for risk review. If definitive information on risk factors was not found through a literature review or contact with relevant experts, any uncertainties were identified and documented.

Based on the information reviewed, a conclusion was made for each hazard regarding whether a significant change in biosecurity risk had occurred that was relevant to the importation of zoo elephants into Australia. Any assumptions and/or judgements made in drawing conclusions were documented.

2.5 Review of risk management

This policy review focussed on determining whether risk management was warranted for each of the hazards identified for the importation of zoo elephants. If it was concluded that risk management was not warranted, then risk management was not proposed. Conversely, if it was concluded that risk management was warranted, previous risk management measures were reviewed to determine if they were appropriate. If it was concluded that previous risk management measures were not able to achieve Australia's ALOP, alternative and/or complementary risk management measures, which were considered to provide an appropriate risk management option, were proposed.

The previous risk management measures were reviewed in the context of updated scientific information, including expert advice where available, as well as operational feasibility and practicality. For example, the adoption of advanced technologies for disease management and prevention (such as diagnostic techniques, vaccine manufacture) for certain hazards were considered appropriate for implementation, not simply on the basis of technical efficacy to achieve Australia's ALOP, but also as measures that would be less resource intensive from an administrative perspective.

This policy review also incorporated long standing policy designed to manage the risks and animal welfare issues associated with the importation and handling of wild animal species. Those risk management measures include:

- the animal must be resident in an approved, licensed or registered zoo or wildlife park in the exporting country since birth or for at least 12 months immediately before export, unless otherwise approved by DAFF; the residency requirement may be achieved in more than one approved country or holding institution if specifically authorised by DAFF and the conditions for each country of residence and holding institution must be met
- the premises of origin (zoo or wildlife park) must provide separation from other animal populations, be under veterinary supervision and have a health monitoring program
- the animal must be held in pre-export quarantine for at least 30 days, during which it is inspected at least daily for signs of disease, treated for internal and external parasites, and tested for diseases in accordance with recommendations arising from this policy review

- the animal must be transported to a quarantine approved premises in Australia in a manner that ensures no direct exposure to Australian animals en route, and must undergo a period of post-arrival quarantine of at least 30 days
- the receiving institution must be approved under relevant Australian state or territory legislation to hold the species being imported.

2.6 Risk communication

Risk communication is defined by the Code as 'the interactive transmission and exchange of information and opinions throughout the risk analysis process concerning risk, risk-related factors and risk perceptions among risk assessors, risk managers, risk communicators, the general public and other interested parties' (OIE 2012).

In conducting import risk analyses and policy reviews DAFF consults directly with the Australian Government Department of Health and Ageing to enable input relevant to public health considerations to be included in the development of Australia's animal biosecurity policies. Furthermore, a formal process of consultation with external stakeholders is a standard procedure for all import risk analyses and policy reviews to enable stakeholder assessment and feedback on conclusions and recommendations regarding Australia's animal biosecurity policies.

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3 Hazard identification

The list of diseases (hazards) of potential biosecurity concern was compiled from:

- diseases listed by the OIE as a multiple species disease affecting elephants (OIE 2012)
- diseases in previous policy reviews and import conditions of elephants, conducted by DAFF
- other diseases identified as occurring in elephants.

The method of hazard identification and refinement is described in Chapter 2. The preliminary list of diseases/disease agents is shown in Table 3.1. This table summarises the results of the hazard refinement process, including the rationale for removal or retention of each identified hazard.

The list of hazards included parasitic infestations. Routine examination and treatment for external parasites, and treatment for internal parasites, are required before the international movement of horses (Ellis and Watkins 2004; IFHA 2002; IFHA 2008), dogs and cats (DEFRA 2007) and other animal species. Routine monitoring for external and internal parasites and treatment as appropriate, are standard practice in zoos and for movement of zoo animals (A. Reiss, ZAA, pers. comm. December 2011). Accordingly, a risk review was not conducted for parasites where treatment occurs as routine standard practice as part of the importation process. Parasite resistance to treatments was not considered in the review.

Many disease agents are ubiquitous or common commensals and may be present in Australia. There are others that are opportunistic, not reported to be pathogenic, or of uncertain relevance in elephants due to limited or insufficient information. These agents were considered when compiling the list of hazards of potential biosecurity concern.

The diseases retained after hazard identification and refinement in Table 3.1 are listed at the end of this chapter.

Table 3.1 Hazard identification and refinement

Disease (disease agent)	Susceptible species	OIE-listed disease?	Adverse consequences in Australia?	Occurrence in Australia?	Present in approved countries?	Retained for risk review?
African horse sickness	All equids, dogs and serological evidence in elephants	Yes	Yes	No	No	No: No evidence zoo elephants play a significant role in disease epidemiology
Anthrax (*Bacillus anthracis*)	Mammals	Yes	Yes	Yes	Yes	Yes: OIE-listed, nationally notifiable in Australia and control measures in place
Bluetongue disease	Ruminants and serological evidence in elephants	Yes	Yes	Yes 10 out of 24 serotypes	Yes	No: No evidence zoo elephants play a significant role in disease epidemiology
Cestodes affecting elephants	Elephants and other mammals	No	Possible	Possible	Possible	All imported elephants to be treated for endoparasites
Ear mites (*Loxoanoetus lenae*)	Elephants	No	Yes	No	Yes	All imported elephants to be treated and inspected for ectoparasites
Elephant endotheliotropic herpesvirus	Elephants	No	Yes	Not reported	Yes	Yes: Not reported in Australia
Elephant pox (Cowpox virus)	Wide variety of mammals, cattle, elephants and rodents.	No	Yes	Not reported	Yes	Yes: Not reported in Australia
Encephalomyocarditis virus	Wide variety of mammals, elephants, humans, pigs and rodents	No	Yes	Yes	Yes	No: present in Australia
Foot-and-mouth disease	All cloven-hoofed species, elephants and tapirs	Yes	Yes	No	No	Yes: OIE-listed, not present in Australia
Haemorrhagic septicaemia (*Pasteurella multocida* serotypes 6:b and 6:e)	Ruminants, camels, deer, yaks, donkeys, horses, pigs, elephants and poultry	Yes	Yes	No	Yes	Yes: OIE-listed, not present in Australia
Heartwater (*Ehrlichia ruminatium*)	Ruminants and elephants (possibly)	Yes	Yes	No	No	No: No evidence zoo elephants play a significant role in disease epidemiology
Japanese encephalitis	Pigs and birds main hosts, also affects equids, humans, reptiles and serological evidence in elephants	Yes	Yes	Not in mainland Australia or Tasmania	No	No: No evidence zoo elephants play a significant role in disease epidemiology

Disease (disease agent)	Susceptible species	OIE-listed disease?	Adverse consequences in Australia?	Occurrence in Australia?	Present in approved countries?	Retained for risk review?
Leptospirosis (*Leptospira* spp.)	Vertebrates; rodents are the main reservoir	No	Yes	Yes multiple serovars	Yes	No: No evidence zoo elephants play a significant role in disease epidemiology
Lyme disease (*Borrelia burgdorferi*)	Small mammals (main hosts), humans, wild animals and other mammals	No	Yes (human)	No (not isolated)	Yes	No: No evidence zoo elephants play a significant role in disease epidemiology
Melioidosis *(Burkholderia pseudomallei*)	Mammals	No	Yes	Yes	Yes	No: Present in Australia
Nematodes affecting elephants	Elephants and other mammals	No	Possible	Possible	Possible	All imported elephants to be treated for endoparasites
New World screwworm (*Cochliomyia hominivorax*)	Mammals	Yes	Yes	No	No	Yes: OIE-listed, not present in Australia
Old World screwworm (*Chrysomya bezziana*)	Mammals	Yes	Yes	No	No	Yes: OIE-listed, not present in Australia
Piroplasmids	Mammals	No	Possible	Possible	Possible	No: No evidence zoo elephants play a significant role in disease epidemiology
Rabies	Mammals	Yes	Yes	No	Yes	Yes: OIE-listed, not present in Australia
Rift Valley fever	Ruminants, horses, humans, pigs and wildlife	Yes	Yes	No	No	No: No evidence zoo elephants play a significant role in disease epidemiology
Surra *(Trypanosoma evansi)*	Livestock, elephants, perissodactyls, dogs and some marsupials	Yes	Yes	No	Yes	Yes: OIE-listed, not present in Australia
Theileriosis (*Theileria annulata*)	Ruminants and camels	Yes	Yes	No	Yes	No: No evidence zoo elephants play a significant role in disease epidemiology
Ticks affecting elephants	Mammals, reptiles, birds	No	Yes	Yes some species	Yes	All elephants to be inspected and treated for ectoparasites
Trematodes affecting elephants	Elephants and other mammals	No	Yes	Possible	Possible	Yes: Some species not present in Australia
Trichinellosis (*Trichinella spiralis*)	Mammals, esp. carnivores	Yes	Yes	No	Yes	No: No evidence zoo elephants play a significant role in disease epidemiology

Disease (disease agent)	Susceptible species	OIE-listed disease?	Adverse consequences in Australia?	Occurrence in Australia?	Present in approved countries?	Retained for risk review?
Trypanosomosis (tsetse-transmitted) (*Trypanosoma brucei brucei, T. congolense, T. vivax*)	Bovids, other livestock, elephants, perissodactyls, humans, dogs, other wildlife and some marsupials	Yes	Yes	No	No	Yes: OIE-listed, not present in Australia
Tuberculosis (*Mycobacterium africanum, M. bovis, M. microti* and *M. tuberculosis*)	Badgers, bovids, deer, elephants, humans, perissodactyls, pigs, possums and other mammals	Yes (*M. bovis*)	Yes	Some species not present in animals in Australia	Yes	Yes: OIE-listed, some species not present in Australia
Venezuelan equine encephalomyelitis	Birds, equids, humans and other animals	Yes	Yes	No	No	No: No evidence zoo elephants play a significant role in disease epidemiology
Vesicular stomatitis	Bovids, equids, pigs and humans	Yes	Yes	No	Yes	No: No evidence zoo elephants play a significant role in disease epidemiology
Warble fly (*Hypoderma bovis, H. lineata*)	Cattle, rarely equids and humans	No	Yes	No	Yes	No: No evidence zoo elephants play a significant role in disease epidemiology
West Nile fever	Birds, equids, humans and other animals	Yes	Yes	Yes (some strains)	Yes	No: Present in Australia, no evidence zoo elephants play a significant role in disease epidemiology
Yersiniosis (plague) (*Yersinia pestis*)	Rodents, cats, dogs, humans and serological evidence in an elephant	No	Yes	No	Yes	No: No evidence zoo elephants play a significant role in disease epidemiology

Conclusion

The following diseases were retained for risk review on the basis of the information provided in Table 3.1.

OIE-Listed Diseases

Viruses

- foot-and-mouth disease
- rabies

Bacteria

- anthrax (*Bacillus anthracis*)
- bovine tuberculosis (*Mycobacterium bovis*)
- haemorrhagic septicaemia (*Pasteurella multocida* serotypes 6:b and 6:e)

Insects

- New World screwworm (*Cochliomyia hominivorax*)
- Old World screwworm (*Chrysomya bezziana*)

Protozoa

- surra (*Trypanosoma evansi*)
- trypanosomosis (tsetse-transmitted) (*Trypanosoma brucei brucei, T. congolense, T. vivax*)

Other Diseases

Viruses

- elephant endotheliotropic herpesvirus
- elephant pox (cowpox virus)

Bacteria

- tuberculosis (*Mycobacterium africanum, M. microti* and *M. tuberculosis*)

Helminths: Trematodes

- various diseases caused by trematodes

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4 Risk reviews

4.1 Anthrax

Anthrax is an infectious bacterial disease of humans, animals and several species of birds. It is caused by a spore-forming bacterium, *Bacillus anthracis*, and is characterised by rapidly fatal septicaemia with widespread oedema, haemorrhage and necrosis.

Domesticated and wild ruminants are most susceptible, equids less susceptible and omnivores and carnivores are relatively resistant. Although *B. anthracis* occurs worldwide, outbreaks occur most commonly in parts of Africa, Asia and the Middle East, with sporadic cases in Australia, Europe and the United States (CFSPH 2007a; OIE 2011a). Outbreaks can affect wildlife, including elephants (Okewole et al. 1993; Promed Mail 2006; Promed Mail 2010; Promed Mail 2011).

Anthrax is a multiple species, OIE-listed disease (OIE 2012i). It is a nationally notifiable animal disease in Australia (DAFF 2011a) and control measures include vaccination, premises quarantine, movement controls and surveillance (Animal Health Australia 2005).

Transmission occurs by entry through skin lesions, ingestion or inhalation of spores in soil or on plants. Contaminated bone meal and other feed can also spread anthrax, and flies can disseminate anthrax mechanically. Outbreaks are often associated with heavy rainfall, flooding, or drought (CFSPH 2007a).

The incubation period is generally 1–7 days, but spores can germinate in the lungs up to six weeks post-infection (CFSPH 2007a). Affected animals usually die within 1–3 days, with some surviving up to seven days.

B. anthracis is readily isolated from blood or tissues of a recently dead animal that died of anthrax.

There are no previous biosecurity measures for anthrax. The Code recommendations include premises freedom or vaccination (OIE 2012a).

Conclusion

Anthrax is present in approved countries. In Australia it is a nationally notifiable disease and control measures are in place. Accordingly and based on the preceding information, risk management measures are warranted.

Australia's biosecurity measures for anthrax for elephants are:

- For 20 days immediately before export (or if applicable, before pre-export isolation) the elephant did not reside on any premises in the country of export where clinical, epidemiological or other evidence of anthrax occurred in any species during the previous 20 days and the disease is compulsorily notifiable.

4.2 Elephant endotheliotropic herpesvirus

Elephant endotheliotropic herpesvirus (EEHV) causes an often fatal haemorrhagic disease, predominantly affecting juvenile Asian elephants (*Elephas maximus*)

(Richman et al. 1999). EEHV belongs to the subfamily Betaherpesvirinae and the genus Proboscivirus (Davison et al. 2009). These viruses are not known to exist outside elephant hosts (Latimer et al. 2011). There are at least seven distinct species or subspecies of EEHV identified as EEHV-1 to EEHV-6, with EEHV-1 divided into two major variants, EEHV-1A and EEHV-1B. EEHV-1 is the most common isolate from Asian elephants (Latimer et al. 2011; Richman and Hayward 2011).

EEHV has been found in Asia, Europe, the Middle East and North America.

EEHV infection is not an OIE-listed disease and it is not a nationally notifiable animal disease in Australia.

The disease has a very rapid course of just one to seven days. Clinical signs include anorexia, lethargy, oedema and tongue cyanosis. Pathological examination shows microvascular damage, haemorrhaging and focal necrotic lesions in all major internal organs (Richman et al. 2000). Initially, findings suggested that African elephants were acting as subclinically infected carriers of at least two herpesviruses, with one potentially lethal to Asian elephants and the other fatal in young African elephants. However, there were deaths due to EEHV in closed Asian elephant herds with no history of exposure to African elephants (Richman et al. 1999). Furthermore, virus was detected in swabs from healthy Asian elephants (Hardman et al. 2011; Stanton et al. 2010). Therefore it is likely that both African and Asian elephants act as carriers of the viruses and are potential sources of infection to naive elephants that have insufficient immunological protection (Richman and Hayward 2011).

Diagnosis in clinically affected animals may be achieved using a polymerase chain reaction (PCR) assay on a sample of whole blood. However, the virus is only present in the blood for a few weeks post infection as there is not a persistent viraemia (Richman and Hayward 2011). TaqMan real-time PCR may be able to detect subclinically infected carriers of EEHV-1 using swabs from the conjunctiva, palate, vulva and trunk washes (Hardman et al. 2011; Stanton et al. 2010). However, further research is needed to validate the tests and they are not commercially available.

The human antiviral drugs famciclovir and ganciclovir have been used to treat affected Asian elephants with variable success (Schmitt et al. 2000; Wiedner et al. 2011).

Australia's previous biosecurity measures for EEHV in elephants included premises freedom. There are no recommendations in the Code.

Conclusion

EEHV is present in approved countries and it is not reported in Australia. Accordingly and based on the preceding information, risk management measures for EEHV continue to be warranted.

Australia's biosecurity measures for EEHV for elephants are:

- For 60 days immediately before export (or if applicable, before pre-export isolation) the elephant did not reside on any premises in the country of export where clinical evidence of elephant endotheliotropic herpesvirus occurred during the previous 12 months before export.

4.3 Elephant pox

Elephant pox is a serious, infectious viral disease characterised by inflammation of localised areas of the skin and/or mucous membranes and often results in generalised or systemic disease. It is caused by a strain of cowpox virus in the genus Orthopoxvirus (Meyer et al. 1999). Other members of the orthopoxvirus genus include camelpox, gerbilpox, monkeypox, mousepox, vaccinia and variola (small pox) viruses.

Cowpox virus has a broad host range and is believed to persist in a reservoir comprising various rodents indigenous to parts of Europe and adjoining Asia. Other hosts include cats, cattle, humans and zoo animals (Damon 2007).

Elephant pox is not an OIE-listed disease and it is not a nationally notifiable animal disease in Australia.

Infection occurs through direct contact with fomites, other infected animals, reservoir hosts (rodents) or rodent predators such as the domestic cat (Fowler 2006a).

Clinical signs in elephants are variable ranging from mild conjunctivitis to systemic illness and death (Fowler 2006a). Infection has also resulted in abortion and congenital infection of an elephant foetus (Wisser et al. 2001).

Clinical signs provide a presumptive diagnosis, but a definitive diagnosis is reached by histopathology, electron microscopy and identification of the agent by virus isolation (Fowler 2006a; Wisser et al. 2001) and molecular techniques (Meyer et al. 1999; Wisser et al. 2001).

Vaccination using the vaccinia virus in elephants in zoos in Europe has been employed with good success (Fowler 2006a).

Australia's previous biosecurity measures for elephant pox included premises freedom. There are no recommendations in the Code.

Conclusion

Cowpox virus is present in approved countries and it is not reported in Australia. Accordingly and based on the preceding information, risk management measures for cowpox virus infection continue to be warranted.

Australia's biosecurity measures for cowpox virus infection for elephants are:

- For 90 days immediately before export (or if applicable, before pre-export isolation) the elephant did not reside on any premises in the country of export where clinical, epidemiological or other evidence of cowpox virus infection occurred during the previous 12 months before export.

4.4 Foot-and-mouth disease

Foot-and-mouth disease (FMD) is a highly contagious viral disease that primarily affects cloven-hoofed animals. FMD is endemic in most of Africa, Asia, the Middle East and parts of South America. Much of Europe is free as is all of North America and the Australasian region.

There are reports of other species being infected with FMD virus including elephants (Howell et al. 1973), hedgehogs, kangaroos (Bhattacharya et al. 2003; Snowdon

1968), wallabies and wombats (Snowdon 1968). Clinical FMD predominantly affects captive elephants. Free-ranging elephants are rarely affected during outbreaks in their territory (Fowler 2006a; Howell et al. 1973).

FMD is a multiple species OIE-listed disease (OIE 2012i). It is absent from Australia and is a nationally notifiable animal disease (DAFF 2011a).

The incubation period in elephants ranges from three to four days, with clinical signs lasting 10–20 days in uncomplicated cases. Clinical signs in elephants include anorexia, pyrexia, lameness and vesicles on oral and nasal mucous membranes. FMD spreads by direct contact between animals and contact with infected animal products, airborne virus or contaminated fomites.

A number of diagnostic tests are available for detecting and identifying whole virus, virus antigen and viral antibodies (OIE 2012d).

Australia's previous biosecurity measures for FMD included country freedom or zone freedom and testing. The Code recommendations include country freedom or zone freedom and testing (OIE 2012c).

Conclusion

FMD is not present in approved countries and it is not present in Australia. Accordingly and based on the preceding information, risk management measures continue to be warranted.

Australia's biosecurity measures for FMD for elephants are:

- For 90 days immediately before export (or if applicable, before pre-export isolation) the elephant was continuously resident and free of quarantine restriction in a country where no clinical, epidemiological or other evidence of foot-and-mouth disease occurred during the previous 12 months before export and the disease is compulsorily notifiable.

4.5 Haemorrhagic septicaemia

Haemorrhagic septicaemia (HS) is a highly fatal disease of cattle and water buffalo caused by specific serotypes of the bacterium *Pasteurella multocida*. HS is endemic in tropical and subtropical regions including South-East Asia, India and regions of Africa (Bastianello and Henton 2004), where epidemic outbreaks have been associated with high morbidity and mortality rates (OIE 2008). Cases have also been reported in Canada and the United States (Bastianello and Henton 2004).

HS has been described in wild mammals, and was either reported or suspected in African buffaloes, Bali cattle, bison, goats, sheep, camels, deer, yaks, donkeys, horses, pigs, elephants and poultry (Bastianello and Henton 2004; de Alwis 1999).

HS (*Pasteurella multocida* serotypes 6:b and 6:e) is an OIE-listed disease (OIE 2012i). It is absent from Australia and is a nationally notifiable animal disease (DAFF 2011a).

P. multocida is shed in respiratory aerosols, saliva, urine, faeces and milk by both active carriers and clinical cases. Infection is through direct contact with infected shedding animals, or indirect methods such as exposure to infected fomites or

aerosols (Bastianello and Henton 2004). Contaminated feed and vectors such as ticks and biting insects have also been implicated in transmission (Radostits et al. 2007a).

Clinical signs described in elephants include nasal discharge, abdominal and limb oedema, respiratory distress, recumbency and sudden death (Harish et al. 2009).

Diagnosis is based on clinical signs, gross lesions, morbidity and mortality patterns. Confirmation requires isolation and characterisation of the pathogen using conventional and molecular techniques. True septicaemia in HS occurs at the terminal stage of the disease, therefore blood samples should be taken from sick animals immediately before death. For animals in the early stages of the disease, *P. multocida* may not be present in blood. The bacteria are also not consistently present in the nasal secretions or body fluids of sick animals (OIE 2012e).

Vaccination of elephants reportedly results in a good antibody response and it is recommended as part of a preventative health care program in elephants that are at risk (Atthi et al. 2003).

Australia's previous biosecurity measures for HS included premises freedom and vaccination. The Code recommendations for bovids include country or zone freedom, testing and vaccination (OIE 2012f).

Conclusion

HS is present in approved countries and it is not present in Australia. Accordingly and based on the preceding information, risk management measures continue to be warranted.

Australia's biosecurity measures for HS for elephants are:

- For 90 days immediately before export (or if applicable, before pre-export isolation) the elephant was continuously resident and free of quarantine restriction in a country where no clinical, epidemiological or other evidence of haemorrhagic septicaemia occurred during the previous 12 months before export and the disease is compulsorily notifiable.

OR

- For 90 days immediately before export (or if applicable, before pre-export isolation) the animal did not reside on any premises in the country of export where clinical, epidemiological or other evidence of haemorrhagic septicaemia occurred during the previous 12 months before export.

  AND

- During the 12 months immediately before export the elephant was vaccinated against haemorrhagic septicaemia with an approved vaccine.

4.6 Rabies

Rabies is a virus in the genus Lyssavirus of the family Rhabdoviridae (Tordo et al. 2005), which causes a progressively fatal encephalitis in all species of mammals. Lyssaviruses are classified phylogenetically into seven genotypes. Genotype 1 is 'classical rabies' and there are six other genotypes of rabies-related viruses. All genotypes can cause disease in mammals. The genotype has not been specified in cases reported in elephants.

Rabies is a multiple species OIE-listed disease (OIE 2012i). It is absent from Australia and is a nationally notifiable animal disease (DAFF 2011a).

The incubation period is variable. For the purposes of importation, the Code recommends that the incubation period for rabies is six months (OIE 2012j). Clinical signs described in elephants include aggression, restlessness, trunk paralysis, recumbency, staggering gait, and repeated falling and rolling (Wimalaratne and Kodikara 1999).

Rabies is usually transmitted through the bite of a rabid animal, particularly carnivores. Large mammals are considered dead-end hosts because they usually succumb to disease and die without further transmission.

There are a number of tests available to confirm the diagnosis of rabies but these require post mortem to obtain samples of brain tissue. These include antigen detection assays such as fluorescent antibody tests, nucleic acid detection assays such as PCR assays, and viral cultures such as the rabies tissue culture infection test (OIE 2011b).

No reliable diagnostic tests for rabies are available for use in live animals.

There are no previous biosecurity measures for rabies. The Code recommendations include country or premises freedom (OIE 2012j).

Conclusion

Rabies is present in approved countries and it is not present in Australia. Accordingly and based on the preceding information, risk management measures are warranted.

Australia's biosecurity measures for rabies for elephants are:

- For 180 days immediately before export (or if applicable, before pre-export isolation) the animal was continuously resident and free of quarantine restriction in a country where no clinical, epidemiological or other evidence of rabies occurred during the previous two years and the disease is compulsorily notifiable.

OR

- For 180 days immediately before export (or if applicable, before pre-export isolation) the animal did not reside on any premises in the country of export where clinical, epidemiological or other evidence of rabies occurred during the previous 12 months and the disease is compulsorily notifiable.

4.7 Screw-worm-fly myiasis

Two species of flies cause screw-worm-fly myiasis—New World screw-worm, *Cochlioma hominivorax* and Old World screw-worm, *Chrysomya bezziana*. Both species are members of the family Calliphoridae, subfamily Chrysomyinae. Screw-worms are the larvae of flies that feed on living flesh. 'New World' refers to the Americas and 'Old World' to Africa, Asia and Europe. *C. hominivorax* has never been reported in Canada and was eradicated from the United States with the last cases reported in 1982 (Branckaert et al. 1991). *C. bezziana* has not been reported in European countries, New Zealand or Singapore. However, *C. bezziana* is endemic in Malaysia (OIE 2012g). In Hong Kong, *C. bezziana* myiasis was reported in dogs, cattle and pigs, and was thought to have been introduced from southern China (FEHD 2011).

Both species of flies can affect all warm-blooded animals, including humans. Infections in birds are rare (CFSPH 2007b). *C. hominivorax* and *C. bezziana* have similar climatic requirements. Australia is the only continent with a suitable climate where screw-worm-fly has not established.

New World screwworm and Old World screwworm are multiple species OIE-listed diseases (OIE 2012i). They are absent from Australia and are nationally notifiable animal diseases (DAFF 2011a).

Screw-worm-flies tend to be attracted to parts of the animal exposed by injury or husbandry operations where skin was perforated and exudes blood. Three instars of larval development occur after adult females lay eggs in the living host tissue. The third stage has heavy bands of backwardly directed thorn-like spines—hence the name 'screw-worm'. Screw-worm-fly myiasis produces a characteristic odour. Secondary infection and tissue necrosis follow in untreated cases, resulting in weight loss, debility and death.

Identification of adult flies confirms the presence of screw-worm-fly in a region, but identification of larvae from clinical cases is required to confirm individual animal infection.

There are no previous biosecurity measures for screw-worm-fly myiasis. The Code recommendations include country freedom or inspection for external parasites, treatment of infested wounds and prophylactic treatment for domestic and wild mammals (OIE 2012h).

Conclusion

C. hominivorax and *C. bezziana* are not present in approved countries and are not present in Australia. Accordingly and based on the preceding information, risk management measures are warranted.

Australia's biosecurity measures for screw-worm-fly myiasis for elephants are:

- For 60 days immediately before export (or if applicable, before pre-export isolation) the animal was continuously resident and free of quarantine restriction in a country where no clinical, epidemiological or other evidence of screw-worm-fly (*Cochliomyia hominivorax* or *Chrysomya bezziana*) myiasis occurred during the previous 12 months.

4.8 Surra

Surra is a disease caused by the flagellate protozoan *Trypanosoma evansi*, which can affect many domesticated mammals and some wild species including elephants. Surra is most severe in donkeys, mules, deer, camels, llamas, cats and dogs (Geering et al. 1995).

T. evansi is the most widely distributed pathogenic trypanosome and is found in Africa north of the tsetse fly belt, Asia, Central and South America and the Middle East (Radostits et al. 2007c).

Surra is a multiple species OIE-listed disease (OIE 2012i). It is absent from Australia and is a nationally notifiable animal disease (DAFF 2011b).

T. evansi is transmitted mechanically, primarily by the horse fly (*Tabanus* spp.) and to a lesser degree by the stable fly (*Stomoxys* spp.) (Geering et al. 1995). Carnivores can become infected after feeding on infected tissues or during fighting (Moloo et al. 1973). Transmission in milk and by the venereal route might also be possible (CFSPH 2009b).

Studies in horses indicate the majority of tabanids return to the original animal if feeding is interrupted. Furthermore, tabanid feeding is mostly limited to within 50 metres of the original horse (Foil 1983).

Potential tabanid vectors and reservoir hosts for trypanosomes, such as feral pigs, occur in Australia (Reid 2002). Experimental studies have shown that two species of wallaby, the agile wallaby (*Macropus agillis*) and the dusky pademelon (*Thylogale brunii*), are susceptible to *T. evansi* (Reid et al. 2001).

Infection may be subclinical or result in signs ranging from chronic wasting to acute death. Clinical signs of acute disease in elephants include pyrexia, depression, weakness and oedema. Death occurs within a few weeks. Chronic surra is characterised by intermittent episodes of pyrexia, anaemia, dependent oedema and emaciation. Elephants with chronic infection may survive 3–4 years depending on the level of care (Fowler 2006b).

A definitive diagnosis requires laboratory methods to detect the parasite. When parasitaemia is high, examination of blood films or lymph node materials may reveal the trypanosomes. In more chronic cases when parasitaemia is usually low, methods of parasite concentration, polymerase chain reaction or the inoculation of laboratory rodents are required (OIE 2012k). Serological tests include an antibody-detection enzyme-linked immunosorbent assay, a card agglutination test and an indirect immunofluorescent antibody test (OIE 2012k).

Several drugs have been used in an attempt to eliminate trypansomes from various species of animals, including melarsomine and suramin in elephants. Responses to the drugs are variable and unreliable (Fowler 2006b).

Australia's previous biosecurity measures for surra included country freedom or premises freedom and testing. There are no recommendations in the Code.

Conclusion

Surra is present in approved countries and it is not present in Australia. Accordingly and based on the preceding information, risk management measures continue to be warranted.

Australia's biosecurity measures for surra for elephants are:

- For 60 days immediately before export (or if applicable, before pre-export isolation) the animal was continuously resident and free of quarantine restriction in a country where no clinical, epidemiological or other evidence of surra occurred in any species during the previous 12 months before export.

OR

- For 60 days immediately before pre-export isolation the elephant did not reside on any premises in the country of export where clinical, epidemiological or other evidence of surra occurred during the previous 12 months before export.

AND

- The elephant was held in pre-export quarantine for at least 21 days immediately before export. During this time the elephant was isolated from other animals not of equivalent surra status.

AND

- The pre-export quarantine facility is located in a defined area where no clinical epidemiological or other evidence of surra has occurred in elephants for 12 months immediately before export.

AND

- During pre-export quarantine the elephant was isolated and not held, housed or exercised within 50 metres of camelids, equids or ruminants.

AND

- Blood samples were taken from the elephant immediately at the start of pre-export quarantine and tested using an antibody-detection enzyme-linked immunoabsorbent assay **or** card agglutination test **and** microhaematocrit centrifugation technique **or** polymerase chain reaction assay as described in the OIE Manual for surra, with negative results in each case.

4.9 Trematodes

Elephants have the potential to harbour a diverse range of internal parasites including trematodes. Some trematodes cause serious zoonoses, such as schistosomiasis. Other trematodes cause significant disease in domestic animals, such as fascioloiasis. Although some trematodes, for example *Fasciola hepatica*, are endemic in Australia, there are a large number of trematodes that remain exotic.

There is limited information regarding trematode infections in elephants. Species of *Fasciola* that affect elephants include *F. hepatica* and *F. jacksoni* (the elephant liver fluke) (Fowler 2006b). The blood fluke *Bivitellobilharzia nairi* is a schistosome that was reported in elephants in India (Sundaram et al. 1972), and Sri Lanka (Agatsuma et al. 2004).

F. hepatica occurs in cooler climates, has a worldwide distribution (Radostits et al. 2007b) and is endemic in all Australian states except Western Australia. The distribution of *F. jacksoni* is not well defined. It was documented in elephants in India and Asia (Fowler 2006b) and has not been reported in Australia.

Schistosomes are found in Africa, India, the Far East, East and Southeast Asia, and Pakistan (Kassai 1999). Neither the intermediate hosts—freshwater snails—nor the schistosome species are present in Australia (J. Walker, University of Sydney, pers. comm. May 2009).

Diseases caused by trematodes are not OIE-listed diseases.

F. jacksoni transmission depends on the presence of snail intermediate hosts, an aquatic environment and warm temperatures. The prepatent period is about eight weeks (Fowler 2006b).

For schistosomes, transmission is seasonal and it is related to high rainfall and high temperature (Urquhart et al. 1996). The prepatent period is usually 30 days or longer.

Diagnosis is based on a combination of clinical signs, seasonal occurrence, weather patterns, history of flukes in endemic areas, examination of faeces for fluke eggs and post-mortem examination findings. Detection of infestations by trematodes is not always reliable, particularly following recent infestation, when parasites are in the pre-patent phase of their life cycle in mild or chronic infections.

Management and treatment for trematodes, like other internal parasites, requires an understanding of the life cycle, including intermediate and reservoir hosts where appropriate. Not only should the principal host be treated but it is also important to eliminate the life cycle stages from the environment and to control the animals' activities and diet to reduce the likelihood of exposure. The drugs albendazole, clorsulon, oxyclozanide and triclobendazole have been used successfully to treat elephants with trematode infestations (Fowler 2006b; Islam 1997).

Australia's previous biosecurity measures for trematodes in elephants included diagnostic testing or treatment. There are no recommendations in the Code.

Conclusion

Trematodes are present in approved countries and some species are not present in Australia. Accordingly and based on the preceding information, risk management measures for trematodes continue to be warranted.

Australia's biosecurity measures for trematodes for elephants are:

- During the 30 days immediately before export faecal flotation was undertaken on three faecal samples collected on separate mornings within a one-week period and all samples were negative for trematode eggs.

OR

- During the 30 days immediately before export the elephant was treated with an approved anthelmintic (or combination of anthelmintics) effective against trematodes and the active ingredient/s and dose rate must be recorded on the veterinary certificate.

4.10 Trypanosomosis

Trypanosomes are blood-borne protozoan parasites that cause diseases of livestock and humans and are transmitted by haematophagous arthropods. *Trypanosoma brucei brucei*, *T. congolense*, *T. simiae* and *T. vivax* cause trypanosomosis, also known as nagana, which results in anaemia, loss of body condition and emaciation in livestock.

Trypanosomes are found in regions of Africa wherever the tsetse fly is endemic between latitude 15 °N and 29 °S, from the southern edge of the Sahara desert to Zimbabwe, Angola and Mozambique. *T. vivax* has spread beyond the 'tsetse fly belt' through mechanical transmission by biting flies and is found in South and Central America and the Caribbean (CFSPH 2009a). Tsetse flies are not present in Australia; however, mechanical transmission is possible by biting flies in Australia as there are suitable vectors in the genera *Stomoxys* and *Tabanus* in some regions.

Trypanosomes occur in the blood of a wide range of wild and domestic hosts. More than 30 species of wild animals, including African elephants can become carriers of pathogenic trypanosomes, acting as reservoirs of infection for vectors and livestock

(Connor and van den Bossche 2004). Information is lacking regarding trypanosomosis in Asian elephants.

Trypanosomosis (tsetse-transmitted) is an OIE-listed disease of cattle (OIE 2012i). It is absent from Australia and is a nationally notifiable animal disease (DAFF 2011a).

The incubation period for trypanosomosis ranges from four to 20 days in most livestock species (Radostits et al. 2007c). Infections with more virulent isolates have a shorter incubation period (CFSPH 2009a).

Trypanosomes in Africa that cause disease in livestock (*T. brucei brucei*, *T. congolense* and *T. simiae*) require development in tsetse flies. The parasites are present in the saliva of an infected tsetse fly and transmitted when the fly bites an animal (Radostits et al. 2007c). *T. vivax* does not require tsetse flies to develop and is found in parts of Africa free or cleared of tsetse flies, and parts of Central and South America (OIE 2009).

Trypanosomosis can be diagnosed using microscopic examination of blood films. Serological tests include an indirect fluorescent antibody test and an antibody-detection enzyme-linked immunosorbent assay (OIE 2008).

There are no previous biosecurity measures for trypanosmosis (*T. vivax*) and there are no recommendations in the Code.

Conclusion

Tsetse-transmitted trypanosomes (*T. brucei brucei*, *T. congolense* and *T. vivax*) are not present in approved countries and are not present in Australia. Tsetse flies are not present but competent vectors for *T. vivax* are present in Australia. Accordingly and based on the preceding information, risk management measures for *T. vivax* are warranted.

Australia's biosecurity measures for *T. vivax* for elephants are:

- For 60 days immediately before export (or if applicable, before pre-export isolation) the animal was continuously resident and free of quarantine restriction in a country where no clinical, epidemiological or other evidence of *T. vivax* has occurred in any species during the previous 12 months before export.

4.11 Tuberculosis

Tuberculosis is a chronic wasting disease caused by bacteria in the genus Mycobacterium. In mammals Mycobacterium tuberculosis-complex organisms, which include *M. tuberculosis*, *M. bovis*, *M. africanum*, *M. microti*, *M. canetti*, *M. caprae*, and *M. pinnipedii*, are responsible for the disease (Mikota 2008). The most important of these are *M. bovis* and *M. tuberculosis*. *M. tuberculosis* is the main cause of tuberculosis in humans and the most common cause of tuberculosis in elephants (USAHA Elephant Tuberculosis Subcommittee 2012). *M. bovis* has only been isolated once from an African elephant following post mortem examination (Lyashchenko et al. 2006).

Tuberculosis is widespread throughout the world. The disease is now emerging as a significant disease of Asian elephants in human care in Asia, Europe, Russia and the United States. A single case was confirmed at a zoo in Australia (Vogelnest 2012).

Tuberculosis (caused by *M. tuberculosis*) is not an OIE-listed disease and is not a nationally notifiable animal disease in Australia. Bovine tuberculosis is an OIE-listed disease (OIE 2012i). It is absent from Australia and is a nationally notifiable animal disease (DAFF 2011a).

Transmission occurs most commonly via the respiratory route or occasionally via the alimentary route. Elephants are usually infected from humans; however, transmission between elephants also occurs. Faeces, urine, genital discharges, milk, feed and water may contain contaminated droplets. Elephant behaviour, which includes blowing air or fluid from the trunk and using the trunk to touch and explore, facilitates transmission when an elephant is actively shedding *M. tuberculosis* organisms (Vogelnest 2012).

Clinical signs in elephants are mostly non-specific and may include inappetance, weight loss, reluctance to do strenuous work and occasionally ventral oedema (Montali et al. 2001). Many infected elephants do not exhibit clinical signs.

Diagnosis of tuberculosis is complex as tests lack sensitivity or specificity. In elephants, the triple trunk wash method, which involves the collection of washings from the trunk on three separate days within a one week period, is required to detect the disease agent. The samples are submitted for culture, polymerase chain reaction testing and acid-fast staining. As shedding of tuberculosis organisms is intermittent, the trunk wash technique has low sensitivity. In addition, culture can take 6–8 weeks to get a result. Despite the limitations, culture is important for identification of the disease agent and to assist with treatment options by determining drug sensitivities.

The intradermal tuberculin test used as a screening test in humans and cattle was shown to be unreliable in elephants (Lewerin et al. 2005; Mikota et al. 2001). One study demonstrated a sensitivity of only 16.7% and therefore the test is not recommended for elephants.

There are several serological test options that have shown good sensitivity for detecting tuberculosis in elephants. These include tests that use lateral flow technology and tuberculosis specific antigens to detect serum antibodies, such as the ElephantTB STAT-PAK® assay and the dual-path platform test (DPP™ VetTB assay). There is also the multi-antigen print immunoassay (MAPIA) that uses a panel of multiple recombinant antigens of *M. tuberculosis* and *M. bovis* (Lyashchenko et al. 2006). Results suggest that these tests have excellent sensitivity and specificity (Greenwald et al. 2009; Lyashchenko et al. 2012).

The guidelines for the control of tuberculosis in elephants from the United States Animal Health Association recommend that all captive elephants are tested annually by culture and with a serological antibody detection test. Elephants with a reactive antibody detection test result should be tested using the confirmatory MAPIA™ (USAHA Elephant Tuberculosis Subcommittee 2012).

Australia's previous biosecurity measures for tuberculosis in elephants included premises freedom and testing. Recommendations in the Code are for *M. bovis* and bovid species only. Those recommendations include country, zone or compartment freedom and testing (OIE 2012b).

Conclusion

Tuberculosis is present in approved countries. Accordingly and based on the preceding information, risk management measures continue to be warranted.

Australia's biosecurity measures for tuberculosis for elephants are:

- For 180 days immediately before pre-export isolation the elephant did not reside on any premises in the country of export where clinical, epidemiological or other evidence of tuberculosis occurred during the previous five years before export.

  AND

- The elephant was held in pre-export quarantine for at least 90 days immediately before export. During this time the elephant was isolated from animals not of equivalent health status.

  AND

- A blood sample was taken from the elephant immediately at the start of pre-export quarantine and tested using a serological antibody detection test (e.g. TB STAT-PAK®or DPP™ VetTB assay) or a multi-antigen print immunoassay (MAPIA™), with negative results.

  AND

- Within the first two weeks after the start of pre-export quarantine, on three separate mornings within a one week period, wash samples from the trunk were collected before water was offered to the elephant. The samples were transported either fresh and chilled, or frozen, and tested for mycobacteria of the *Mycobacterium tuberculosis* complex (*M. tuberculosis, M. bovis, M. africanum* and *M. microti*) by culture and polymerase chain reaction assay, with negative results in each case.

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5 Biosecurity measures for the importation of zoo elephants

The biosecurity measures described in this policy review apply to the importation of zoo elephants from approved countries.

There are general risk management measures common to most Australian import policies for zoo animals that are required, including:

- the animal/s must be resident in an approved, licensed or registered zoo or wildlife park in the exporting country since birth or for at least 12 months immediately before export, unless otherwise approved by DAFF. The residency requirement may be achieved in more than one approved country or holding institution if specifically authorised by DAFF and the biosecurity measures for each country of residence and holding institution must be met
- the premises of origin (zoo or wildlife park) must provide separation from other animal populations, be under veterinary supervision and have a health monitoring program
- the animal/s must be held in pre-export quarantine for at least 30 days, during which it is inspected at least daily for signs of disease, treated for internal and external parasites, and tested for diseases in accordance with recommendations arising from the policy review
- the animal/s must be transported to a quarantine approved premises (QAP) in Australia in a manner that ensures no direct exposure to Australian animals en route and must undergo a period of post-arrival quarantine of at least 30 days
- the receiving institution must be approved under relevant Australian state or territory legislation to hold the species being imported.

The World Organisation for Animal Health (OIE) Terrestrial Animal Health Code (the Code) recommends periods (ranging from less than 30 days to 90 days) that an animal must be resident on premises free from certain diseases. For elephants, with typically small group sizes and limited knowledge about disease occurrence, 90 days is recommended as the residency period required for certification of premises freedom where applicable.

The Code also recommends a period in which premises should remain free from certain diseases ranging from less than 30 days up to two or more years. This applies to the time period before an animal enters pre-export isolation, if applicable.

For disease agents of biosecurity concern that have no recommendations in the Code for the periods of premises residency and/or disease freedom, the periods are based on the epidemiology and information detailed in the relevant sections in Chapter 4.

The biosecurity measures for the importation of zoo elephants are in Section 5.1. The residency periods and timing of tests in Section 5.1 are based on recommendations in the Code and are amended for consistency and clarity of certification.

The operational and quarantine facilities requirements apply to all elephants. An example of the biosecurity measures for a hypothetical approved country, Country X,

is provided in Section 5.2. These sections include the amended residency period of 12 months and timing for tests and will be included in the specific measures developed for each country.

5.1 Biosecurity measures for the importation of zoo elephants from approved countries

Documentation

Each elephant must travel with an original international veterinary certificate that conforms to Article 5.10.2. of the Code, signed by the Official Veterinarian of the country of export.

These biosecurity requirements apply to elephants.

An **Official Veterinarian** means a veterinarian authorised by the Veterinary Authority of the country of export to perform certain official tasks associated with animal health and/or public health, and inspections of commodities and, when appropriate, to certify in conformity with the Certification Procedures of Chapter 5.2 of the Code.

The veterinary certificate must:

- be written in English and a language understood by the Official Veterinarian of the country of export
- meet the requirements of the '**certification before export**' section and state that all the **pre-export quarantine requirements** have been met
- provide identification for each elephant (microchip number/site or other permanent identification e.g. tattoo) including description, species, sex and age
- include the name and address of the zoological institution of origin
- include the name and address of the exporter and importer and identify the import permit against which it was issued.

The Official Veterinarian must:

- provide a separate veterinary certificate for each elephant
- sign, date and stamp (with the stamp of the Veterinary Authority) each page of the veterinary certificate and all attached documents (e.g. laboratory reports) that form part of the extended veterinary certification
- endorse each page of copies of supporting documents with date, signature and Official Veterinarian stamp
- record his/her name, signature and contact details on the veterinary certificate.

Pre-export quarantine requirements

Pre-export quarantine

Any variation from the **pre-export quarantine requirements** must be specifically authorised by DAFF.

Location

The pre-export quarantine facility must be located within a government registered or licensed zoological institution or wildlife park that is under veterinary supervision and in which the animals held in the premises are subject to a health monitoring program.

Facilities

1. The pre-export quarantine facility must meet the country and premises requirements specified in the **certification before export** section.
2. The entire pre-export quarantine facility must be surrounded by a physical barrier (e.g. fencing) that provides sufficient security to isolate the elephants in pre-export quarantine from all other animals except those that meet all the conditions in these biosecurity measures.
3. The pre-export quarantine facility including buildings, yards, fences, feeding and watering arrangements must address animal welfare considerations.
4. Buildings holding elephants in the pre-export quarantine facility must be constructed so that they can be cleaned and disinfectant applied and must be maintained in good order.
5. The pre-export quarantine facility must have a separate area for the cleaning and disinfection of vehicles for transporting elephants, and facilities for the safe loading and unloading of elephants.
6. The pre-export quarantine facility must have facilities for veterinary examination and collection of samples.

Operation

1. The pre-export quarantine facility must have current approval from DAFF and the Veterinary Authority of the exporting country before commencement of pre-export quarantine.
2. DAFF may audit the approved pre-export quarantine facility.
3. All pre-export quarantine operations and procedures must be detailed in Standard Operating Procedures (SOPs), consistent with a risk-based approach and approved by DAFF.
4. The Official Veterinarian must inspect the pre-export quarantine facility before commencement of pre-export quarantine and must ensure that the facility was cleaned and disinfectant applied to his/her satisfaction.
5. Pre-export quarantine must be under the supervision of the Official Veterinarian.
6. The pre-export quarantine period commences from the time the last elephant in the export consignment has entered the pre-export quarantine facility and all

elephants have been examined by the Official Veterinarian.

7. All equipment used in feeding, handling and treating elephants in pre-export quarantine must be new or cleaned and disinfected before entry, and must be used only in the facility during pre-export quarantine.
8. During pre-export quarantine, the facility should be occupied only by elephants of the export consignment. If other elephants are present, they must meet all the conditions in these biosecurity measures.
9. Only personnel specifically authorised by the Official Veterinarian are permitted entry to the pre-export quarantine facility. Details of all visitor entries must be recorded.
10. Other than inspections, visits and treatments required for certification, all veterinary visits, health problems, tests, test results, treatments and reasons for removal from pre-export quarantine of any animal, must be reported to the Official Veterinarian within 24 hours, and to DAFF within 48 hours.
11. A detailed health record must be kept for each elephant and be available to the Official Veterinarian and to DAFF on request.
12. Elephants that leave the facility during pre-export quarantine for any reason cannot rejoin the consignment during pre-export quarantine.

Certification before export

The Official Veterinarian must certify:

1. During pre-export quarantine:
   a. the elephant was not vaccinated
   b. all elephants in the pre-export quarantine facility remained free from evidence of infectious or contagious disease and had no contact with elephants except those that meet all the conditions in these biosecurity measures
   c. all samples for testing were taken by the Official Veterinarian or a veterinarian authorised by the Official Veterinarian
   d. all testing was conducted in a laboratory approved and monitored by the Veterinary Authority in the country of export. If there is no approved laboratory in the country of export, testing must be undertaken in a laboratory recognised by the Veterinary Authority of the country of export.
2. All of the following risk management measures apply:

Anthrax

For 20 days immediately before export (or if applicable, before pre-export isolation) the elephant did not reside on any premises in the country of export where clinical, epidemiological or other evidence of anthrax occurred during the previous 20 days before export and the disease is compulsorily notifiable.

Elephant endotheliotropic herpesvirus

For 60 days immediately before export (or if applicable, before pre-export isolation) the elephant did not reside on any premises in the country of export

where clinical evidence of elephant endotheliotropic herpesvirus occurred during the previous 12 months before export.

Elephant pox

For 90 days immediately before export (or if applicable, before pre-export isolation) the elephant did not reside on any premises in the country of export where clinical, epidemiological or other evidence of elephant pox occurred during the previous 12 month before export.

Foot-and-mouth disease

For 90 days immediately before export (or if applicable, before pre-export isolation) the elephant was continuously resident and free of quarantine restriction in a country where no clinical, epidemiological or other evidence of foot-and-mouth disease occurred during the previous 12 months before export and the disease is compulsorily notifiable.

Haemorrhagic septicaemia

For 90 days immediately before export (or if applicable, before pre-export isolation) the elephant was continuously resident and free of quarantine restriction in a country where no clinical, epidemiological or other evidence of haemorrhagic septicaemia occurred during the previous 12 months before export and the disease is compulsorily notifiable.

OR

a. For 90 days immediately before export (or if applicable, before pre-export isolation) the elephant did not reside on any premises in the country of export where clinical, epidemiological or other evidence of haemorrhagic septicaemia occurred during the previous 12 months before export and the disease is compulsorily notifiable.

   AND

b. During the 12 months immediately before export, the elephant was vaccinated against haemorrhagic septicaemia with an approved vaccine.

Rabies

For 180 days immediately before export (or if applicable, before pre-export isolation) the elephant was continuously resident and free of quarantine restriction in a country where no clinical, epidemiological or other evidence of rabies occurred during the previous two years before export and the disease is compulsorily notifiable.

OR

For 180 days immediately before export (or if applicable, before pre-export isolation) the elephant did not reside on any premises in the country of export where clinical, epidemiological or other evidence of rabies occurred during the previous 12 months before export and the disease is compulsorily notifiable.

Screw-worm-fly myiasis

For 60 days immediately before export (or if applicable, before pre-export isolation) the elephant was continuously resident and free of quarantine restriction in a country where no clinical, epidemiological or other evidence of screw-worm-fly (*Cochliomyia hominivorax* or *Chrysomya bezziana*) myiasis occurred during the previous 12 months before export.

Surra (*Trypanosoma evansi*)

For 60 days immediately before export (or if applicable, before pre-export isolation) the elephant was continuously resident and free of quarantine restriction in a country where no clinical, epidemiological or other evidence of surra occurred during the previous 12 months before export.

OR

a. For 60 days immediately before pre-export isolation the elephant did not reside on any premises in the country of export where clinical, epidemiological or other evidence of surra occurred during the previous 12 months before export.

AND

b. The elephant was held in pre-export quarantine for at least 21 days immediately before export. During this time the elephant was isolated from other animals not of equivalent surra status.

AND

c. The pre-export quarantine facility is located in a defined area where no clinical epidemiological or other evidence of surra has occurred in elephants for 12 months immediately before export.

AND

d. During pre-export quarantine the elephant was isolated and not held, housed or exercised within 50 metres of camelids, equids or ruminants.

AND

e. Blood samples were taken from the elephant immediately at the start of pre-export quarantine and tested using an antibody-detection enzyme-linked immunoabsorbent assay **or** card agglutination test **and** microhaematocrit centrifugation technique **or** polymerase chain reaction assay as described in the OIE Manual for surra, with negative results in each case.

Trematodes

a. During the 30 days immediately before export faecal flotation was undertaken on three faecal samples collected on separate mornings within a one-week period and all samples were negative for trematode eggs.

OR

b. During the 30 days immediately before export the elephant was treated with an approved anthelmintic (or combination of anthelmintics) effective against

trematodes and the active ingredient/s and dose rate must be recorded on the veterinary certificate.

Trypanosomosis (*Trypanosoma vivax*)

For 60 days immediately before export (or if applicable, before pre-export isolation) the elephant was continuously resident and free of quarantine restriction in a country where no clinical, epidemiological or other evidence of trypanosomosis (*T. vivax*) has occurred during the previous 12 months before export.

Tuberculosis

a. For 180 days immediately before pre-export isolation the elephant did not reside on any premises in the country of export where clinical, epidemiological or other evidence of tuberculosis occurred during the previous five years before export.

AND

b. The elephant was held in pre-export quarantine for at least 90 days immediately before export. During this time the elephant was isolated from other animals not of equivalent tuberculosis status.

AND

c. A blood sample was taken from the elephant immediately at the start of pre-export quarantine and tested using a serological antibody detection test (e.g. TB STAT-PAK® or DPP™ VetTB assay) or a multi-antigen print immunoassay (MAPIA™), with negative results.

AND

d. Within the first two weeks after the start of pre-export quarantine, on three separate mornings within a one week period, wash samples from the trunk were collected before water was offered to the elephant. The samples were transported either fresh and chilled, or frozen, and tested for mycobacteria of the *Mycobacterium tuberculosis* complex (*M. africanum, M. bovis, M. microti* and *M. tuberculosis*) by culture and polymerase chain reaction assay, with negative results in each case.

3. The elephant was examined by the Official Veterinarian within 24 hours before leaving the pre-export quarantine facility for the port of export and was found to be:
   a. free from evidence of infectious or contagious disease
   b. visibly free of external parasites
   c. healthy and fit to travel.
4. Vehicles and transport containers used for transporting elephants from the pre-export quarantine facility to the port of export, and to Australia, were new or were cleaned and disinfected to the satisfaction of the Official Veterinarian before entering the pre-export quarantine facility to load the elephants.
5. The Official Veterinarian was present during loading of elephants when leaving the pre-export quarantine facility to supervise sealing of transport containers

and/or vehicles for transporting elephants, with tamper-evident seals.

6. At the port of export a government officer authorised by the Veterinary Authority of the exporting country must certify:
    a. during transport to the port of export, the elephants had no contact with other animals except those that meet all the conditions in these biosecurity measures.
    b. the seals on the vehicles were intact on arrival at the port of export.
    c. the compartment of the aircraft or vessel to be occupied by the elephants and all removable equipment, penning and containers including loading ramps were satisfactorily cleaned and disinfected before loading.

Transport

1. Exporters or their agents must have detailed plans to cover procedures including contingency plans, for transporting the elephant from pre-export quarantine until arrival in Australia.
2. Elephants must be consigned to Australia by a route approved by DAFF.
3. Elephants must travel in a container recommended for that particular species under the International Air Transport Association (IATA) Live Animal Regulations.
4. The use of hay or straw as bedding during transport is not permitted. Treated wood shavings, sterilised peat and soft board can be used.
5. Elephants must remain isolated from all animals except those that meet all the conditions in these biosecurity measures, during transport from the pre-export quarantine facility until arrival in Australia.
6. Insect netting must be carried on the flight at all times for contingencies. There must be sufficient insect netting to cover all travel containers completely. Insect netting must be in good condition to minimise entry of insect vectors into the travel containers.

Transit and transhipment

1. Elephants must transit or tranship only at an approved airport. Any transhipment requires the prior approval of DAFF. Elephants are not to leave the airport and must not be removed from their travel containers during transit or transhipment.
2. Elephants must remain on board the aircraft at approved transit airports. Cargo doors can be opened at approved transit airports to allow for unloading or loading of freight. Immediately after the cargo hold doors are closed, an approved knockdown aerosol insecticide must be sprayed throughout the cargo hold, in the manner recommended by the manufacturer.
3. In cases where elephants in travel containers are to be unloaded, before opening the cargo door, the travel containers must be completely covered in netting to prevent insect access to the elephants. The netting must remain in place until the elephants are reloaded onto an aircraft. Immediately after the elephants are reloaded onto an aircraft and the cargo hold doors are closed, an

approved knockdown aerosol insecticide spray must be sprayed throughout the cargo hold in the manner recommended by the manufacturer. The insect netting must not be removed until 30 minutes after spraying.

Delayed takeoffs and unscheduled landings

1. Exporters or their agents must have contingency plans for the management of delayed takeoff and unscheduled landings.
2. If the aircraft lands at any airport other than in an approved country, DAFF must be informed immediately and the elephant must not proceed to Australia without approval from DAFF. The decision as to whether the elephant can continue to travel to Australia, and additional biosecurity measures that may be required, will be made by DAFF on a case-by-case basis after assessing the risks.

Arrival in Australia

1. Importers or their agents must have a plan developed in consultation with DAFF to cover post-arrival procedures. The plan must include roles and responsibilities for their staff, vehicles for transporting elephants to the quarantine approved premises (QAP) and road transport arrangements including contingency plans for vehicle and equipment failures.
2. Vehicles for transporting the elephants from the port of entry to the QAP must be cleaned and disinfected to the satisfaction of the DAFF quarantine officer before loading the elephants. DAFF must be advised of the transport route to the QAP.
3. After the elephants arrive at an Australian airport they must be transferred in their transport containers onto vehicles, along with personnel and equipment, and proceed directly to the QAP.
4. All personnel travelling with, or that have had contact with the elephants, quarantine risk material or travel containers, must undertake appropriate decontamination measures as specified by DAFF before leaving the airport or the QAP if they are accompanying the elephant to the QAP.
5. All quarantine risk material (e.g. bedding, feed, water and waste material) remaining at the airport must be sealed in bags, ordered into quarantine and disposed of under DAFF supervision.
6. All equipment used during transport of the elephant, and all baggage and personal equipment accompanying personnel, must be cleaned and disinfected under DAFF supervision before leaving the airport.

Post-arrival quarantine requirements

Post-arrival quarantine

The minimum post arrival quarantine period of 30 days for zoo animals applies.

Any variation from the **post-arrival quarantine requirements** must be specifically authorised by DAFF.

Location

The QAP should be located within a secure part of a zoo or wildlife park approved under relevant Australian state or territory legislation to hold the species being imported, separated from public access areas and where it is under the supervision on day-to-day basis of a registered veterinarian.

Facilities

The post arrival quarantine facility must meet DAFF requirements for a QAP class 7.9 facility.

Operation

1. The QAP must be approved by DAFF before entry of any elephant into the facility.
2. All post arrival quarantine operations and procedures must follow those outlined for a QAP class 7.9 facility and also include:
    a. A registered veterinarian must inspect the QAP before entry of any elephant to ensure it was cleaned and disinfectant applied to his/her satisfaction.
    b. The post arrival quarantine period will commence from the time of entry into the facility of the last elephant of the consignment.
    c. If any elephant dies during post arrival quarantine, DAFF must be notified within 24 hours and the elephant must undergo a post mortem examination by a registered veterinarian to determine the cause of death.
    d. DAFF is to be advised within 24 hours of any disease incident and its outcome.
    e. Elephants must not leave the QAP during post arrival quarantine without permission of DAFF.
    f. At the satisfactory completion of post arrival quarantine, the elephants will be released from quarantine into premises approved by the appropriate state or territory governments for the holding of elephants.

5.2 Biosecurity measures for the importation of zoo elephants from Country X

Documentation

Each elephant must travel with an original international veterinary certificate that conforms to Article 5.10.2. of the Code, signed by the Official Veterinarian of the country of export.

These biosecurity requirements apply to elephants.

An **Official Veterinarian** means a veterinarian authorised by the Veterinary Authority of the country of export to perform certain official tasks associated with animal health and/or public health, and inspections of commodities and, when appropriate, to certify in conformity with the Certification Procedures of Chapter 5.2 of the Code.

The veterinary certificate must:

- be written in English and a language understood by the Official Veterinarian of the Country X
- meet the requirements of the '**certification before export**' section and state that all the **pre-export quarantine requirements** have been met
- provide identification for each elephant (microchip number/site or other permanent identification e.g. tattoo) including description, species, sex and age
- include the name and address of the zoological institution of origin
- include the name and address of the exporter and importer and identify the import permit against which it was issued.

The Official Veterinarian must:

- provide a separate veterinary certificate for each elephant
- sign, date and stamp (with the stamp of the Veterinary Authority) each page of the veterinary certificate and all attached documents (e.g. laboratory reports) that form part of the extended veterinary certification
- endorse each page of copies of supporting documents with date, signature and Official Veterinarian stamp
- record his/her name, signature and contact details on the veterinary certificate.

Pre-export quarantine requirements

Pre-export quarantine requirements for the importation of zoo elephants from Country X

Any variation from the **pre-export quarantine requirements** must be specifically authorised by DAFF.

Location

The pre-export quarantine facility must be located within a government registered or licensed zoological institution or wildlife park which is under veterinary supervision and in which the animals held in the premises are subject to a health monitoring program.

Facilities

1. The pre-export quarantine facility must meet the country and premises requirements specified in the **certification before export** section.
2. The entire pre-export quarantine facility must be surrounded by a physical barrier (e.g. fencing) that provides sufficient security to isolate the elephants in pre-export quarantine from all other animals except those that meet all the conditions in this import permit.
3. The pre-export quarantine facility including buildings, yards, fences, feeding and watering arrangements must address animal welfare considerations.
4. Buildings holding elephants in the pre-export quarantine facility must be constructed so that they can be cleaned and disinfectant applied and must be maintained in good order.
5. The pre-export quarantine facility must have a separate area for the cleaning and disinfection of vehicles for transporting elephants, and facilities for the safe loading and unloading of elephants.
6. The pre-export quarantine facility must have facilities for veterinary examination and collection of samples.

Operation

1. The pre-export quarantine facility must have current approval from DAFF and the Veterinary Authority of Country X before commencement of pre-export quarantine.
2. DAFF may audit the approved pre-export quarantine facility.
3. All pre-export quarantine operations and procedures must be detailed in Standard Operating Procedures (SOPs) consistent with a risk-based approach and approved by DAFF.
4. The Official Veterinarian must inspect the pre-export quarantine facility before commencement of pre-export quarantine and must ensure that the facility was cleaned and disinfectant applied to his/her satisfaction.
5. Pre-export quarantine must be under the supervision of the Official Veterinarian.
6. The pre-export quarantine period commences from the time the last elephant in the export consignment has entered the pre-export quarantine facility and all elephants have been examined by the Official Veterinarian.
7. All equipment used in feeding, handling and treating elephants in pre-export quarantine must be new or cleaned and disinfected before entry, and must be used only in the facility during pre-export quarantine.
8. During pre-export quarantine, the facility must be occupied only by elephants of

the export consignment. If other elephants are present, they must meet all the conditions in this import permit.

9. Only personnel specifically authorised by the Official Veterinarian are permitted entry to the pre-export quarantine facility. Details of all visitor entries must be recorded.
10. Other than inspections, visits and treatments required for certification, all veterinary visits, health problems, tests, test results, treatments and reasons for removal from pre-export quarantine of any animal, must be reported to the Official Veterinarian within 24 hours, and to DAFF within 48 hours.
11. A detailed health record must be kept for each animal and be available to the Official Veterinarian and to DAFF on request.
12. Elephants that leave the facility during pre-export quarantine for any reason cannot rejoin the consignment during pre-export quarantine.

Certification before export

The Official Veterinarian must certify:

1. Since birth, or for at least 12 months immediately before export, each elephant for export was continuously resident in an approved government licensed or registered zoological institution or wildlife park that provided separation from other animal populations, was under veterinary supervision and has a health monitoring program in Country X.
2. The elephant was held in pre-export quarantine for at least 90 days immediately before export in a facility that meets the requirements specified in the pre-export quarantine requirements. During this time the elephant was isolated from animals except those that meet all the conditions in this import permit.
3. During pre-export quarantine:
    a. the elephant was not vaccinated
    b. all elephants in the pre-export quarantine facility remained free from evidence of infectious or contagious disease, and had no contact with animals except those that meet all the conditions in this import permit
    c. all samples for testing were taken by the Official Veterinarian or a veterinarian authorised by the Official Veterinarian
    d. all testing was conducted in a laboratory approved and monitored by the Veterinary Authority of Country X. If there is no approved laboratory in Country X, testing must be undertaken in a laboratory recognised by the Veterinary Authority of Country X.
4. During the 30 days immediately before export, each elephant was treated with a broad spectrum anthelmintic (or combination of anthelmintics) effective against cestodes and nematodes, and tested by appropriate parasitological techniques 14 days later. The elephant was re-treated if there was evidence of parasites on testing (active ingredient/s, dose and date/s of treatment stated on the veterinary certificate).
5. During the 30 days immediately before export, each elephant was treated on two occasions 21–28 days apart, with a long acting external parasiticide effective

against ticks to provide continual protection against tick infestation beyond the day of export. The final treatment must occur within seven days of export (active ingredient/s, dose and date/s of treatment stated on the veterinary certificate).

6. No clinical, epidemiological or other evidence of foot-and-mouth disease occurred in Country X during the previous 12 months before export and the disease is compulsorily notifiable.
7. No clinical, epidemiological or other evidence of screw-worm-fly myiasis or *Trypanosoma vivax* occurred in Country X during the previous 12 months before export.
8. For 270 days immediately before export the elephant did not reside on any premises in Country X where clinical, epidemiological or other evidence of tuberculosis occurred in the previous five years before export.
9. For 270 days immediately before export the elephant did not reside on any premises in Country X where clinical, epidemiological or other evidence of rabies occurred in the previous 12 months before export and the disease is compulsorily notifiable.
10. For 180 days immediately before export the elephant did not reside on any premises in Country X where clinical, epidemiological or other evidence of anthrax or haemorrhagic septicaemia occurred in the previous 12 months before export and the diseases are compulsorily notifiable.
11. For 180 days immediately before export the elephant did not reside on any premises in Country X where clinical evidence of elephant endotheliotropic herpesvirus occurred in the previous 12 months before export.
12. For 180 days immediately before export the elephant did not reside on any premises in Country X where clinical, epidemiological or other evidence of elephant pox or surra occurred in the previous 12 months before export.
13. Haemorrhagic septicaemia

    During the 12 months immediately before export, the elephant was vaccinated against haemorrhagic septicaemia with an approved vaccine (vaccine and date of treatment stated on the veterinary certificate).

14. Surra

    A blood sample was taken from the elephant immediately at the start of pre-export quarantine and tested using an antibody-detection enzyme-linked immunosorbent assay **or** card agglutination test **and** microhaematocrit **or** polymerase chain reaction assay as described in the OIE Manual for surra, with negative results in each case.

15. Trematodes

    During the 30 days immediately before export faecal flotation was undertaken on three faecal samples collected on separate mornings within a one-week period and all samples were negative for trematode eggs

    OR

    During the 30 days immediately before export the elephant was treated with an approved anthelmintic (or combination of anthelmintics) effective against

trematodes (active ingredient/s, dose and date of treatment stated on the veterinary certificate)

16. Tuberculosis

    a. A blood sample was taken from the elephant immediately at the start of pre-export quarantine and tested using a serological antibody detection test (e.g. TB STAT-PAK® or DPP™ VetTB assay) or a multi-antigen print immunoassay (MAPIA™), with negative results.

    AND

    b. Within the first two weeks after the start of pre-export quarantine, on three separate mornings within a one week period, wash samples from the trunk were collected before water was offered to the elephant. The samples were transported either fresh and chilled, or frozen and tested for mycobacteria of the *Mycobacterium tuberculosis* complex (*M. africanum*, *M. bovis*, *M. microti* and *M. tuberculosis*) by culture **and** polymerase chain reaction assay, with negative results in each case.

17. The elephant was examined by the Official Veterinarian within 24 hours before leaving the pre-export quarantine facility for the port of export and was found to be:

    a. free from evidence of infectious or contagious disease

    b. visibly free of external parasites

    c. healthy and fit to travel.

18. Vehicles and transport containers used for transporting elephants from the pre-export quarantine facility to the port of export, and to Australia, were new or were cleaned and disinfected to the satisfaction of the Official Veterinarian before entering the pre-export quarantine facility to load the elephants.

19. The Official Veterinarian was present during loading of the elephant when leaving the pre-export quarantine facility to supervise sealing of the vehicle for transporting the elephant, with tamper-evident seals.

20. At the port of export a government officer authorised by the Veterinary Authority of Country X must certify:

    a. after due enquiry, that during transport to the port of export, the elephants had no contact with other animals except those that meet all the conditions in this import permit

    b. the seals on the vehicles were intact on arrival at the port of export

    c. the compartment of the aircraft or vessel to be occupied by the elephants and all removable equipment, penning and containers including loading ramps were satisfactorily cleaned and disinfected before loading.

Transport

1. Exporters or their agents must have detailed plans to cover procedures including contingency plans, for transporting the elephant from pre-export quarantine until arrival in Australia.

2. The elephant must be consigned to Australia by a route approved by DAFF.

3. The elephant must travel in a container recommended for that particular species under the International Air Transport Association (IATA) Live Animal Regulations.
4. The use of hay or straw as bedding during transport is not permitted. Treated wood shavings, sterilised peat and soft board can be used.
5. The elephant must remain isolated from animals except those that meet all the conditions in this import permit, during transport from the pre-export quarantine facility until arrival in Australia.
6. Insect netting must be carried on the flight at all times for contingencies. There must be sufficient insect netting to cover all travel containers completely. Insect netting must be in good condition to minimise entry of insect vectors into the travel containers.

Transit and transhipment

1. Elephants must transit or tranship only at an approved airport. Any transhipment requires the prior approval of DAFF. Elephants are not to leave the airport and must not be removed from their travel containers during transit or transhipment.
2. Elephants must remain on board the aircraft at approved transit airports. Cargo doors can be opened at approved transit airports to allow for unloading or loading of freight. Immediately after the cargo hold doors are closed, an approved knockdown aerosol insecticide must be sprayed throughout the cargo hold, in the manner recommended by the manufacturer.
3. In cases where elephants in travel containers are to be unloaded, before opening the cargo door, the travel containers must be completely covered in netting to prevent insect access to the elephants. The netting must remain in place until the elephants are reloaded on an aircraft. Immediately after the elephants are reloaded on an aircraft and the cargo hold doors are closed, an approved knockdown aerosol insecticide spray must be sprayed throughout the cargo hold in the manner recommended by the manufacturer. The insect netting must not be removed until 30 minutes after spraying.

Delayed takeoffs and unscheduled landings

1. Exporters or their agents must have contingency plans for the management of delayed takeoff and unscheduled landings.
2. If the aircraft lands at any airport other than in an approved country, DAFF must be informed immediately and the elephant must not proceed to Australia without approval from DAFF. The decision as to whether the elephant can continue to travel to Australia, and additional biosecurity measures that may be required, will be made by DAFF on a case-by-case basis after assessing the risks.

Arrival in Australia

1. Importers or their agents must have a plan developed in consultation with DAFF to cover post-arrival procedures. The plan must include roles and responsibilities for their staff, vehicles for transporting elephants to the quarantine approved premises (QAP) and road transport arrangements including contingency plans for vehicle and equipment failures.

2. Vehicles for transporting elephants from the port of entry to the QAP must be cleaned and disinfected to the satisfaction of the DAFF quarantine officer before loading the elephants. DAFF must be advised of the transport route to the QAP.
3. After the elephants arrive at an Australian airport they must be transferred in their transport containers onto vehicles, along with personnel and equipment, and proceed directly to the QAP.
4. All personnel travelling with, or that have had contact with the elephants, quarantine risk material or travel containers, must undertake appropriate decontamination measures as specified by DAFF before leaving the airport or the QAP if they are accompanying the elephant to the QAP.
5. All quarantine risk material (e.g. bedding, feed, water and waste material) remaining at the airport must be sealed in bags, ordered into quarantine and disposed of under DAFF supervision.
6. All equipment used during transport of the elephant, and all baggage and personal equipment accompanying personnel, must be cleaned and disinfected under DAFF supervision before leaving the airport.

Post-arrival quarantine requirements

Post-arrival quarantine requirements for the importation of zoo elephants from Country X

Any variation from the **post-arrival quarantine requirements** must be specifically authorised by DAFF.

1. The elephant must be held in post arrival quarantine for at least 30 days. During this time the elephant must be isolated from animals except those that meet all the conditions in this import permit
2. Within 48 hours of arrival at the QAP the elephant was treated under the direct supervision of a registered veterinarian, with a parasiticide effective against ticks.

Location

The QAP should be located within a secure part of a zoo or wildlife park approved under relevant Australian state or territory legislation to hold elephants, separated from public access areas and where it is under the supervision on a day-to-day basis of a registered veterinarian.

Facilities

The post arrival quarantine facility must meet DAFF requirements for a QAP class 7.9 facility.

Operation

1. The QAP must be approved by DAFF before entry of any elephant into the facility.
2. All post arrival quarantine operations and procedures must follow those outlined for a QAP class 7.9 facility and also include:

a. A registered veterinarian must inspect the QAP before entry of any elephant to ensure it was cleaned and disinfectant applied to his/her satisfaction.

b. The post arrival quarantine period will commence from the time of entry into the facility of the last elephant of the consignment.

c. Vehicles for transporting elephants must not leave the QAP until thoroughly cleaned and disinfected.

d. If any elephant dies during post arrival quarantine, DAFF must be notified within 24 hours and the elephant must undergo a post mortem examination by a registered veterinarian to determine the cause of death.

e. DAFF is to be advised within 24 hours of any disease incident and its outcome.

f. Elephants must not leave the QAP during post arrival quarantine without permission of DAFF.

g. At the satisfactory completion of post arrival quarantine, the elephants will be released from quarantine into premises approved by the appropriate state or territory governments for the holding of elephants.