

AUSTRALIAN VETERINARY EMERGENCY PLAN

AUSVETPLAN

Enterprise Manual

Artificial breeding centres

Version 5.0

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

National Biosecurity Committee

© 1991–2022 Animal Health Australia ABN 86 071 890 956. Certain materials in this publication are protected by copyright and are reproduced with permission from the Commonwealth of Australia, acting through its Department of Agriculture, Water and the Environment (or any successor agency); each state and territory of Australia, as represented by their relevant agencies, and by the National Biosecurity Committee and Animal Health Committee; and Animal Health Australia’s industry members.

ISBN 0 642 24506 1 (printed version)

ISBN 1 876 71438 7 (electronic version)

Licence

This work is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International Licence, with the exception of:



- any third-party material contained within the work
- any material protected by a trademark
- any images and/or photographs.

To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-sa/4.0/>.

Moral rights

The author(s) of this work hold ‘moral rights’ as defined in the *Copyright Act 1986* (Cwlth) and assert all moral rights in connection with this work. This means you must:

- attribute (give credit to) the author(s) of this work
- not say a person is a creator of a work when they are not
- not do something with the work (such as change or add to it) that would have a negative impact on the reputation of the author(s) of this work.

Failure to do so could constitute a breach of the *Copyright Act 1986* (Cwlth).

Disclaimer and warranty

- This publication has been produced in accordance with the procedures described in the *AUSVETPLAN Overview*, and in consultation with Australian national, state and territory governments; the relevant livestock industries; nongovernment agencies; and public health authorities, as relevant. Any views and opinions expressed in this document do not necessarily represent the views and opinion of the authors or contributors, Animal Health Australia or the Commonwealth of Australia.
- This publication is for use in emergency situations. The strategies and policy guidelines in this work are not applicable to quarantine policies for imported livestock or livestock products.
- This publication is not legal or professional advice and should not be taken as a substitute for legal or other professional advice.
- This publication is not intended for use by any person who does not have appropriate expertise in the subject matter of the work. Before using this publication, you should read it in full, consider its effect and determine whether it is appropriate for your needs.
- This publication was created in February 2022. Laws, practices and regulations may have changed since that time. You should make your own inquiries as to the currency of relevant laws, practices and regulations, as these may have changed since publication of this work.

No warranty is given as to the correctness of the information contained in this work, or of its suitability for use by you. To the fullest extent permitted by law, Animal Health Australia is not, and the other contributing parties are not, liable for any statement or opinion, or for any error or omission contained in this work, and it and they disclaim all warranties with regard to the information contained in it, including, without limitation, all implied warranties of merchantability and fitness for a particular purpose. Animal Health Australia is not liable for any direct, indirect, special or consequential losses or damages of any kind, or loss of profit, loss or corruption of data, business interruption or indirect costs, arising out of or in connection with the use of this work or the information contained in it, whether such loss or damage arises in contract, negligence, tort, under statute, or otherwise.

Text under development

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

Contact information

If you have any requests or inquiries concerning reproduction and rights, or suggestions or recommendations, you should address these to:

AUSVETPLAN – Animal Health Australia
Executive Manager, Emergency Preparedness and Response
PO Box 5116
Braddon ACT 2612
Tel: 02 6232 5522
email: aha@animalhealthaustralia.com.au

Approved citation

Animal Health Australia (2022). *Enterprise manual: Artificial breeding centres* (version 5.0). Australian Veterinary Emergency Plan (AUSVETPLAN), edition 5, Canberra, ACT.

EMERGENCY ANIMAL DISEASE WATCH HOTLINE: 1800 675 888

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

Publication record

Edition 2

Version 2.0, 1996 (interim version)

Version 2.1, 1999 (final document)

Edition 5

Version 5.0, 2022 (major revision)

Contents

1	Introduction	7
1.1	This manual	7
1.1.1	Purpose	7
1.1.2	Scope	7
1.1.3	Development	7
1.2	Other documentation	7
1.3	Training resources.....	8
2	The Australian industry	9
2.1	Industry operations.....	10
2.1.1	Semen and embryo centres (wholesalers)	10
2.1.2	Semen and embryo storage and distribution centres (resellers)	11
2.1.3	Inseminators and embryo transfer technicians	11
2.1.4	On-farm semen and embryo collection, storage and use	11
2.2	Industry organisations.....	11
2.3	Industry regulations, standards and programs.....	13
2.4	Legislation relevant to the industry	13
2.5	Animal welfare	14
3	Emergency animal diseases and the industry	15
3.1	The risk of an EAD entering Australia via imported semen or embryos.....	15
3.2	Risk of disease spread from the enterprise	15
3.2.1	Factors to consider in assessing risk of disease spread.....	16
3.3	Significant issues for the industry in the event of an EAD incident.....	17
3.3.1	Broad issues.....	18
3.3.2	Commercial implications.....	19
3.3.3	Nature of the incurred losses	19
3.3.4	Possible longer-term implications	19
3.4	Work health and safety.....	19
4	Emergency animal disease preparedness and management	20
4.1	Australia's animal health services.....	20
4.2	National arrangements	20
4.2.1	Emergency Animal Disease Response Agreement.....	20
4.2.2	AUSVETPLAN	21
4.2.3	Training for emergency animal disease response personnel.....	22
4.3	Controlling an emergency animal disease incident.....	22
4.3.1	Governance.....	22
4.3.2	Response measures	23
4.3.3	Overview of declared areas and premises classifications.....	24
4.3.4	Use of declared areas and premises classifications in an EAD incident.....	29
5	Industry preparedness	31
5.1	Impact of an EAD on the industry	31
5.2	Biosecurity measures and the industry	32
5.2.1	General biosecurity.....	32
5.2.2	Procedures for early detection of disease.....	32
5.2.3	Design of the enterprise.....	33

5.2.4	Livestock	34
5.2.5	Semen and embryos	34
5.2.6	Personnel	35
5.2.7	Equipment and facilities	36
5.2.8	Miscellaneous animals and byproducts	37
5.2.9	Work procedures, staff hygiene and biosecurity	37
5.2.10	Record keeping	38
5.3	Media and public relations	39
Appendix 1		40
Appendix 2		42
Appendix 3		43
Glossary		46
	Manual-specific terms	46
	Standard AUSVETPLAN terms	46
Abbreviations		55
	Manual-specific abbreviations	55
	Standard AUSVETPLAN abbreviations	55
References		57

Tables

Table 4.1	Disease categories and cost-sharing arrangements	21
Table A1.1	Transmission of emergency animal diseases by semen or embryos	40

Figures

Figure 4.1	Schematic illustration of declared areas, indicating standard movement controls	28
------------	---	----

1 Introduction

1.1 This manual

1.1.1 Purpose

Enterprise manuals address the risks associated with so-called risk enterprises. These are defined as livestock or related enterprises that are a potential source of major infection for many other premises, and can thus increase the potential size of an outbreak and affect its nature.

1.1.2 Scope

This enterprise manual is aimed at both government officers and artificial breeding personnel who may be involved in emergency animal disease (EAD) preparedness. For government personnel, including those not familiar with the industry, the manual brings together, from many sources, operational guidelines, plans of action and other resources for dealing with EADs. For industry personnel, including owners or managers, the manual provides guidelines on their responsibilities during an EAD outbreak, as required by the relevant government authorities, and strategies that may be adopted to improve preparedness for, or to handle, a suspected EAD. Managers should include elements of this manual in the operational manuals of their enterprises.

1.1.3 Development

This manual has been produced in accordance with the procedures described in the **AUSVETPLAN Overview**, and in consultation with Australian national, state and territory governments; the relevant livestock industries; nongovernment agencies; and public health authorities, where relevant.

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

1.2 Other documentation

This enterprise manual should be read and implemented in conjunction with:

- other AUSVETPLAN documents, including response strategies, and operational and management manuals; and any relevant guidance and resource documents. The complete series of manuals is available on the Animal Health Australia website¹
- relevant nationally agreed standard operating procedures (NASOPs).² These procedures complement AUSVETPLAN and describe in detail specific actions undertaken during a response to an incident. NASOPs have been developed for use by jurisdictions during responses to EAD incidents and emergencies

¹ <https://animalhealthaustralia.com.au/ausvetplan/>

² <https://animalhealthaustralia.com.au/nationally-agreed-standard-operating-procedures/>

- relevant jurisdictional or industry policies, response plans, standard operating procedures and work instructions
- relevant Commonwealth and jurisdictional legislation and legal agreements (such as the Emergency Animal Disease Response Agreement – EADRA,³ where applicable).

1.3 Training resources

EAD preparedness and response arrangements in Australia

The EAD Foundation online course⁴ provides livestock producers, veterinarians, veterinary students, government personnel and emergency workers with foundation knowledge for further training in EAD preparedness and response in Australia.

³ <https://animalhealthaustralia.com.au/eadra/>

⁴ <https://animalhealthaustralia.com.au/online-training-courses/>

2 The Australian industry

Artificial breeding centres select, breed and supply quality genetic material for improving the performance of production and performance animals. Species include cattle, sheep, goats, pigs, horses and alpacas. Artificial breeding is also used to a limited extent with dogs, turkeys, deer, zoo animals and endangered species.

The industry operates in three major areas:

- breed improvement programs (usually consist of progeny testing of young sires and genomic selection of young females)
 - Young sires are selected, their semen is distributed, and the performance of the progeny is measured (eg for meat, milk or wool production). The young sires are progeny test sires (ie 'potentially superior' sires). Once the results of their progeny have been measured, the sires are termed 'proven' (ie the sires have a 'proof', with a defined reliability). The very top proof sires are retained and marketed.
 - Young females can be selected soon after birth on the basis of genomic testing. Farmers can then make early decisions on the suitability of the female for future breeding purposes.
 - Embryos can undergo genomic testing and are marketed according to the results of these tests.
- worldwide export (subject to the import health requirements of importing countries) of genetic material, via frozen and fresh semen and embryos
- worldwide importation (subject to Australian biosecurity requirements) of genetic material, via frozen and fresh semen and embryos.

The artificial breeding industry, veterinarians, technicians and farmers operate and service a diverse range of both on-farm facilities (for collecting and transferring semen and embryos outside major commercial centres) and off-farm facilities (for further work on the germplasm). These include laboratories for fertilising oocytes and culturing zygotes to produce in vitro-produced (IVP) embryos, and facilities for long-term storage of germplasm. Activities are largely focused on providing services to individual farmers who own all or a part-share of the semen or embryo donor animals. A significant number of unregulated operators who are not audited or documented also exist. These are important during an emergency animal disease (EAD) outbreak because they will be difficult to identify and locate.

For exported artificial breeding material, the Australian Government Department of Agriculture, Water and the Environment ensures that the centre is approved for export and that the importing country's requirements are met before issuing a health certificate and export permit.

Importation of semen or embryos is governed by the *Biosecurity Act 2015* (Cwlth) and its Regulations. Australia does not currently import fresh or frozen porcine semen or embryos (primarily because of the risk of introducing diseases such as porcine reproductive and respiratory syndrome), or equine embryos (because no import conditions have been developed). Semen from species other than pigs may be imported from countries that are free from foot-and-mouth disease and other major diseases (eg lumpy skin disease, contagious bovine pleuropneumonia), depending on the species involved. Imported genetic material must be accompanied by animal health certification, specific to the country of origin, which certifies, for example, that the genetic material was collected at an approved centre from animals certified as being free from diseases of concern.

After release from the Australian border and processing at regional artificial breeding centres, semen and embryos are distributed freely throughout Australia to storage and distribution centres (resellers), artificial insemination (AI) technicians (inseminators), veterinarians and livestock producers/farmers (see Section 2.2).

2.1 Industry operations

2.1.1 Semen and embryo centres (wholesalers)

Artificial breeding centres may hold and maintain cattle, sheep, goats, pigs, horses or alpacas for collection, processing, freezing, storage, importation, transfer and distribution of semen and embryos. These centres distribute fresh (pig and horse), chilled or frozen semen or embryos directly to semen and embryo storage and distribution centres (resellers), inseminators, veterinarians and farmers. Some centres may consist of facilities spread over different localities. For example, with IVP embryos, oocytes may be collected and processed for in vitro maturation on a number of farms, and transported in special incubators overnight to a laboratory in a commercial centre hundreds of kilometres away. In the laboratories, oocytes are subjected to further processing (in vitro fertilisation (IVF) and in vitro culture) before being either frozen and stored or distributed to farms fresh in special incubators for transfer to females. This may result in a number of trace premises that require investigation during an EAD response.

Semen collection centres, embryo collection teams (for in vivo-derived embryos) and embryo production teams (for IVP embryos) require approval from the Australian Government Department of Agriculture, Water and the Environment to export semen or embryos. They must also meet the conditions in the World Organisation for Animal Health (OIE) *Terrestrial animal health code*. Approved export centres must adhere to any health standards prescribed by importing countries.

Artificial breeding centres also collect, process and distribute semen or embryos not intended for export (ie for the domestic market only). Domestic products can be collected at export-approved centres but must be collected and stored separately from export products – that is, collected at different times, and kept in tanks and in areas separate from export tanks. Only facilities approved for export collections can collect genetic material for export, and only animals of equivalent health status to the importing country's requirements (or that meet any specific requirements for contact animals) can be in contact with the donor animals.

Some artificial breeding centres may have facilities for sophisticated processing of genetic material – for example, semen sexing, intracytoplasmic sperm injection (ICSI), genomic testing or embryo cloning.

Artificial breeding centres can supply and deliver semen and embryos, liquid nitrogen, pharmaceuticals, and AI and embryo transfer (ET) equipment to those involved in AI and ET services, including inseminators, veterinarians, technicians and farmers. Inseminators may operate from the artificial breeding centre and supply semen to owners and operators, who may inseminate livestock other than their own (eg neighbours' livestock). In the pork industry, unlike other livestock sectors, all insemination is done by trained staff on farm.

There is significant international trade in both live horses and frozen semen travelling to artificial breeding centres. There is also significant trade in fresh semen with New Zealand. The equine ET industry is currently limited to chilled embryo transfers within Australia, but new laboratories capable of producing IVP embryos using ICSI are being built.

Additionally, 'shuttle stallions' move around the world, serving mares in the breeding season of each hemisphere – these are not part of the artificial breeding industry.

2.1.2 Semen and embryo storage and distribution centres (resellers)

Semen and embryo storage and distribution centres import, store and dispatch frozen semen or embryos from overseas, and fresh-chilled equine semen from New Zealand, or store and dispatch fresh, chilled or frozen semen or embryos from Australian artificial breeding enterprises. These enterprises also supply and dispatch liquid nitrogen and AI equipment. There are no known semen and embryo storage and distribution centres in the pork industry.

2.1.3 Inseminators and embryo transfer technicians

Inseminators and veterinarians may operate an on-farm service that is structurally independent of an audited centre for collecting, processing and freezing semen and embryos. They can also receive semen and embryos from artificial breeding centres in Australia and overseas for:

- storage
- transfer to farm animals not at an artificial breeding centre
- distribution to other centres or to on-farm storage units.

Inseminators and ET technicians can also supply liquid nitrogen and artificial breeding equipment to farms.

ET is not practised in pigs on any commercial scale in Australia.

2.1.4 On-farm semen and embryo collection, storage and use

Facilities on farms throughout Australia are used to collect and process fresh, chilled or frozen semen or embryos, and transfer semen or embryos to animals on the same property or other properties. Semen and embryos may be stored or distributed to other farms or storage facilities. Export-eligible and domestic semen or embryos may be stored on farm in one or more containers for on-farm AI or ET programs. Because of separate storage requirements, export-eligible semen stored with domestic semen cannot be returned for storage in artificial breeding centre storage facilities as export-eligible semen.

On-farm AI or ET programs can be implemented by farmers, staff, inseminators or veterinarians.

2.2 Industry organisations

The Australian artificial breeding industry has developed as a diverse, interlocking group of individually owned and operated enterprises, with some direct integration. Artificial breeding centres and service facilities are scattered throughout rural Australia. They include IVF laboratories – some commercial and some at universities – as well as semen collection and processing centres.

During an outbreak of an EAD, it is likely that additional personnel would be enlisted through the broader industry and veterinary groups to assist in responses. Specialists and liaison officers will need to be co-opted through broader industry and veterinary organisations.

Ruminants

The Ruminant Genetics Trade Advisory Group (RGTAG) represents the Australian bovine, ovine and caprine germplasm industry. The group meets periodically with the Animal Division in the Australian Government Department of Agriculture, Water and the Environment to discuss issues relating to the import and export of semen and embryos, set industry priorities for trade and market access, and provide comments on operational aspects of imports and exports of ruminant reproductive material to support trade and biosecurity regulation.

The National Herd Improvement Association of Australia (NHIA) is the industry organisation that promotes herd improvement within the Australian dairy industry. It provides industry representation on representative bodies, advocacy on issues with government, and support on industrial matters through access to employer bodies. The NHIA currently provides secretariat services to the RGTAG.

Because Australia does not allow importation of live ruminants for agricultural animal production, access to gene transfers occurs through imported germplasm.

Horses

Equine Veterinarians Australia (EVA), a special interest group of the Australian Veterinary Association, is the peak representative body for equine veterinarians. EVA is the first point of contact for consultation about the equine artificial breeding industry in Australia.

Other key contacts include the Australian Horse Industry Council (AHIC) and Harness Racing Australia (HRA). AHIC is made up of breed societies, performance and competition associations, service providers and state horse councils. HRA uses AI for much of its breeding; this is often done on farm with stud personnel.

The equine artificial breeding industry is diverse, including horse types and breeds such as standardbreds, warmbloods, quarter horses and ponies. It excludes thoroughbreds, where artificial breeding is banned. Breed societies regulate and record the artificial breeding activities in their sector; different breeds have different stud book requirements. There is no unifying equine umbrella group; each breed has at least one registering body.

Pigs

The Australian pork industry is diverse. It includes intensive piggeries (90%), free-range piggeries (5%), outdoor-bred piggeries (5%) and peri-urban piggeries.

As of 2021, five principal companies provide improved pig genetics to the Australian pork industry. These companies have artificial breeding centres in South Australia, Victoria, New South Wales and Queensland, and supply fresh, chilled semen to pork producers throughout Australia. A large number of producers do their own artificial breeding. For example, large, vertically integrated businesses may collect semen from in-house boar studs and distribute it across their breeding sites.

ET is no longer a feature of commercial pig gene transfer, and its use is restricted to research laboratories.

In an outbreak of some EADs, special methods of engaging people in the pork industry will need to be developed, in the absence of an organisation that represents them.

Turkeys

AI is typically only practised in the turkey industry by a small number of operators. Semen is only used internally by company operators.

2.3 Industry regulations, standards and programs

Operation of artificial breeding centres, subcentres, and inseminators and technicians, and related training, vary between the states and territories, as outlined in each jurisdiction's legislation.

Export approval is a standard process run through the Australian Government Department of Agriculture, Water and the Environment.

Domestic operations and on-farm enterprises, which account for a considerable proportion of artificial breeding operations in Australia, are not covered by specific legislative controls or industry codes of practice.

The establishment of nationally consistent compartments, and compartment standards to ensure isolation of a compartment from major diseases, is recommended to provide confidence in the integrity of the compartment. This may support continuity of operations and trade of artificial breeding facilities or enterprises in the event of an EAD incursion.

The Farm Biosecurity website⁵ provides guidance on measures to prevent introduction of diseases onto properties or movement of diseases off properties. These measures can be applied to artificial breeding centres, including the movement of live animals, semen and embryos onto and off centres. The website provides general principles for preventing the spread of an EAD. Ideally, all artificial breeding centres should have their own biosecurity plans.

Section 5 outlines areas within artificial breeding centres where biosecurity can be enhanced to help prevent the introduction or spread of EADs.

2.4 Legislation relevant to the industry

National, state and territory legislation has been enacted for the purpose of controlling EADs.

Commonwealth legislation – specifically, the *Biosecurity Act 2015* and the *Biosecurity (Conditionally Non-prescribed Goods) Determination Act 2021* – is about managing diseases and pests that may cause harm to human, animal or plant health or the environment. It deals with managing biosecurity risks in relation to goods that are imported into Australia. It is also relevant for the importation and export of germplasm.

State and territory legislation aims to control and eradicate disease in animals, and establishes controls over animal movement, treatment, decontamination, slaughter and compensation. South Australia⁶ and Tasmania⁷ are the only states where dedicated artificial breeding facilities (other than on farm) are required to be licensed by the state authorities.

Codes of practice

National standards and national model codes of practice for animal welfare in the livestock industries provide minimum standards for the care to be given to animals. They have been adopted throughout Australia, either directly by reference in legislation or indirectly in the development of state and territory codes to meet specific regional needs. The model codes are also used as a resource for the

⁵ www.farmbiosecurity.com.au

⁶ www.legislation.sa.gov.au/LZ/C/A/LIVESTOCK%20ACT%201997/CURRENT/1997.6.AUTH.PDF

⁷ www.legislation.tas.gov.au/view/html/inforce/current/act-1995-085?#HP7@EN

development of training and awareness programs. Standards and guidelines can be found on the Australian Animal Welfare Standards and Guidelines website.⁸

2.5 Animal welfare

It will be essential to maintain high animal welfare standards during an EAD response, consistent with legislation, codes, the Australian Animal Welfare Strategy⁹ and the OIE Terrestrial Code.¹⁰

AUSVETPLAN operational manuals describe in detail the recommended operational procedures for different aspects of an EAD response. These manuals include *Livestock welfare and management* and *Destruction of animals*.

⁸ www.animalwelfarestandards.net.au

⁹ www.agriculture.gov.au/animal/welfare/aaws

¹⁰ www.oie.int/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/

3 Emergency animal diseases and the industry

3.1 The risk of an EAD entering Australia via imported semen or embryos

Importation into Australia of livestock and livestock products is strictly controlled by Australia's import requirements. Importation of semen and embryos from certain livestock species, including cattle, sheep, goats, deer and horses, is allowed from selected countries, under strict import protocols.

Noncompliance of exporters with Australia's import requirements was assessed as a possible means of introducing an emergency animal disease (EAD) by the Interim Inspector General of Biosecurity audit report on imported animal breeding material (IIGB 2014). Semen or embryos illegally imported into Australia also pose a risk of importing an EAD.

Currently, no Australian legislation or national standard requires record keeping, and records kept within the industry vary. Imported germplasm is usually identified according to requirements of the World Organisation for Animal Health (OIE) *Terrestrial animal health code*. These factors have implications for tracing.

A retrospective change in an exporting country's disease status after certification has occurred is another potential biosecurity risk (IIGB 2014).

A significant number of EADs can be spread by contaminated semen and embryos (see Appendix 1), as well as mechanically on equipment used in the artificial breeding process, and via contaminated liquid nitrogen and liquid nitrogen tanks. Management of these risks in the event of an EAD outbreak is covered by the **AUSVETPLAN response strategy** for each disease likely to be spread by genetic material.

3.2 Risk of disease spread from the enterprise

Artificial breeding centres hold, store and supply valuable elite breeding stock and considerable stores of genetic material. Depending on the pathogen and epidemiological considerations, there is potential for rapid and widespread exposure of livestock to disease agents through the distribution of fresh, chilled or frozen genetic material. This justifies a significant commitment from artificial breeding centres to ensuring maximum protection from disease at all times and under all conditions.

The reputation of the artificial breeding industry as a responsible industry depends on the quality and disease-free status of its service. It is essential that this reputation is maintained.

The risk of rapid spread of an EAD as a result of collection and transfer of semen or embryos from animals in a preclinical phase of infection or in a nonclinical carrier state is high. This is relevant for bacterial and viral diseases.

Risk is high for semen or embryos processed and transferred in a fresh or chilled state, and in a frozen state as freezing can maintain infectious organisms indefinitely.

Frozen materials are usually stored before being dispatched to inseminators or farmers. Freezing allows time for clinical disease to be detected in donors before semen or embryos are disseminated, so the risk from these materials can be reduced to near zero. Any EAD risk can be further mitigated by maintaining records that can be used in tracing activities; however, there is no legal requirement to

maintain records, and there are often no records on farm. It is also possible that frozen material could be overlooked in control activities and potentially cause another outbreak when the material is subsequently used.

Appendix 1 lists the EADs covered by the Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses (Emergency Animal Disease Response Agreement – EADRA) that are of concern for the artificial breeding centre industry. For EADs covered by AUSVETPLAN manuals, it shows the current evidence and data relating to possible presence of the disease agent in, and transfer of diseases via, semen and embryos of cattle, sheep, goats, pigs and horses. Research suggests that the majority of infective agents responsible for these diseases may be present in semen and attached to, or in the media collected with, embryos. Transmission of disease is likely in many cases via artificial insemination (AI), but less likely via embryo transfer.

Further information on these diseases may be found in the **disease-specific AUSVETPLAN response strategies**.

3.2.1 Factors to consider in assessing risk of disease spread

Live animals

Movement of animals to and from artificial breeding centres is minimal. The length of stay depends on the enterprise, the species and the purpose of the animal (teaser, donor or recipient). Animals may be transferred back to their farms of origin or to other farms. The National Livestock Identification System (NLIS)¹¹ enables effective identification and traceability of cattle, sheep and goats. PigPass/NLIS enables effective identification and traceability of pigs.

Other species of animal may be kept at artificial breeding centres (eg working dogs, cats to manage rodents). These should be kept under biosecure conditions.

Products

Semen and embryos

Semen and embryos from cattle, sheep, goats, pigs and horses, as appropriate, are collected and processed on farm and at artificial breeding centres before being distributed as fresh, chilled or frozen product to other centres, inseminators, farmers or overseas markets. Imported frozen semen and embryos are distributed from Australian artificial breeding centres or direct to individuals with an import permit.

Frozen semen and embryos are stored and transported in liquid nitrogen at $-196\text{ }^{\circ}\text{C}$ in specialised cryogenic tanks. The semen and embryos are usually processed into 0.25 mL or 0.5 mL plastic straws, although a significant amount of ram semen is also processed as pellets that are directly exposed to liquid nitrogen. The straws or pellets are packed into plastic or metal goblets, which are packed into individual metal canisters in the storage tank.

Processing and distribution of fresh and chilled semen or embryos do not require liquid nitrogen or liquid nitrogen containers. These products are normally distributed in polystyrene containers, thermoses or specially designed cooling units (isothermalisers).

¹¹ www.nlis.com.au

Biological products and specimens

Blood samples, urine or faecal samples, milk, and biopsy and tissue samples may be removed from the artificial breeding centre and transferred to laboratories or other centres holding animals. These are potentially high-risk items for spread of infection.

People

Veterinarians, artificial breeding centre staff, inseminators, visitors and others who leave the centre following direct contact with animals or animal quarters are a potential risk for the spread of infection. All facilities approved for export are required to have a visitor log. However, there is no such legal requirement for domestic facilities.

Equipment

New AI equipment is supplied to inseminators and farmers, with no risk of disease transfer. Equipment used during embryo collection and transfer, and equipment used for semen collection, such as artificial vaginas, is cleaned and sterilised before leaving an artificial breeding centre, so there is minimal risk of disease transfer via this equipment.

Liquid nitrogen

Liquid nitrogen supplies required by inseminators and farmers are transported from artificial breeding centres in portable storage tanks.

Waste

Effluent, water runoff, manure, slurry, soiled bedding, waste feed concentrates or hay, and bags are potentially high-risk items for spread of infection from an artificial breeding centre.

3.3 Significant issues for the industry in the event of an EAD incident

The nature of the artificial breeding centre enterprise and its operational systems (eg reserve stocks of frozen product) means that, with the exception of the pork industry (see below), it is feasible to temporarily close down the centre and AI services. Initially, on declaration of an EAD in the area of an artificial breeding centre, this will be the recommended approach. The extent of ongoing restrictions or regulations will depend on the nature and extent of the disease, and whether the artificial breeding centre is declared an infected, dangerous contact or suspect premises, or is merely within a restricted or control area.

The pork industry is the exception to the notion of easily closing down an AI centre. Approximately 90% of the sows in Australia are inseminated with chilled semen. Every week of the year, semen is collected from boars on 2–3 days of the week and shipped to customer farms the same morning. Closing down an AI centre would have profound effects on the long-term viability of the producers who rely on regular semen deliveries and on industry sustainability. The volume of demand is high enough that existing centres would struggle to maintain semen supply and cover any herd that was closed for EAD control measures.

This means that, to ensure ongoing production in the face of a disease outbreak, AI centres servicing the pork sector must operate at the highest levels of biosecurity and disease awareness. Measures to maintain continuity of supply must be considered by government and industry before an EAD outbreak.

Some laboratories for processing oocytes to in vitro–produced embryos may also be difficult to close down, especially if they are located within multipurpose buildings in large commercial centres.

3.3.1 Broad issues

In the event of an EAD incursion, the following issues are relevant for the artificial breeding centre industry:

- The industry is diverse in nature and location.
- Many different forms of transport are used for semen, oocytes and embryos, including the postal system, buses, domestic flights and couriers.
- After initial post-import movements, records of distribution of artificial breeding material are not legally required (IIGB 2014).
- The distribution of contaminated semen or embryos can be geographically widespread.
- Detection of some EADs can be slow. The EAD may be disseminated in the lag time before detection through natural or artificial breeding, or the movement of stock and contaminated personnel and equipment.
- The potential to halt operations (eg restrictions to animal movements) needs to be considered.
- With imported germplasm, responses can be further delayed as a result of reliance on notification and tracing in another country.
- There may be destruction of genetics or animals.
- There may be potential for wide and rapid dissemination of disease from a single animal or technician.
- In some instances, poor record keeping may delay tracing of contaminated germplasm.
- Some disease agents may be preserved in liquid nitrogen.
- Different diseases are transmitted in different ways, with different risks (see Appendix 1).
- Fresh semen must be used rapidly following collection, and a sudden cessation to the artificial breeding industry would have an immediate negative impact for the pig and horse industries, in particular.

Declared areas

Declared areas and premises classifications during an EAD incident (see Section 4.3.3) are designed to assist with management of a response, based on the risk associated with the area and/or premises. The emergency response activities to be undertaken to eliminate the disease and prevent its spread are determined by the disease status or risk in the area and premises. It is very likely that there will be impacts on the movement of livestock. Increased surveillance, recording and reporting of suspicious disease signs will be required. The impact on semen and embryos from artificial breeding centres will vary with the disease, and its nature and extent.

3.3.2 Commercial implications

During an EAD outbreak, there may be:

- loss of income for affected end users of the semen and embryos; for certain industries, end users may be producers of elite stock, which is likely to be of high commercial and genetic value
- significant business interruption, including disruption to the pork industry if there is a failure of regular semen supply
- loss of income for affected distributors, and veterinarians and technicians within the industry
- trade impacts.

3.3.3 Nature of the incurred losses

An EAD outbreak will create:

- financing issues resulting from recurrent costs (and associated interest charges) incurred in continuing to operate a business in the absence of all, or part, of the business's cash flow
- additional costs for any remedial treatment and monitoring of stock at affected centres, and stock that have received potentially contaminated semen or embryos
- potential herd and genetic losses as a result of disease control activities
- job losses as businesses respond to the reduced ability to maintain their normal business operations
- potential closures of breeding centres due to an inability to operate or loss of reputation
- disruption to downstream production and associated losses for pork farming businesses that rely on genetic supply.

Compensation may be required for producers if animals, genetic material or property are destroyed. (Details are available in the **AUSVETPLAN operation manual *Valuation and compensation.***)

3.3.4 Possible longer-term implications

Long-term implications will vary with the type of EAD, and its location and spread.

The impact on the export of Australian genetic material will depend on the type of EAD and the response of the export market.

The potential large-scale loss of high-end genetic material and animals would have a significant impact on the affected industries.

3.4 Work health and safety

Some diseases pose a potential risk to people handling infected animals or tissues. People responsible for handling infected or suspect animals must maintain due care and maximum personal hygiene at all times to limit the risk of becoming infected. EADs presenting the most risk include brucellosis, rabies, Hendra virus, vesicular stomatitis and Rift Valley fever.

4 Emergency animal disease preparedness and management

4.1 Australia's animal health services

Australian governments, primary industries and other stakeholders work closely together to prevent, detect, control and manage pest and disease outbreaks, and minimise impacts on the economy, the environment and international trade. To do this effectively, governments, industries and stakeholders use consistent and collaborative approaches to determine national animal health priorities. The livestock industries are active partners in policy development, support targeted animal health activities and contribute to emergency responses.

4.2 National arrangements

Governance arrangements for the response to emergency animals diseases (EADs) are outlined in the **AUSVETPLAN Overview**.

Information on the responsibilities of a state coordination centre and local control centre is available in the **AUEVTPAN management manual Control centres management (Parts 1 and 2)**.

Australia's response planning and coordination are enhanced by collaborative national arrangements between governments and industry, and other key stakeholders. These arrangements include:

- the Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses (Emergency Animal Disease Response Agreement – EADRA)
- the Australian Veterinary Emergency Plan (AUSVETPLAN)
- training for EAD response personnel.

Coordination of the response to EAD incidents is further enhanced by the use of established consultative committees and management groups.

4.2.1 Emergency Animal Disease Response Agreement

The EADRA¹² is a legally binding agreement between the Australian Government, state and territory governments, livestock industries and Animal Health Australia. It supports a rapid and efficient response to an EAD outbreak.

The agreement establishes basic operating principles and guidelines, and defines roles and responsibilities of the parties that are involved. It provides for formal consultation and dispute resolution between government and industry on resource allocation, funding, training, risk management and ongoing biosecurity arrangements.

The signatories of the EADRA are committed to:

- minimising the risk of EAD incidents by developing and implementing biosecurity plans for their jurisdictions or industries

¹² The full title of the agreement is the Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses. For more information, see <https://animalhealthaustralia.com.au/eadra>.

- maintaining capacity to respond to an EAD by having adequate numbers of trained personnel available to fill the response functions specified in AUSVETPLAN
- participating in decision making relating to EAD responses, through representation on the Consultative Committee on Emergency Animal Diseases (CCEAD) and the National EAD Management Group (NMG) established for the incident
- sharing the eligible response costs of EAD incursions using pre-agreed cost-sharing formulas.

Four categories of diseases are used to determine the liability for costs. These categories have been developed according to the benefits of controlling the disease, as assessed by the likely impact of the specific EAD on human health, socioeconomics, the environment and livestock production.

Table 4.1 describes the four disease categories and their respective cost-sharing arrangements.

Table 4.1 Disease categories and cost-sharing arrangements

Category	Cost-sharing arrangement
1	100% government
2	80% government 20% industry
3	50% government 50% industry
4	20% government 80% industry

The EADRA also contains many other important instructions that provide the basis for a coordinated national EAD response. In particular, it refers to using existing plans, such as AUSVETPLAN; sets standards for accounting, auditing and training personnel; and provides the incentive for developing and maintaining government and industry biosecurity measures.

4.2.2 AUSVETPLAN

This enterprise manual is part of AUSVETPLAN – the Australian Veterinary Emergency Plan.

AUSVETPLAN is Australia’s nationally agreed approach to responding to EADs of national significance. It comprises resources that support efficient, effective and coherent responses to these diseases. It has been developed and agreed on by governments and relevant industries in non-outbreak times to ensure that a fast, efficient and effective EAD response can be implemented consistently across Australia with minimal delay.

AUSVETPLAN provides the contingency planning framework for Australia’s response to EADs, and is complemented by a range of other plans and resources, including:

- national and state/territory standard operating procedures for the implementation of certain response measures
- plans involving other areas of state and territory emergency management arrangements (eg police, local government)
- diagnostic resources
- training materials.

4.2.3 Training for emergency animal disease response personnel

It is a requirement of the EADRA that, where possible, signatories (governments and industries) use appropriately trained staff to undertake the response functions outlined in AUSVETPLAN for an EAD response.

Governments provide training in response functions for their personnel.

Animal Health Australia's Training Services project provides training for government personnel and representatives of the Australian livestock industries to help prepare them to participate in the CCEAD and the NMG. The program also provides training for livestock industry representatives to prepare them to undertake the Liaison – Livestock Industry function in either a state coordination centre (SCC) or a local control centre (LCC).

The responsibilities of the SCC and LCC Liaison – Livestock Industry functions are documented in the **AUSVETPLAN management manual *Control centres management, Part 2***.¹³

4.3 Controlling an emergency animal disease incident

4.3.1 Governance

Control of an EAD outbreak is a complex operation, requiring rapid mobilisation of resources and coordination of a diverse team of people. An EAD response may require input from all tiers of government and from a range of portfolios, as it may need to address not only animal health issues, but also financial, social, economic, human, trade and recovery issues.

EAD responses are planned and implemented at three levels: national, state or territory, and local.

The Australian Government (through the Department of Agriculture, Water and the Environment) provides international liaison during an EAD response; this includes market access negotiations, international reporting (eg to the World Organisation for Animal Health (OIE)), and coordination of access to overseas assistance through existing agreements. The Australian Government also provides national coordination for the response; more information is provided in the **AUSVETPLAN management manual *Control centres management, Part 1***.

The CCEAD is the key technical coordinating body, providing the link between the Australian Government, states and territories, industry, Animal Health Australia and the NMG during an EAD response.

The NMG manages national policy and resourcing of the response. It determines whether a disease is eradicable and whether the direct costs of a response should be shared between Australia's governments and the relevant livestock industry(ies) under the EADRA.

Both the CCEAD and the NMG base their recommendations and decisions on current information provided by the affected state or territory, and on guidance provided in AUSVETPLAN.

In an EAD outbreak, relevant state or territory animal health officials manage all aspects of its control and eradication according to a nationally agreed plan (Emergency Animal Disease Response Plan (EADRP)).

¹³ <https://animalhealthaustralia.com.au/ausvetplan/>

The chief veterinary officer (CVO) of the state or territory in which an EAD outbreak occurs implements disease control measures as agreed in the EADRP and in accordance with relevant legislation. State or territory animal health (or, in many cases, biosecurity) legislation provides broad powers to enable an effective response to EADs, including the ability to enter premises, examine records, order livestock musters, control livestock movements, request that animals or products be submitted for testing, and isolate and destroy diseased or suspected diseased livestock.

An SCC may be established to coordinate response activities across the state or territory, in accordance with the strategic direction provided by the CVO, the CCEAD and the NMG. The SCC maintains overall control of the incident under the CVO and is able to give specific directions to the LCCs to ensure that the CVO's intentions are met.

Disease control activities are managed from an LCC, usually established in the vicinity of the outbreak. The LCC is responsible for all operational activities within a defined area, assigned by the CVO, including investigations of reports of disease outbreaks; consultation with livestock producers and processors; specimen collection; property quarantine; valuation of livestock and property; livestock slaughter; livestock product tracing, treatment and disposal; and property decontamination.

Information on the structure, functions and responsibilities of the SCCs and LCCs is contained in the ***Control centres management manual, Part 1***. Detailed descriptions of functions and associated activities in an EAD response are contained in the ***Control centres management manual, Part 2***.

The CVO makes ongoing decisions on follow-up disease control measures in consultation with the CCEAD and, where applicable, the NMG, based on epidemiological information about the outbreak.

Industry participation

For disease responses relevant to the artificial breeding industry, Animal Health Australia industry representatives are members of both the CCEAD and the NMG. These representatives receive education in EAD management and their roles through Animal Health Australia's EAD training program.

Trained industry personnel undertake the Liaison – Livestock Industry function at an SCC or LCC, to provide the official conduit between the SCC or LCC and the affected industries. These personnel represent the interests and advice of industry, consistent with the EADRP approved by the NMG, and relevant to the scope of the response at the SCC or LCC level.

Industry personnel may also participate in a response at the state/territory or local level, by undertaking advisory or other functions in an SCC or LCC. These personnel do not represent industry but contribute their individual expertise to managing the response.

4.3.2 Response measures

The response to an EAD will be determined by the nature of the outbreak, including:

- how early the outbreak is detected
- the extent of the outbreak
- the location of infected, suspect, trace and dangerous contact premises
- which species of livestock are affected
- the characteristics of the disease agent involved.

The fundamental aim of national EAD control policy is to eradicate an EAD if this is reasonably feasible. Key factors taken into account are those related to the disease and affected population. For example,

the principal option used for many EADs is eradication by stamping out where this is applicable to the EAD in question and is considered to be cost-effective. This may involve use of all or some of the following procedures:

- epidemiological assessment (to understand how the disease is behaving in that particular outbreak)
- quarantine of premises and/or movement controls on potentially infected or contaminated live animals, animal products, people, equipment, vehicles and other things – this will include a national livestock standstill if foot-and-mouth disease (FMD) is strongly suspected or confirmed; see the **FMD response strategy** for more information
- tracing of potentially infected animals, and potentially contaminated products and things (eg equipment, vehicles)
- surveillance of susceptible animals
- biosecurity measures for people and equipment
- management of animal welfare
- valuation and compensation for livestock and property (including milk and milk products) destroyed as part of the EAD response
- destruction and disposal of infected and exposed susceptible animals, animal products and contaminated materials
- decontamination of infected premises
- restriction of the activities of certain enterprises
- an industry and public information program.

Other measures that may be used where necessary include:

- vaccination
- vector or wild animal control
- treatment of affected animals
- treatment of affected products
- use of sentinel animals
- zoning and compartmentalisation.

In some circumstances, a modified stamping-out approach may be used – for example, by allowing the slaughter of animals at an accredited abattoir to produce a marketable product.

Sometimes, eradication is not considered feasible because the outbreak is already widespread when diagnosed or is considered likely to spread further despite the application of stamping out. In these cases, other control measures may be selected, such as vaccination, with a view to possible containment and eventual eradication; or a state or territory and/or industry-based control program to manage a disease that is likely to become endemic in the population. Where the NMG has reason to believe that eradication is not possible and the disease can only be contained, or in any situation where the cost of an EADRP will exceed an agreed limit on funding, the NMG may decide to stop cost sharing.

4.3.3 Overview of declared areas and premises classifications

Declared areas

A declared area is a defined tract of land that is subjected to disease control restrictions under emergency animal disease legislation. There are two types of declared areas: restricted area (RA) and control area (CA).

Declared areas are declared under jurisdictional legislation. RAs are subject to strict disease control measures. CAs are disease-free buffers between an RA and the parts of Australia that are free from disease (the outside area – OA).

All declared areas need to be clearly identified and easily understood, so that all affected parties can recognise which area they are in, and what regulations and control measures are applicable to them.

Declared areas are declared by a CVO or their delegate, or a ministerial declaration, according to the appropriate legislation of the states and territories involved.

There are also other areas that are not legally declared, but are used for specific reasons:

- transmission areas (TAs), which are used for vector-borne diseases for epidemiological purposes, recognising that vectors are not confined by property boundaries
- the OA, which is used to describe the rest of Australia outside the declared areas.

Figure 4.1 provides a schematic illustration of declared areas and standard movement controls.

Area definitions for non-vector-borne diseases

Restricted area (RA)

An RA is a relatively small legally declared area around infected premises (IPs) and dangerous contact premises (DCPs) that is subject to disease controls, including intense surveillance and movement controls.

An RA will be a relatively small declared area¹⁴ (compared with a CA – see below) drawn with at least 'x' km radius¹⁵ around all IPs and DCPs, and including as many suspect premises (SPs), trace premises (TPs) and dangerous contact processing facilities (DCPFs) as practicable. Based on risk assessment, the RA is subject to intense surveillance and movement controls, and other relevant disease controls. The purpose of the RA is to minimise the spread of the EAD. The RA does not need to be circular but can have an irregular perimeter, provided that the boundary is initially an appropriate distance from the nearest IP, DCP, DCPF, SP or TP. Multiple RAs may exist within one CA.

The boundaries will be modified as new information becomes available, including from an official surveillance program. The actual distance in any one direction will be determined by factors such as terrain, the pattern of livestock movements, livestock concentrations, the weather (including prevailing winds), the distribution and movements of relevant wild (including feral) animals, and known characteristics of the disease agent. In practice, major geographic features and landmarks, such as rivers, mountains, highways and roads, are frequently used to demarcate the boundaries of the RA. Although it would be convenient to declare the RA on the basis of local government areas, this may not be practical, as such areas can be larger than the particular circumstances require.

Control area (CA)

A CA is a legally declared area where the disease controls, including surveillance and movement controls, applied are of lesser intensity than those in an RA (the limits of a CA and the conditions applying to it can be varied during an incident according to need).

A CA is a disease-free buffer between the RA and the OA (see below). Specific movement controls, surveillance strategies, and other relevant disease controls will be applied within the CA to maintain its disease-free status and prevent spread of the disease into the OA.

¹⁴ As defined under relevant jurisdictional legislation.

¹⁵ For specific details, refer to the relevant AUSVETPLAN response strategy (<https://animalhealthaustralia.com.au/ausvetplan>).

An additional purpose of the CA is to control movement of susceptible livestock for as long as is necessary to complete tracing and epidemiological studies, to identify risk factors and forward and backward risk(s).

The CA will be a larger declared area around the RA(s) – initially, possibly as large as the state or territory in which the incident occurs – where restrictions will reduce the risk of disease spreading from the RA(s). The CA will have a minimum radius of ‘y’ km,¹⁶ encompassing the RA(s). The actual distance in any one direction will be determined by factors such as terrain, the pattern of livestock movements, livestock concentrations, the weather (including prevailing winds), the distribution and movements of relevant wild (including feral) animals, and known characteristics of the disease agent. In practice, major geographic features and landmarks, such as rivers, mountains, highways and roads, are frequently used to demarcate the boundaries of the CA. The boundary will be adjusted as confidence about the extent and distribution of the incident increases.

In general, surveillance and movement controls will be less intense in the CA than in the RA, and disease-susceptible animals and their products may be more likely to be permitted to move under permit within and from the area than those originating from the RA.

Outside area (OA)

The OA is the area of Australia outside the declared (control and restricted) areas.

The OA is **not** a declared area but is used to describe the rest of Australia outside the declared areas. The OA will be subject to surveillance. Because it is highly desirable to maintain the OA as ‘disease-free’, the movement of animals and commodities from the RA and CA into the OA will be restricted.

The OA will also be of interest for zoning¹⁷ and compartmentalisation¹⁸ for purposes of trade access, as well as for disease control (see below).

Area definitions for vector-borne diseases

Transmission area (TA)

A TA is an area, not legally declared, that is used for vector-borne¹⁹ diseases for epidemiological purposes, recognising that vectors are not confined by property boundaries. It includes IPs and, where possible, SPs, TPs, DCPs and DCPFs. A TA is subject to an increased level of surveillance, and has movement controls appropriate to its associated RA.

Vector-borne diseases differ from non-vector-borne infectious diseases in that vectors cannot be contained by boundary fences. The TA is thus less concerned with property boundaries or definitions and more with including all infected vectors in the area surrounding known areas of transmission. It will be drawn around known sources of transmission, as evidenced by disease, seroconversion, trapping of infected vectors and any other confirmation of active disease transmission. There may be insufficient information at the start of a response to identify a TA, and an RA may be put in place before a TA can be determined.

A TA is not a legally declared area but will include all IPs and, where possible, all SPs, TPs, DCPs and DCPFs. In the presence of competent vectors, a TA of ‘x’ km²⁰ radius should be drawn. The TA does not

¹⁶ For specific details, refer to the relevant AUSVETPLAN response strategy (<https://animalhealthaustralia.com.au/ausvetplan>).

¹⁷ The process of defining, implementing and maintaining disease-free and infected areas, in accordance with OIE standards. Zoning is based on geopolitical and/or physical boundaries and surveillance, in order to facilitate disease control and/or trade.

¹⁸ The process of defining, implementing and maintaining one or more disease-free establishments, under a common biosecurity management system, in accordance with OIE standards. Compartmentalisation is based on applied biosecurity measures and surveillance, in order to facilitate disease control and/or trade.

¹⁹ In most cases, a TA is focused on insect (arthropod) vectors.

²⁰ For specific details, refer to the relevant AUSVETPLAN response strategy (<https://animalhealthaustralia.com.au/ausvetplan>).

need to be circular but can have an irregular perimeter, provided that the boundary is initially an appropriate distance from the nearest IP, DCP, DCPF, SP or TP. This distance will depend on the information gained about vector numbers and competence, environmental factors (eg prevailing winds, rainfall, temperature, humidity), and the number and distribution of infected and/or susceptible animals. In the absence of competent vectors, the TA may be reduced in size.

Restricted area (RA)

An RA will be a larger legally declared area around the TA. The boundary of the RA does not have to be circular or parallel to that of the TA but should be at least 'y' km from the boundary of the TA; this distance may be influenced by OIE standards or an official control program. The RA can include areas of known competent vector distribution. In general, surveillance may be less intense than in the TA, but movement controls will be the same.

The boundary of the RA will be adjusted as confidence about the extent of the incident increases. It will take into account the relevant OIE *Terrestrial animal health code* chapter on the disease and, if appropriate, OIE standards on zoning and compartmentalisation (Chapter 4.4²¹).

Other types of areas

It is possible that other types of areas (eg vaccination area, surveillance area), which are not legally declared, may be used for disease control purposes in some jurisdictions.

²¹ www.oie.int/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access

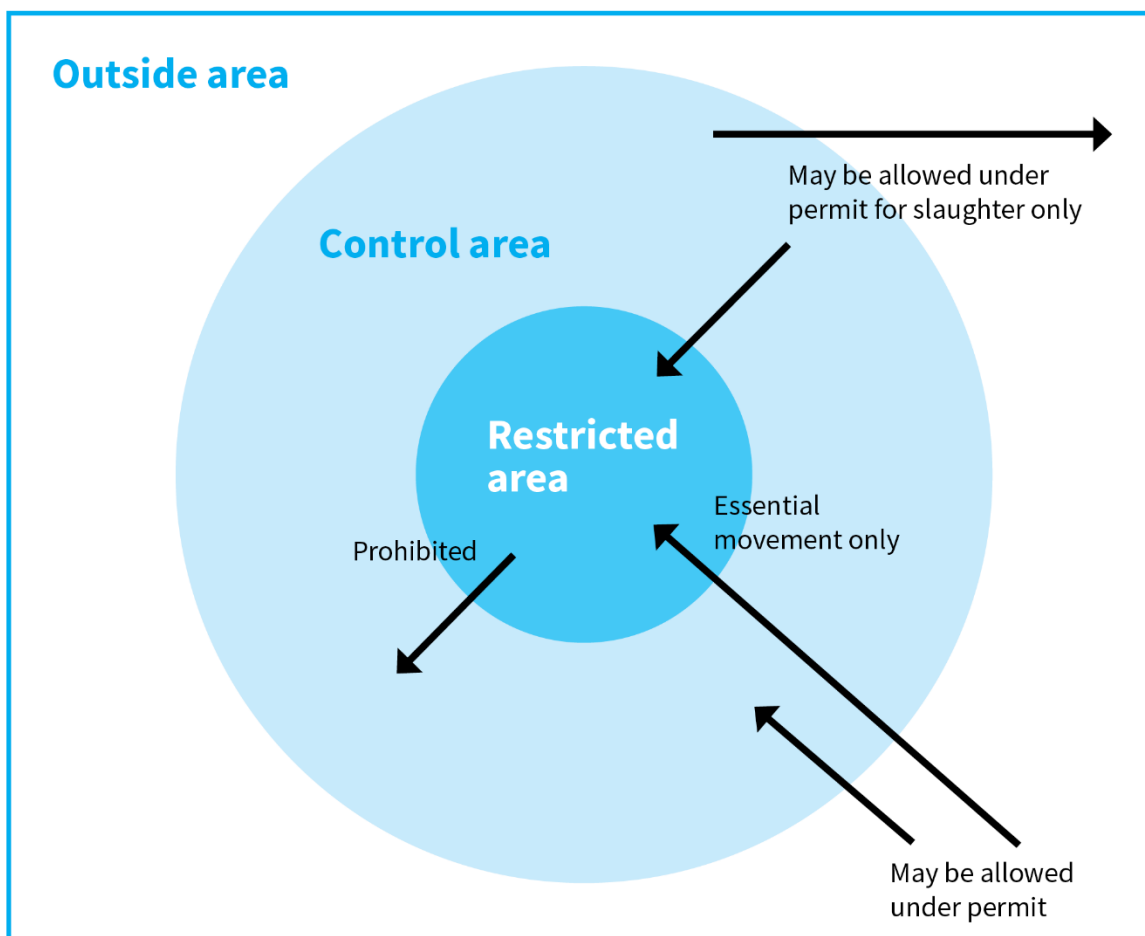


Figure 4.1 Schematic illustration of declared areas, indicating standard movement controls

Premises classifications

All premises within declared areas are subject to classification for disease control management and monitoring purposes.

A particular property (or premises) must fit clearly into only one premises classification at a given time. The classifications and their abbreviations are (in alphabetical order):

- approved disposal site (ADS)
- approved processing facility (APF)
- at-risk premises (ARP)
- dangerous contact premises (DCP)
- dangerous contact processing facility (DCPF)
- infected premises (IP)
- premises of relevance (POR)
- resolved premises (RP)
- suspect premises (SP)
- trace premises (TP)
- unknown status premises (UP)
- zero susceptible species premises (ZP).

In addition to these premises definitions, the following ‘qualifiers’ may be used to describe the outcome of a recent investigation, epidemiological risk assessment or other activity on premises where their status has not changed:

- assessed negative (AN)
- vaccinated (VN)
- sentinels on site (SN).

For example, an ARP that has been determined by the relevant jurisdictional authority as being ‘assessed negative’ should be recorded as ‘ARP-AN’, and an IP that has completed a vaccination program should be recorded as ‘IP-VN’.²²

Not all classifications may be needed in a particular EAD response.

Classification of premises provides a framework for authorities to exercise legal powers over such premises, facilitates product tracking, and serves as a communication tool for reporting nationally and internationally on progress in the response.

4.3.4 Use of declared areas and premises classifications in an EAD incident

When an EAD incident is first suspected, the premises involved would undergo a clinical and/or epidemiological investigation. If the case definition, as defined in the relevant AUSVETPLAN response strategy, is met²³ (ie the index case²⁴), the relevant CVO or their delegate will determine the premises classification and may declare the premises an IP.

After the identification of the first IP, an RA and a CA may be declared.²⁵ A TA may also be defined, if appropriate. All premises within these areas will be classified. At the beginning of an EAD incident, the initial premises classifications would be IP, ARP, POR, UP and ZP.

Any premises within the RA or CA will have only one classification at any one time. After an epidemiological investigation, clinical assessment, risk assessment or completion of control measures, a premises may be reclassified.

Once the first IP has been identified, intelligence gathering through veterinary epidemiological investigations would quickly lead to the identification of SPs and TPs. These will be high priorities for follow-up investigation by the relevant state or territory authorities. In a worst-case scenario, an SP could become an IP; therefore, SPs need to be investigated as a matter of very high priority. Similarly, investigation and risk assessment of a TP might identify it as an IP, DCP or DCPF. Both an SP and a TP might also be assessed as negative and qualified as SP-AN and TP-AN, and eventually reclassified as an ARP, POR or ZP.

All premises classifications are subject to change as a result of a modification in the case definition(s) or investigation(s) as the incident response proceeds.

Classifications should be applied with information needs of managers in mind. They should assist managers to monitor and report progress. Premises classifications to be used should be agreed early

²² Some jurisdictions might have a date associated with the ‘assessed negative’ qualifier.

²³ Note that case definitions are under development for some manuals and also that some diseases could be present without showing clinical signs.

²⁴ The first case to come to the attention of investigators.

²⁵ This is invariably the case with highly contagious diseases (eg FMD, equine/avian/swine influenza, classical swine fever) but may not apply to less contagious diseases (eg Hendra virus, anthrax, Australian bat lyssavirus).

in a response, so that control centre personnel can apply the correct and consistent classifications and definitions from the outset of the investigation and response.

5 Industry preparedness

The reputation of the artificial breeding industry as a responsible industry depends on the quality and disease-free status of the service. It is essential that this reputation is maintained. The potential for rapid spread of an emergency animal disease (EAD) through artificial breeding operations or artificial insemination (AI) services in rural Australia is significant.

In addition to the *Minimum health standards for stock standing on licensed or approved artificial breeding centres in Australia* (Animal Health Committee Working Party on Artificial Breeding 1988), the World Organisation for Animal Health (OIE) *Terrestrial animal health code* (OIE 2021) contains recommended procedures for management of animals, semen collection, handling of semen and preparation of semen doses in the laboratory; and for handling and treatment of oocytes and embryos before processing, transfer or freezing.

Several procedures, including biosecurity plans, can be implemented by artificial breeding centres to reduce the risks associated with the introduction or spread of disease, maximise the identification and detection of diseased animals, and assist with disease control.

Disease control activities can have significant implications for the artificial breeding industry. Factors that need to be considered in developing an appropriate response include:

- protection of valuable breeding stock
- animal welfare
- use and disposal of genetic material
- business continuity
- confirmation and recognition of disease freedom for established nationally consistent compartments.

5.1 Impact of an EAD on the industry

Artificial breeding centres are intensive, concentrated holding facilities for various animal species. For species that breed seasonally, an EAD outbreak during breeding season would have a more devastating impact on the industry than an outbreak out of season. Some centres hold multiple species, and these animals may come from a variety of sources for short- or medium-term holding for collection of semen, oocytes or embryos.

Collection of semen, oocytes or embryos from animals incubating disease could lead to the use and storage of infected material.

Rapid spread of an EAD could occur through dissemination of infected semen, oocytes or embryos, or in-contact fomites or equipment. Distribution of fresh and chilled semen or embryos poses a higher risk than frozen material because the short storage time increases the possibility of spreading the disease before clinical signs develop in the donor animals.

More detail on the specific risks within artificial breeding centres is provided in Section 3.2.

Inseminators, technicians and veterinary surgeons often visit multiple farms each day over a large area, providing the potential for rapid spread of disease, in a variety of ways. This risk is not high in the pork industry, where all AI is done by trained staff in-house. More detail on recommended guidelines for personnel associated with artificial breeding centres is in Appendix 3.

If an EAD outbreak occurs in the area of an artificial breeding centre, it is feasible to temporarily close down the processing and services operations of the centre and associated AI services. Operations would recommence when subsequent information indicates that the risk of disease spread by semen, oocyte or embryo collection, storage or use is low. The significant, time-sensitive and ongoing demand for pig semen requires that risk assessment activities for pig artificial breeding operations be a response priority.

The animals at an artificial breeding centre should be protected by a quarantine buffer. This should be considered when assessing the risks of exposure or spread of infection during a disease outbreak.

5.2 Biosecurity measures and the industry

The OIE Terrestrial Code²⁶ contains recommended procedures for management of bulls, semen collection, handling of semen and preparation of semen doses in the laboratory, handling and treatment of embryos before transfer or freezing, oocyte collection, in vitro processing to embryos, micromanipulation of oocytes and embryos, and handling and storage of oocytes and embryos. It also covers recommended procedures for genetic material of sheep, goats, pigs and horses.

Several procedures can be implemented by artificial breeding centres to reduce the risk of introduction or spread of disease, maximise the identification and detection of diseased animals, and assist in disease control programs. These are discussed below.

5.2.1 General biosecurity

Affected livestock industries must implement strict biosecurity measures for their operations when an EAD is declared. For diseases relevant to artificial breeding centres, this will include measures for receiving animals; collecting semen, oocytes and embryos; and disseminating semen and embryos.

5.2.2 Procedures for early detection of disease

EAD response planning is a critical part of artificial breeding centres' preparedness should there be an outbreak, or suspicion of an outbreak, of an EAD in Australia. Response planning will assist centre operators to work with biosecurity officers to manage the outbreak with the highest degree of mutual understanding and efficiency.

EAD response planning for artificial breeding centres will be complementary to EAD response planning for the cattle, sheep, goat, pig, deer and horse industries. It is likely that there will be some overlap between these so that each industry's response plans have standalone status.

EAD response planning has two related objectives, covering the role that relevant artificial breeding centres can play in:

- managing, controlling and eradicating an EAD outbreak
- implementing protocols to help minimise time out of domestic and export markets.

²⁶ www.oie.int/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access

Biosecurity measures applicable to the industry in general will include:

- increased surveillance by both animal health authorities and industries; artificial breeding centres will be advised by their state or territory animal health authorities or the local control centre of signs of the disease and actions to prevent its spread
- enhanced record keeping, including animal, semen and embryo identification and traceability systems.

Specific areas of the input and output where controls may need to be put in place in the event of an EAD outbreak are outlined below. Although the specifics are likely to vary with the disease, the following basic tenets relating to quarantine, movement controls and traceability will apply:

- Unless otherwise declared or permitted, do not receive any animals or genetic material from any declared areas. Care in applying this principle is required for the pork sector, where a small number of highly biosecure boar studs in Queensland, New South Wales, Victoria and South Australia provide semen within and across states. The same care is required for laboratories producing in vitro-produced embryos.
- Where possible, hold and do not release genetic material or livestock present at the artificial breeding centre until it is certain that the movement is deemed safe – that is
 - the artificial breeding centre is not within a declared area and has not received susceptible animals from a declared area
 - the genetic material has otherwise been classified safe (via permit, compartmentalisation or prior state/territory certification, together with point-of-care surveillance, where necessary) because it meets any legally declared requirements; this may include undertaking additional approved processes to meet acceptable standards for the inactivation of EAD agents that may be present in the semen or embryos
 - equipment moved onto and off the property associated with the genetic material has been decontaminated, where required
 - there is biosecure distribution and delivery of genetic material to end users.
- Biosecurity conditions may apply to staff, vehicles, feedstuffs, equipment and contaminated waste materials entering or leaving the property.
- Ensure that records relating to identifying and tracing livestock and genetic material associated with the enterprise are readily accessible, comprehensive and complete. The records should include the origin, transit points and destinations, and all relevant dates.

5.2.3 Design of the enterprise

Before any EAD incursion, the establishment of nationally consistent domestic compartments is recommended. These may be established for artificial breeding centres and subcentres, inseminators, semen and embryo centres, storage and distribution facilities, and on-farm semen and embryo storage and use. Standards for application and compartment recognition should demonstrate confidence in the integrity of disease freedom status so that the recognised compartments can continue to operate for the purpose of domestic trade. The compartment standard operating procedures should be established with input from the relevant veterinary authorities, industry and other stakeholders, and must include biosecurity plans.

5.2.4 Livestock

The animals themselves are potential sources of diseases, because cattle, sheep, pigs, goats, deer and horses enter artificial breeding centres at varying times for collection and processing of semen or embryos. The length of stay depends on the enterprise, and the species and purpose (teaser, donor or recipient) of the animal.

Animals may also be transferred back to their farms of origin or other farms,²⁷ or may be sold or culled. These movements will be captured in the National Livestock Identification System (NLIS) database for cattle, sheep and goats, and the PigPass/NLIS database for pigs. All movements have the potential to transmit infection. The critical period would be during the incubation period before the appearance of clinical signs. See the relevant disease-specific **AUSVETPLAN response strategy** for information on incubation periods.

The following recommendations apply during an EAD outbreak:

- Where possible, the number of animal species residing at an artificial breeding centre should be limited.
- If two or more species are present at the same time, they should be maintained in separate areas.
- Regular veterinary health inspections of all animals should be carried out.
- Sick animals should be placed in immediate isolation. Any sick animals should be reported to the animal health authorities or the supervising veterinarian for prompt investigation.
- Dead animals should be placed in immediate isolation, and reported to the animal health authorities or the supervising veterinarian for prompt investigation.
- Depending on the declaration of area status, movement of animals, including movements from pre-entry isolation to the artificial breeding centre, may require movement permits, or may not be allowed. Check with animal health authorities before any movements on or off the facility or between facilities.
- Biosecurity principles must apply – for example, isolation on the property of origin before sending and at arrival at the centre.
- Records must be maintained of all movements of livestock onto and off the centre, including
 - NLIS and physical identification of animal
 - property of origin
 - date of arrival and departure
 - destination property when leaving the centre (if different from property of origin)
 - vehicle details
 - copies of National Vendor Declarations
 - records of tests conducted before movement onto the premises.

5.2.5 Semen and embryos

Infection can potentially be transferred via semen or embryos, or their transport containers, although the probability of this occurring in an artificial breeding centre is extremely low.

Because pig enterprises only use chilled and fresh semen, the ability to transport semen over long distances (including interstate) within a short timeframe during an EAD outbreak may be affected and require delivery arrangements that offer higher biosecurity levels.

²⁷ Pigs are not returned to farms if taken off farm for artificial breeding purposes.

The following recommendations apply during an EAD outbreak:

- No semen, oocytes or embryos should be collected from a sick animal. Collections may be made from a recovered animal with veterinary clearance.
- The use of biological products in media for processing fresh, chilled or frozen semen should be limited.
- For all semen, the donor sire, dam and teaser animals should be identifiable, and the date of production should be recorded.
- Distribution of fresh and chilled semen and embryos should be controlled until the cause of the outbreak has been determined. Further action will depend on the results of the investigations. Movement controls applied to semen and embryos will vary with the EAD and the location of the artificial breeding centre.
- The use of biological products in media for processing oocytes and fresh, chilled or frozen embryos should be limited.
- Embryos should be washed and handled according to the current edition of the International Embryo Technology Society (IETS) manual.²⁸ Unless the embryos were micromanipulated, they should have intact zona pellucida before and after washing – if the integrity of the zona pellucida is compromised, this will increase the likelihood of contamination or infection of the embryo with disease agents, and thus such embryos should not be used. Micromanipulated embryos should be handled as recommended by the OIE Terrestrial Code.
- Frozen embryos should be stored in a temporary liquid nitrogen storage container for 30 days before transfer to permanent storage or to recipients.
- For all embryos, the donor sire and dam should be identifiable, and the date of collection of oocytes or embryos should be recorded.
- Sick animals should not be used as teaser animals.
- Embryos entering artificial breeding centres for use within that centre should be restricted to embryos collected, washed and handled in line with IETS protocols.

Non-health-tested semen and embryos

Semen or embryos collected on farms from animals that have had no health testing present a significant risk of transfer of infection.

To reduce the risks associated with this common practice, it is recommended that frozen semen and embryos be stored in separate containers, and isolated from health-tested semen and embryos.

In the event of an EAD outbreak, any health-tested semen or embryos stored in contact with suspicious non-health-tested material and considered to have been contaminated will be destroyed along with the contaminated material.

5.2.6 Personnel

People can carry disease agents. A diverse range of people enter artificial breeding centres, including centre staff and their family members, veterinarians, inseminators, farmers, government inspectors, maintenance contractors, builders, local and overseas visitors, and agents. People leaving the centre who have been in contact with animals or animal quarters can also potentially spread disease agents.

²⁸ www.iets.org/Publications/IETS-Manual

The following recommendations apply during an EAD outbreak:

- The entry of visitors should always be strictly controlled.
- Records should be kept of all people moving onto and off the facility (ie date and time of movements on and off).
- Staff at the centre should be technically competent and observe high standards of personal decontamination to prevent the introduction or spread of disease agents.
- Protective clothing and footwear for use only at the centre should be provided.
- Staff exposed to artificial breeding centre animals should be encouraged to limit contact with animals residing off the centre, especially those of the same or similar species. Where this is not possible, suitable biosecurity procedures should be implemented.
- Inseminators, technicians and veterinarians should be restricted from access to, or contact with, animals at the artificial breeding centre unless they change into clean protective clothing and footwear provided at the quarantine entry points.

5.2.7 Equipment and facilities

Equipment used for semen distribution, AI, embryo collection and transfer, animal husbandry and farm centre operations can be a source of contamination.

New, sterile AI equipment is supplied to inseminators and farmers, and this reduces the risk of transfer of an EAD agent.

Embryo collection and transfer equipment, and semen collection equipment, is cleaned and sterilised before leaving an artificial breeding centre; therefore, the risk of transfer of disease agents via this equipment is low.

Vehicles of the artificial breeding centre, centre staff, inseminators, technicians, veterinary staff and visitors, and vehicles used for liquid nitrogen delivery, livestock transport, feed delivery and general goods delivery can all carry disease agents.

Both during and outside of an EAD outbreak, biosecurity measures should be applied to all movements onto and off the artificial breeding centre.

Liquid nitrogen

If liquid nitrogen is required by inseminators and farmers, it is transported to them from artificial breeding centres or directly from suppliers in portable storage tanks.

The risk of transfer and survival of infectious organisms in liquid nitrogen and its vapour is high if the liquid nitrogen has become contaminated with these organisms. Contamination of liquid nitrogen tanks or their contents may occur when straws or vials containing semen or embryos break or lose their seal. Semen that is processed into pellets and stored in open bulk goblets has a greater risk of contaminating an artificial breeding centre.

The following recommendations apply during an EAD outbreak:

- Liquid nitrogen tanks should be identified and disinfected.
- Liquid nitrogen should be disposed of using an approved procedure.

5.2.8 Miscellaneous animals and byproducts

Although artificial breeding centres may maintain a closed biosecurity status, entry of other animal species or products can occur. These include pets, working dogs and horses, food products (eg staff meals, waste), native wildlife and feral animals (eg foxes, possums, birds, bats, rats, mice, wombats), and water (eg streams, effluent runoff, waste).

Animal products and byproducts, and wastes are also potentially high-risk items for the spread of infection both onto and off an artificial breeding centre. They include effluent, water runoff, manure, slurry, soiled bedding, waste feed concentrates or hay, and bags.

Blood samples, embryo wash samples, urine or faecal samples, milk, and biopsy and tissue samples removed from the artificial breeding centre and transferred to laboratories or other centres holding animals are other potentially high-risk items for spread of infection.

Biological products used in testing and treating animals, and for processing embryos, can be sources of contamination. They include bovine serum, reproductive hormones and assay test kits based on animal products.

Drugs required for the treatment of animals and products required for processing semen or embryos (eg dry milk powder, eggs) can also contain infectious agents.

The following recommendations apply during an EAD outbreak:

- Contact of pets with breeding centre animals should be minimised or eliminated (by secure housing of pets).
- Pest control should be implemented.
- Contaminated runoff and other waste products should be contained and disposed of in a manner that is approved by the local control centre.
- Biological samples taken from animals at the artificial breeding centre may need a permit for movement off the centre; this should be ascertained through animal health authorities.
- Biological products for testing and treating animals should be approved for use by government authorities.
- Products used for processing semen and embryos should be approved for use.
- Any movement of animals or products onto or off the property should be recorded. Records should be made available to animal health authorities, if required.

5.2.9 Work procedures, staff hygiene and biosecurity

The transfer of genetic material during an EAD outbreak involves some risk. In a restricted area, where the movement of sires is restricted, it is impossible to guarantee the safety of semen. Transfer of embryos may be safer if IETS protocols are followed for processing, washing and handling embryos. These protocols are effective in removing most virus particles from the collection fluid or embryo if the zona pellucida is intact because the zona pellucida is a very effective barrier to entry of most virus particles into the embryo.

Procedures that compromise the integrity of the zona pellucida or fail to comply with IETS protocols (eg fewer washes) will increase the likelihood of contamination or infection of the embryo with disease agents.

Although rare, some ovaries may be collected postmortem for collection of oocytes and then fertilised in vitro to become embryos (IVF). The cause of death should be investigated and a definitive diagnosis made to assess the disease risk under these circumstances.

5.2.10 Record keeping

Concise, accurate and accessible records, containing details of all animal, semen and embryo transfers from artificial breeding centres and on-farm artificial breeders, are a requirement for export-approved facilities. It is also advisable to record the daily movement of staff, and all animals and genetic material leaving the artificial breeding centre. Although important in an EAD response, records are not a legal requirement for domestic collections.

In the event of an EAD outbreak, these records would enable the local disease control centre to rapidly trace all transfers of potentially infected or suspect animals, animal products or people, thereby limiting possible contamination and preventing the unnecessary destruction of animals or animal products not deemed infected or highly suspect. Such records should include the following details:

- animals
 - breed, sex and age
 - identification (NLIS-approved device, rumen bolus, tattoo, tag, brand, photo); microchip numbers and silhouettes are also used for identification of horses
 - dates in artificial breeding centre
 - date of removal and method of transfer
 - destination for transfer
- people
 - name
 - contact details
 - date of movements
 - animal contacts
 - sites visited and procedures involved
- fresh and chilled semen, oocytes or embryos
 - breed and age of donor
 - identification (NLIS-approved device, rumen bolus, tattoo, tag, brand, photo) of donor
 - details of any teaser animals used in semen collection (eg breed, age, identification; for horses, microchips and silhouettes are also used)
 - dates of collection
 - numbers and doses collected and processed
 - date and means of dispatch
 - destination for transfer and details of recipients
- frozen semen and embryos
 - breed and age of donor
 - identification (tattoo, tag, brand, photo) of donor
 - dates of collection
 - numbers and doses collected and processed
 - storage location and identification of storage unit
 - dispatch details – numbers, date and destination; all straws to be identified by animal's reference identification, date of collection and centre of collection.

5.3 Media and public relations

The AUSVETPLAN resource document *Biosecurity incident public information manual*²⁹ contains detailed information on media and public relations activities that would occur in the event of an EAD outbreak. Enterprises such as artificial breeding centres could become a target for media interest. Information fact sheets for each of the diseases covered by AUSVETPLAN are contained in the relevant **response strategy**.

²⁹ <https://animalhealthaustralia.com.au/download/6146>

Appendix 1

EMERGENCY ANIMAL DISEASES OF CONCERN FOR THE ARTIFICIAL BREEDING INDUSTRY

Many emergency animal diseases can be transmitted by semen or embryos, and therefore are a risk for artificial breeding centres. Details of disease transmission are in Table A1.1.

Table A1.1 Transmission of emergency animal diseases by semen or embryos

Disease	Transmission by semen or embryos
African horse sickness	Virus is present in semen and embryos, and may be transferred this way, although there is no documentation to support transmission by either semen or embryos.
African swine fever	Preliminary evidence shows that risk of transmission via IVD embryos is negligible if the embryos are handled correctly between collection and transfer. Additional data are required to substantiate the preliminary findings.
Aujeszky's disease	Acutely infected boars can transmit virus through semen, and carriers are also expected to excrete virus intermittently. Acutely and chronically infected sows are expected to excrete virus into the reproductive tract. Washing will not remove all virus attached to the embryo, but trypsin treatment will remove residual attached virus. It is highly unlikely that virus can be transmitted under natural circumstances by embryo transfer of IVD embryos.
Bluetongue	Virus may (rarely) be excreted in the semen when males are viraemic. Excretion is more likely if there is inflammation of the genital tract, if the animal is aged or if the virus has been laboratory adapted (as in live vaccines or experimental infection). Except for BTV-8, there is much evidence from in vitro and in vivo work that IVD embryos from infected donors washed according to IETS protocols do not transmit the virus. This is despite virus presence in uterine washings of donors and even the use of infected semen.
Classical swine fever	Virus is present in semen and likely to be transmitted. Washing of embryos does not remove virus attached to the embryo, but virus is removed or inactivated by trypsin treatment of IVD embryos. Therefore, there should be no risk when standard IETS methods are followed.
Dourine	Nearly all transmission occurs by the venereal route. Because the infection is present in seminal plasma, it must be assumed that AI would be as effective at transmitting dourine as natural mating, including contaminated AI equipment.
Contagious equine metritis	Direct venereal transmission can take place by AI using infective raw, chilled and possibly frozen semen. Indirectly, infection may be acquired through fomite transmission, manual contamination and inadequate observance of appropriate biosecurity measures at the time of breeding and at semen collection centres.
Foot-and-mouth disease	In bovine and small ruminants, virus is present in semen and can be transmitted in this manner. Virus has been found in bull semen 4 days before, during, and up to at least 37 days after the appearance of clinical signs. In cattle, sufficient evidence has been accrued to show that risk of

	transmission via embryos is negligible provided the IVD embryos are carefully handled between collection and transfer. For sheep and goats, substantial evidence has shown the same as for cattle. In pigs, virus is present in, and can be transmitted by, semen. Transmission via embryo transfer is as for sheep and goats.
Japanese encephalitis	Virus has been transmitted in semen from experimentally infected boars.
Lumpy skin disease (LSD)	LSD virus has been isolated from semen for up to 42 days post-inoculation in an experimentally infected bull (Irons et al 2005). Viral DNA has been detected in all fractions of semen (Annandale et al 2010). However, mechanical transmission by biting insects is considered to be the main route of local transmission of LSD virus.
Peste des petits ruminants	Virus is present in semen and embryos, and likely to be transmitted in this way.
Porcine reproductive and respiratory syndrome (PRRS)	Detection of field and vaccine strains of PRRS virus in semen of infected intact and vasectomised boars has been documented (Rossow 1998). Virus can be recovered from semen before seroconversion and after cessation of viraemia. The most likely means of PRRS entry to Australia or a herd is via subclinically or asymptotically infected live pigs, or via semen.
Rift Valley fever (RVF)	RVF virus can be excreted in discharges, and likely in infected donors, although this has not been demonstrated (Saber et al 1984, Swanepoel & Coetzer 2004). Inflammatory cells and leukocytes, which can potentially be infected with RVF virus, may be secreted in seminal fluids while animals are infected. Thus it is highly probable that bovine semen can be infected with RVF virus during viraemia (Thibier & Guerin 2000). RVF virus is known to infect several organs, and it is highly probable that bovine embryos can be infected with RVF virus during viraemia. However, published research or reports on infection of IVD embryos with RVF virus are not available.
Sheep pox and goat pox	No information; therefore consider as for lumpy skin disease.
Swine vesicular disease	Spread via semen is unlikely. Preliminary evidence shows that transmission via embryos is unlikely if correct handling and transfer procedures are followed. However, additional experimental work is necessary to substantiate these findings.
Vesicular exanthema	Virus is present in, and can be transmitted via, semen. It is possibly in ova and could be transmitted this way.
Vesicular stomatitis	In bovines, transmission is thought possible via semen. Transmission is not considered likely via embryos, although additional experimental work is necessary. In pigs and horses, virus is present in, and can be transmitted via, semen if the semen is contaminated with vesicular fluid. It is known to be present in ova, but transmission is considered unlikely. There is no viraemia in vesicular stomatitis infection, so there can be no haematogenous contamination of semen or embryos with virus.

AI = artificial insemination; BTV = bluetongue virus; IETS = International Embryo Technology Society; IVD = in vivo-derived

Appendix 2

VALUATION AND COMPENSATION

Many animals present at artificial breeding centres have a significant commercial value. A number of factors will contribute to their valuation, and there is significant variation between species. Details are available in the **AUSVETPLAN operational manual *Valuation and compensation***.

Semen and embryos that have been purchased or are saleable are considered 'animals' for the purpose of compensation, and are valued at their non-stud or non-elite value. Semen and embryos at artificial breeding centres should already have a specified market value.

Species not covered by the Emergency Animal Disease Response Agreement, such as alpaca and deer, may be eligible for compensation under state or territory legislation, but cost sharing would be at the discretion of the National Management Group.

Appendix 3

GUIDELINES FOR STAFF WORKING IN A DECLARED AREA UNDER BIOSECURITY ARRANGEMENTS

In many instances during an emergency animal disease (EAD) outbreak, artificial breeding operations, and movement of artificial breeding material and people on and off farms, will be prohibited. The following guidelines only apply when such movement is permitted and some operations are allowed to continue under approved biosecurity arrangements.

Artificial breeding centre staff

The code of practice to be observed by artificial breeding centre staff in a restricted area (RA) or control area (CA) during an outbreak of an EAD should be in accordance with the relevant AUSVETPLAN response strategy. Some general examples that may apply include the following:

- Maintain accurate records of all animals, semen and embryos received, collected, processed, transferred, dispatched and inseminated, and all farm visits.
- Maintain high standards of personal cleanliness and hygiene.
- Decontaminate vehicles, equipment, clothing, footwear and people when entering and leaving the centre.
- Do not permit staff residing on a farm with susceptible livestock to enter an artificial insemination (AI) centre in an RA during the disease declaration.
- Potentially control centre staff movements from a CA to an RA unless they intend to remain in the RA.
- Define roles and locations for designated staff within the centre (eg animal attendant, laboratory technician). These staff must observe strict limitations on all movement outside their respective areas.
- Potentially control movements of pets, animal products, feed, waste products, equipment or similar items into the centre.
- Ensure that centre staff are familiar with EAD declaration procedures through regular formal training sessions or workshops.

Artificial insemination technicians

The code of practice to be observed by AI technicians in an RA or CA during an EAD outbreak includes the following:

- Maintain accurate records of all semen received, dispatched and inseminated, and all farm visits.
- Maintain high standards of personal cleanliness and hygiene.
- Decontaminate vehicles, equipment, clothing, footwear and people when entering and leaving an artificial breeding centre or subcentre, distribution facility, or farm.
- Use disposable equipment, where possible. Soiled disposables are to be appropriately disposed of on farm before leaving, according to the biosecurity procedures that apply.
- Do not permit any inseminator residing on a farm with susceptible livestock to continue to operate an on-farm AI service within an RA.
- Do not dispatch semen, permitted embryos, equipment, liquid nitrogen tanks or supplies from the RA to other locations unless permitted by the local control centre (LCC).
- Restrict entry to an artificial breeding centre's quarantine facility that maintains animals to personnel required to care for the animals. Entry (and exit) will only be permitted after compliance with appropriate decontamination procedures.

- Identify and isolate all semen and embryos received from an infected premises (IP), along with semen or embryos in direct contact with these items within 1–2 incubation periods for the disease, and – in consultation with the LCC – arrange for the tank containing these items to be sealed pending possible destruction.
- Within an RA, ensure that all nondisposable AI equipment and liquid nitrogen transport tanks are emptied, washed, disinfected and sterilised following an on-farm visit.
- Ensure that AI technicians are familiar with EAD declaration procedures through regular formal training sessions or workshops.

On-farm semen and embryo transfer veterinarians and technicians

The code of practice to be observed by semen and embryo transfer veterinarians and technicians in an RA or CA during an outbreak of an EAD should be in accordance with the relevant AUSVETPLAN response strategy. Some general examples that may apply include the following:

- Maintain accurate records of all animals, semen and embryos received, collected, processed, transferred, dispatched and inseminated. Potentially health test frozen semen or embryos held on farm in isolation before transferring to other facilities within the RA.
- Maintain high standards of personal cleanliness and hygiene.
- Decontaminate vehicles, equipment, clothing, footwear and people when entering and leaving a farm or centre.
- Restrict access to the artificial breeding centre by veterinarians and technicians working on farms with susceptible livestock.
- Use disposable equipment, where possible. Soiled disposables are to be disposed of on farm before leaving.
- Empty, wash, disinfect and sterilise all nondisposable AI equipment. Liquid nitrogen tanks must be emptied, washed, disinfected and sterilised following an on-farm visit within an RA.
- Dispose of media, biological products and partially used drugs on farm.
- Restrict service operations to a minimum, and limit non-essential visits to farms within the RA.

In vitro-fertilised embryo laboratories

The code of practice to be observed by staff working inside the laboratory should be in accordance with the relevant AUSVETPLAN response strategy. Some general examples that may apply include the following:

- Maintain accurate records of all animals, semen and oocytes received, collected, processed, fertilised, cultured, stored (either in portable incubators or frozen) and dispatched. Potentially health test frozen semen or embryos held on farm in isolation before transferring to other facilities within the RA.
- Maintain high standards of personal cleanliness and hygiene.
- Decontaminate vehicles, equipment, clothing, footwear and people when entering and leaving the laboratory.
- Restrict access to the laboratory to veterinarians and technicians working there.
- Use disposable equipment, where possible. Before leaving, soiled disposables are to be identified for sanitary disposal.
- Empty, wash, disinfect and sterilise all nondisposable laboratory equipment. Liquid nitrogen tanks must be emptied, washed, disinfected and sterilised following an on-farm visit within an RA.
- Properly dispose of media, biological products and partially used drugs used in the laboratory.

- Restrict service operations to a minimum, and limit non-essential visits by clients within the RA.

Glossary

Manual-specific terms

Zona pellucida	A glycoprotein layer surrounding the plasma membrane of mammalian oocytes.
----------------	--

Standard AUSVETPLAN terms

Animal byproducts	Products of animal origin that are not for consumption but are destined for industrial use (eg hides and skins, fur, wool, hair, feathers, hoofs, bones, fertiliser).
Animal Health Committee	A committee whose members are the chief veterinary officers of the Commonwealth, states and territories, along with representatives from the CSIRO Australian Centre for Disease Preparedness (CSIRO-ACDP) and the Australian Government Department of Agriculture, Water and the Environment. There are also observers from Animal Health Australia, Wildlife Health Australia, and the New Zealand Ministry for Primary Industries. The committee provides advice to the National Biosecurity Committee on animal health matters, focusing on technical issues and regulatory policy. <i>See also</i> National Biosecurity Committee
Animal products	Meat, meat products and other products of animal origin (eg eggs, milk) for human consumption or for use in animal feedstuff.
Approved disposal site	A premises that has zero susceptible livestock and has been approved as a disposal site for animal carcasses, or potentially contaminated animal products, wastes or things.
Approved processing facility	An abattoir, knackery, milk processing plant or other such facility that maintains increased biosecurity standards. Such a facility could have animals or animal products introduced from lower-risk premises under a permit for processing to an approved standard.
At-risk premises	A premises in a restricted area that contains a live susceptible animal(s) but is not considered at the time of classification to be an infected premises, dangerous contact premises, dangerous contact processing facility, suspect premises or trace premises.
Australian Chief Veterinary Officer	The nominated senior veterinarian in the Australian Government Department of Agriculture, Water and the Environment who manages international animal health commitments and the Australian Government's response to an animal disease outbreak. <i>See also</i> Chief veterinary officer
AUSVETPLAN	Australian Veterinary Emergency Plan. Nationally agreed resources that guide decision making in the response to emergency animal diseases (EADs). It outlines Australia's preferred approach to responding to EADs of national significance, and supports efficient, effective and coherent responses to these diseases.

Carcase	The body of an animal slaughtered for food.
Carcass	The body of an animal that died in the field.
Chief veterinary officer (CVO)	The senior veterinarian of the animal health authority in each jurisdiction (national, state or territory) who has responsibility for animal disease control in that jurisdiction. <i>See also</i> Australian Chief Veterinary Officer
Compartmentalisation	The process of defining, implementing and maintaining one or more disease-free establishments under a common biosecurity management system in accordance with OIE guidelines, based on applied biosecurity measures and surveillance, to facilitate disease control and/or trade.
Compensation	The sum of money paid by government to an owner for livestock or property that are destroyed for the purpose of eradication or prevention of the spread of an emergency animal disease, and livestock that have died of the emergency animal disease. <i>See also</i> Cost-sharing arrangements, Emergency Animal Disease Response Agreement
Consultative Committee on Emergency Animal Diseases (CCEAD)	The key technical coordinating body for animal health emergencies. Members are state and territory chief veterinary officers, representatives of CSIRO-ACDP and the relevant industries, and the Australian Chief Veterinary Officer as chair.
Control area (CA)	A legally declared area where the disease controls, including surveillance and movement controls, applied are of lesser intensity than those in a restricted area (the limits of a control area and the conditions applying to it can be varied during an incident according to need).
Cost-sharing arrangements	Arrangements agreed between governments (national and state/territory) and livestock industries for sharing the costs of emergency animal disease responses. <i>See also</i> Compensation, Emergency Animal Disease Response Agreement
Dangerous contact animal	A susceptible animal that has been designated as being exposed to other infected animals or potentially infectious products following tracing and epidemiological investigation.
Dangerous contact premises (DCP)	A premises, apart from an abattoir, knackery or milk processing plant (or other such facility) that, after investigation and based on a risk assessment, is considered to contain a susceptible animal(s) not showing clinical signs, but considered highly likely to contain an infected animal(s) and/or contaminated animal products, wastes or things that present an unacceptable risk to the response if the risk is not addressed, and that therefore requires action to address the risk.
Dangerous contact processing facility (DCPF)	An abattoir, knackery, milk processing plant or other such facility that, based on a risk assessment, appears highly likely to have received infected animals, or contaminated animal products, wastes or things, and that requires action to address the risk.

Declared area	A defined tract of land that is subjected to disease control restrictions under emergency animal disease legislation. There are two types of declared areas: restricted area and control area.
Decontamination	Includes all stages of cleaning and disinfection.
Depopulation	The removal of a host population from a particular area to control or prevent the spread of disease.
Destroy (animals)	To kill animals humanely.
Disease agent	A general term for a transmissible organism or other factor that causes an infectious disease.
Disease Watch Hotline	24-hour freecall service for reporting suspected incidences of exotic diseases – 1800 675 888.
Disinfectant	A chemical used to destroy disease agents outside a living animal.
Disinfection	The application, after thorough cleansing, of procedures intended to destroy the infectious or parasitic agents of animal diseases, including zoonoses; applies to premises, vehicles and different objects that may have been directly or indirectly contaminated.
Disinsection	The destruction of insect pests, usually with a chemical agent.
Disposal	Sanitary removal of animal carcasses, animal products, materials and wastes by burial, burning or some other process so as to prevent the spread of disease.
Emergency animal disease	A disease that is (a) exotic to Australia or (b) a variant of an endemic disease or (c) a serious infectious disease of unknown or uncertain cause or (d) a severe outbreak of a known endemic disease, and that is considered to be of national significance with serious social or trade implications. <i>See also</i> Endemic animal disease, Exotic animal disease
Emergency Animal Disease Response Agreement	Agreement between the Australian and state/territory governments and livestock industries on the management of emergency animal disease responses. Provisions include participatory decision making, risk management, cost sharing, the use of appropriately trained personnel and existing standards such as AUSVETPLAN. <i>See also</i> Compensation, Cost-sharing arrangements
Endemic animal disease	A disease affecting animals (which may include humans) that is known to occur in Australia. <i>See also</i> Emergency animal disease, Exotic animal disease
Enterprise	<i>See</i> Risk enterprise
Enzyme-linked immunosorbent assay (ELISA)	A serological test designed to detect and measure the presence of antibody or antigen in a sample. The test uses an enzyme reaction with a substrate to produce a colour change when antigen–antibody binding occurs.
Epidemiological investigation	An investigation to identify and qualify the risk factors associated with the disease. <i>See also</i> Veterinary investigation

Epidemiology	The study of disease in populations and of factors that determine its occurrence.
Exotic animal disease	A disease affecting animals (which may include humans) that does not normally occur in Australia. <i>See also</i> Emergency animal disease, Endemic animal disease
Exotic fauna/feral animals	<i>See</i> Wild animals
Fomites	Inanimate objects (eg boots, clothing, equipment, instruments, vehicles, crates, packaging) that can carry an infectious disease agent and may spread the disease through mechanical transmission.
General permit	A legal document that describes the requirements for movement of an animal (or group of animals), commodity or thing, for which permission may be granted without the need for direct interaction between the person moving the animal(s), commodity or thing and a government veterinarian or inspector. The permit may be completed via a webpage or in an approved place (such as a government office or commercial premises). A printed version of the permit must accompany the movement. The permit may impose preconditions and/or restrictions on movements. <i>See also</i> Special permit
In-contact animals	Animals that have had close contact with infected animals, such as noninfected animals in the same group as infected animals.
Incubation period	The period that elapses between the introduction of a pathogen into an animal and the first clinical signs of the disease.
Index case	The first case of the disease to be diagnosed in a disease outbreak. <i>See also</i> Index property
Index property	The property on which the index case is found. <i>See also</i> Index case
Infected premises (IP)	A defined area (which may be all or part of a property) on which animals meeting the case definition are or were present, or the causative agent of the emergency animal disease is present, or there is a reasonable suspicion that either is present, and that the relevant chief veterinary officer or their delegate has declared to be an infected premises.
Local control centre	An emergency operations centre responsible for the command and control of field operations in a defined area.
Monitoring	Routine collection of data for assessing the health status of a population or the level of contamination of a site for remediation purposes. <i>See also</i> Surveillance
Movement control	Restrictions placed on the movement of animals, people and other things to prevent the spread of disease.
National Biosecurity Committee	A committee that was formally established under the Intergovernmental Agreement on Biosecurity (IGAB). The IGAB was signed on 13 January 2012, and signatories include all states and territories except Tasmania. The committee provides advice to

	the Agriculture Senior Officials Committee and the Agriculture Ministers' Forum on national biosecurity issues, and on the IGAB.
National Management Group (NMG)	A group established to approve (or not approve) the invoking of cost sharing under the Emergency Animal Disease Response Agreement. NMG members are the Secretary of the Australian Government Department of Agriculture, Water and the Environment as chair, the chief executive officers of the state and territory government parties, and the president (or analogous officer) of each of the relevant industry parties.
Native wildlife	See Wild animals
OIE Terrestrial Code	OIE <i>Terrestrial animal health code</i> . Describes standards for safe international trade in animals and animal products. Revised annually and published on the internet at: www.oie.int/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access .
OIE Terrestrial Manual	OIE <i>Manual of diagnostic tests and vaccines for terrestrial animals</i> . Describes standards for laboratory diagnostic tests, and the production and control of biological products (principally vaccines). The current edition is published on the internet at: www.oie.int/en/what-we-do/standards/codes-and-manuals/terrestrial-manual-online-access .
Operational procedures	Detailed instructions for carrying out specific disease control activities, such as disposal, destruction, decontamination and valuation.
Outside area (OA)	The area of Australia outside the declared (control and restricted) areas.
Owner	Person responsible for a premises (includes an agent of the owner, such as a manager or other controlling officer).
Polymerase chain reaction (PCR)	A method of amplifying and analysing DNA sequences that can be used to detect the presence of viral DNA.
Premises	A tract of land including its buildings, or a separate farm or facility that is maintained by a single set of services and personnel.
Premises of relevance (POR)	A premises in a control area that contains a live susceptible animal(s) but is not considered at the time of classification to be an infected premises, suspect premises, trace premises, dangerous contact premises or dangerous contact processing facility.
Prevalence	The proportion (or percentage) of animals in a particular population affected by a particular disease (or infection or positive antibody titre) at a given point in time.
Proof of freedom	Reaching a point following an outbreak and post-outbreak surveillance when freedom from the disease can be claimed with a reasonable level of statistical confidence.
Qualifiers	
- assessed negative	Assessed negative (AN) is a qualifier that may be applied to ARPs, PORs, SPs, TPs, DCPs or DCPFs. The qualifier may be applied following surveillance, epidemiological investigation, and/or

	laboratory assessment/diagnostic testing and indicates that the premises is assessed as negative at the time of classification.
- sentinels on site	Sentinels on site (SN) is a qualifier that may be applied to IPs and DCPs to indicate that sentinel animals are present on the premises as part of response activities (ie before it can be assessed as an RP).
- vaccinated	The vaccinated (VN) qualifier can be applied in a number of different ways. At its most basic level, it can be used to identify premises that contain susceptible animals that have been vaccinated against the EAD in question. However, depending on the legislation, objectives and processes within a jurisdiction, the VN qualifier may be used to track a range of criteria and parameters.
Quarantine	Legally enforceable requirement that prevents or minimises spread of pests and disease agents by controlling the movement of animals, persons or things.
Resolved premises (RP)	An infected premises, dangerous contact premises or dangerous contact processing facility that has completed the required control measures, and is subject to the procedures and restrictions appropriate to the area in which it is located.
Restricted area (RA)	A relatively small legally declared area around infected premises and dangerous contact premises that is subject to disease controls, including intense surveillance and movement controls.
Risk enterprise	A defined livestock or related enterprise that is potentially a major source of infection for many other premises. Includes intensive piggeries, feedlots, abattoirs, knackeries, saleyards, calf scales, milk factories, tanneries, skin sheds, game meat establishments, cold stores, artificial insemination centres, veterinary laboratories and hospitals, road and rail freight depots, showgrounds, field days, weighbridges and garbage depots.
Sensitivity	The proportion of truly positive units that are correctly identified as positive by a test. <i>See also Specificity</i>
Sentinel animal	Animal of known health status that is monitored to detect the presence of a specific disease agent.
Seroconversion	The appearance in the blood serum of antibodies (as determined by a serology test) following vaccination or natural exposure to a disease agent.
Serosurveillance	Surveillance of an animal population by testing serum samples for the presence of antibodies to disease agents.
Serotype	A subgroup of microorganisms identified by the antigens carried (as determined by a serology test).
Serum neutralisation test	A serological test to detect and measure the presence of antibody in a sample. Antibody in serum is serially diluted to detect the highest dilution that neutralises a standard amount of antigen. The neutralising antibody titre is given as the reciprocal of this dilution.
Slaughter	The humane killing of an animal for meat for human consumption.

Special permit	A legal document that describes the requirements for movement of an animal (or group of animals), commodity or thing, for which the person moving the animal(s), commodity or thing must obtain prior written permission from the relevant government veterinarian or inspector. A printed version of the permit must accompany the movement. The permit may impose preconditions and/or restrictions on movements. <i>See also</i> General permit
Specificity	The proportion of truly negative units that are correctly identified as negative by a test. <i>See also</i> Sensitivity
Stamping out	The strategy of eliminating infection from premises through the destruction of animals in accordance with the particular AUSVETPLAN manual, and in a manner that permits appropriate disposal of carcasses and decontamination of the site.
State coordination centre	The emergency operations centre that directs the disease control operations to be undertaken in a state or territory.
Surveillance	A systematic program of investigation designed to establish the presence, extent or absence of a disease, or of infection or contamination with the causative organism. It includes the examination of animals for clinical signs, antibodies or the causative organism.
Susceptible animals	Animals that can be infected with a particular disease.
Suspect animal	An animal that may have been exposed to an emergency disease such that its quarantine and intensive surveillance, but not pre-emptive slaughter, is warranted. or An animal not known to have been exposed to a disease agent but showing clinical signs requiring differential diagnosis.
Suspect premises (SP)	Temporary classification of a premises that contains a susceptible animal(s) not known to have been exposed to the disease agent but showing clinical signs similar to the case definition, and that therefore requires investigation(s).
Swill	Also known as 'prohibited pig feed', means material of mammalian origin, or any substance that has come in contact with this material, but does not include: (i) Milk, milk products or milk by-products either of Australian provenance or legally imported for stockfeed use into Australia. (ii) Material containing flesh, bones, blood, offal or mammal carcasses which is treated by an approved process. ¹ (iii) A carcass or part of a domestic pig, born and raised on the property on which the pig or pigs that are administered the part are held, that is administered for therapeutic purposes in accordance with the written instructions of a veterinary practitioner. (iv) Material used under an individual and defined-period permit issued by a jurisdiction for the purposes of research or baiting. ¹ In terms of (ii), approved processes are:

	<ol style="list-style-type: none"> 1. rendering in accordance with the 'Australian Standard for the Hygienic Rendering of Animal Products' 2. under jurisdictional permit, cooking processes subject to compliance verification that ensure that a core temperature of at least 100 °C for a minimum of 30 minutes, or equivalent, has been reached 3. treatment of cooking oil, which has been used for cooking in Australia, in accordance with the 'National Standard for Recycling of Used Cooking Fats and Oils intended for Animal Feeds' 4. under jurisdictional permit, any other nationally agreed process approved by AHC for which an acceptable risk assessment has been undertaken and that is subject to compliance verification. <p>The national definition is a minimum standard. Some jurisdictions have additional conditions for swill feeding that pig producers in those jurisdictions must comply with, over and above the requirements of the national definition.</p>
Swill feeding	<p>Also known as 'feeding prohibited pig feed', it includes:</p> <ul style="list-style-type: none"> • feeding, or allowing or directing another person to feed, prohibited pig feed to a pig • allowing a pig to have access to prohibited pig feed • the collection and storage or possession of prohibited pig feed on a premises where one or more pigs are kept • supplying to another person prohibited pig feed that the supplier knows is for feeding to any pig. <p>This definition was endorsed by the Agriculture Ministers' Council through AGMIN OOS 04/2014.</p>
Trace premises (TP)	Temporary classification of a premises that contains susceptible animal(s) that tracing indicates may have been exposed to the disease agent, or contains contaminated animal products, wastes or things, and that requires investigation(s).
Tracing	The process of locating animals, people or other items that may be implicated in the spread of disease, so that appropriate action can be taken.
Unknown status premises (UP)	A premises within a declared area where the current presence of susceptible animals and/or risk products, wastes or things is unknown.
Vaccination	Inoculation of individuals with a vaccine to provide active immunity.
Vaccine	A substance used to stimulate immunity against one or several disease-causing agents to provide protection or to reduce the effects of the disease. A vaccine is prepared from the causative

	agent of a disease, its products or a synthetic substitute, which is treated to act as an antigen without inducing the disease.
- adjuvanted	A vaccine in which one or several disease-causing agents are combined with an adjuvant (a substance that increases the immune response).
- attenuated	A vaccine prepared from infective or 'live' microbes that are less pathogenic but retain their ability to induce protective immunity.
- gene deleted	An attenuated or inactivated vaccine in which genes for non-essential surface glycoproteins have been removed by genetic engineering. This provides a useful immunological marker for the vaccine virus compared with the wild virus.
- inactivated	A vaccine prepared from a virus that has been inactivated ('killed') by chemical or physical treatment.
- recombinant	A vaccine produced from virus that has been genetically engineered to contain only selected genes, including those causing the immunogenic effect.
Vector	A living organism (frequently an arthropod) that transmits an infectious agent from one host to another. A biological vector is one in which the infectious agent must develop or multiply before becoming infective to a recipient host. A mechanical vector is one that transmits an infectious agent from one host to another but is not essential to the life cycle of the agent.
Veterinary investigation	An investigation of the diagnosis, pathology and epidemiology of the disease. <i>See also</i> Epidemiological investigation
Viraemia	The presence of viruses in the blood.
Wild animals	
- native wildlife	Animals that are indigenous to Australia and may be susceptible to emergency animal diseases (eg bats, dingoes, marsupials).
- feral animals	Animals of domestic species that are not confined or under control (eg cats, horses, pigs).
- exotic fauna	Nondomestic animal species that are not indigenous to Australia (eg foxes).
Wool	Sheep wool.
Zero susceptible species premises (ZP)	A premises that does not contain any susceptible animals or risk products, wastes or things.
Zoning	The process of defining, implementing and maintaining a disease-free or infected area in accordance with OIE guidelines, based on geopolitical and/or physical boundaries and surveillance, to facilitate disease control and/or trade.
Zoonosis	A disease of animals that can be transmitted to humans.

Abbreviations

Manual-specific abbreviations

Abbreviation	Full title
AI	artificial insemination
ET	embryo transfer
FMD	foot-and-mouth disease
IVF	in vitro fertilisation
IVP	in vitro produced
NLIS	National Livestock Identification System

Standard AUSVETPLAN abbreviations

Abbreviation	Full title
ACDP	Australian Centre for Disease Preparedness
AN	assessed negative
ARP	at-risk premises
AUSVETPLAN	Australian Veterinary Emergency Plan
CA	control area
CCEAD	Consultative Committee on Emergency Animal Diseases
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CVO	chief veterinary officer
DCP	dangerous contact premises
DCPF	dangerous contact processing facility
EAD	emergency animal disease
EADRA	Emergency Animal Disease Response Agreement
EADRP	Emergency Animal Disease Response Plan
EDTA	ethylenediaminetetraacetic acid (anticoagulant for whole blood)
ELISA	enzyme-linked immunosorbent assay
GP	general permit
IETS	International Embryo Technology Society
IP	infected premises

Abbreviation	Full title
LCC	local control centre
NMG	National Management Group
OA	outside area
OIE	World Organisation for Animal Health
PCR	polymerase chain reaction
POR	premises of relevance
RA	restricted area
RP	resolved premises
SCC	state coordination centre
SP	suspect premises
SpP	special permit
TP	trace premises
UP	unknown status premises
ZP	zero susceptible species premises

References

Annandale CH, Irons PC, Bagla VP, Osuagwuh UI & Venter EH (2010). Sites of persistence of lumpy skin disease virus in the genital tract of experimentally infected bulls. *Reproduction in Domestic Animals* 45(2):250–255.

Animal Health Committee Working Party on Artificial Breeding (1988). *Minimum health standards for stock standing at licensed or approved artificial breeding centres in Australia*, Australian Government Publishing Service, Canberra.

IIGB (Interim Inspector-General of Biosecurity) (2014). *Effectiveness of biosecurity controls for imported animal breeding material (mammalian semen and embryos)*, IIGB audit report, Australian Government Department of Agriculture, Canberra, www.igb.gov.au/sites/default/files/documents/effectiveness-biosecurity-controls-imported-animal-breeding-material.pdf.

Irons PC, Tuppurainen ESM & Venter EH (2005). Excretion of lumpy skin disease virus in bull semen. *Theriogenology* 63(5):1290–1297.

OIE (World Organisation for Animal Health) (2021). *Terrestrial animal health code*, OIE, Paris, www.oie.int/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access.

Rossow KD (1998). Porcine reproductive and respiratory syndrome. *Veterinary Pathology* 35(1):1–20.

Saber MS, Emad N, Barakat AA, El Debegy A, Fathia M, El Nimr MM & El Nakashly S (1984). Shedding of Rift Valley fever virus by infected sheep and by sheep protected by BCG and RVF vaccines. *Revue Scientifique et Technique de l'OIE* 3(2):369–381.

Swanepoel R & Coetzer JAW (2004). Rift valley fever. *Infectious Diseases of Livestock* 2:1037–1070.

Thibier M & Guerin B (2000). Hygienic aspects of storage and use of semen for artificial insemination. *Animal Reproduction Science* 62(1–3):233–251.