AUSTRALIAN VETERINARY EMERGENCY PLAN

AUSVETPLAN

1998

Enterprise Manual

Feedlots

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

Agriculture and Resource Management Council of Australia and New Zealand

This Enterprise Manual forms part of:
AUSVETPLAN Edition 2.0, 1996
[AUSVETPLAN Edition 1.0, was published in 1991]
This document will be reviewed regularly. Suggestions and recommendations for amendments should be forwarded to the AUSVETPLAN Coordinator (see Preface).

Record of amendments to this manual:
[AUSVETPLAN Edition 2.0 Interim Document was published in 1996]

[AUSVETPLAN Version 2.1 Final Document was published in 1998]

ISBN 0 642 24506 1

PREFACE

This **Enterprise Manual** for **feedlots** constitutes part of the Australian Veterinary Emergency Plan (AUSVETPLAN Edition 2.0). AUSVETPLAN is an agreed management plan and set of operational procedures, which would be adopted in the event of an emergency animal disease outbreak in Australia. The procedures are briefly outlined in the **Summary Document** and details are given in the individual **Disease Strategies**. The manuals are written with specific reference to certain animal industries where a greater than normal risk of harm could be expected from an emergency disease outbreak. Detailed instructions for field implementation of the strategies are contained in the AUSVETPLAN **Operational Procedures Manuals** and **Management Manuals. All of the Strategies and manuals are** available on the website: http://www.brs.gov.au/aphb/aha/ausvet.htm

This manual is aimed at both government and industry personnel who may be involved in emergency disease preparedness. For government personnel, the manual provides an overview of the industry and outlines operational guidelines, plans of action, and other issues pertaining to a disease emergency either on the premises or in the vicinity of the feedlot. For owners or managers, the manual provides guidelines on the strategies, which may be adopted, for the handling of a suspected emergency disease.
This manual is being released as a final document following full industry/government consultation and with the approval of the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ).
The resource book *Exotic Diseases of Animals: A Field Guide for Australian Veterinarians* by W.A. Geering, A.J. Forman and M.J. Nunn, Australian Government Publishing Service, Canberra, 1995 (the **Exotic Diseases Field Guide**) has been a source for some of the information about the aetiology, diagnosis and epidemiology of the diseases. It should be used as a field guide for veterinarians and other animal health personnel associated with emergency disease diagnosis and management in livestock enterprises, including feedlots.
The manuals will be revised and updated from time to time to ensure that they keep pace with the changing circumstances of the particular industry they cover. Comments and suggestions are welcome and should be addressed to:

The AUSVETPLAN Coordinator
Emergency Disease Strategies Section
Livestock and Pastoral Division
Agriculture, Fisheries and Forestry - Australia
GPO Box 858
CANBERRA ACT 2601
Tel: (02) 6272 5540; Fax: (02) 6272 3372

Membership of writing group

Dr Pat Boland (consultant) 19 Stanley Street
HACKETT ACT 2602

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

CONTENTS

1 NATURE OF THE ENTERPRISE

Risk enterprises are defined as those with a high potential for disease spread. Feedlots are included in this definition on two accounts; there is a high concentration of animals on the premises and there is a relatively high throughput of cattle from widely dispersed locations. The natural consequence of these factors is that the opportunity for disease to affect a large number of animals and the opportunity for rapid spread within, into or out of the feedlot is higher than for other livestock enterprises. The aim of this manual is therefore to provide a degree of specialised consideration of feedlots in order to delineate and consolidate the plans for a disease emergency.

Government officers, feedlot owners and managers all need to be aware of the possibility of an emergency disease. Feedlot operators need to understand the procedures outlined in this manual and to ensure their senior staff are reasonably familiar with them. They should complement the procedures outlined this manual by developing internal contingency plans suited to the particular circumstances of their feedlot operation. Such individual plans should include proactive steps such as ensuring the adequacy of records of movements of animals, vehicles, equipment and personnel, as well as preparing contingency plans for lines of communication and within-premises quarantine barriers should these prove necessary (see Section 2). Feedlots lend themselves well to such contingency planning because each operation is relatively discrete; they are usually well managed; and lines of reporting and responsibilities are usually well defined.

There is ample precedent both in the feedlot industry and elsewhere to show that prior planning and careful consideration of such issues can pay significant dividends should a disease emergency of even a minor nature arise.

Sabotage through the use, or threatened use, of disease agents is a possibility that cannot be overlooked. Some people perceive feedlots as inimical to the welfare of cattle. Feedlots have a very high concentration of animals and a very large capital value. For these reasons, they may be seen as ideal targets for threatened or real sabotage.

1.1 The lot feeding industry

1.1.1 Some industry facts and statistics

The feedlot industry started on the Darling Downs in Queensland in the 1960s and apart from a short-lived slump in 1975 when Japan closed its markets, the feedlot industry has continually expanded. The growth of export markets requiring a consistent supply of cattle, uninterrupted by climatic conditions, led to the rapid expansion of the Australian Lot Feeding Industry in the mid-1980s. Grain fed beef now accounts for approximately 30% of beef production in Australia.

The Australian Lot Feeders' Association (ALFA) represents feedlots in Australia at every level, as the Industry's national peak body. ALFA membership represents 85% of feedlot capacity. The Association's mission is to lead the Industry in a manner that fosters excellence and integrity; improves the feedlot business environment; and ensures its community standing.

Feedlot enterprises vary from:

- large operations where fattening, slaughter and marketing aspects are integrated;

- ‘contract feeders’ who do not own the cattle but meet the client's requirements for production of beef suitable to their market (custom feeders);
- opportunity feedlots; and
- drought management facilities.

Although this manual is directed at all of these enterprises, it is the larger commercial enterprises which, by their very nature, come more squarely within the scope of a ‘risk enterprise’.
Ownership of the cattle in a feedlot is important to the extent that it could have implications for operations in a disease emergency; especially in regard to the compulsory destruction of animals and associated compensation issues. A feedlot manager may not be in a position to agree to operational decisions on behalf of the owner of the cattle (irrespective of whether he/she has any choice).
In 1995, the feedlot industry launched a Quality Assurance program, the National Feedlot Accreditation Scheme (NFAS). As from 1 August 1995, feedlots have been required to gain accreditation under the NFAS Scheme for their products to carry the grainfed (GF) or yearling grainfed (GFYG) cypher descriptions.

Currently (September 1998), some 620 feedlots participate in the scheme representing 800,000 head of cattle. A further 250 feedlots are in voluntary suspension at this time. There are a large number of feedlots located in Queensland, largely in the southeast, accounting for 43% of the total pen capacity. New South Wales has fewer feedlots although represents 39% of pen capacity. There are 16 feedlots with a capacity of over 10 000 head including three with capacities in excess of 30 000 head. The distribution of feedlots throughout Australia is shown schematically on Figure 1 and pen capacities are listed in Table 1.
A typical commercial feedlot consists of feed yards (ranging from 50 to 300 head capacity), induction and handling yards, feed preparation and storage areas, water storage facilities, manure storage areas, waste management systems and administration facilities. A diagramatic layout for a modern feedlot is shown at Figure 2.

1.1.2 Cattle movements

Feeder cattle are purchased under a number of purchase systems from a wide range of markets depending on current market prices and availability. Breed type, age and quality of purchased cattle depends upon market destination requirements. Cattle may be sourced from distant locations, with interstate movements from Victoria to Queensland, and South Australia to Queensland not uncommon. Cattle are fed under varying feeding regimes, typically ranging from 70–300 days. Feeding period is dependent upon market destination, with the Australian domestic market requiring short fed (70 day) cattle and export markets requiring longer feeding periods.
Cattle are allocated to particular pens occurs upon arrival at the feed yard, with minimal relocations during the feeding period.
A majority of cattle turned off from the feedlot go directly to slaughter, with a small number exported live for further feeding in Japan or marketed through saleyards.

1.1.3 Feed & Nutrition

Feedlots utilise large quantities of feed commodities on a daily basis, with cattle consuming 3% bodyweight equivalent per day on a dry matter basis. These commodities are sourced locally in combination with regional and/or interstate suppliers.

Feedlot rations typically incorporate grain, hay, silage, molasses and a mineral vitamin supplement. Feedlot operators often grow a small portion of the annual grain and forage requirements on site.

To provide adequate time for cattle to become used to the high energy/protein feedlot diet, a stepped feeding procedure is often utilised during the feeding phase., incorporating starter, grower and finisher rations. Fresh feed is allocated on a daily basis, with many feedyards utilising twice daily feeding programs.

Commercial feedyards usually prepare feed mixes on-site in accordance with rations formulated by nutritionists. Eligibility for grain fed beef (GF and GFYG) certification is restricted to NFAS accredited feedlots that have fed cattle to the following minimum standards.

Grain Fed – Young Beef (GFYG)

> *The cattle must be fed for a minimum of 70 days (Heifers' 60 days), and for not less than 50 days of that, on a nutritionally balanced ration of a recognised high energy feed of which grain is the highest single component. Rations must have an average Metabolisable Energy (ME) content greater than 10 Megajoules (MJ) per kilogram of dry matter*.

Grain Fed (GF)

> *The cattle must be fed for a minimum of 100 days, and for not less than 80 days of that, on a nutritionally balanced ration of a recognised high energy feed of which grain is the highest single component. Rations must have an average Metabolisable Energy (ME) content greater than 10 Megajoules (MJ) per kilogram of dry matter.*

Larger feedyards utilise a primary process of tempering, reconstitution or steam flaking to enhance digestibility. The later two processes will destroy most infective agents that are present. Grain is then further processed by rolling or less frequently, hammer milling.

Table 1 Pen capacities of national accredited feedlots

	Feedlot grouping	No. of feedlots
New South Wales	Up to 100	7
	101 – 1000	60
	1001 – 10 000	18
	10 000 – 30 000	5
	Over 30 000	2
Northern Territory	101 - 1000	1
Queensland	Up to 100	223
	100 – 1000	187
	1000 – 10 000	31
	10 001 – 30 000	4
	Over 30 000	1
South Australia	Up to 100	6
	101 – 1000	22
	1001 – 10 000	6
Tasmania	1001 – 10 000	1
Victoria	101 – 1000	8
	1001 – 10 000	4
	10 001 – 30 000	2
Western Australia	Up to 100	2
	101 – 1000	21
	1001 – 10 000	9

Source: (AUS-MEAT, October, 1998)

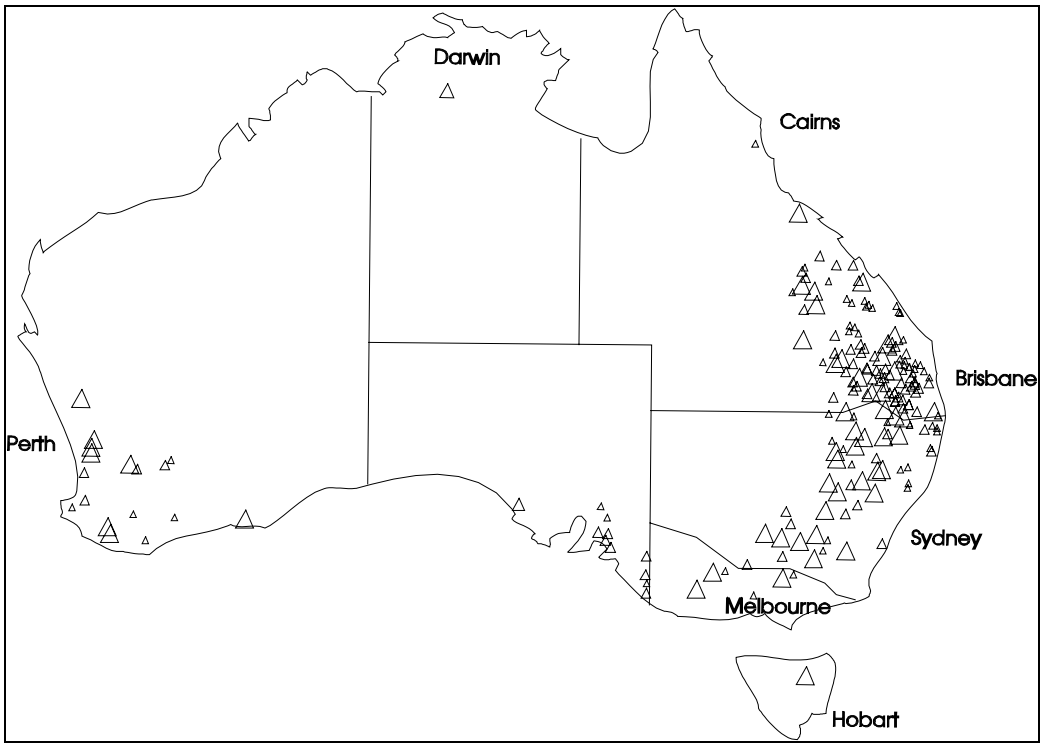

Figure 1 Distribution of feedlots in Australia

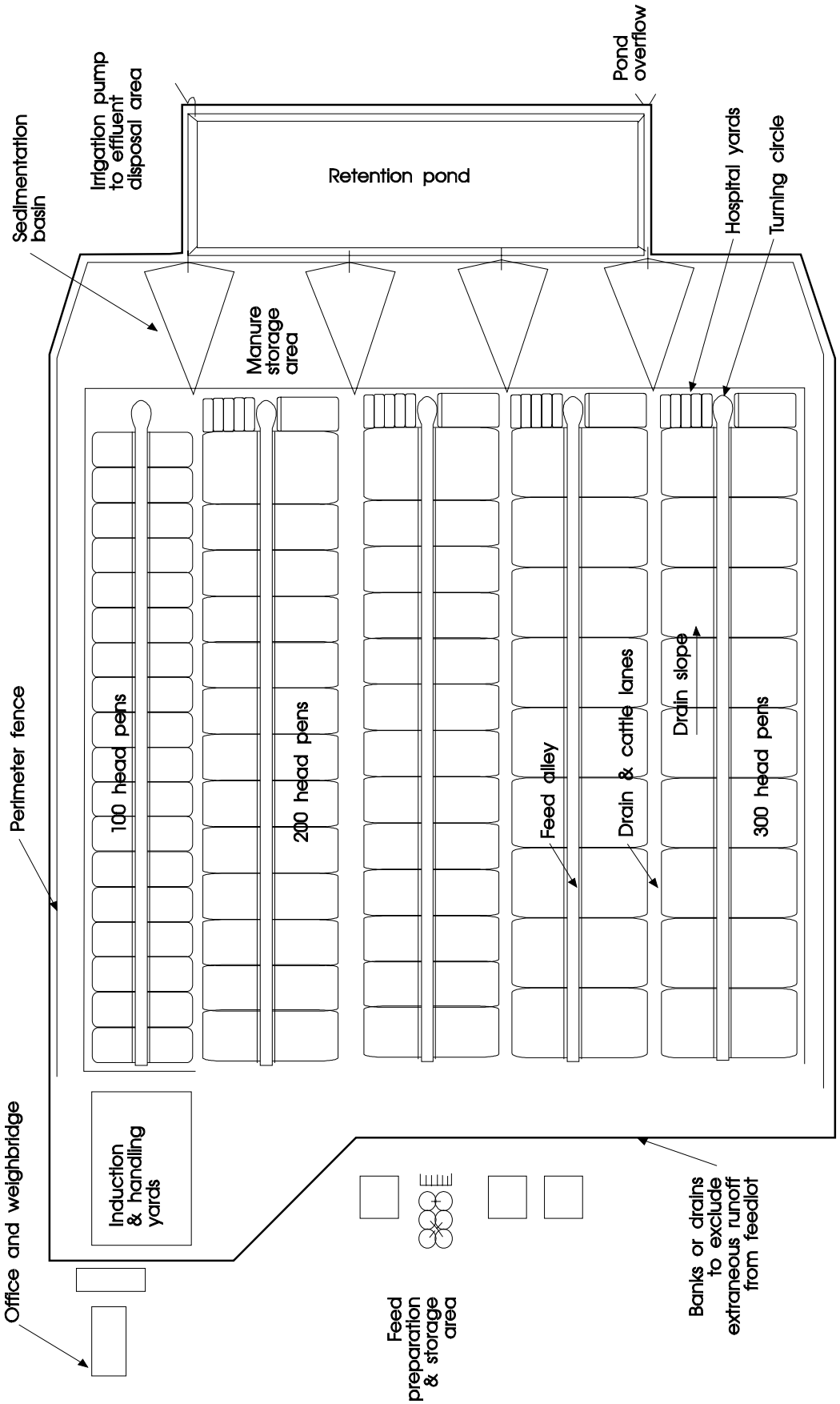

Figure 2 Schematic layout of a modern feedlot

1.1.4 Waste disposal

The disposal of waste and effluent is a major consideration in the feedlot. Total manure production (solid and liquid) is approximately 6% of bodyweight per day. Feedlot manure is a valuable resource and utilised on site and surrounding farmland as an organic nutrient source, particularly nitrogen, phosphorus and potassium. Liquid effluent is also utilised on site for irrigation purposes.

1.1.5 Existing legislation and codes of practice

Legislation

Legislation both at the Commonwealth and State/Territory level has been enacted for the purpose of controlling significant animal diseases. Commonwealth legislation is primarily concerned with preventing the introduction and establishment of disease or of things that may carry disease. Statutory provisions exist in all States/Territories aimed at the eradication and prevention of disease in animals, and establish controls over the whole field of animal movement, treatment, decontamination, slaughter and compensation. Wide powers are conferred on ministers of the Crown and government inspectors; including the power to enter premises, to order stock musters, to request animals or products be submitted for testing, isolated or destroyed.

The Commonwealth *Quarantine Act 1908* and the Quarantine (Animals) Regulations cover a 'quarantine incident' and give wide powers to Commonwealth officers to contain an exotic disease. However, in the circumstances of an exotic disease emergency on a feedlot they are unlikely to be used.

Legislation for licensing of feedlots is of particular significance in respect of contingency planning and it may be appropriate to include certain contingency plans, such as plans against the outbreak of key diseases, as a part of a quality assurance program. Legislation specifically pertaining to the operation of feedlots in each State/Territory is shown in Table 2.

Accreditation

The National Feedlot Accreditation Scheme (NFAS) came into effect in 1995. Under this national quality assurance system of industry self-regulation, feedlots wishing to market beef as 'grain-fed' must be accredited and feed cattle to AUS-MEAT Minimum Standards. Under the program, AUS-MEAT ensures training and assistance to feedlot operators in the understanding and implementation of quality assurance systems.

Codes of practice

NFAS accredited feedlots must operate in accordance with three Codes of Practice.

1. The *National Guidelines for Beef Cattle Feedlots* (2nd Edition – SCARM 1997) provides recommended standards for construction and operation of feedlots to the regulatory authorities.
2. *The Australian Code of Practice for the Welfare of Cattle in Beef Feedlots.* This code is incorporated in the National Guidelines. The code gives very general advice on management practices in feedlots and includes some practices that would be significant in the event of an outbreak of a suspected emergency disease, especially feeding practices and destruction methods. For example, routine feeding, manure removal and/or inspection checks may need to be interrupted in the interests of reducing the chance of spreading infection.
3. *Code of Practice for the Safe Use of Veterinary Medicines on Farms*

Table 2 State/Territory legislation for the operation of feedlots

State/Territory	Legislation
NSW	Approval for feedlot operations in NSW requires approval of the water resources authority and the Environmental Protection Agency as well as local government. Approval is given by the local government in the case of feedlots up to 10 000 head or by the Minister for Planning for larger feedlots. Planning focus meetings are held to coordinate the policies and activities of the various authorities involved. Local government development requirements normally mirror State level requirements.
VIC	Local governments are responsible for planning approval of new feedlots in Victoria. Each local authority requests comments from other interested bodies such as the Department of Agriculture on proposals for feedlots. State legislation rests on NFAS accreditation procedures to ensure compliance with management standards.
QLD	Licensing of feedlots in Queensland is coordinated by the Department of Primary Industries. Site approval of local government as well as the Pollution Control Commission and water resources authorities is a prerequisite to licensing. The Qld Department of Primary Industries has published Guidelines for Establishment and Operation of Cattle Feedlots, September 1989. This document covers environmental standards and not disease control.
SA	South Australia has a small feedlot industry. There is no specific legislation regulating their establishment or operation.
WA	There are very few large feedlots in Western Australia. Most are opportunity feedlots fattening cattle in summer and autumn. Approval of feedlots is provided by local governments under environmental protection legislation.
TAS	Tasmania has only one feedlot at present. There is no specific legislation for licensing of feedlots.
NT	There are one or two feedlots in the Northern Territory and no specific legislation under which they are licensed.
ACT	Feedlots are banned in the ACT under health and planning authority legislation.

1.2 Emergency diseases of concern

1.2.1 Significant diseases

The diseases covered by AUSVETPLAN that could occur within the cattle feedlot industry are shown below. Diseases that may occur on the property but affect species other than cattle eg equine influenza or Newcastle disease, are not included.

Bluetongue

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

Bovine spongiform encephalopathy (BSE)

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

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

Foot-and-mouth disease

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

Japanese encephalitis

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

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

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

Lumpy skin disease

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

Rift Valley fever

This is a mosquito-borne disease of cattle, sheep, goats and humans characterised by a high abortion rate and a mortality rate in young animals. Severe disease can occur in man requiring special safety precautions.

Rinderpest

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

Screw-worm fly

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

Vesicular stomatitis

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

1.2.2 Occupational health issues

Rabies and Rift Valley fever pose significant risks to anyone handling infected animals or tissues. Strict safety precautions should be adopted whenever these diseases are suspected.

1.2.3 AUSVETPLAN strategies and OIE requirements for diseases

Table 3 provides a concise summary of the proposed strategy in Australia if there is an outbreak of one of the diseases covered by AUSVETPLAN. More details are provided in the individual **Disease Strategies**. Some of the diseases are covered by a cost-sharing agreement whereby the Commonwealth and States/Territories share the eradication and compensation costs (see the AUSVETPLAN **Summary Document, Appendix 3**).
The Office International des Epizooties (OIE) is the world organisation for animal health. The OIE, established in 1924 in order to promote world animal health, provides guidelines and standards for health regulations in the international trade of animals and animal products. Diseases that spread rapidly, have particularly serious socioeconomic or public health consequences and are of major importance in international trade, have been designated by OIE as List A diseases. List B diseases are similar to List A, but are considered less invasive across political borders, and to be 'significant' diseases only for international trade considerations.

1.3 Inputs

1.3.1 Animals

Cattle are purchased at approximately the same rate as they leave (are 'turned-off'). The numbers vary as a percentage of pen capacity depending on the fattening period, which varies widely even within a feedlot. On a large enterprise consignments can arrive daily.

1.3.2 Feed

The major feed components are grains, predominantly barley, sorghum and wheat. Meatmeal is used as a source of protein on only a small number (about 5%) of feedlots. Tallow, obtained from slaughtering establishments, is commonly used as a feed ingredient.

1.3.3 Vehicles and equipment

The amount of contact with the animal areas needs to be carefully assessed.

1.3.4 People

Movement of people in and out of a feedlot includes staff, visitors, and the staff or visiting veterinarian(s).

Table 3 OIE classification, cost-sharing agreement and eradication strategies for the AUSVETPLAN diseases

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

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

KEY:

OIE	Office International des Epizooties List A or List B disease
CSA	Commonwealth/States cost-sharing agreement

Strategies:

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

1.4 Outputs

1.4.1 Cattle

Cattle are 'turned-off' continuously and are immediately slaughtered or occasionally exported for further fattening in Japan. Usually a whole pen of cattle leave the feedlot at once. Selection for export or local sale is done after slaughter and carcase appraisal.

1.4.2 Manure

Manure control is a vital part of feedlot management. Most often, it is scraped towards the centre of the pen and formed into a compacted temporary mound. Later, it is transported to a manure stockpiling area on the premises and from there disposed of for use as fertiliser.

1.4.3 Effluent

Effluent including manure runs off at the lowest point. It usually runs down the stock lanes between the pens. In well designed feedlots, it is channelled into broad drains and ultimately into anaerobic ponds or evaporation ponds. The quantity of effluent is highly variable depending on the runoff of liquid waste from the pen surface associated with rainfall.

1.4.4 Diagnostic specimens

Diagnostic specimens are often collected by veterinarians or lay staff and sent to laboratories.

1.4.5 Carcases of dead animals

In any feedlot, there are sporadic deaths. Postmortem examination of carcases is commonly performed, either by a veterinarian or by feedlot staff. This is usually done on the premises.

1.5 Risks of spread of disease

An understanding of mechanisms by which diseases spread is important for the purposes of planning control, whether in regard to spread into or out of the feedlot. For each of the major diseases, the major methods of spread together with relevant comments are shown in Table 4.

Table 4 Methods of spread for the major diseases that could affect a feedlot

Disease	Method of spread	Notes
Bluetongue	• vectors, (midges; culicoides insects) depending on location and season; and • movement of infected animals within the vector zone.	Bluetongue virus does not usually cause clinical disease in cattle. Hence it is quite feasible that the disease would be well established, through cattle movements and transmission of the virus by vectors, before it was detected. Given the high concentration of cattle on feedlots and the preference of vectors to feed on cattle, the likelihood of enormous propagation of virus in large numbers of infected animals should be anticipated.
BSE	• material from infected animals.	BSE is very slow to develop (minimum 18 months incubation but more likely 2.5 to 8 years). Because of the long incubation period, its detection on feedlots is unlikely even if the agent were present.
Foot-and-mouth disease (FMD)	• aerosol spread within the feedlot; • movement of infected animals; • direct contact with outside animals; • airborne spread between properties (under certain conditions); • movement of contaminated persons, clothes, equipment, vehicles etc; • indirect mechanical spread by wild animals and birds; • movement of improperly treated meat and other products from infected animals; and • wastes and effluent from infected animals.	FMD virus is extremely contagious and would spread explosively. The presence of FMD would probably be detected within a relatively short time. However the virus could still have spread significantly before disease was detected.
Lumpy skin disease (LSD)	• movement of infected animals; • vectors—biting flies, mosquitoes and possibly other insects; and • direct contact with outside animals.	In Africa, LSD can remain established at a low level in cattle and/or buffalo during the inter-epidemic periods. The ability of Australian vectors to transmit the disease is unknown but certain known vectors (eg *Stomoxys calcitrans*) do exist here. The Australian cattle population is immunologically susceptible and the disease may spread rapidly within a feedlot.

contd...

Table 4 (contd)

Disease	Method of spread	Notes
Rabies	• usually from a bite from a rabid animal.	Cattle would likely be dead-end hosts for rabies. Spread of infection to other animals or man is possible if bitten but this is unlikely in practice (see also Section 1.2.2 regarding risks to humans).
Rift Valley fever	• movement of infected animals; • vectors (mosquitoes); and • movement of infected people.	In Africa, RVF can occur in epidemics, which appear to explode from multi-centric foci. It is possible that the virus might take some time to detect in Australia especially if it first occurred in cattle where the disease is milder. Rapid spread via suitable vectors here is a definite possibility (see also Section 1.2.2 regarding risks to humans).
Rinderpest	• movement of infected animals; • direct contact with outside animals; and • movement of contaminated persons, clothes, equipment, vehicles (less important).	Most strains of rinderpest virus are highly contagious. Like foot-and-mouth disease, the presence of rinderpest would probably be detected within a relatively short time of its first appearance, but even by that time, the virus could have spread widely.
Screw-worm fly	• completion of life cycle and emergence of adults; and • movement of infested animals.	Early SWF strike can be very difficult to detect. Even in a feedlot where animals are regularly inspected, it may not be detected until advanced lesions are present.
Vesicular stomatitis	• movement of infected animals; • direct contact with outside animals including small wild mammals; • vectors, biting flies, mosquitoes and possibly other insects; and • unexplained geographical spread.	In view of the erratic nature of this disease, its characteristics if it arose in Australia are difficult to predict. The disease may or may not be highly pathogenic and the spread of virus may or may not be rapid.

2 RISK REDUCTION AND CONTINGENCY PLANNING

Contingency planning is necessary for emergency diseases but also has spin-off benefits in respect of unexpected endemic disease losses. Each feedlot can make forward plans, which may be useful in the event of a disease emergency. In States where licensing of feedlots is practised, it may be appropriate to include a description of such forward plans as part of the licensing requirements.

2.1 Internal quarantine

Internal quarantine should be planned in advance and maintained as far as possible in accordance with the perceived risks. Opportunities for physical division of different areas of the feedlot as well as separation of livestock handlers, feed trucks and other potential sources of infection should be considered.

Any introduced animals to the feedlot should be isolated for seven days to detect any major disease introduction. Individual sick animals should also be removed to an isolated 'hospital' pen. Mixing of animal groups and adding introductions to other pens should be minimised as far as possible.

Internal quarantine areas should:

- have no direct contact with other animals, equipment and vehicles;
- not be exposed to effluent or run-off from other parts of the premises;
- have facilities arranged so that animals can be handled and fed last;
- be handled by dedicated staff, or have staff undertake a decontamination procedure before handling other stock;
- allow sick stock to be separated, based on overseas experience, by 50-200 metres from other livestock.

2.2 Veterinary services/training of staff

Veterinary services to the feedlot should be planned with a view to emergency disease preparedness. If a regular veterinarian is employed, he/she should be familiarised with all relevant aspects of animal handling and feedlot management practices so as to enable more informed decisions to be made if an emergency disease is suspected. The veterinarian should be aware of emergency diseases and have attended postgraduate training. The veterinarian should be involved in basic training of feedlot staff in what to do and not to do in order to minimise the spread of disease. Further information on training materials, including videos and slides can be found in the **Summary Document.**

2.3 Laboratory specimen collection and dispatch

Specimens should be taken with basic precautions to prevent contamination. Proper techniques for collection, packaging and dispatch should always be observed. Where specimens are taken by lay staff, proper procedures should be the subject of training by the feedlot veterinarian.

2.4 Induction area and hospital pens

The induction area should be physically separated from fattening pens. Hospital pens should also be separated, preferably from both the induction and fattening pens.

2.5 Disposal sites for carcases

A single postmortem site should be selected for disposal of carcases although it may be necessary to prepare a new site from time to time. The site should be secured so as to prevent any chance of disease spread.
Contingency plans should exist for the disposal of large numbers of animals and possibly the entire feedlot population. This will require knowledge of the soil type and profile and the watertable characteristics in the immediate vicinity of the feedlot. The dimensions needed are approximately as described in Section 4.3.2 below.
Note: 1 km of trenching will be needed per 5000 animals (this need not be one continuous trench).

2.6 Record keeping

Proper routine recording of the movements in and out of animals, feed ingredients, equipment and the like, may be of invaluable use in investigating a suspected disease incursion. In the event of a disease outbreak adequate records of inputs and outputs may well enable an earlier return to normal operations than would be possible in their absence. Such records should include:

- the source or destination;
- the nature of the article;
- the purpose to which it is put; and
- other details as appropriate.

The records should be designed so that they can be easily and speedily searched for relevant information. The type of records required are described in Section 3.4.1.

2.7 Water supply

In the event of decontamination of vehicles and equipment being necessary, extra water may be required for the purpose (see the **Decontamination Manual, Section 4.3**). A supply of water adequate only for normal operations of the feedlot is not sufficient. The supply must be capable of giving significantly more than normal requirements if needed but the use of power hoses is not recommended because the process will release contaminated aerosols of the pathogen.

2.8 Media and public relations

The **Public Relations Manual** contains detailed information on media and public relations activities in the event of an emergency disease outbreak when a feedlot would inevitably be the target of intense media interest. Information fact sheets for each of the diseases covered by AUSVETPLAN are contained in the **Summary Document**.

3 RESPONSE PLANS IN A DECLARED AREA

3.1 Introduction

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

3.1.1 Declared areas

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

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

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

An example of movement restrictions that are likely to apply with an outbreak of foot-and-mouth disease is shown in Figure 3.

3.1.2 Local disease control centre

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

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

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

Feedlots not declared an infected premises or dangerous contact premises but within a restricted or control area may be allowed to continue to operate as long as it does not undermine the effectiveness and likelihood of success of disease control operations. Because the nature of the enterprise involves the entry and departure of cattle on a daily basis it will be necessary to ensure that no infected cattle are moved into the feedlot. The possibility that apparently healthy cattle in the feedlot could be incubating the disease, or that products could be infected, needs to be considered when moving cattle or products out of the feedlot. The continued operation of the feedlot will therefore be dependent on the movement restrictions

imposed in the event of a particular disease outbreak. These restrictions are discussed in some detail for the different diseases that are important for feedlots in Section 3.3.1, below. Economic imperatives resulting from loss of access to premium (largely export) markets may in practice override theoretical permitting of operations based on disease control criteria. Feedlots can generally be selective in their sourcing of store cattle. Hence, they may be able to ensure that incoming cattle come from outside the declared area. Permits for the movement of susceptible animals would likely be issued with caution as government compensation would be payable if these animals become infected. Admission of animals from non-infected properties within the declared area may nonetheless be permitted, to allow operations to continue on those properties.

For certain diseases such as *bluetongue, lumpy skin disease, Rift Valley fever,* and *screw-worm fly* the causative organism can survive well outside the host. Hence eradication measures may be prolonged and require an extended period of surveillance. Depending on the stage of the outbreak, prophylactic vaccination may be feasible for incoming store cattle for diseases such as bluetongue, lumpy skin disease, and Rift Valley fever. Similarly, in the case of screw-worm fly, prophylactic treatment with ivermectin can be expected to have a preventive effect for 16–20 days. This may be used at the time of any husbandry procedures, which may cause wounds and hence predispose cattle to screw-worm fly infestation.

3.3 Minimisation of risks associated with operation

When a premises is within a restricted area or a control area, a general clean-up of sites likely to contribute to the risk of disease should be undertaken. This would include cleaning away rubbish in the vicinity, removal or destruction of areas that might house vermin, improved procedures for manure removal and effluent control, improved perimeter controls and similar measures (see Section 2).

3.3.1 Livestock

Destruction and disposal of cattle on a feedlot should be undertaken only on infected or dangerous contact premises (see Section 4.1). However, account should be taken of the possibility of disease being in the incubation phase on a non-infected premises. **During the period of declaration, mixing of stock from different pens should be avoided wherever possible.** All cattle being released from hospital pens or other isolated facilities should be grouped in separate pens and not returned to pens of 'normal' cattle. If for any reason it is suspected that some animals are in a higher risk category or are incubating the disease, these should be kept separate from others or slaughtered as appropriate.

Careful consideration of the logistics of induction procedures should be undertaken for feedlots in the declared area. Isolation of introduced cattle should be instituted where appropriate, possibly including the establishment of temporary pens at a distance from the main body of cattle.

Livestock movement control

Restrictions on introductions of animals may be necessary in a variety of forms. Depending on the scenario, permits may be issued for movement of animals into a premises from declared or free areas and such permits may be restricted to assist with the overall management of the disease control program.

The following account of restrictions applicable to various diseases are adapted from the relevant AUSVETPLAN **Disease Strategies**. The specific quarantine and movement controls applicable to each disease is found in Appendix 2 of the appropriate **Disease**

Strategy. The likely movement restrictions applying to feedlots in the case of foot-and-mouth disease are shown in Figure 3.

High level restrictions

A very high level of caution would apply to *foot-and-mouth disease* because of its highly contagious nature. Movement into a restricted area would be very unlikely but may be permitted from a free area or a contiguous control area. In effect, this would mean that if a feedlot in the restricted area were full to capacity, it would have to retain all animals on feed until restrictions were lifted. This in itself poses a risk in allowing the perpetuation of a very large, concentrated population of susceptible animals with attendant opportunity for massive production of virus should they become infected, except as explained below. The alternative of allowing movement for immediate slaughter would carry the risk of spreading virus widely if any of the slaughtered animals was incubating the disease.

Movement to an abattoir in the RA for immediate slaughter could be allowed under permit. Movement to an abattoir within the CA may be considered provided it does not compromise disease control and sufficient time has elapsed to allow authorities to thoroughly assess the situation.

For *lumpy skin disease* similar conditions would apply, namely movement into the RA or CA allowed under permit but movement out prohibited except direct to slaughter. In this case, there would necessarily be less risk from movement of feedlot cattle directly to slaughter than from retaining them in a situation where they remain exposed to vectors.

Operations within a control area could be possible. Movement of cattle in from free areas is allowed under permit.

Restrictions applicable to *Rift Valley fever* would constrain feedlot operations. Only fully immune vaccinated animals may be able to leave the RA and no ruminants would be permitted to enter. However, vaccines are unlikely to be available in the short term.

Restrictions applicable to Rift Valley fever within a control area could enable continued feedlot operation. Cattle may move into the control area under permit and fully immune, vaccinated animals may leave the control area. Vaccination, if available, would be performed while on the feedlot.

Medium level restrictions

For other contagious diseases, operations could be possible in either a restricted or control area. Movement of animals in from a free or contiguous control area and movement out to an abattoir may be permitted for *vesicular stomatitis* and *rinderpest*.

Restrictions for *screw-worm fly* may require special consideration. Within a restricted area, movement would require inspection, treatment and permit. For slaughter animals however, treatment with chemicals is not possible. Movement for slaughter within the declared area may be allowed under permit after injection. Intensive inspection is the only option.

Movements within or out of a control area would be permitted by inspection and permit without treatment.

Low level restrictions
For several of the diseases, feedlot operations in a restricted area or a control area should be minimally affected.
Movement restrictions for *bluetongue* would be for the purposes of epidemiological assessment and would be unlikely to impede the movement of cattle in and out.
Bovine spongiform encephalopathy (BSE) should only involve restrictions for feed ingredients, although some livestock restrictions on infected premises are likely, dependent on a risk assessment.

Vaccinations and treatments

In certain circumstances, the risk of infection entering the feedlot may be minimised by the authorised use of vaccination or treatment of the animals present. Examples could include vaccination for bluetongue, lumpy skin disease, Rift Valley fever, or rinderpest, or treatment with ivermectin as a preventive for screw-worm fly infestation or bluetongue. The withholding periods for any drugs used in disease control or prevention measures would need to be considered before slaughter for human consumption (see Section 4.3.4). Whether such preventive measures were permissible may depend on the strategy adopted for the disease, and the availability of vaccine. Vaccines are unlikely to be immediately available.

3.3.2 By-products

Manure arising from the operation should be destroyed by burial or decontaminated where it poses a threat of spreading the disease (see the **Decontamination Manual, Section 5.1**) For diseases that may be spread by manure, its removal from the premises should be disallowed unless necessary. It should merely be stockpiled on the premises. If removal is permitted, the destination must be known and recorded.

3.3.3 Discharges

Effluent from the enterprise should be controlled and contained where feasible. Within the declared area, any risk of spread of potential infection via discharges should be assessed and minimised. Specific measures to decontaminate discharges are unlikely to be warranted on feedlot premises in a declared area.

3.3.4 Vehicles

A systematic decontamination procedure for all incoming vehicles should be introduced if appropriate for the disease in question, or if already in routine use, reviewed as to its potential effectiveness. In all cases, the previous destinations of incoming vehicles should be checked before they are allowed entry onto the feedlot. The entry of vehicles onto the feedlot during the time of declaration should be restricted to those with a clear need. All unnecessary vehicle entries should be stopped.

3.3.5 Equipment and materials

As far as possible, entry of equipment and materials within a declared area should be curtailed. Clearly this will be more important in the case of the highly contagious diseases. For necessary introductions, a systematic decontamination procedure should be introduced. Feed and feed ingredients should preferably be sourced from outside the declared area if the disease is contagious. Vehicles carrying feed should if possible be dedicated to the task and even to the particular feedlot. Information on their past destinations and routes should be available and scrutinised as necessary to establish that there is no obvious risk of infection. Rubbish and unwanted equipment should be destroyed if it is likely to compromise disease preventive measures.

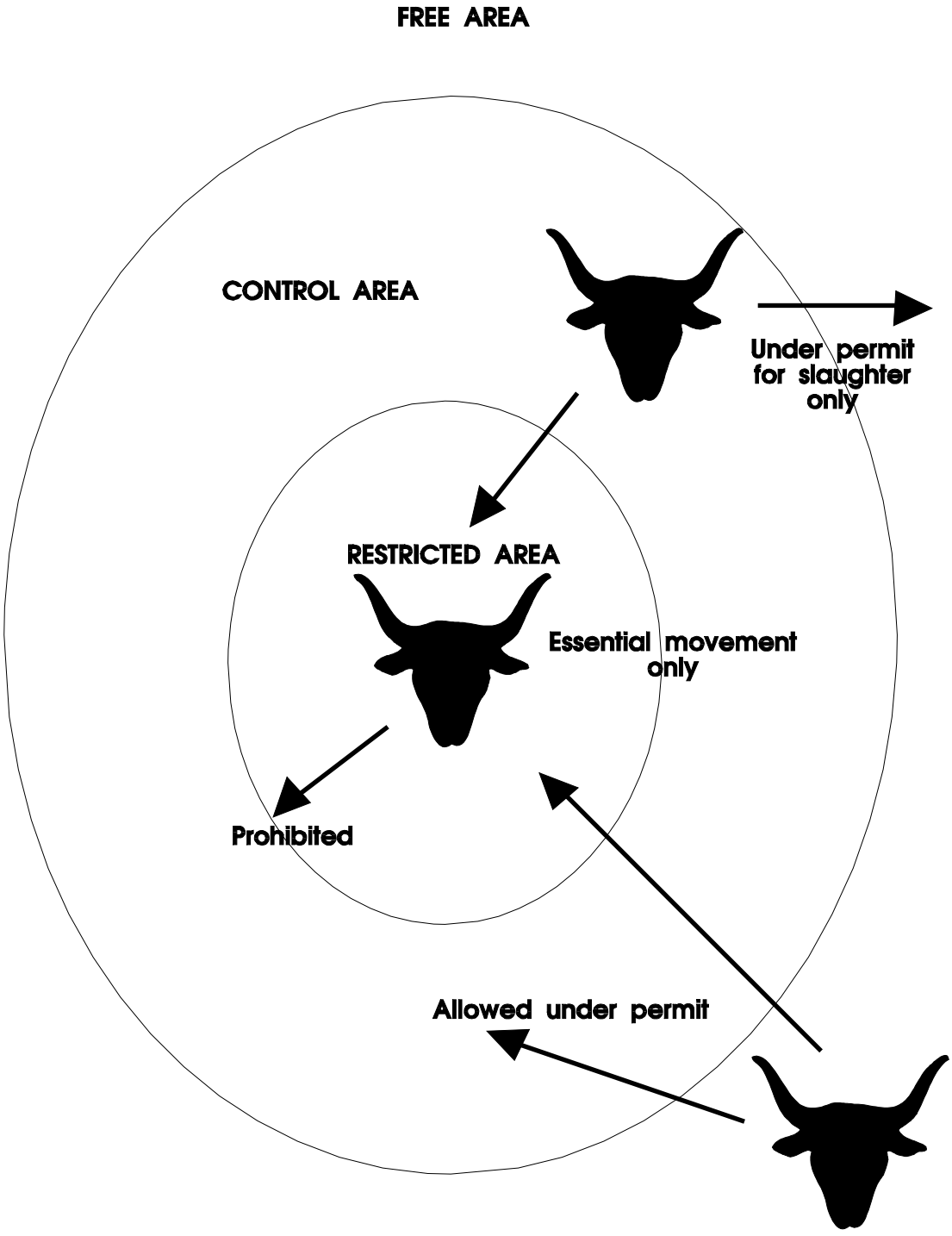

Figure 3 **Movement restrictions that would be likely to apply to feedlots in the case of a disease such as foot-and-mouth disease**

3.3.6 Personnel

Again, an appropriate, systematic decontamination procedure for personnel should be introduced or, if already in routine use, reviewed as to its potential effectiveness.

3.3.7 Vermin and feral animals

Rodents and other animals may compromise attempts at disease control on the premises. Reduction of such risks can be achieved by an effective pest control program. It should be noted that most rodenticides (based on anticoagulants) take up to two weeks to start taking effect. Feral animals such as cats and foxes may be very shy and their presence on and around the premises may not be noticed. Effective measures should be taken to eliminate them if they present any risk to disease control measures.

3.3.8 Buildings and structures

In the case of some insect-borne and highly contagious diseases, control of insects in and around buildings may be important. However, since the cattle in feedlots are for imminent slaughter, unintentional chemical contamination must be avoided. The choice of insecticide may be quite significant in this respect.

3.4 Other precautions

See also Section 2.

3.4.1 Record keeping

Purchases

As stressed in Section 2.6, the maintenance of detailed and easily accessible records of inputs and outputs is extremely important and will facilitate a suspected disease investigation.
Cattle (and any other animals). Within a declared area, rigorous attention should be given to recording of all introduced animals. Identification of the source of any animal and its date of arrival should be available with minimal difficulty or delay. Details of the means of transport and identification of the vehicle should be kept. These records should be kept for a minimum of one year or longer if so recommended by the local disease control centre (LDCC) controller. All introduced animals must be individually identified.
Feed and ingredients. Records of all purchases should be kept including the origin and the identification of vehicle. The duration of these records should be as for cattle.

Sales

Cattle. Records of sales/slaughters should identify the property of origin.
Manure. Records of sales or deliveries should be kept in a similar manner to that for introduced animals.

4 RESPONSE PLANS IN AN INFECTED OR DANGEROUS CONTACT PREMISES

4.1 Introduction

This section covers the situation where a feedlot either has infected animals on the premises or has animals that have been in direct contact with infected animals.
Declared premises, which are proclaimed in the event of an outbreak of a disease by the State/Territory CVO under the relevant State legislation, are described below.
Infected premises (IP): defined as the area (which may be all or part of a property) in which an emergency disease exists, is believed to exist, or in which the infective agent of that emergency disease exists or is believed to exist.
Dangerous contact premises (DCP): premises containing animals showing no clinical signs of disease but which, by reason of its probable exposure to disease, will be subjected to disease control measures.
Suspect premises (SP): an area containing animals that might have been exposed to an emergency disease through possible contact with infected animals or facilities, people, equipment, semen or embryos, and currently show no symptoms; OR where the disease symptoms are evident, but the diagnosis is as yet to be confirmed.
The declaration by the CVO of an IP, DCP or SP is determined by the policy set out in the AUSVETPLAN **Disease Strategies** in order to minimise the spread of disease.

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

A feedlot would recommence normal routines after clearance from the CVO/SDCHQ. This would only be given when there is agreement that the program of stock destruction, cleaning and disinfection or vaccination (depending on the disease) has been carried out and completed. See also Section 4.6 for the conditions required to establish proof of freedom.
When a premises is declared an IP or DCP, immediate consideration should be given to the imposition of internal quarantine barriers within the premises. This may help to achieve two objectives:

- a reduction in the number of animals that can be affected by the disease, hence limiting the opportunity for spread; and
- an improved chance of salvaging some animals.

Planning of internal quarantine barriers should be considered before an emergency (see Section 2, Table 4). The plan must minimise potential ways the pathogen could spread in the feedlot. The plan may include restriction of movement of staff to certain areas according to the internal barriers. Consideration should be given to **all** means of spread of infection including personnel, equipment, feed and water sources. The main objective would be to isolate the non-infected area from the infected or suspect areas. Isolation of several separate non-infected areas is desirable if circumstances permit, ie the premises would be divided up into one infected and several non-infected areas. The following Sections (4.3 and 4.4) discuss the measures that would be needed to eliminate the infection.

4.3 Elimination of the disease — livestock

4.3.1 Stamping out

Elimination of the disease-causing agent on an infected or dangerous contact premises is usually achieved by destruction of all infected or suspect animals. Exceptions are screw-worm fly where treatment of existing infestations as appropriate can be instituted or vector-borne diseases such as bluetongue.

It should be noted however that any stamping-out program is likely to be a somewhat protracted affair in practice. Destruction of cattle and carcase disposal, will entail considerable organisation and resources, which, in all likelihood, will not be immediately available on a sizeable feedlot. In the meantime, movement of vehicles, such as grain carriers, onto the property may be necessary on welfare grounds.

Depending on the disease and the circumstances of the outbreak, the need for rapid imposition of quarantine and stamping-out procedures may be paramount. Early steps that reduce the likelihood of spread of disease and increase the speed and likelihood of successful eradication will almost certainly substantially reduce the ultimate costs of the campaign. The LDCC controller will, under the direction of the State/Territory CVO, be responsible for eradication strategies on infected premises. The infected premises operations team (IPOT) will undertake the eradication under the control of a site supervisor.

4.3.2 Disposal of carcases

The destruction and disposal of large numbers of semi-mature cattle will present major logistical problems. Procedures will be determined by the LDCC, taking into consideration the available facilities, the disposal site, animal welfare and personnel safety.

Previous experience with mass deaths in feedlots has drawn attention to the logistical difficulties of disposing of large numbers in a short time. Broad disposal pits have been found to be unsuitable because the large mass of carcases are difficult to properly cover and they tend to be buoyed to the surface by putrefactive gases. Trenches are therefore preferred. These should be deep and narrow (three metres maximum width). Excavated material should be stored on one side of the pit to allow easy access of front end loaders or dump trucks on the other. An excavator is preferred to a bulldozer. *As a guide, a pit three metres wide, five metres deep, and filled to within 2.5 metres of ground level will accommodate five adult cattle per linear metre.*

An important aspect of carcase disposal is safety for operators. It is mainly for safety reasons that pits should be no deeper than five metres. The site supervisor of the infected premises operations team has a responsibility to ensure that disposal is conducted in a safe manner. Destruction and disposal of large numbers of cattle is certain to attract the attention of the media, which, if it can, will undoubtedly use helicopter film footage to publicise the process. Close attention should therefore be given to public relations aspects of any emergency on feedlots..

4.3.3 Salvage of animals/product

Removal of cattle to an abattoir for slaughter for human consumption or rendering of carcases may be feasible in cases where the feedlot is adjacent or in close proximity to a suitable facility. Under certain conditions, salvage of meat or other animal products may be feasible even when the feedlot is declared an infected or dangerous contact premises. In practice, the likelihood of this option being available is small. The quantity to be processed is likely to be such that disposal by destruction and burial is a faster means of reducing the opportunity for

the spread of disease. Nevertheless, slaughter for rendering for food processing (human or petfood) should be considered as a possible option, not only during, but in advance of an emergency and the logistical limitations of such an operation should be assessed in the circumstances of the individual feedlot. The likely financial savings achievable through such a strategy should also be taken into account. The situation with respect to individual disease is shown below in Table 5.

Table 5 Salvage options in the case of different diseases

DISEASE	SALVAGE OPTIONS
Foot-and-mouth disease; rinderpest vesicular stomatitis	In the case of highly contagious diseases salvage would not be possible on any infected or dangerous contact premises because of the risk of disease spread. A stamping-out policy with immediate destruction and disposal of infected and suspect animals would be applied.
Lumpy skin disease	As for the highly infectious diseases described above.
Bluetongue; Screw-worm fly	Meat is not a means of spread of infection. Salvage of animals by slaughter for human consumption is an option, subject to the need for preventing any spread of the disease.
Rabies	As for bluetongue and screw-worm fly (occupational hazards would be considered in the handling of any infected or suspect cattle).
Rift Valley fever	This disease can cause serious illness, with a relatively high mortality rate, in humans. Although insects are the main means of transmission, there is a significant risk of human infection through the handling of infectious tissues. Hence, there would be no scope for salvage of any animals from infected or dangerous contact premises. Movement of susceptible animals out of infected or dangerous contact premises is prohibited
Bovine spongiform encephalopathy (BSE)	Product from infected or suspect animals would not be allowed for human consumption. Furthermore, because of the difficulties of diagnosis, all suspect animals would be destroyed and tested.

Rendering

Rendering of carcases may be feasible under certain conditions. The rendering process will reliably kill all disease agents of concern with the proviso that the agent of BSE will require special attention to the adequacy of the rendering process because of the extremely high temperature required to deactivate the infectious agent.. The possibility therefore may exist for the use of rendering as a means of increasing the efficiency of stamping-out measures and/or reducing the costs inherent in such measures.

4.3.4 Prevention of spread

In some cases, it may be possible to take advantage of the epidemiological pattern of the disease to ensure that cattle leaving the enterprise do not harbour the causative agent. Treatment to prevent potential spread of infection may be employed. For bluetongue, treatment with ivermectin would render cattle lethal for any *Culicoides* insect feeding on them. Correct withholding periods would have to be observed before slaughter for human consumption. When treated with ivermectin cattle must be withheld from human consumption for 42 days, and dairy cattle must not be treated when milk or milk products are used for human consumption.

In the case of bluetongue, it is now considered that the maximum duration of effective viraemia is normally about 50 days in cattle and 20 days in sheep, although most animals are infectious to vectors for a much shorter period.

4.3.5 Vaccination

Vaccination of cattle may be practised for some diseases, to reduce the spread of infection. Such a measure may be applicable, depending on availability of vaccine, for bluetongue, Rift Valley fever, and lumpy skin disease (see Table 3 for a summary of vaccine strategies). This is likely to be of consequence only in the event of a protracted outbreak.

Vaccination may be used to prevent new infections, and a 'buffer period' applied, entailing no movements out of the enterprise, to render any presently infected animals non-infectious. A program could be used whereby vaccination is followed by close clinical examination for a period, probably of 21 days duration.

Vaccination is not a preferred option for control of *foot-and-mouth disease* due to its potential to extend market disruption. In discussions with impact groups and the veterinary authorities it has been agreed that vaccination may have limited application in the face of uncontrolled spread of the disease in risk enterprises such as large intensive feedlots. These enterprises have the potential to generate large volumes of virus. This strategy may also 'buy time' to assist the logistical problems in the destruction, disposal and decontamination of such large livestock enterprises.

Australia is a member of the International Vaccine Bank, which holds a limited number of subtypes of FMD virus types O, A, C and Asia 1. Up to 500 000 doses of vaccine produced to OIE standards, can be accessed from the bank at the cost of replacement. The reconstitution, packaging and transport takes time so that vaccine may not be available on demand. If a vaccine is required that is specific to the Australian isolate then the time for production and availability of that vaccine will be extended.

Inactivated vaccines are the only reliable ones available but their sterility and safety must be assured.

Vaccine protects the animal against disease but does not prevent infection and shedding of virus still occurs but is reduced. Immunity wanes rapidly after about 4–6 months and re-vaccination is required. Some vaccine strains have been known to mutate and it is necessary

to frequently check the strain variation of the field isolate and to check the composition of the vaccine.
Vaccinated animals must be positively identified as they will need to be slaughtered towards the end of the campaign if eradication and country freedom is to be achieved.
Vaccination is a resource intensive operation, particularly if revaccination is required. It is also expensive and can defer the declaration of freedom and exacerbate the devastating effects on producers. Its use therefore should be treated with caution particularly as there is a risk that vaccination teams may inadvertently spread virus. Slaughtering healthy animals that have been vaccinated will pose significant social problems.

4.4 Decontamination — products and facilities

All aspects of decontamination must take into account the nature of the disease agent, its pattern of spread, and its persistence in the environment. The **Decontamination Manual** gives much information about disinfectants and methods and about other equipment such as pumps and sprays, which will be required on the premises. However, it does not deal specifically with feedlots.
Water supply is an important consideration and prior consideration should be given to the possible need for a greater than normal supply (see Section 2).

4.4.1 Products

There are no products from a feedlot. The potential for slaughter of cattle at an abattoir for human consumption and/or rendering of carcases is discussed in Section 4.3.3.

4.4.2 By-products

The only by-product of the feedlot industry is manure, which is sometimes sold as fertiliser. Special measures may be required to ensure that manure is decontaminated so as to reduce the risk of disease spread. Burial or composting would be the most appropriate method of permanently disposing of possibly contaminated manure
Some infective agents cannot be transmitted through manure, eg bluetongue, BSE, and Rift Valley fever. For these diseases, decontamination is unnecessary and removal from the premises may be permitted.

4.4.3 Discharges

Elimination of contamination through containment and decontamination of effluent may constitute a vital measure in limiting the spread of disease. Rendering safe the prodigious quantities of manure and effluent from a feedlot requires careful consideration in the light of the circumstances of the outbreak. Contamination of manure and effluent is of relevance in the case of FMD, rinderpest and vesicular stomatitis. Depending on the number of cattle on the feedlot and other factors such as topography and weather, it may be possible to contain the effluent for the duration of any quarantine period. Dilution of effluent is an important means of reducing risk and this may be feasible, depending on water availability.
Decontamination is possible up to a certain scale but treatment of all manure and effluent over a time is likely to be expensive and logistically impracticable. A decision would have to be made, depending on individual circumstances, as to whether long-term decontamination of manure and effluent is the most cost- effective option.
Fencing off of areas containing contaminated manure and/or effluent should be considered as a possible solution where appropriate. Access to such areas by wild birds and insects would be difficult to prevent and this should be taken into account.

4.4.4 Vehicles

While animals remain on the feedlot, there will be a need for movement of vehicles into, within and out of the infected or dangerous contact premises. Such vehicles will include grain carriers, feed trucks, cattle trucks, personal vehicles and other vehicles such as excavators and front end loaders. If the disease can be spread by fomites, passage of vehicles should be kept to the minimum. Passenger vehicles for instance may be restricted. Also, the route taken by vehicles within the IP should be rigidly controlled to avoid unnecessary potential contamination.

A stringent procedure for disinfection of vehicles leaving the enterprise may be required. Details of the methods to be used are described in the **Decontamination Manual, Section 4.3**. The disinfection procedures will be supervised by IPOT under the direction of the LDCC. A record of all such disinfections and the destination of the vehicles concerned should be kept by IPOT.

On a large feedlot, the quantity of feed ingredients coming onto the premises, and hence the number of truckloads, can be very large. It may, however, be possible to devise a means by which incoming grain carriers do not cross paths with any of the other vehicles, personnel or equipment. If so, the need for decontamination may be obviated or the extent of procedures may be significantly reduced.

Decontamination of trucks used to distribute feed on the feedlot may pose significant problems. Generally, it is possible to load these trucks at only one location. Hence any plans to separate 'clean' and 'dirty' trucks requires the setting up of a separate loading facility. It is likely that the emergency facility, not the routine one, would be regarded as 'clean' yet it may be required to serve the major proportion of the feedlot.

4.4.5 Equipment and materials

Feed handling and processing equipment may need to be decontaminated depending on the circumstances of the outbreak. The equipment involved will include a wide range of items such as storage bins, chutes, augers, elevators, electrical equipment, steam or heat processing equipment and the like. Advice from management on safety and proper procedures to avoid unnecessary damage should be sought. Generally, decontamination of such equipment could only be achieved when the plant was not operating, and this may be possible only if the feedlot is empty. Fortunately however, urgent decontamination of feed processing equipment should not be required except in circumstances where a stamping-out policy was applied.

The procedures and materials used will again be under the control of the IPOT. For a description of requirements and methods, refer to the **Decontamination Manual, Sections 4.3 and 5.3** for machinery and vehicles used on the IP, and for feedstuff and grain stores, respectively.

4.4.6 Personnel

Disinfection of personnel may be necessary in order to prevent the spread of many of the diseases. The procedures applicable will be the same as for enterprises other than feedlots and they will again be under the control of the IPOT. Records should be kept of destinations of persons requiring decontamination procedures. The aim of personal decontamination is to safely remove any contamination from the body or clothing so that there is minimal risk of dissemination of the pathogen when they remove themselves from the contaminated environment.

4.4.7 Vermin and feral animals

Rodents and other animals may compromise attempts at disease control on the premises and effective control measures should be instituted (see Section 3.3.7).

4.4.8 Buildings and structures

Decontamination procedures for buildings and structures where applicable will be supervised by the IPOT. Several recommended disinfectants are listed in the **Decontamination Manual**. Additional points specific to feedlots are described below.

Variations in persistence of disease-causing agents should be taken into consideration. For instance, 'spelling' (resting) of contaminated areas may be the most important method of removing agents of low persistence whereas decontamination measures combined with prolonged spelling and placement of sentinel animals might be required for more persistent agents.

Cattle pens and structures

Steel, cement, plastic and some wood structures such as feed and water troughs, posts, rails and wire or cable can be decontaminated manually. Some wooden structures may be capable of being disinfected depending on the agent concerned and the qualities of the wood (old and cracked, painted, treated and the like).

Where decontamination of earthen areas is required, prior removal of manure down to and including the manure/soil interface should be undertaken. It should be noted, however, that this interface acts (or should act) as an impervious seal preventing saturation of the underlying soil and boggy conditions. Its removal is not normally recommended (Tucker et al 1991). The top layer of remaining soil may be disinfected using sodium hydroxide or sodium carbonate and the area spelled thereafter. Later sentinel animals would be used to verify the adequacy of disinfection of soil.

Where the disease-causing agent is not of high persistence, and possibly depending on prevailing weather conditions, it may be appropriate merely to remove any accumulated manure from the pen and spell it for a specified period. Such an approach would be appropriate for rinderpest since this virus is not very stable (see the **Exotic Diseases Field Guide**).

Feed preparation area

Disinfection of equipment is covered under Section 4.4.5 above.

Disinfection of floors, especially those used by feed delivery vehicles, and feed depots, is an important consideration because of the capacity for widespread contamination from this point. More rigorous disinfection, involving walls, structures and surrounds, may be required for highly persistent agents.

Resting of cattle pens may be necessary for some of the contagious diseases. The period of resting required will depend on the nature of the disease in question.

Offices and dwellings

Disinfection of these buildings may be necessary despite the consequent disruption. Because of the transit of people, both offices and dwellings may constitute areas of high risk of contamination in the case of contagious diseases. Consideration should be given to the organised transfer of the records of the feedlot to temporary premises so that epidemiological investigations may progress.

4.5 Tracing requirements

Tracing of animals, vehicles, people or other items will depend on adequate records, which should be kept as outlined in Sections 2.6 and 3.4.1.

4.6 Proof of freedom

The **Disease Strategies** give details of how proof of freedom can be re-established for each disease. The OIE Codes (**Disease Strategies, Appendix 3**), set international requirements for freedom from a wide range of diseases. These should be referred to for advice relating to requirements for specific diseases not covered by the AUSVETPLAN strategies. Ultimately the decision to declare freedom from a particular disease and cessation of disease control activities, will be made by the Consultative Committee on Emergency Diseases (CCEAD) and the State CVO based on information assessed at the time.
A period of surveillance may be imposed before feedlot operations are permitted to return to normal. The conditions for sentinels, restocking and surveillance are shown in Table 6.

4.6.1 Sentinel animals

The use of sentinel animals may be necessary to confirm the effectiveness of decontamination procedures. The procedures to be followed will be the responsibility of the LDCC.

4.6.2 Restocking

Restocking of partly or fully destocked premises will be permitted after a period. The length of the period will depend on the nature of the disease and the persistence of the agent.

4.6.3 Surveillance

A program of surveillance may also be required. The nature and period of surveillance will again depend on the nature of the disease and its causative agent.

Table 6 Summary of conditions for sentinels, restocking and surveillance.

DISEASE	CONDITIONS
Foot-and-mouth disease	Sentinel animals on all IPs and DCPs starting 30 days after disinfection. Restocking permitted after a buffer period (Note: period not specified in FMD). Surveillance for at least 6 months.
Lumpy skin disease	Sentinel animals on all IPs and DCPs starting 28 days after disinfection. Restocking permitted 6 weeks after sentinels introduced. Surveillance for at least 6 months. .
Rift Valley fever	Sentinel animals on all IPs and DCPs starting 6 weeks after destocking. Restocking permitted after a period depending on status of sentinels. Surveillance for three years to demonstrate country freedom.
Rinderpest	Sentinel animals not necessary if complete stamping out performed. Restocking permitted after a short buffer period. Surveillance for at least 6 months.
Screw-worm fly	Sentinel animals likely to be stationed up to 150 km from known cases for up to 16 weeks after the last case. Intense surveillance would be undertaken. Restocking not applicable since destocking unlikely.
Vesicular stomatitis	Sentinel animals on all IPs and DCPs starting a short time (weeks) after destocking. Restocking permitted after a period depending on status of sentinels. Surveillance for two years to demonstrate country freedom.

Note: Not applicable for bluetongue, BSE or screw-worm fly as destocking does not occur.

APPENDIX 1 List of AUSVETPLAN diseases

African horse sickness

African swine fever

Aujeszky's disease

Avian influenza

Bluetongue

Bovine spongiform encephalopathy (BSE)

Classical swine fever (hog cholera*)

Equine influenza

Foot-and-mouth disease

Japanese encephalitis

Lumpy skin disease

Newcastle disease

Peste des petits ruminants

Rabies

Rift Valley fever

Rinderpest

Scrapie

Sheep and goat pox

Screw-worm fly

Swine vesicular disease

Transmissible gastroenteritis

Vesicular exanthema

Vesicular stomatitis

Bee diseases:

- Braula fly (*Braula coeca*)
- tracheal mite (*Acarapis woodi*)
- tropilaelaps mite (*Tropilaelaps clarae*)
- Varroa mite (*Varroa jacobsoni*)

* this term is not used in AUSVETPLAN

APPENDIX 2 Summary role statement for key personnel

Role descriptions for positions within the direct administrative control of the relevant government department are given in the **Control Centres Management Manual.** In addition, positions under the control of the feedlot management are briefly described below.

FEEDLOT MANAGER

Skills

- Full knowledge of the feedlot and its operation.
- Ability to direct and control operations necessary for assisting the infected premises operation team (IPOT).

Line relationships

- Responsible for liaison with the site supervisor on the infected premises.
- Responsible for all personnel working for the feedlot on the premises.
- Responsible for liaison with feedlot management at a higher level (eg company head office) in respect of the operation on the premises.

Roles and responsibilities

- Ensure that the infected site supervisor has the full cooperation of the feedlot staff.
- Liaise closely with IPOT site supervisor to ensure that any impediments to the operation are addressed at an early stage.
- Ensure that feedlot staff are adequately briefed on their responsibilities in respect of the outbreak.

LIVESTOCK CONTROLLER

Skills

- Knowledge of all livestock on the premises and ability to manage and control all movements of same.

Line relationships

- Responsible to the feedlot manager.
- Responsible for all feedlot employees working directly with the livestock.

Roles and responsibilities

- Oversee the handling and moving of all livestock, whether on the hoof or in trucks, in accordance with the needs of the IPOT.

EQUIPMENT AND VEHICLES CONTROLLER

Skills

- Knowledge of all vehicles and equipment on the premises and ability to manage and control all movements of same.

Line relationships

- Responsible to the feedlot manager.
- Responsible for feedlot employees working in the feed preparation or distribution area.

Roles and responsibilities

- Oversee the handling and moving of all feed and feed ingredients within the provisions stipulated by the IPOT.

GLOSSARY

ANEMIS	*An*imal Health *E*mergency *I*nformation *S*ystem. A system for the collection, assimilation, actioning and dissemination of essential disease control information using paper documentation and computing assistance.
AUS-MEAT	The industry organisation responsible for the trading language, standards and quality assurance programs from producer to retail outlets
AUSVETPLAN	A series of documents that describe the Australian response to emergency animal diseases, linking policy, strategies, implementation, coordination and counter-disaster plans.
Chief veterinary officer	The senior veterinarian of each State or Territory animal health authority who has responsibility for animal disease control in that State or Territory.
Control area	A bigger area than a restricted area (possibly as big as a State) where restrictions will reduce the chance of the disease spreading further afield.
Dangerous contact animal	An animal showing no clinical signs of disease but which, by reason of its probable exposure to disease, will be subjected to disease control measures.
Dangerous contact premises	Premises containing dangerous contact animals.
Declared area	Any premises or area to which legal notices or restrictions apply: infected premises, dangerous contact premises, suspect premises, control area or restricted area.
Disinfectant	Any agent used to destroy microorganisms outside living animals.
Disposal	Sanitary removal of animal carcases and things by burial, burning or some other process so as to prevent the spread of disease.
Emergency	A situation requiring an immediate response and given highest priority for allocation of resources.
Emergency animal disease	Includes exotic animal diseases and endemic diseases that warrant a national emergency response.
Exotic animal disease	Disease affecting animals (which may include humans) not presently occurring in Australia.
Induction	The process undertaken when animals are introduced to a feedlot to accustom them to the ration, including any veterinary treatments and a period of isolation before introduction to the main feedlot.
Infected animal	An animal infected with or believed to be infected with an emergency disease.
Infected premises	A defined area (which may be all or part of a property) in which a disease is confirmed or presumed to exist.
Job card	A written list of tasks to be carried out by an individual in the early stages of an emergency response.
List A diseases (OIE)	International list of transmissible diseases that have the potential for serious and rapid spread, irrespective of national borders; which are of serious socioeconomic or public health importance and which are of major importance in the international trade of animals and animal products.
List B diseases (OIE)	International list of transmissible diseases that are considered to be of socioeconomic and/or public health importance within countries and which are significant in the international trade of animals and animal products.
Local disease control centre	An emergency operations centre responsible for the command and control of field operations in a defined area.
Movement control	Restrictions placed on the movement of animals, people and things to prevent the spread of disease.
Pen capacity	The number of animals capable of being accommodated in all pens on the feedlot at the normal stocking density. Feedlots, even full-time operations, are rarely full to capacity.

Premises	A defined area or structure, which may include part or all of a farm, enterprise or other private or public land, building or other property.
Quarantine	Legal restrictions imposed on a place or a tract of land by the serving of a notice and limiting access or egress of specified animals, persons or things.
Reconstitution	The process of adding water to dry grain in an enclosed container or silo to raise the moisture content and allow some fermentation; the digestibility of the grain is thus enhanced.
Rendering	Processing by heat to inactivate infective agents. Rendered material may be used in various products according to particular disease circumstances.
Restricted area	A relatively small declared area (compared to a control area) around an infected premises that is subject to intense surveillance and movement controls.
Risk enterprise	Livestock-related enterprise with a high potential for disease spread or economic loss.
Role description	Statement of responsibilities of an officer within the overall operation.
Salvage	Recovery of some (but not full) market value by treatment and use of products, according to disease circumstances.
Sentinel animals	Animals of known health status monitored for the purpose of detecting the presence of a specific emergency disease agent.
Spell	Keep unused for a period of time until there is no risk of disease agent remaining.
Stamping out	Disease eradication strategy based on the quarantine and slaughter of all susceptible animals that are infected or exposed to the disease.
Steam flaking	A process of treating grain with steam at a temperature of about 99°C for a period of around 25 minutes. The process will raise the moisture content of the grain from a nominal 10% to about 20%.
Stores	Store cattle.
Surveillance	A systematic program of investigation designed to establish the presence, extent of, 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.
Suspect animal	An animal that may have been exposed to an emergency disease such that its quarantine and intensive surveillance is warranted; OR an animal not known to have been exposed to a disease agent but showing clinical signs requiring differential diagnosis.
Suspect premises	Premises containing suspect animals.
Tracing	The process of locating animals, persons, products, materials, vehicles and other things that may be implicated in the spread of disease.
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.

Abbreviations

AAHL	Australian Animal Health Laboratory
ALFA	Australian Lot Feeders' Association
ANEMIS	Animal health emergency information system
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AUSVETPLAN	Australian Veterinary Emergency Plan
BSE	Bovine spongiform encephalopathy
CA	Control area

CCEAD	Consultative Committee on Emergency Diseases
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CVO	Chief veterinary officer
DCP	Dangerous contact premises
DPIE	Department of Primary Industries and Energy
FMD	Foot-and-mouth disease
IP	Infected premises
IPOT	Infected premises operation team
LDCC	Local disease control centre
LSD	Lumpy skin disease
OIE	World Organisation for Animal Health [Office International des Epizooties]
RA	Restricted area
RVF	Rift Valley fever
SCA	Standing Committee of Agriculture
SWF	Screw-worm fly

REFERENCES

Dyer, I.A. and O'Mary, C.C. (1977). *The Feedlot*. Lea & Febiger.

Howard, K. and Plasto, A.W. (1991). Feedlotting: a guide for beef producers. Queensland Department of Primary Industries.

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

NSW Department of Agriculture & Fisheries (1990). *The Feedlot Manual*. Feedlot Advisory Unit.

Standing Committee on Agriculture (SCA) (1992). *National Guidelines for Beef Cattle Feedlots in Australia*. SCA Report No 47.

Tucker, R.W., Watts, P.J., Lott, S.L. and Jukes, P. (1991) Lot feeding in Australia. Queensland Department of Primary Industries.

United States Department of Agriculture (1993). *Bovine Spongiform Encephalopathy — Emergency Disease Guidelines*. Animal and Plant Health Inspection Service.

Training resources

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

OIE publications

OIE Code (1992). *International Animal Health Code* (6th edition), OIE, Paris, France.
OIE Manual (1992). *Manual of Standards for Diagnostic Tests and Vaccines* (2nd edition), OIE, Paris, France.

INDEX