Emergency animal diseases
A field guide for Australian veterinarians
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Foreword

Animal production in Australia is a significant contributor to the economy and a major employer of rural and regional Australians. We are fortunate to be free from most major diseases of livestock that impede production, affect trade and cause serious animal welfare concerns. Historically, this can be attributed in part to the distance and limited movements of animals, animal products and people from other major livestock producing regions.

This no longer is the case. International movement of passengers, mail and cargo are increasing and the threats of an incursion are becoming more prominent. For instance, in 2015-16 there were over 20 million international travellers, 42 million consignments of cargo and 158 million international mail items coming into the country.

Freedom from emergency animal diseases offers a distinct market advantage for exports of Australian animals and animal products. Estimates from 2015¹ suggest that, on average, freedom from foot-and-mouth disease and highly pathogenic avian influenza provide up to $13,172 and $6,000 annual profit for broadacre livestock and poultry producers, respectively.

The chapters in this book are written by some of the foremost experts in their field and provide the information veterinarians need to help them with the early detection, diagnosis and control of exotic and emerging infectious diseases in livestock.

¹ The value of Australia’s biosecurity system at the farm gate. An analysis of avoided trade and on-farm impacts
# Key to symbols

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<td><img src="symbol" alt="zoonotic disease" /></td>
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Preface

Outbreaks of emergency animal diseases (EADs) in Australia have the potential to cause significant socio-economic impacts, and affect animal, human and environmental health. Many of these diseases are exotic to Australia.

New diseases of animals continue to emerge and with this trend likely to continue it is important that veterinarians are prepared to investigate any unusual outbreaks of disease in domestic animals.

This field guide provides field veterinarians with readily accessible information on EADs. It will help those in the field include appropriate EADs in their differential diagnoses, and take appropriate action if presented with signs of an unusual disease.

Early and accurate diagnosis of any case of an EAD is essential for effective control, since controlling localised disease is more effective than managing widespread disease.

Exclusion testing of EADs conducted on suspect case investigations increases the likelihood of early detection of any EAD events in Australia. All negative laboratory test results generated through this process provide data that support Australia’s claims of freedom from EADs for international market access purposes.

This field guide does not provide exhaustive information on each disease, focusing instead on information that veterinarians need when confronted with disease situations in the field. It is not a textbook, and we refer readers to more comprehensive sources at the end of each disease chapter. Likewise, the discussion of laboratory procedures is limited to information that helps with collecting and submitting useful diagnostic samples.

This field guide covers high priority syndromes and diseases of domestic terrestrial animals. It is intended that further syndromes and disease chapters will be added over time. It complements the Australian Veterinary Emergency Plan (AUSVETPLAN), Australia’s coordinated national response plan for controlling and eradicating EADs.

Other materials are available to assist disease recognition and investigation in aquatic animals, and in wildlife. The Australian Government Department of Agriculture has published Aquatic Animal Diseases Significant to Australia: Identification Field Guide 4th Edition. Wildlife Health Australia also includes resources to support investigation of wildlife diseases on its website.
Acknowledgements

This publication would not be possible without the generous support and assistance of many dedicated individuals. Organisational support was provided by Kelly Maher and editorial support was provided by Rhyll Vallis of the Department of Agriculture. A full list of the other contributors follows. Funding for this publication was provided by the Australian Government’s Agricultural Competitiveness White Paper, the government’s plan for stronger farmers and a stronger economy.

Many of the images were sourced courtesy of the Center for Food Security and Public Health: http://www.cfsph.iastate.edu.

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## Acronyms and abbreviations

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<td>Australian Animal Health Laboratory</td>
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<td>AFIP</td>
<td>Armed Forces Institute of Pathology</td>
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<td>AHS</td>
<td>African horse sickness</td>
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<td>AI</td>
<td>Avian influenza</td>
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<td>ASF</td>
<td>African swine fever</td>
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<td>BSE</td>
<td>Bovine spongiform encephalopathy</td>
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<td>CFSPH</td>
<td>The Center for Food Security and Public Health</td>
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<td>CSF</td>
<td>Classical swine fever</td>
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<td>EAD</td>
<td>Emergency animal disease</td>
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<td>EuFMD</td>
<td>European commission for the control of foot-and-mouth disease</td>
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<td>Epizootic haemorrhagic disease</td>
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<td>Equine influenza</td>
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<td>Highly pathogenic avian influenza</td>
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<td>Low pathogenic avian influenza</td>
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<td>Lumpy skin disease</td>
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<td>OIE</td>
<td>World Organisation for Animal Health</td>
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<td>Porcine epidemic diarrhoea</td>
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<td>PIADC</td>
<td>Plum Island Animal Disease Center</td>
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<td>PPR</td>
<td>Peste des petits ruminants</td>
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<td>PRRS</td>
<td>Porcine reproductive and respiratory syndrome</td>
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<td>RVF</td>
<td>Rift Valley fever</td>
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<td>SVD</td>
<td>Swine vesicular disease</td>
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<td>TGE</td>
<td>Transmissible gastroenteritis</td>
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<td>USDA</td>
<td>United States Department of Agriculture</td>
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<td>vCJD</td>
<td>variant Creutzfeldt-Jakob disease</td>
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<td>Vesicular stomatitis</td>
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<tr>
<td>WAHIS</td>
<td>World Animal Health Information System</td>
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CHAPTER 1.1

Roles and responsibilities of field veterinarians in emergency animal disease detection and reporting

Australia’s animal health system relies on veterinarians reporting any suspicion of an emergency animal disease (EAD).

EADs are diseases that have been agreed by governments and industry in Australia as capable of having severe effects on trade, production, the environment, and/or human health. Most are diseases exotic to Australia but some are endemic diseases such as Hendra virus infection and anthrax. Others are described as ‘emerging diseases’ because increasing incidence and/or an expanding geographic or host range would result in them having greater trade or public health effects.

It is important that veterinarians know about EADs for several reasons.

1. Early detection and reporting helps prevent the establishment of exotic diseases, or the spread of serious endemic diseases, some with human health implications.
2. Investigating any suspected EAD generates evidence that helps support Australia’s animal health status claims.
3. Veterinarians have legal and professional requirements to report any suspected EAD.

When to suspect an emergency animal disease

There is a large list of (in some cases, unfamiliar) notifiable animal diseases that veterinarians must report to the government authorities in each state and territory of Australia. All EADs are notifiable animal diseases in all states and territories nationally.

Broadly, you might suspect EADs in cases where:

• there are abnormal mortality rates (in any species, including birds)
• there are abnormal morbidity rates in animals (including birds)
• there is rapid spread of disease through a herd or flock
• the disease event affects multiple species
• cloven-hoofed animals have ulcers, erosions or blisters around the feet, muzzle, udder or teats and/or in the mouth
• cloven-hoofed animals are lame and drooling or salivating excessively
• affected animals display unusual nervous signs (or progressing nervous signs)
• there are multiple, deep, fly-struck wounds (particularly if this occurs in northern Australia)
• there is a sudden, sharp and inexplicable fall in production
• there are unusual and concerning clinical signs of disease in animals or birds
• the clinical presentation suggests signs of a particular EAD, including those listed in Section 3.
How to report an emergency animal disease

If you suspect an EAD, phone government animal health authorities immediately from the affected property.

This is the most important step, because effective disease control relies on early detection.

Call the Emergency Animal Disease Hotline (1800 675 888) to report the suspected EAD. Government duty veterinarians monitor the hotline and are available to advise you 24 hours a day, 7 days a week.

Alternatively, notify a state or territory government veterinary officer of the suspected EAD directly.

Leaving messages is inadequate. Avoid relying on other people to make the notification.

If you are unable to make a telephone call from the affected property, you should disinfect yourself and your vehicle (as thoroughly as possible in the circumstances) and travel to the nearest site where you can make the call. Ensure you do not enter premises with susceptible animals.

What information to include in a report

You will need to include this basic information in the initial telephone notification:

- the types and approximate numbers of animals on the property (including feral animals) and which species are affected
- a brief description of clinical signs of disease and gross lesions observed
- the disease or diseases suspected
- the name of the owner and/or farm manager
- the full address and telephone number for the property
- the date when the disease was first noticed, approximate numbers of sick and dead animals
- whether any susceptible animals have recently left or been brought onto the property.

This information allows animal health authorities to make the initial disease control and epidemiological tracing to begin.

You should remain on the property until a government veterinary officer arrives unless otherwise advised. Use this time to implement biosecurity measures to prevent further spread of infection, gather a comprehensive clinical history and epidemiological data on the outbreak from the livestock owner or workers.

Who should take samples and conduct a disease investigation?

Although this book provides general guidance, you should seek advice before sampling and conducting a disease investigation.

This is the decision of the state or territory Chief Veterinary Officer (CVO) or their delegate. It will depend on the circumstances. For example, in cases where there is a high suspicion of an EAD, the CVO would be expected to send a diagnostic team to investigate the outbreak and collect diagnostic samples.

This will ensure that risks to human and animal health of highly infectious diseases are managed appropriately, and investigations are undertaken effectively.
CHAPTER 1.2
Safety, personal protection and containment of infection

Biosecurity for personal protection and infection containment

When you suspect an EAD, you need to use routine biosecurity procedures to:

- **contain infection** to prevent the spread of infectious animal diseases between groups of animals on the property and to animals on other properties
- **prevent exposure** of veterinarians and other people (including clients, clinic staff, couriers and laboratory staff) to potential zoonotic agents. Each state and territory identifies the prevention of exposure in occupational health and safety legal requirements.

Containment of infection

Containing the infection is of prime concern and you should gain the property owner’s cooperation to:

- secure potentially-infected animals in well-fenced paddocks, yards, buildings, pens or cages, and prevent contact with unaffected herds or flocks of animals
- confine animals as well as potentially-infected livestock products and fomites to the property
- move livestock away from farm borders, particularly in the case of suspected diseases for which the causal organism can be airborne over considerable distances (e.g. foot-and-mouth disease)
- avoid actions that would encourage the dispersal of feral animals from the property
- dissuade people who have had recent contact with livestock from leaving the property
- discourage unnecessary visitors from entering the property.

Advise any persons on the property to contact a government veterinary officer for instructions on personal disinfection (for containment purposes) before leaving the property.

Investigating a suspected zoonosis

Several animal diseases have serious public health implications. Examples are Hendra virus infection, rabies and Rift Valley fever. In investigating such diseases, you may need extra precautions to prevent infection of personnel by ingestion, inhalation of infected aerosols, or contamination of mucous membranes or abraded skin.

You may need to wear face masks, eye protection and standard protective clothing depending on the suspected disease. This is discussed in the appropriate chapter on each disease.

Adequate restraint and safe handling of live animals and carcasses is of critical importance, especially where diseases such as rabies are suspected as animals may become aggressive or unpredictable. In addition, when investigating a suspected zoonosis, personal hygiene and disinfection, as well as decontamination of post-mortem sites, must be of the highest standard.

Advise the client, the farm owner or manager and in-contact family members, farm employees and visitors of the steps they need to take to avoid infection. This should include advice on the safety of consumption of farm products.
CHAPTER 1.3

General principles of disease investigation

The material in this section only provides general information on conducting a disease investigation. Seek advice from government veterinary services when you suspect an EAD.

A routine process for disease investigation involves assembling evidence and should include (click on the links for relevant sections):

- implementing biosecurity procedures
- taking a thorough history
- determining a case definition for the health problem
- conducting overall clinical assessment of various groups or classes of animals
- performing a thorough clinical examination of affected individual animals
- performing a thorough post-mortem examination(s)
- submitting laboratory samples to help make or confirm a diagnosis
- following up disease events to monitor progress.

Routine disease investigation biosecurity procedures

Routine disease investigation biosecurity procedures include:

- pre-visit preparation
- entry and exit procedures (which include hygiene practices and the use of personal protective equipment)
- safe transport of diagnostic specimens
- follow-up.

Pre-visit preparation

Equip your vehicle with (in easily accessible containers with fitted lids):

- personal protective equipment
- extra clothing (boots and overalls)
- cleaning (disinfection and decontamination) gear (including plastic bags)
- equipment for restraint and humane destruction of animals
- post-mortem instruments
- instruments, containers and media for collection and transport of diagnostic specimens
- telephone numbers and stationery.

The level of zoonotic disease risk and disease transmission risk presented by different animal disease investigation situations varies considerably. Therefore, it is fitting that you take a risk-based approach to manage the likelihood and consequences of either exposure to potential zoonotic infectious agents or the spread of infectious agents between sites.
Ensure risk management is commensurate to the level of risk posed. Veterinarians should:

- use the minimum standard of personal protective equipment and biosecurity practices for any disease investigation
- use an enhanced level of personal protective equipment and biosecurity practices where there is greater risk, such as when
  - exposure to a zoonotic pathogen during a disease investigation is plausible
  - the situation suggests that the disease agent may be highly transferable via fomites
- use the highest level of personal protective equipment and biosecurity practices when the risk is highest, that is, potentially life-threatening zoonoses are involved. Examples would be suspected cases of Hendra virus infection, Australian bat lyssavirus infection or highly pathogenic avian influenza. Veterinarians need to keep abreast of the current guidelines and procedures for handling such cases.

It is suggested that veterinarians use a checklist (see an example in Appendix B) of equipment for disease investigation. Veterinary vehicles should carry supplies for both high- and low-risk activities.

**Entry and exit procedures**

In line with the principles of the perceived level of risk, practitioners should determine for each visit what entry and exit procedures are required.

**Low biosecurity risk sites**

For routine, low biosecurity risk site visits, standard procedures might include:

- wearing clean overalls (regular or disposable)
- wearing new, clean boots and/or washing footwear before entry
- using clean instruments and equipment (in clean containers)
- wearing gloves prior to handling animals or carcasses
- wearing coverall clothing and protective footwear
- maintaining hygienic processes when handling biological samples
- safely packing biological samples
- removing, bagging and disposing of used gloves, disposable overalls and other wastes before exiting the property
- cleaning instruments in soapy water
- cleaning boots thoroughly (grooves in the soles and the outside) prior to exiting the property
- removing and bagging any dirty garments (such as overalls) prior to exiting the property
- washing hands prior to exiting the property
- cleaning and disinfecting clothes and equipment, replacing materials and disposing of contaminated waste in a biosecure way.
**Higher biosecurity risk sites**

For higher risk visits where there is a greater suspicion of (or likelihood of) disease spread, veterinarians should follow more thorough entry and exit procedures, and adopt more stringent personal hygiene and PPE measures. It is the practitioner’s responsibility to align these to disease specific procedures and the situation presented.

It is useful to have these processes detailed in clinic standard operating procedures that are carried in the vehicle. Ensure the equipment needed to follow these steps is packed in the vehicle at all times, as you will not always receive warning of when you will require them. Figure 1.3.1 is a diagrammatic representation of a proposed entry and exit decontamination site suitable for higher risk visits.

**FIGURE 1.3.1 Diagram of suitable entry and exit decontamination site**

When attending cases where the zoonotic and/or infectious risk has been assessed as high, veterinarians must wear full personal protective equipment during clinical examination and post-mortem examination. This may include the use of P2 or P3 masks, eye protection, double disposable gloves and involve strict protocols.

This includes situations where there is a suspicion of a significant zoonotic agent (e.g. Hendra virus infection, highly pathogenic avian influenza, anthrax, rabies lyssavirus infection, bat lyssavirus infection, Rift Valley fever, Nipah virus infection and transmissible spongiform encephalopathies).

When attending sites with a **high** biosecurity risk, follow a checklist (see Table 1.3.1 for an example) to implement high-level biosecurity protection.
High biosecurity risk site visit checklist

Table 1.3.1 and Table 1.3.2 provide checklists for biosecurity entry and exit procedures.

**TABLE 1.3.1 Checklist for biosecurity entry procedures**

Park your vehicle at a distance from livestock handling areas to minimise the possibility that your vehicle will become contaminated.

Leave your watch and all jewellery items in the vehicle.

Retrieve all items required for the disease investigation from the car so you do not have to return.

Identify clean, dirty and transition zones between your vehicle and the livestock handling area (Figure 1.3.1).

Set up decontamination equipment in the transition zone and lay out a ground sheet.

In the transition zone, place:
- a bucket of disinfectant for a footbath
- a second bucket or spray bottle of disinfectant
- scrubbing brush
- two plastic bags with ties for waste.

In the clean zone, place:
- a bucket or spray bottle of disinfectant
- two plastic bags with ties for personal protective equipment disposal.

Put on personal protective equipment while in clean zone, being sure to:
- wash hands with soap and dry
- put on impermeable overalls with legs outside boots
- put on a respirator (if required) and check the fit
- put on eye protection, ensuring it fits snugly over respirator
- put on two pairs of gloves (double gloved) with the outer pair fitting snugly over overall sleeves
- secure the outer glove onto the sleeves of impermeable overalls with tape over gloves onto sleeves.

The outer packing of specimen transport containers should not be taken into the dirty zone.

Enter the dirty zone. While on the property, select suitable areas for ante-mortem and post-mortem examination of animals. Conduct examination, sampling or post-mortem, and:
- double bag samples
- wipe each packing layer with disinfectant.
TABLE 1.3.2 Biosecurity exit procedures

At the completion of examinations (clinical or post-mortem) and collection of diagnostic specimens:

- make arrangements for the safe disposal of carcasses
- make arrangements to dispose any contaminated objects that are no longer required. These materials may be left on site for subsequent destruction if they cannot be moved safely
- clean the ground or other surfaces (including instruments) contaminated by blood, excretions or tissues as thoroughly as possible and disinfect.

While still in the **dirty zone**: remove gross contamination and use a hose or tub of water and soap/detergent to clean boots, overalls, gloves and instruments/equipment

- immerse instruments/equipment in an appropriate concentration of disinfectant solution for at least 10 minutes (or leave behind for subsequent disinfection by a specialised team).

Return to the **transition zone** and:

- put waste in a plastic bag, disinfect it, put it in a second bag and disinfect again, then place in clean zone
- disinfect boots and wash or spray hands, equipment and samples with appropriate disinfectant
- wash hands, face and other exposed skin surfaces with soap and water. Your nose should be blown several times into disposable tissues.

Once in the **clean zone**:

- remove outer gloves and wash or spray inner gloves with disinfectant
- remove overalls and boots, remove eye protection, then remove respirator once any dust has settled
- put personal protective equipment in a plastic bag
- remove inner gloves, put in plastic bag with other personal protective equipment and close securely
- disinfect plastic bag then put in second plastic bag and disinfect again
- wash hands with soap and dry hands thoroughly.

### Assembling the evidence for diagnosis

#### Taking a case history

Taking a careful history of the events that have occurred, formulating a case definition to clarify precisely what is being investigated, and doing some basic epidemiology are important components of a disease investigation.

Taking a history requires the collection of accurate, quality information. Preparing a standard history collection template can help with gathering evidence (see an example in Appendix A).
Clinical investigation

Several specific guidelines for veterinarians performing clinical livestock disease investigations are to:

- use personal protective equipment appropriate to the situation
- begin investigation with the least affected groups of animals
- clinically examine representative numbers of clinically affected and unaffected animals
- determine a working case definition
- take samples from an the appropriate number of animals for laboratory testing, based on advice from government veterinary officers
- consider taking samples from affected and unaffected animals where pertinent
- take an appropriate range of samples
- always take body temperatures (remember that pyrexia is a key finding in many EADs)
- ensure the proper restraint of animals, which is necessary both for personal safety and to ensure that a comprehensive examination of individuals can be done.

Selection of animals for clinical examination

It is important to select animals that are fully representative of the disease syndrome in the affected herd or flock. Where possible:

- collect diagnostic samples from several animals
- collect samples from animals early in the clinical course (not only are the causal organisms usually found in greatest concentration in tissues at this time, but secondary infections, which may mask the underlying cause, are less likely to be present)
- collect specimens from animals that are freshly dead (most viruses and bacteria are quickly inactivated after the death of the host as autolysis of tissues occurs, particularly in hot weather) or slaughter sick animals for the purpose.

In some cases it may be desirable to deliver live sick animals to the laboratory (e.g. poultry). However, this must only be done after advice from the government veterinary officer and/or laboratory, who will take into account the microbiological security of such action and the physical security of the animals while being transported.

Case definitions

You can develop a working case definition following the history taking process and clinical examination. The benefit of having a case definition is that it helps to define whether there is a single disease or multiple problems occurring at the same time.

A case definition may need to be flexible to prevent excluding cases that are related, and can be altered over time if more information comes to light. This is helpful in providing clarity in determining the nature of unfolding disease events.
Basic epidemiological analysis

A distribution map, which shows the location and distribution of the livestock affected on a property (in relation to the location of all the livestock), plus paddocks and water bodies, may help suggest a possible cause of the problem. This may be hand drawn.

In addition, it is good practice in field investigations for veterinarians to use basic epidemiological measurements to determine fundamental event descriptors such as prevalence, incidence and mortality rates.

**Prevalence** is the proportion of a population affected by a disease at a given point in time. The prevalence is the number of affected animals divided by the total number of animals at risk.

**Incidence** is a measure of new cases of disease in a population within a defined time period. The cumulative incidence is the number of animals developing disease over the period in question divided by the number of non-diseased animals at the start of the period.

**Mortality** is the number of dead animals divided by the total number of animals in the population at the start of the period.

Other factors may also influence the expression of disease, including species, age, sex, reproductive status or other management activities. Comparing the prevalence, incidence or mortality in particular classes of animals can indicate factors associated with expression of disease.

It may also be useful to draw a timeline which shows the number of cases occurring over time and events considered potentially related to the problem. Similarly, a plotted graph of number of cases over time (an epidemic curve) is useful to visualise the timeframe of the outbreak or disease event. The pattern of the graph can indicate whether cases have the appearance of a ‘point source’ problem (such as a single access to a toxin) or a ‘propagating epidemic’ (indicating a possible infectious disease occurrence).

Post-mortem examination

Undertake post-mortems only where it is safe to do so. You should not conduct post-mortems for sudden death of livestock in the field due to the possibility of anthrax.

Post-mortem examinations should be carried out in a systematic way to ensure nothing is missed. This routine approach also leads to the most efficient use of time.

In conducting post-mortems, personal safety is paramount—both from the risk of exposure to animal pathogens and the physical risks involved with using sharp equipment. Post-mortems are sometimes carried out in less than ideal situations and under time pressures. However, it is essential for veterinarians to ensure their personal safety and follow standard procedures to reduce the risk of accidents.
There are many detailed guides on post-mortem procedures. In general, it is important for veterinarians to:

- have a standardised procedure that you follow routinely. It is important not to deviate based on initial findings or a narrow differential diagnosis list
- work safely for the benefit of themselves and others nearby
- examine all organs and tissue systems in a systematic way, even if lesions appear to be confined to one system
- record gross lesions in a report to give the reader a clear understanding of the lesions seen. Consider using a waterproof camera to record lesions that can be disinfected following the post-mortem
- collect a comprehensive range of diagnostic specimens for consideration in the differential diagnosis
- maintain and use sharp equipment
- have all equipment available in an organised way
- have a pre-arranged sample collection system (i.e. mark containers clearly (and ideally pre-label them)
- place samples into appropriate collection containers
- have and use a routine to maintain cleanliness
- conduct more than one post-mortem
- where possible, post-mortem freshly dead animals and consider sacrificing sick animals (since only limited information can be obtained from decomposed carcasses)
- dispose of carcasses appropriately.

**Samples for laboratory diagnosis**

In the routine investigation of endemic diseases field diagnosis based on clinical, pathological and epidemiological evidence are adequate on many occasions. However, when faced with an outbreak of an unusual disease, possibly an EAD, it is crucial that an accurate confirmatory laboratory diagnosis is obtained as rapidly as possible. Failure to do so may compromise the success of any attempted eradication campaign.

Collecting and submitting a variety of samples allows for open-ended testing and increases the likelihood of accurate diagnosis. Multiple fixed tissues and sera allow for non-specific testing, and veterinary laboratories can hold extra samples pending the initial testing results. You should contact the veterinary laboratories you use for their specific requirements and guidelines. Some diseases (e.g. bovine spongiform encephalopathy and scrapie) require specific samples. Details of special requirements are provided in the appropriate disease chapter in this guide. Later chapters will describe specific samples to submit by syndrome; however, a general description of samples to collect is shown below in Table 1.3.3.
### TABLE 1.3.3 Sampling guide (base sample set)

<table>
<thead>
<tr>
<th>Sample type</th>
<th>Examples of samples to take</th>
<th>Storage/transport conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ante-mortem samples</td>
<td>blood samples:</td>
<td></td>
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<tr>
<td></td>
<td>• EDTA 10 ml</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Plain 10 ml</td>
<td></td>
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<tr>
<td></td>
<td>swab(^2), e.g. oral, nasal, rectal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>blood samples:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• mix with anticoagulant and chill</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• do not freeze</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• draw off serum for prolonged transport (put serum in plain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>blood tube)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sterile swab in PBGS</td>
<td></td>
</tr>
<tr>
<td>Fresh tissue</td>
<td>tissue samples(^3) from organs relevant to clinical signs/gross</td>
<td></td>
</tr>
<tr>
<td>(in separate individual sterile</td>
<td>necropsy findings, as well as:</td>
<td></td>
</tr>
<tr>
<td>containers)</td>
<td>• brain (swab, small section)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• liver</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• lung</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• kidney</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• spleen</td>
<td></td>
</tr>
<tr>
<td></td>
<td>fresh samples:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• chill or refrigerate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• do not freeze</td>
<td></td>
</tr>
<tr>
<td>Fixed samples</td>
<td>tissues from lesions and representative samples from each organ</td>
<td></td>
</tr>
<tr>
<td>(pooled in formalin – 10:1 formalin: tissue)</td>
<td>system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>fixed tissues:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• keep at room temperature</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• can be pooled</td>
<td></td>
</tr>
</tbody>
</table>

1 Samples from at least 10 animals is recommended.
2 Ensure the swab fully absorbs sample fluid.
3 Samples from at least five animals are recommended.
Labelling of samples

Note that:

- each specimen container should be clearly labelled with the property and animal identification, date of collection and the tissue enclosed
- waterproof labels/labelling used should stay attached and writing remain legible if the outside of the containers become wet.

Documentation to accompany samples

When you are outside of the infected area complete the relevant state laboratory submission form/specimen advice note. This specimen advice note is included inside the outer packaging (see section on sample packaging).

The specimen advice note should include:

**Location and contact information**
- owner’s name and address of property, with appropriate contact information
- name, address and contact information of the sender.

**Case information**
- disease agents suspected and tests requested
- species, breed, sex, age and identity of the animals sampled
- date when samples were collected and submitted
- list and type of samples submitted with transport media used
- case history, including
  - list of animals examined and findings
  - clinical signs and their duration
  - length of time the sick animals have been on the premise and, if recent arrivals, where they originated from
  - date of first case and subsequent cases.

**Epidemiological information**
- a description of the spread of infection in the herd or flock, for example, the number of sick or dead animals/number of exposed animals
- different species on the property and numbers of each
- type and standard of animal husbandry on the property, including the type of feed available, biosecurity measures and other relevant factors potentially associated with the occurrence of cases
- history of foreign travel by owner or of introduction of animals from other countries or regions
- any medication given to the animals, and when given
- vaccination history describing the type of vaccines used and dates of application
- other observations about the disease, husbandry practices and other disease conditions present.
Sample packaging

Package and transport all biological materials in accordance with local, national and international regulations. The minimum requirements for transporting specimens follow the principle of triple packaging, which consists of three layers—a primary receptacle (such as a blood tube or specimen container), secondary packaging (for example a plastic container), and an outer packaging.

In addition:

• a primary container is packed into the secondary container on the infected property, along with absorbent material
• the secondary container must have its surface disinfected and be removed from the infected area prior to packaging in the outer transport container
• label the outer packaging with the name, address and 24-hour telephone number of the sender, the delivery address, orientation labels and any other relevant regulatory requirements
• contact government veterinary laboratories regarding supplies of suitable packing containers
• store suitable gel packs (‘cold bricks’) frozen at –20°C, ready for use
• use dry ice if the journey is expected to take several days. Seal the sample containers to ensure that CO₂ does not reach the samples, which could affect sample pH
• seek advice from the appropriate government veterinary authority when carcasses or other specimens to be submitted are too large to be packed into a specimen transport container.

Transport of laboratory samples

Australia has strict regulations governing the road, rail and air shipment of clinical material and specimens. Specimens that are incorrectly packaged and labelled can be refused for transport or laboratory processing, and may put the safety of those receiving the specimens at unnecessary risk. For example leaking containers, blood in syringes, with or without needles, are unacceptable.

Veterinarians and clinic staff must ensure that packages containing biological material meet the requirements outlined in the current Australian Code for the Transport of Dangerous Goods by Road or Rail. It is recommended that commercial packaging and printed labels be used.

Consignments of specimens suspected of containing pathogens are considered to be dangerous goods (infectious substances). A person holding a current certification for dangerous goods must pack dangerous goods consignments for air transport. Mark the appropriate shipping name and number for the dangerous goods on the package. In most cases this will be UN 2900 (infectious substances, affecting animals only, in solid or liquid form) or UN 2814 (infectious substances, affecting humans, in solid or liquid form) or air or by post transport. In either case, the actual name of the infectious agent (known or suspected) should be added in parentheses. Complete two copies of the shipper’s Declaration/or Dangerous Goods form for transport by air or by post. These must accompany the package, in the plastic envelope for shipping documents, attached on the side of the box.

The Animal Health Committee has developed protocols for the submission of likely EAD specimens to the CSIRO Australian Animal Health Laboratory (CSIRO AAHL). These are contained in the AUSVETPLAN management manual Laboratory Preparedness.
Follow-up

An important disease investigation principle is to follow-up with owners to determine if there are any ongoing concerns. Follow-up allows veterinarians to see if the situation has escalated or otherwise changed. You should not only rely on owners keeping you up to date with the clinical progression of the incident. Rather, actively make contact to monitor the situation, as this is a proactive way to ensure that an escalating situation does not go unnoticed. It can be beneficial to routinely schedule follow-up calls to producers after you have made livestock disease visits.
SECTION 2
GUIDE TO INVESTIGATION OF DISEASE SYNDROMES