

AUSTRALIAN VETERINARY EMERGENCY PLAN

AUSVETPLAN

1996

Operational Procedures Manual

Destruction

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

Agriculture and Resource Management Council of Australia and New Zealand

This Operational Procedures 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:

There are occasional minor differences in the page breaks between the paper and this electronic version which we can unfortunately not avoid.

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ISBN 0 642 24506 1

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PREFACE

This **Operational Procedures Manual** for the **destruction of animals** is an integral part of the **Australian Veterinary Emergency Plan**, or AUSVETPLAN (Edition 2.0). AUSVETPLAN structures and functions are described in the **Summary Document**.

This manual sets out the disease control procedures which were approved in February 1991 by the then Australian Agricultural Council, out-of-session at meeting 135, for use in an animal health emergency in Australia. It has been upgraded and approved by the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) out-of-session in January 1996.

Technical information and policies for individual diseases is provided in the AUSVETPLAN **Disease Strategies**. The **Management Manuals** and other **Operational Procedures Manuals** provide information on the field implementation of strategies. Cross-references to strategies, manuals and other AUSVETPLAN documents are expressed in the form:

Document Name, Section no.

For example, **Decontamination Manual, Section 3**.

In addition the following important documents have been the source of some of the information in this manual:

- Queensland Department of Primary Industries' Firearms Training Manual (1989); and
- Queensland Department of Primary Industries' Brucellosis and Tuberculosis Eradication Campaign Destocking Manual (1990).

The manual will be reviewed regularly. Suggestions and recommendations for amendments should be forwarded to:

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

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1 INTRODUCTION

If an exotic disease outbreak occurs, it may be necessary to destroy a large number of animals. It is essential that these animals are speedily and humanely slaughtered and are indeed dead before disposal of carcasses commences. Speed is of the essence once the disease has been confirmed because, in most situations, the live animals will continue to produce and possibly disseminate the exotic pathogen. An experienced veterinarian should be present during destruction. There is likely to be considerable media interest, at least initially, in the destruction of animals. Positive media coverage concerning animal welfare will reflect favourably on staff and increase community support for the eradication campaign.

The destruction of large animals poses perhaps the biggest concern in this regard. They may have to be destroyed individually with firearms, captive-bolt pistols, or other means in full public view.

Officers-in-charge (OIC) must be aware of the impact that animal destruction will have on all people involved. They must quickly acquaint themselves with the skills and experience of all assistants and brief and train them accordingly. Further they must be aware that some people will be unable to handle the mentally and physically stressful environment likely to be encountered.

The livestock owner and his or her family may be present during the slaughter process and may experience considerable distress. Counselling and welfare will be available through the welfare liaison officer in the local disease control centre (LDCC). The officer-in-charge (site supervisor) of the infected premises operation team (IPOT) should ensure that those in need receive help (see the **Control Centres Management Manual, Part 1**).

2 ORGANISATION OF DESTRUCTION

2.1 Action plan

Planning is essential to ensure the destruction task is carried out efficiently and is not impeded by lack of resources. An action plan should be drawn up in consultation with the owner or his/her agent and other departmental officers. The following procedures should be followed.

- Consult with the IPOT site supervisor and property owner/manager to establish:
 - property layout, facilities and equipment;
 - the number, species and location of animals to be destroyed;
 - the destruction technique to be used; and
 - the time-frame for commencement and completion of animal destruction.
- Advise the IPOT site supervisor of immediate resources needed to move and secure animals to prepare for their destruction.
- When practicable (and applicable), move animals to the centre of the infected premises (IP) or to areas most remote from other susceptible animals including wild animals.
- Ensure that animals not to be destroyed, including domestic pets, are confined.
- Consult with the OIC of the disposal team, determine the disposal method and site to be used and, if necessary, identify centrally located carcass disposal sites as close as practicable to the site of destruction.
- Decide on the appropriate methods and facilities needed for the safe, humane and efficient destruction of the animals.
- Provide the IPOT site supervisor with a concise written plan for approval, including:
 - destruction method(s) (see Section 3);
 - destruction site(s) (see Section 5);
 - order of destruction (see Section 6);
 - personnel required; and
 - facilities and equipment needed.

Details of the destruction operation should be included on a diagram of the IP or dangerous contact premises (DCP).

- Confirm that the IPOT site supervisor possesses a complete inventory of all animals to be destroyed on the property. Destruction should not be delayed because there has been no agreement on valuation. However, where possible, all animals should be valued before destruction.
- When there is a delay in reaching agreement on valuation with the owner or his/her agent, authority to destroy should be sought from the LDCC controller (see the **Valuation and Compensation Manual, Section 2.10**).
- Brief the destruction teams, then supervise and coordinate their activities. Ensure that:
 - if possible, destruction takes place away from public view;
 - destruction facilities, methods and working conditions are consistent with personal safety;

- destruction is humane and that no animal is removed for disposal until it is dead;
- destruction teams receive adequate rest and meal breaks.
- Make every effort to avoid damage to property. Any damage that does occur must be drawn to the attention of the owner/manager, recorded and reported promptly to the IPOT site supervisor.
- Check all destruction against the authorised inventory to ensure that all variations are accounted for (eg births and natural deaths) and that all susceptible animals scheduled to be destroyed on that day have in fact been destroyed.
- Provide the IPOT site supervisor with a situation report at the end of each day using ANEMIS DAILY SITUATION (REPORT) — SLAUGHTER .
- Advise the IPOT site supervisor of resource requirements for the next 48 hours.
- Advise the IPOT site supervisor immediately destruction has been completed so that other tasks, eg disinfection, can be started without delay. Carcasses and the destruction area should be oversprayed with disinfectant immediately following destruction.

2.2 Selection of destruction site

The factors that need to be considered in selecting a destruction site are:

- facilities available on site;
- additional facilities and equipment required;
- animal security;
- proximity and ease of access to disposal site;
- safety to personnel;
- acceptability to the owner/manager;
- likelihood of damage to property and services; and
- protection from public view.

2.3 Order of destruction

The order of destruction will be determined after consultation with the LDCC. Normally the order will be:

- affected animals;
- their direct contacts; and
- other susceptible animals in descending order of epidemiological importance.

In foot-and-mouth disease, pigs should be destroyed before other species.

Within these groups fractious and potentially dangerous animals, eg bulls, sows with litters, and boars, should be destroyed first.

3 METHODS OF DESTRUCTION

Methods of destruction of animals are listed below. Rabid or suspect rabid animals should be shot in the heart with a firearm to preserve the brain, which is the best diagnostic specimen, and to avoid contamination of personnel with potentially infective brain or saliva. Animals with bovine spongiform encephalopathy (BSE) or scrapie should also not be shot through the head as brain tissue is required for diagnostic testing.

3.1 Firearms (rifles and guns)

Firearm licensing requirements, which vary substantially from State to State, must be complied with. Generally only licensed operators may use rifles and guns (which may require registration in the relevant State).

Part of the preparation process for an exotic disease outbreak is to ensure licensed firearms operators experienced in shooting livestock can be contacted at short notice. The following aspects of firearms safety should be considered.

- All firearms are potentially hazardous.
- When shooting at short range in stockyards use relatively low velocity hollow/soft point ammunition should be used. Solid point ammunition should be avoided because these solid projectiles can penetrate the skull and leave the target at high velocity. This can be dangerous to personnel in the area. Also, hollow point ammunition disintegrates when entering the target, thus more effectively destroying brain tissue (for details see relevant species in Section 4). When paddock shooting use high velocity, preferably hollow/soft point, ammunition.
- Persons other than the shooters and assistants should be cleared from the area or should stand well *behind* the shooters. The line of fire must be chosen to prevent accidents or injury from stray bullets or ricochets.
- To provide maximum impact and the least possibility of misdirection the range should be as short as circumstances permit.
- Whilst the humane killer pistol and captive-bolt pistol are designed to be pressed firmly on the head before being discharged, it is not safe to do this with a standard rifle or pistol.
- Always notify police before using firearms near populated areas.

The *advantages* of using firearms are:

- clean kill in the hands of experienced operators;
- handling individual animals is not necessary;
- can be used to destroy animals from a distance;
- both firearms and ammunition are readily available; and
- many people are proficient in their use;

The *disadvantages* of using firearms are:

- they are potentially dangerous; and
- unsuitable for use close to populated areas.

3.2 Captive-bolt pistols

Captive-bolt pistols are an acceptable alternative to firearms where animals are sufficiently restrained.

Blank cartridges for the captive-bolt pistol are colour coded according to the amount of charge they contain. It is essential that manufacturers' recommendations should be followed on the most appropriate blank cartridges for different farm animals. The most widely used is the 'Cash Special' a single shot .22 calibre captive bolt similar to a revolver. It uses three different loads:

PINK - 1¼ grains (weaners etc)

PURPLE - 2¼ grains (sheep)

GREEN - 3 grains (cattle, boars etc)

Regular maintenance of the captive-bolt pistol is essential for efficient stunning.

When using captive-bolts, more than one operator can work in the same area with safety. Spare weapons and parts should be on hand.

The *advantages* of captive-bolt pistols are:

- operator safety as there is no free projectile;
- both pistols and ammunition are readily obtainable;
- easy to use; and
- operator does not need to be an expert shooter.

The *disadvantages* of captive-bolt pistols are:

- they may only stun larger animals (as a rule-of-thumb, cattle over one-year old, sows, boars, billy goats and rams) which must then be pithed (or bled see Section 3.3) to ensure death;
- some animals have to be individually restrained; and
- they are relatively slow, especially when destroying large numbers of animals.

3.3 Pithing

Pithing is the process of destroying nervous tissue in the region of the brain stem to ensure the death of the animal. It is usually done by inserting a rod through the hole made by the captive-bolt in the head to ensure the death of the animal, or by severing the spinal cord between the atlas and axis, that is, between the first and second bones of the neck.

Pithing *unstunned* animals is not an acceptable method of destruction as it is inhumane. It is essential on animals that have been stunned only, eg when captive-bolts are used on larger animals (see Section 3.2).

Pithing is also a safety measure to prevent workers being struck by the involuntary movements of a stunned animal.

Pithing is preferable to exsanguination (bleeding out) which could release infectious material and make working conditions slippery and dangerous.

3.4 Other physical methods

3.4.1 Dislocation of the neck

This may be suitable for poultry and smaller laboratory animals. Suitable methods are by burdizzo, bone cutters, secateurs or manually. Burdizzos are particularly useful when large numbers of poultry with strong necks (geese, ducks etc) are to be destroyed.

3.4.2 Electrocutation

Electrocutation is used widely in abattoirs but its application to field use is not available at present.

3.4.3 Decompression

This method is now regarded as unacceptable.

3.4.4 Exsanguination

Exsanguination, combined with neck dislocation, of sheep and goats is a humane method of destruction when performed by an experienced operator. However it is undesirable because of the release of infectious material and the destruction site becomes slippery making working conditions dangerous.

3.5 Gaseous agents

3.5.1 Carbon dioxide

Carbon dioxide is the method of choice for destroying most poultry species, when large numbers are involved, and for many laboratory animal species.

Animals must be exposed to an atmosphere of at least 30% carbon dioxide to ensure loss of consciousness and then at least 70% carbon dioxide to kill the animal.

To achieve this, animals may be placed in an air-filled container and then carbon dioxide is allowed to flow into it so that the concentration rises to at least 70%. This level must be maintained for at least 3 minutes. An optimum flow rate is one that will displace 20% of the chamber volume per minute. Animals may be left in the container until rigor mortis ensues or they may be removed once unconscious and killed by cervical dislocation or exsanguination (if appropriate). Up to 20 minutes exposure may be necessary to ensure death and this will be even longer in neonatal or juvenile animals, which are tolerant of carbon dioxide. They may require 30 minutes exposure or longer.

Alternatively, the container may be prefilled with the carbon dioxide/air mixture before animals are placed into it, in which case anaesthesia is said to occur more rapidly (20 seconds to unconsciousness compared to 70 seconds). However some workers have suggested that the latter technique is more stressful.

If cylinders of carbon dioxide are not available, dry ice may be used. This is placed in the bottom of a deep container under a gauze floor, such that there is not direct contact with the dry ice. Animals are then placed into the container, and left there until unconsciousness or death ensues as before.

The use of a carbon dioxide/oxygen mixture (70/30) is said to decrease the discomfort of hypoxia before the onset of anaesthesia and narcosis. However this will complicate the procedures by requiring additional cylinders of oxygen and reducing valves.

Carbon dioxide is safe and easy to use as long as it is used in a well ventilated area.

3.5.2 Gaseous anaesthetic agents

These agents, which are Schedule 4 drugs (see Glossary) and include halothane, enflurane and isoflurane, can be used to produce anaesthesia and death. Halothane at concentrations greater than 4% can produce anaesthesia and cardiac arrest in 90 seconds. These agents can be used in exactly the same way as carbon dioxide, that is, piped into a container with a carrier gas such as oxygen, or poured onto cotton wool and placed under gauze at the bottom of a deep container. Again there should be no direct contact between the animal and the anaesthetic in the liquid form.

The major disadvantages are that these agents are expensive and should only be used in a well ventilated room or preferably in a fume cupboard, as prolonged exposure, even at low concentrations may be detrimental to the health of personnel. As with carbon dioxide, animals may be left in the anaesthetic chamber until dead or may be removed once unconscious and killed by one of the physical methods or even by injection of an overdose of barbiturate as detailed below.

Ether is not recommended. Induction of anaesthesia is slow and stressful as the high concentrations of the vapour necessary to produce unconsciousness are irritant to skin and mucous membranes. Ether is also hazardous to personnel due to its explosive properties both during use and when disposing of carcasses after death.

3.5.3 Hydrogen cyanide gas

Hydrogen cyanide gas is a highly effective method of destroying poultry, however human safety considerations restrict its use. It should only be used by experienced commercial operators after permission to use it has been granted by the State/Territory disease control headquarters (SDCHQ).

3.5.4 Carbon monoxide

Carbon monoxide can be used to destroy poultry. It is readily available from car exhaust but unleaded petrol vehicles produce less than super petrol and the fumes must be cooled. Human safety considerations restrict its use.

3.5.5 Methyl bromide

Methyl bromide is similarly effective at killing poultry but operator safety requirements restrict its use also. There are people trained in its use in all agriculture departments. It is also virucidal. Environmental concerns are now restricting its use.

3.6 Injectable agents

An overdose of any of the barbiturates can be used for euthanasia, ideally by the intravenous route in large animals but the intracardiac or intraperitoneal route may be preferable in smaller animals. Destruction of cats, rabbits and some birds by intraperitoneal sodium pentobarbitone may be accompanied by an excitement phase.

Animals should be confined and handled with extreme care. Specific euthanasia solutions are available (sodium pentobarbitone 325 mg/kg). This should not be used by the intrathoracic, subcutaneous or intramuscular route as at this concentration it is extremely irritant to tissues. Pentobarbitone at the normal concentrations used for anaesthesia may also be used but obviously larger volumes will be required.

If the animals are excitable or vicious, other drugs can be administered to chemically restrain them. These drugs such as tranquillisers, analgesics or other depressants like ketamine or xylazine, can be given by the subcutaneous or intramuscular route. An overdose of barbiturate can then be given intravenously to kill the animal.

These agents are restricted by law and must only be used by a veterinarian or under veterinary supervision.

3.7 Oral agents

An oral agent may be the most appropriate means for destruction of the population of large piggeries and feedlots. See the **Wild Animal Control Manual, in press**.

4 DESTRUCTION OF VARIOUS SPECIES

The preferred methods of destruction of various domestic species and the factors that determine the selection are presented below. The preferred methods of destruction of various wild animals are listed in the **Wild Animal Control Manual, in press** .

The distinction between wild and domestic animals may be unclear in some extensive situations.

4.1 Cattle and buffalo

Under most circumstances cattle and buffalo will be mustered into yards and shot using firearms. In extensive areas where 100% musters cannot be achieved, unmustered animals will be paddock shot after first mustering as many as possible.

Captive-bolt pistols are most suitable when animals can be adequately restrained (but see Section 3.2). Injectable agents may be most suitable for small numbers of calves, such as on hobby farms.

4.1.1 Frontal method

The firearm should be directed at the point of intersection of lines taken from the base of each horn (or equivalent position in polled animals), to the opposite eye aiming at the spine (see Figure 1a). For bulls or older animals the bullet should enter about 1 cm to the left or right of this point and hard point/jacketed ammunition may be necessary. Small calves may be shot just behind the nuchal crest (poll) in the mid-line aiming directly at the muzzle (see Figure 2). Alternatively, a captive-bolt pistol using cartridges may be used.

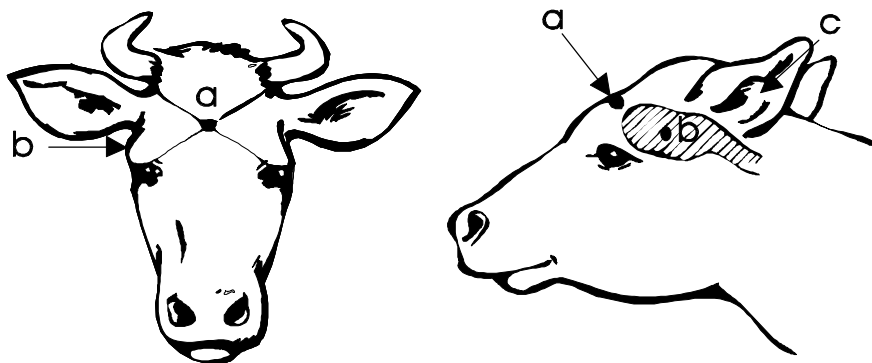


Figure 1 Humane destruction of cattle; (a) recommended position for frontal method (suitable for firearm or captive-bolt pistol); (b) recommended position for temporal method (only suitable for firearms); (c) recommended position for small calves

4.1.2 Temporal method

This is only suitable for firearms. The animal is shot from the side so that the bullet enters the skull midway between the eye and the base of the ear. The bullet should be directed horizontally (Figure 1b).

4.1.3 Shooting in yards

Ideally only personnel who have had previous experience in this type of work should undertake this task. If such personnel are not available, the task may be allocated to police or army marksmen. They should be fully briefed on humanitarian and safety aspects of destruction before commencing yard shooting. Only hollow/soft point ammunition should be used. The minimum calibre should be 0.22 magnum; maximum calibre should be 0.44 magnum (240 grain) or 0.375 (250 grain).

Operate from top rail, preferably in a small yard. It is not practical to shoot in a crush unless dealing with very small numbers and the crush is equipped with a side opening gate in which case a captive-bolt pistol should be considered.

4.1.4 Paddock/extensive area destruction

Shooting from helicopters is usually the most effective method of destroying unmusterable cattle. Civil Aviation Authority approval is needed before rifles may be used from helicopters. Again this should be carried out only by experienced personnel specifically trained and with current proficiency in this type of operation. Untrained personnel should undergo a training course and pass a practical and written test at its conclusion before shooting from a helicopter. Minimum recommended calibre is .308 soft point using military type semiautomatic rifles eg M14, SLR or MIA.

Shots aimed to destroy the brain are preferred, but for practical reasons this is not generally possible with helicopter shooting, in which case heart/lung shots can be used. Further details are contained in Queensland departmental manuals (QDPI 1989, QDPI 1990).

The problem of rapidly destroying large numbers of cattle on intensive feedlots has not been resolved. The possibility of using a lethal oral agent in water or feed should be considered.

4.1.5 Technique for buffalo

As for cattle except:

- hard point/jacketed ammunition is preferable for large animals;
- for small numbers, when use of semi-automatic rifles is not critical, use heavier calibre or magnum rifles;
- frontal shooting — be mindful of angle of impact as buffalo will often elevate their nose.

4.2 Sheep

The preferred method of destruction is by .22 rifles or captive-bolt pistols.

4.2.1 Hornless sheep

The top of the head (centre of upper forehead) is a suitable position with the firearm or captive-bolt being aimed towards the animal's gullet. Alternatively the instrument may be placed just behind the poll and aimed in the direction of the animal's muzzle. Both methods are illustrated in Figure 2.

4.2.2 Horned sheep

If using a captive-bolt, the top of the head position used for hornless sheep may not be suitable, in which case the instrument may be placed behind the poll and aimed in the direction of the animal's muzzle (see Figure 3a). If using a firearm, shoot at a point in the middle of the face just above the level of the eyes whilst aiming towards the spine as shown in Figure 3b.

- *Rams* — it may be easier to use .22 magnum rifle, depending on facilities. If captive-bolt is more practical heavy duty cartridges should be used (see section 3.2).
- *Wethers/ewes* — Sheep must be packed tightly as destruction proceeds. This can be achieved using light portable panels or mesh.
- *Newborn lambs* — should be drafted off and administered sodium pentobarbitone (intraperitoneal 3–5 mL Lethobarb through automatic syringes).



Figure 2 Humane destruction of hornless sheep, recommended positions and direction of fire for captive-bolt pistol or firearm

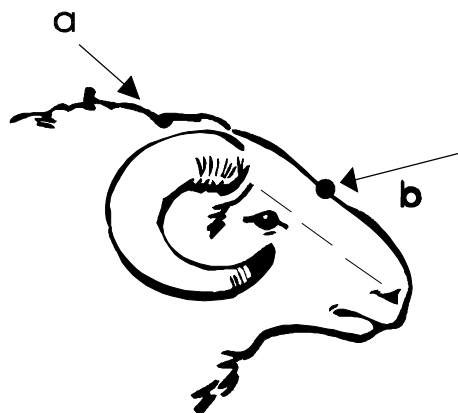


Figure 3 Humane destruction of horned sheep; recommended position and direction of fire for (a) captive-bolt pistol; or (b) firearm

4.3 Pigs

Pigs are particularly difficult to destroy. Captive-bolt pistols should be used for housed pigs to avoid the danger of ricochets. Housed pigs may be moved outside and destroyed using firearms. Sows with litters are particularly fractious and difficult to handle. Pigs in paddocks can be shot using firearms.

Use sodium pentobarbitone on unweaned pigs. Intraperitoneal injections of 3–5 mL Lethobarb using automatic syringes is satisfactory.

4.3.1 Frontal method

The captive-bolt pistol or firearm should be directed at a point about midway across the forehead and (for adult pigs) about 2 cm above the level of the eyes (Figure 4a).

4.3.2 Temporal method

This is only suitable for firearms. The pig is shot from the side so that the bullet enters the skull at a point midway between the eye and the base of the ear. The bullet should be directed horizontally into the skull (Figure 4b). This method is preferred for adult pigs due to the heavier bone structure of the front of the skull.

Feed one-third of the normal ration before commencement of destruction. Pigs will stay calmer and therefore be easier to handle. If slaughter is likely to be delayed, ensure sufficient feed is on hand.

- *Growers* — pack in tight; work round perimeter of yard, then climb in to finish balance of group. Pigs usually quieten as destruction progresses.
- *Sows* — do not yard too tightly as they become upset if jammed and will start climbing on rails; work steadily — do not hurry. Use heavy duty cartridges in captive-bolt pistols (see section 3.2).
- *Boars* — use heavy duty cartridges in captive-bolt (see section 3.2) or, if this is too difficult, use a .22 magnum rifle.
- *Small pigs* — use standard captive-bolt cartridges (see section 3.2). It is preferable to have them caught and held over the rail of the yard while destroyed. A wheelbarrow can then be a useful means of conveying to the front-end loader.

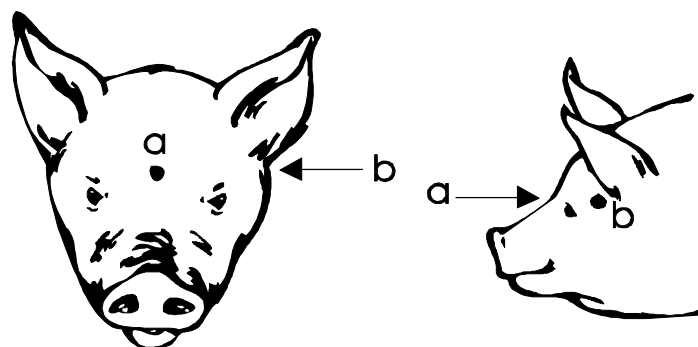


Figure 4 Humane destruction of pigs; recommended position and direction of fire for (a) frontal method (suitable for captive-bolt pistol or firearm); or temporal method (suitable for firearm only)

4.4 Goats

Using either a captive-bolt pistol or firearm, direct the instrument to the skull behind the horns as shown Figure 5. Aim the firearm in line with animal's mouth.

Kids may also be shot from the front as for cattle. However this method is not suitable for mature goats as the brain is located well back in the skull compared to other livestock. Sodium pentobarbitone is also appropriate (as for lambs).

Newborn kids should be drafted off and sodium pentobarbitone administered (intraperitoneal 3–5 mL Lethobarb).



Figure 5 Humane destruction of goats; recommended position and direction of fire (captive-bolt pistol or firearm)

4.5 Horses, donkeys and mules

Animals can be destroyed either by intravenous injections of euthanasing drug or shooting, as detailed below.

4.5.1 Frontal method

The firearm should be directed at the point of intersection of diagonal lines taken from the base of each ear to the opposite eye aiming at the spine (Figure 6a).

4.5.2 Temporal method

The horse is shot from the side so that the bullet enters the skull midway between the eye and the base of the ear (Figure 6b). The bullet should be directed horizontally.

Recommended rifles for horses are 0.22 magnum (hollow point) or 0.44 magnum. Captive-bolt pistols are not recommended for horses because some horses rear before the operator can withdraw the bolt or move out of danger. Horses in the public view can be exsanguinated humanely by severing the abdominal aorta per rectum.

4.5.3 Paddock/extensive area destruction

As for cattle and buffalo (see Section 4.1).

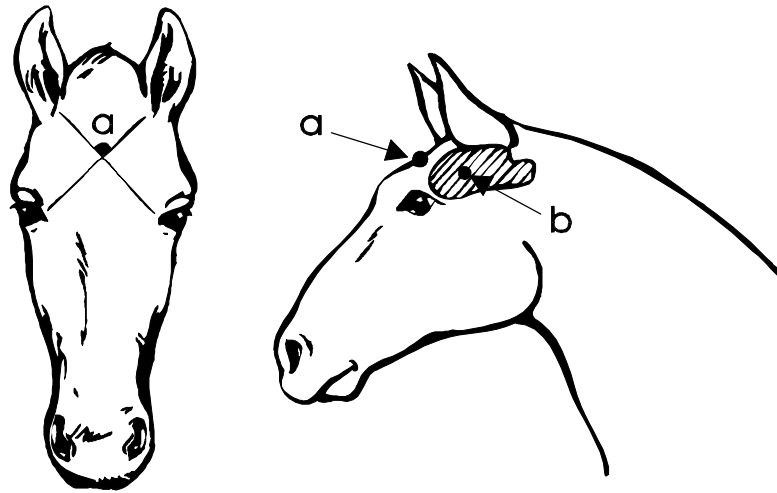


Figure 6 Humane destruction of horses; recommended position and direction of fire for (a) frontal method; or (b) temporal method

4.6 Deer

A firearm or captive-bolt pistol should be directed at the forehead where lines taken from the base of each ear to the opposite eye intersect (Figure 7a). A firearm should be fired horizontally into the forehead. If using a captive-bolt on adult bucks, heavy duty cartridges are necessary.

If the deer are disturbed when approached from the front, an equally effective method is to fire the instrument through the skull just behind the base of the antlers. The weapon should be aimed in line with the animal's muzzle (Figure 7b).



Figure 7 Humane destruction of deer; recommended position and direction of fire for (a) firearm or captive-bolt pistol; or (b) alternative position for disturbed deer

4.7 Birds

For small numbers of birds, eg fancy breeds, pigeons, the preferred methods are dislocation of the neck (using burdizzos, bone cutters, secateurs or bare hands) or intracardiac or intraperitoneal injection of sodium pentobarbitone.

Cassowaries, brolgas and other unusual/difficult birds need expert assistance.

For large numbers of birds in commercial poultry units the preferred method is gassing with carbon dioxide. This method involves lining large garbage waste bins (skips) with plastic sheeting that also forms a canopy over the top of the bin.

Birds can be caught using teams of 10–15 labourers. Experienced catching teams may be available. Chicks are easily caught under heaters and are transferred to skips in plastic garbage bins. Broilers on the ground are driven, using a movable hessian wall, to the catching area where they are caught and placed directly into skips.

Caged birds are more difficult and progress is slower. Each catcher removes 3 or 4 birds from cages and carries them by the legs to skips.

Layers on perches are best caught at night or during low light when they are quiet.

Carbon dioxide is transferred to the bottom of the skips through one inch garden hose fitted to the top of the cylinders. The carbon dioxide should be decanted in 30–45 second bursts. It is essential not to decant too quickly or the bottles will freeze when about half empty.

On average half a 45 kg cylinder of carbon dioxide is needed for the three cubic metre skips and 3 or more cylinders for the 20 cubic metre skips. Carbon dioxide should be added at a sufficient rate to ensure birds succumb before other birds are placed on top of them. Skips should be three quarters filled with birds, sealed and transported to the disposal site. Care must be taken to ensure no bird is still alive when dropped into the burial pit. Should this happen birds must be immediately caught and humanely killed.

4.8 Dogs

Injectable agents are the best method of destruction of dogs that can be handled. Intravenous sodium pentobarbitone (40 mg/kg) is the ideal method. Intracardiac injections are favoured for puppies and small dogs. Other drugs given subcutaneously or intravenously may be used initially, for example xylazine (2 mg/kg) or ketamine (20 mg/kg), if necessary by using a tranquilliser gun. Once the dog is sedated intravenous barbiturates can be used to kill the animal.

If a tranquilliser gun is not available, injection by any route will be too dangerous for some totally unmanageable dogs and for suspect rabid or rabid dogs. A lasso on a pole may be useful to help catch and control these dogs. Including a sedative (eg sodium pentobarbitone) in the food may be an appropriate preliminary to an injectable agent. Dogs may have to be restrained with muzzles or tape before destruction.

Some dogs will have to be shot through the heart.

4.9 Cats

Injectable agents are the best method of destruction of cats. Intravenous or intracardiac sodium pentobarbitone (40 mg/kg) is the preferred drug. Alphaxalone (Saffan®) may be used as a preliminary. Intraperitoneal injections can cause excitation before death. Tranquilliser guns are not suitable for cats as they are a small fast-moving target.

Animals that are not easy to handle may have to be put in a hessian bag, injected through the bag and left in a cage until dead. Alternatively they can be placed in a plastic bag into which any of the anaesthetic gases (including carbon dioxide) are piped with oxygen as the carrier gas. Anaesthesia is usually quick and quiet but death may take some time (at least 20 minutes with carbon dioxide but less with some of the other anaesthetic gases). Once the animal is unconscious it may be removed and killed with an overdose of barbiturate.

4.10 Rats, mice, guinea pigs

Any of the physical or chemical methods described above can be used in a laboratory, but the method of choice is carbon dioxide. Newborns are resistant to carbon dioxide and need prolonged exposure, or a combination of carbon dioxide and cervical dislocation. When using pentobarbitone this should be given by the intraperitoneal route (rats and mice 100 mg/kg, guinea pigs 90 mg/kg).

4.11 Rabbits

Physical methods such as cervical dislocation should only be used by skilled personnel and only on rabbits less than 1 kg in weight. The preferred method for laboratory rabbits is intraperitoneal pentobarbitone 60 mg/kg. Intravenous barbiturate injections of the very concentrated barbiturate euthanasia solution into the ear vein are often painful and may be distressing. Therefore standard anaesthetic solutions should be used. Rabbits should be restrained since an excitement phase may occur especially if the intraperitoneal or intravenous injection is incorrectly administered.

Induction of anaesthesia with carbon dioxide as described for birds and cats is slow and animals appear to become apprehensive before unconsciousness supervenes and therefore is not recommended. Overdosage with other inhalation anaesthetic agents may be used.

4.12 Primates

Chemical restraint by means of ketamine (20 mg/kg intramuscularly) followed by an overdose of barbiturate given by the intravenous or intracardiac route (50 mg/kg) is recommended for laboratory primates.

4.13 Fish

A sharp blow to the head followed by destruction of the brain has been recommended as a physical method of euthanasia. If chemical methods are preferred, an overdose of anaesthetic such as MS222 (tricaine methane sulphonate) can be used or carbon dioxide can be bubbled into the water. This should be followed by destruction of the brain.

4.14 Bees

See the **Bee Diseases, Section 2.3**.

4.15 Circus and zoo animals

The assistance of a veterinarian with experience of handling (and destroying) circus and zoo animals should be sought. If none is available the methods outlined above should be extrapolated to the various species.

4.16 Wild animals

A comprehensive operational procedures manual is in preparation written for many wild animals species (**Wild Animal Control Manual, in press**).

GLOSSARY

ANEMIS	ANimal Health <i>Emergency</i> Information System. A system for the collection, assimilation, actioning and dissemination of essential disease control information using paper documentation and computer assistance.
Ammunition	
– hard point	Hard metal ammunition; passes through tissues cleanly and can leave the target at high velocity causing danger to other people/animals in the area. .
– soft/hollow point	Ammunition made of softer metal, or with a hollow point that tends to fatten on impact causing greater damage to tissues, but does not exit the target.
AUSVETPLAN	A series of documents that describe the Australian response to exotic animal diseases, linking policy, strategies, implementation, coordination and emergency-management plans.
Burdizzo	Castrating pincers.
Captive-bolt pistol	Humane animal killer — takes either a blank cartridge that delivers a knockout blow to the skull; or a penetrating bolt that is driven a short distance into the brain. The operator does not have to be a marksman as the instrument's muzzle is firmly pressed against the animal's skull before firing.
Disinfectant	An agent used to destroy micro-organisms outside a living animal.
Disposal	Sanitary removal of animal carcasses and things by burial, burning or some other process so as to prevent the spread of disease.
Exsanguination	Severe loss of blood.
Firearm	Small arms weapon (guns and rifles).
Infected premises	A defined area (which may be all or part of a property) in which an exotic disease exists, is believed to exist, or in which the infective agent of that exotic disease exists or is believed to exist. An infected premises is subject to quarantine served by notice and to eradication or control procedures.
Infected premises operations team	Team appointed by the LDCC controller to coordinate/supervise operations at the infected premises.
Injection sites	
– intracardiac	into the heart
– intraperitoneal	into the peritoneal (abdominal) cavity
– intramuscular	into muscle (the needle is passed deeply into the substance of a muscle before the fluid is injected)
– intrathoracic	into the thoracic (chest) cavity
– intravenous	into a vein
– subcutaneous	under the skin (hypodermic)

Local disease control centre	An emergency operations centre responsible for the command and control of field operations in a defined area.
Nuchal crest	Transverse bony ridge across the back margin of the roof of the vertebrate skull.
Poll	Crown of the head
Quarantine	Legal restrictions imposed on a place, animal, vehicle or other things limiting movement.
Schedule 4 drugs	Standard for the uniform scheduling of drugs: Schedule 4 — Poisons that should, in the public interest, be restricted to medical, dental or veterinary prescription or supply, together with substances or preparations intended for therapeutic use, the safety or efficacy of which requires further evaluation (NHMRC 1993).
State disease control headquarters	The emergency operations centre that directs the disease control operations to be undertaken in the State/Territory.
Susceptible animals	Animals that can be infected with the disease

Abbreviations

ANEMIS	Animal health <i>emergency information system</i>
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AUSVETPLAN	Australian Veterinary Emergency Plan
DCP	Dangerous contact premises
LDCC	Local disease control centre
IPOT	Infected premises operation team
IP	Infected premises
OIC	Officer-in-charge
SDCHQ	State/Territory control headquarters

REFERENCES

National Health and Medical Research Council (NHMRC) (1993). *Standard for the Uniform Scheduling of Drugs And Poisons*, No.9, Australian Government Publishing Service, Canberra.

Queensland Department of Primary Industries (QDPI) (1989). *Firearms Training Manual*.

QDPI (1990). *Brucellosis and Tuberculosis Eradication Campaign Destocking Manual* .

Video/training resources

First things first – slaughter and disposal of sheep, cattle and horses (video), AAHL 1993 (available from the Animal Diseases/Incidents Section, DPIE, Canberra; or AAHL)

First things first – slaughter and disposal of pigs (video), AAHL 1993 (available from the Animal Diseases/Incidents Section, DPIE, Canberra; or AAHL)

First things first – slaughter and disposal of poultry (video), AAHL 1993 (available from the Animal Diseases/Incidents Section, DPIE, Canberra; or AAHL)

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