

AUSTRALIAN VETERINARY EMERGENCY PLAN

AUSVETPLAN

Operational Procedures Manual

Destruction of animals

A manual of techniques of humane destruction

Version 3.0, 2006

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

Primary Industries Ministerial Council

This operational procedures manual forms part of:

AUSVETPLAN Edition 3

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

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DISEASE WATCH HOTLINE

1800 675 888

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

Preface

This operational procedures manual for the destruction of animals (with techniques for humane destruction) is an integral part of the **Australian Veterinary Emergency Plan, or AUSVETPLAN (Edition 3)**. AUSVETPLAN structures and functions are described in the **AUSVETPLAN Summary Document**.

This manual describes management considerations and best-practice procedures for achieving euthanasia of various animal species. Procedures for humane destruction were initially approved in February 1991 by the then Australian Agricultural Council. Upgraded procedures were approved by the Agriculture and Resource Management Council of Australia and New Zealand in January 1996. The procedures in this manual were approved by the Primary Industries Ministerial Council out-of-session on 15 June 2006 for use in an animal health emergency.

The manual incorporates best-practice techniques from around the country and internationally (United Kingdom, United States, Europe and New Zealand). The *Australian Model Codes of Practice for the Welfare of Animals*¹ and the Australian and New Zealand Council for the Care of Animals in Research and Teaching (ANZCCART) Facts Sheets² are key references for most species.

Detailed instructions for the field implementation of AUSVETPLAN are contained in the disease strategies, operational procedures manuals, management manuals and wild animal manual. Industry-specific information is given in the relevant enterprise manuals. The full list of AUSVETPLAN manuals that may need to be accessed in an emergency is:

Disease strategies

Individual strategy for each disease

Operational procedures manuals

Decontamination
Destruction of animals
Disposal
Public relations
Valuation and compensation

Management manuals

Control centres management
(Volumes 1 and 2)
Animal Health Emergency Information System
Laboratory preparedness

Enterprise manuals

Animal quarantine stations
Artificial breeding centres
Aviaries and pet shops
Feedlots
Meat processing
Poultry industry
Saleyards and transport
Veterinary practices
Zoos

Wild animal manual

Wild animal response strategy

Summary document

¹ <http://www.publish.csiro.au/nid/22/sid/11.htm>

² <http://www.adelaide.edu.au/ANZCCART/publications/facts.html>

Earlier versions of this manual were prepared by a writing group with representatives from the Australian national, state and territory governments and livestock industries. For Version 3.0, the document has been reviewed and updated by Kevin de Witte, Principal Veterinary Officer, Department of Primary Industry and Fisheries, Northern Territory. Scientific editing was by Dr Janet Salisbury of Biotext, Canberra.

The revised manual has been reviewed and approved by:

Government

Commonwealth of Australia
State of New South Wales
State of Queensland
State of South Australia
State of Tasmania
State of Victoria
State of Western Australia
Northern Territory
Australian Capital Territory

Industry

Australian Dairy Farmers Limited
Cattle Council of Australia Inc
Wool Producers
Sheepmeat Council of Australia Inc
Australian Lot Feeders Association Inc
Australian Honey Bee Industry Council
Australian Pork Limited
Australian Egg Corporation Limited
Australian Chicken Meat Federation Inc
Goat Industry Council of Australia Inc
Australian Harness Racing Council Inc
Australian Racing Board
Australian Horse Industry Council

The complete series of AUSVETPLAN documents is available on the internet at:
<http://www.animalhealthaustralia.com.au/>

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1 Introduction

The word 'euthanasia' is derived from the Greek terms *eu* (meaning good) and *thanos* (meaning death). Euthanasia is defined as a death with minimal pain and distress and is synonymous with a rapid loss of consciousness and a loss of brain function. Death may result from cardiac or respiratory arrest or from destruction of the brain. The humane destruction techniques described in this manual seek to achieve euthanasia.

For an animal to experience pain, its cerebral cortex and subcortical structures must be functional. If the cerebral cortex is nonfunctional because of hypoxia, depression by drugs, electric shock or concussion, the animal does not experience pain. From an animal welfare perspective, the process of anaesthesia (causing unconsciousness with minimal stress to the animal) is the key to euthanasia. The choice of a terminal procedure to cause death after anaesthesia is less important, provided the animal does not regain consciousness.

It is important that the death of the animal be confirmed at an appropriate interval after killing procedures and before moving the carcass for disposal (see Section 3). It is the responsibility of all in the destruction team to ensure that animals are correctly assessed to be dead.

In an emergency animal disease (EAD) outbreak, it may be necessary to destroy a large number of animals quickly. It is essential that these animals are speedily and humanely slaughtered and that they are indeed dead before the disposal of their carcasses begins. Speed is essential in most outbreaks, because live animals will continue to produce and possibly disseminate the pathogen.

Demonstrating a high standard of euthanasia and respect for the animals is an essential consideration during an EAD response. A person experienced in slaughter of the species, and appropriately trained in animal welfare aspects of destruction, must be present at all times during the destruction process.

The purpose of this manual is to provide clear guidance on acceptable euthanasia techniques for use on most species in most likely situations. Skilful application of the techniques described here will ensure compliance with animal welfare legislation and with the *Australian Model Codes of Practice for the Welfare of Animals*.

It is not possible to cover all possibilities, and professional judgment and ethics must be used. Use of techniques *not* described in this manual may not gain the support of animal welfare agencies – novel techniques should only be used with the approval of the state or territory disease control headquarters (SDCHQ).

The livestock owner, industry liaison officer and animal welfare officer may all be able to make a useful contribution to the planning and execution of animal euthanasia, and should be consulted where possible as suggested in the action plan.

There will be considerable media interest, at least initially, in the destruction or killing of animals as part of an EAD response. Positive media coverage of animal

welfare will boost staff morale and increase community support for the eradication campaign.

Health and safety considerations for euthanasia teams are a key consideration. Officers in charge of operations (usually site supervisors) must be aware of the impact that animal destruction will have on all people involved. They must quickly determine the knowledge, skills and experience of their assistants, and brief and train them appropriately. Supervisors must also be aware that some people will not be able to handle the mental and physical stress of euthanasia procedures.

The livestock owner and their family may be present during the slaughter process and may experience considerable distress. Expert counselling, welfare assistance and assessment will be available through the welfare liaison officer from the local disease control centre. The site supervisor of the infected premises should ensure that those who need help receive it (see the **Control Centres Management Manual**, Part 1).

2 Organisation of operation

2.1 Action plan

Planning is essential to ensure that the destruction task is carried out efficiently and is not impeded by lack of resources. An action plan should be drawn up by the animal destruction team leader in consultation with the owner or the owner's agent and other officers.

The following procedures form a checklist for the animal destruction team leader, and should be followed.

- Consult with the infected premises (IP) or dangerous contact premises (DCP) site supervisor, the property owner/manager, and the local disease control centre (LDCC) animal welfare specialist and industry liaison officer to establish:
 - property layout, facilities and equipment;
 - the number, species and location of animals to be destroyed;
 - the destruction technique to be used and an alternative technique; and
 - the timeframe for animal destruction operations.
- Complete an occupational health and safety risk assessment.
- Consider any necessary actions to limit possible environmental impacts of the operation.
- Consider closing airspace, especially if shooting. Contact the Civil Aviation Safety Authority to issue a 'Notice to Airmen' (NOTAM).
- Advise the IP site supervisor of immediate resources needed to move and secure animals to prepare for their destruction.
- Create good handling systems for live and dead stock.
- When practicable (and applicable), move animals to the centre of the IP or to areas furthest from other susceptible animals, including wild animals.
- Ensure that animals not to be destroyed, including domestic pets, are confined.
- Decide on the appropriate methods and facilities needed for the safe, humane and efficient destruction of the animals.
- Consult with the officer in charge of the disposal team to determine the disposal method(s) and, if necessary, identify centrally located carcass disposal sites as close as practicable to the site of destruction. Coordinated

destruction and disposal operations should ensure that both occur efficiently and safely.

- Provide the IP site supervisor with a concise written plan for approval, including:
 - destruction methods (see Section 3);
 - destruction sites (see Section 2.2);
 - order of destruction (see Section 2.3);
 - timeframe;
 - personnel required;
 - facilities and equipment needed; and
 - OHS risk assessment.
- Details of the destruction operation should be included on a diagram of the IP or DCP.
- Confirm that the site supervisor has a complete inventory of all animals on the property that are to be destroyed. Destruction should not be delayed because there has been no agreement on valuation. However, where possible, all animals should be valued before destruction.
- If there is a delay in reaching agreement on valuation with the owner or their agent, authority to destroy should be sought from the LDCC controller (see the **Valuation and Compensation Manual**). A signed legal order to destroy is mandatory.
- Brief the destruction teams, and then supervise and coordinate their activities. Ensure that staff are familiar with the behaviour and handling of the animals and with the destruction technique.
- If possible, destruction should take place away from public view.
- Destruction facilities, methods and working conditions must be consistent with personal safety.
- Destruction must be humane, and animals must not be removed for disposal until they are dead.
- Destruction teams must receive adequate rest and meal breaks.
- Make every effort to avoid damage to property. Any damage must be recorded and reported promptly to the IP site supervisor who will draw it to the attention of the owner/manager.
- 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 the day have been destroyed.

- Provide the site supervisor with a situation report at the end of each day, using the Animal Health Emergency Information System (ANEMIS) Daily Situation Report – Slaughter.
- Advise the site supervisor of resource requirements.
- Advise the site supervisor immediately destruction has been completed, so that other tasks, such as disinfection, can be started without delay.

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 and transport requirements to the disposal site;
- safety of all personnel on the site and in the immediate vicinity;
- acceptability to the owner/manager;
- likelihood of damage to property and services; and
- protection/screening from public view.

2.3 Order of destruction

The order of destruction will be determined after consultation with the LDCC. The order will be determined by disease control requirements, but is likely to be:

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

Disease-specific considerations may apply. For example, in an outbreak of foot-and-mouth disease, pigs should be destroyed before other species because of their capacity for generating virus aerosols, then cattle, goats and sheep in that order.

In determining priorities for euthanasia, some animal welfare requirements could override disease eradication considerations. For example, animals that cannot obtain feed or water, or whose shelter has been compromised, must be euthanased before better managed populations. Sick and distressed animals may require immediate euthanasia and should be killed before healthy animals. Unweaned

stock must be euthanased in a timeframe that takes into account their nutritional requirements; young stock would normally be killed first. Animals in parturition or late pregnancy should also be given special consideration. Death of the foetus in utero, following the death of the dam, is not an animal welfare concern and is preferable to handling newborn animals. Fractious and potentially dangerous animals, such as bulls, sows with litters, and boars, should be destroyed first.

3 Methods of destruction

This section lists and describes methods of destruction of animals.

Preferred and acceptable methods for particular species are discussed in Section 4. Appendix 1 lists unacceptable agents and methods of destruction.

3.1 Choice of method

The final choice of a method will depend on many factors, including:

- the animal species and the age grouping;
- the number of animals (individuals versus large numbers);
- the state of domestication (tame, handled animals versus wild animals);
- the status of the animal (pet versus production farm animal);
- the type of facilities available, including occupational health and safety aspects;
- firearm safety – proximity of people and infrastructure;
- the efficiency and acceptability of the method;
- the practicality of the method, including the availability of proficient operators;
- the training required by operators to reach proficiency;
- the overall level of stress on the animal, including whether it is fit or unwell; and
- the future use of the carcass and any risk to consumers (including people and nontarget scavengers).

After safety, animal welfare is the main consideration. Within these constraints, the best euthanasia method for the species and the circumstances must be selected. Methods of euthanasia are not ranked in this manual, because important but variable factors may determine the final choice of a method.

The aim of any destruction technique is to achieve euthanasia in a single treatment by a rapid loss of consciousness, leading to death with no return to consciousness, and with an acceptable, minimal level of stress to the animal before its death. Some techniques produce loss of consciousness but not always death. These techniques must be followed with a terminal technique such as pithing (Section 3.9.1) or exsanguination (Section 3.9.2).

Where euthanasia has been performed, animals must always be assessed for vital signs (see Section 3.2). If there is any doubt that the animal is dead, it should be treated again; if it is merely unconscious, it should be subjected to a terminal procedure.

In some circumstances, special disease or sampling considerations apply. For example, rabid or suspected rabid animals should be shot in the heart with a firearm to preserve the brain (which is the best diagnostic specimen), to avoid contamination of personnel with potentially infective brain or saliva, and to avoid the risks of handling a rabid animal. Similarly, animals with suspected bovine spongiform encephalopathy (BSE), scrapie and other nervous system conditions generally should not be shot through the head, as brain tissue is required for diagnostic testing. They may be shot through the cervical spinal column (neck shooting), but an accurate shot for humane destruction requires expert anatomical knowledge. For suspect BSE cases, a technique for brain shooting is described in the National Transmissible Spongiform Encephalopathy Surveillance Program (NTSESP) National Guidelines for Field Operations³.

If animals are highly infectious and/or are very sick, it is desirable not to move them off their home property. Destruction in situ reduces the risk of spreading the agent, the extent of cleaning and decontamination required, and risks to the welfare of the animal. While the use of abattoirs is usually not an option for exposed animals, it should be considered where possible.

3.2 Assessing death

Knowledge of the vital signs of life is important in certifying death. Different euthanasia techniques used for different species may result in different final behaviours, and it is necessary to understand what is 'normal'. For example, an animal that has recently died may display an 'agonal struggle' (uncoordinated limb movements and gasping), but this is not a welfare concern. Using a terminal technique helps guarantee death but does not remove the responsibility of slaughter personnel to check their subjects.

At least two of the following signs of death must be observed in each animal:

- loss of consciousness (not enough in itself, as the animal may only be stunned);
- absence of rhythmic respiratory movements (may also be temporary respiratory failure);
- loss of eye-protection reflex (corneal reflex) or 'blink' (also happens in heavily anaesthetised animals);
- pupillary dilation (difficult to assess in some species);

3

http://www.animalhealthaustralia.com.au/shadomx/apps/fms/fmsdownload.cfm?file_uid=F3347B27-0D7D-58C4-9078-A7888E2A3C20&siteName=aaahc

- glazing of the eyes (cornea becomes opaque, dry and wrinkled);
- absence of heartbeat (requires expertise to detect; heartbeat may persist for some minutes);
- absence of a pulse (requires expertise as for heartbeat);
- loss of colour in the mucous membranes, which become pale and mottled, without refill;
- lack of response to painful stimuli (withdrawal reflex – not reliable);
- lack of jaw muscle tension and slack tongue (may be difficult to judge);
- rigor mortis (onset after several hours).

Return of rhythmic breathing is the main sign that an animal is only stunned and requires retreatment. Lack of any respiratory movement is the best indication of death.

3.3 Firearms (rifles, shotguns and hand guns)

Firearms are an acceptable method of euthanasia, especially for larger animals, and particularly where these animals cannot be safely handled and restrained. The bullet should normally be placed to destroy the brain. Heart or lung shots can only be justified where the accuracy required for a brain shot cannot be achieved or where there are disease or diagnostic considerations.

Recommendations for the most suitable type of ammunition should always be obtained from experienced personnel. Appendix 2 contains more specific guidance on ballistics; Section 4 gives aiming points for individual species.

Firearm licensing requirements vary from state to state and must be complied with. Only licensed operators may use firearms. Firearms require registration in the relevant state or territory.

The following aspects of firearm safety should be considered:

- All firearms are potentially hazardous and should be treated as if they are loaded: safety first.
- All firearm users require appropriate training and proof of expertise.
- When shooting at short range in stockyards, shooters should use relatively low-velocity hollow-point or soft-point ammunition matched to the size of the animals. Solid-point ammunition should be avoided because solid projectiles can penetrate the skull and exit at high velocity, endangering personnel in the area. Hollow-point or soft-point ammunition deforms when entering the target, destroying brain tissue more effectively. If animals are to be shot in their paddocks, shooters should use high-velocity ammunition adequate to the task.

- People other than the shooters and their assistants should be cleared from the area or should stand well behind the shooters. The direction of fire must be chosen to prevent accidents or injury from stray bullets or ricochets. It may be necessary to construct a suitable backstop (example of effective ranges: 7.62mm rifle – 2,750m or 0.22" rifle – 1300m).
- For maximum impact and the least possibility of misdirection, the range should be as short as circumstances permit. For handled animals, this should be 5–20 cm, but the barrel of the firearm should not be placed directly against the animal's forehead.
- The police should always be notified before firearms are used near populated areas.
- Tranquilliser dart guns may be useful for unapproachable animals in populated areas.

The *advantages* of using firearms are:

- Experienced, proficient operators can achieve a clean kill, usually with no need for a terminal procedure.
- Handling individual animals is not necessary.
- Shooters can destroy animals from a distance.
- Firearms and ammunition are readily available.
- Many people are proficient in the use of firearms.

The *disadvantages* of using firearms are:

- They are potentially the most dangerous of the methods of destruction.
- High-powered ammunition is unsuitable for use close to populated areas.

3.4 Captive-bolt pistols

Captive-bolt pistols are an acceptable alternative to firearms where animals, particularly ruminants and pigs, can be adequately restrained. **Use of a follow-up terminal procedure to guarantee death (Section 3.9) is mandatory.** Provisions of the firearms legislation apply in some jurisdictions.

There are two types of bolt: penetrating and nonpenetrating ('mushroom'). Penetrating bolts concuss and traumatise the cerebral hemisphere and brainstem, resulting in loss of consciousness and usually death. A terminal procedure is required. Nonpenetrating bolts are mainly used for religious slaughter in abattoirs under tightly controlled conditions and are not suitable for field use, as they require the animal to be bled.

With an effective stun, the animal becomes immediately senseless, collapses and exhibits tonic limb contractions followed by gradual relaxation and involuntary

kicking movements. Many animals so treated will be dead, but stunning must be followed up with a terminal procedure.

Blank cartridges for the captive-bolt pistol are colour-coded according to the amount of charge they contain. The most widely used is the 'Cash Special' – a single-shot, .22 calibre, captive-bolt pistol which uses one of three loads:

- Pink: 1.25 grains (weaners, young stock to 100 kg);
- Purple: 2.5 grains (sheep, pigs);
- Green: 3 grains (cattle to 600 kg, boars, mature sows etc).

Further details are available in Appendix 2. It is essential to follow the manufacturer's recommendations for the most appropriate cartridges for different farm animals. If there is doubt, a more powerful charge should be used.

Regular (daily) maintenance of the captive-bolt pistol is essential for efficient stunning. Spare weapons and parts should be on hand.

Captive-bolt pistols are designed to be pressed firmly to the animal's head before being discharged. If a follow-up shot is necessary, it should be in a different spot, not far from the ideal impact site.

The *advantages* of captive-bolt pistols are:

- Although the pistols are dangerous, there is no free projectile and this aspect of operator safety is increased compared to firearms.
- More than one operator can safely work in the same area.
- Both pistols and ammunition are readily obtainable.
- They are easy to use.
- Operators need not be expert shooters.

Despite these advantages, captive-bolt pistols must still be aimed accurately (see Section 4 for species-specific aiming diagrams).

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 exsanguinated to ensure death (see Section 3.9).
- Some animals have to be individually restrained.
- The method is relatively slow, especially when large numbers of animals are to be destroyed.

3.5 Other physical methods

For small animals, physical methods may be the most appropriate method for euthanasia in certain situations. Where trauma is involved, operators must be proficient and sensitive to the implications of the method for human sensibilities. Usually, these methods would not be the first choice, but might be used as terminal techniques.

3.5.1 Dislocation of the neck

Dislocation of the neck may be suitable for poultry and smaller laboratory animals. Suitable methods are by burdizzo (castrating pincers), forceps, or by hand. Burdizzos are particularly useful when large numbers of poultry with strong necks (geese, ducks etc) are to be destroyed. To achieve consistent results, proficient and motivated operators are required. Damage to the brainstem results in an acceptable death. The instrument must be applied close to the cranium.

3.5.2 Electrical stunning or electrocution

Electrical stunning is used widely in abattoirs for pigs, sheep and lambs, but its field use is currently not practical.

Electrocution of a stunned animal using alternating current ('AC') causes death by cardiac fibrillation and resulting cerebral hypoxia, but may be unreliable in small animals (<5 kg). Animals should be unconscious before being electrocuted, as death will take 10 to 30 seconds. The use of this method as a terminal technique is questionable.

3.5.3 Decompression

Decompression is now regarded as unacceptable.

3.5.4 Exsanguination

Exsanguination is an important terminal technique (see Section 3.9).

3.5.5 Decapitation

Decapitation by trained operators using knives, guillotines, bone cutters or secateurs is suitable only for small rats and mice. There are concerns about the humaneness of this technique, due to length of time that the severed brain is active.

3.5.6 External trauma

A blow to the head can be a humane method of euthanasia for neonatal animals with thin craniums. More acceptable techniques are gassing or injection of an anaesthetic overdose. Specific jurisdictional requirements for instrument choice and use of a terminal technique must be adhered to.

3.5.7 Immersion anaesthesia

Tricaine methane sulfonate (TMS, MS-222) can be used for euthanasia of amphibians and fish in an immersion solution (see Section 4.12).

Drowning or suffocation of any species is not acceptable (unacceptable techniques are listed in Appendix 1).

3.6 Gaseous agents

Inhalation agents cause loss of consciousness followed by respiratory depression and death from hypoxia. Any gas that is to be inhaled must reach a certain concentration in the alveoli, blood and brain before it can be effective; therefore, euthanasia will take some time. Suitability of an agent depends on whether the animal experiences distress before it loses consciousness.

Neonatal animals appear to be resistant to hypoxia; therefore, they take longer to die than adults and should receive a longer treatment or a terminal procedure once unconscious.

3.6.1 Carbon dioxide gas

Carbon dioxide gas (CO₂) at 70% minimum concentration is the method of choice for destroying most poultry species in large numbers, and for many smaller livestock and laboratory animal species (see Appendix 4 for large-scale use). It is colourless, heavier than air and nearly odourless, and is easy to use and safe in well-ventilated areas. Normal atmosphere is composed of nitrogen (N), 78%; oxygen (O₂), 21%; and carbon dioxide (CO₂), 1%.

CO₂ has rapid depressant, analgaesic and anaesthetic effects; it depresses the central nervous system by lowering the pH in brain tissue. At low concentrations in inspired air (7.5%), CO₂ increases the pain threshold, and at higher concentrations (>30%) it has a rapid anaesthetic effect in about one minute. Animals must be exposed to an atmosphere of at least 30% CO₂ to ensure loss of consciousness, and then at least 70% CO₂ to kill them.

To achieve this, animals should be placed in a container prefilled with the gas, and exposed to a continuous inflow of 100% CO₂ to maintain a minimum concentration of at least 70% for at least three minutes. An optimal flow rate is one that will displace 20% of the chamber volume per minute. In birds, anaesthesia typically occurs within 20 seconds. Animals may be left in the container until rigor mortis ensues or they may be removed once unconscious and killed by a terminal technique.

For adult poultry, an exposure time of one minute is usually necessary, but up to 20 minutes exposure may be needed to ensure death. The period between unconsciousness and death will be even longer in neonatal or juvenile animals, which are more tolerant of CO₂. They may require 30 minutes exposure or longer. Species that normally live in water, control their respiration or hold their breath also require longer.

Animals must be checked to ensure that they are dead before the procedure is complete.

Compressed CO₂ gas in cylinders is the only recommended source. CO₂ released from the cylinder is cold and has the potential to chill animals on direct contact. If cylinders of gas are not available, dry ice may be used for small numbers of small animals. The dry ice is placed in the bottom of a deep container under a gauze

floor, so that there is no direct contact between the animals and the ice. Animals are then placed into the container, and left there until unconsciousness or death.

In situ CO₂ gassing in sheds or cages is difficult to do and is not recommended unless stringent operating conditions are met.

The use of a CO₂/O₂ mixture (70/30) may decrease the discomfort of hypoxia before the onset of anaesthesia and narcosis. However, there appears to be no advantage to combining O₂ with CO₂ for euthanasia. The combined use of inert gas mixtures incorporating nitrogen or argon ('controlled atmosphere') has some application in abattoirs but its use in field situations is problematic.

3.6.2 Gaseous anaesthetic agents

Gaseous anaesthetic agents, which include halothane, enflurane, isoflurane and methoxyflurane, can be used to produce anaesthesia and death in small animals (<7 kg).

These agents can be used in exactly the same way as CO₂, but there should be no direct contact between the animal and the anaesthetic in its liquid form. Animals may be left in the anaesthetic chamber until dead, or may be removed once unconscious and killed by one of the physical terminal methods or even by injection of an overdose of barbiturate (see Section 3.7).

The major disadvantage of these agents is that they are expensive and restricted (Schedule 4) drugs that should only be used in a well-ventilated room or, preferably, in a fume cupboard. Prolonged exposure, even at low concentrations, may harm the health of personnel.

Ether is not recommended. Induction of anaesthesia is slow and stressful because the high concentrations necessary to produce unconsciousness irritate the skin and mucous membranes. Ether is also hazardous to personnel because of its explosive properties during use and during disposal of carcasses.

Nitrous oxide (N₂O) used alone does not induce anaesthesia and is not suitable. On its own, it produces hypoxia before respiratory or cardiac arrest, and animals may become distressed before losing consciousness.

3.6.3 Hydrogen cyanide gas

Hydrogen cyanide gas is a humane and highly effective method of destroying poultry and other small animals. However, human safety considerations restrict its use. It should only be used by experienced commercial operators.

3.6.4 Carbon monoxide

Carbon monoxide gas is a humane and highly effective method of destroying poultry and other small animals. However, because it is a colourless and odourless gas with cumulative effects, human safety considerations restrict its use. It should only be used from a commercially bottled source; petrol engine exhaust fumes are not acceptable and are unlikely to be approved for use.

