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## A. Purpose

This resource document has been developed to provide information on the various destruction methods available for poultry, pet/zoo birds and aviary species and factors to consider when determining the most appropriate method to use during the management of a particular emergency animal disease incident.

## **B. Scope**

This document shall apply to farmed poultry, including, but not limited to caged, barn reared and free range poultry. It may also be applied to pet/zoo birds and aviary species. Future reference to 'poultry' will be considered to include other bird species.

This document should be read in conjunction with the AUSVETPLAN Operational Procedures Manual – Destruction. The implementation of the chosen method of destruction is not within the scope of this document. Standard operating procedures and work instructions specific to the chosen method of destruction should be consulted together with the AUSVETPLAN Operational Procedures Manual – Destruction.

## **C. Decision making – factors to consider**

Factors to consider when choosing the most appropriate method of poultry and other birds destruction for a given situation are as follows:

- The disease agent
  - Nature of disease agent, including known epidemiology
  - Disease status of groups within the enterprise
- An assessment of the facilities including:
  - Number of enterprises involved
  - Nature of the enterprise (e.g. free range, barn etc. and buildings/facilities available)
  - Access to the premises and holding facilities within a premises
  - Number of birds by category / shed / type / design to be destroyed
    - Type of construction of housing
    - Integration with other enterprises, including processing plant
- Resources available
  - People
    - Number available
    - Skill set
    - Training required
  - Equipment and materials
    - Lethal agent e.g. injectable barbiturate, foam, CO<sub>2</sub>,
    - Injection guns, foam generating machine(s), container(s)
    - Disinfection requirements
    - Transport requirements
- Affected bird species

- Environment
  - Urban or rural
  - Weather
  - Topography
  - Proximity to processing plant/s
  - Proximity to other at-risk groups
  - Proximity to human populations
  - Proximity to transport corridors
- Workplace health and safety (WH&S)
  - Zoonotic diseases
  - Medical status of field personnel (including current seasonal influenza vaccination status)
  - Access to human vaccines / antiviral medications
  - Personal protective equipment
- Animal welfare considerations (see section below)
- Political and community concerns
  - Community health risks (perceived and actual)
- Cost considerations
- Timeliness considerations
- Disposal considerations.

During the destruction planning phase for zoonotic diseases, consideration should always be given to reducing the human handling of birds, or at least minimising the number of people involved in handling live birds, not only from a manual handling perspective, but also from a disease contagion perspective. Handling infected birds after death may reduce but not eliminate exposure to zoonotic diseases.

#### **a. Animal welfare**

All personnel involved in the handling and euthanasia process have a duty of care to ensure the wellbeing of the poultry prior to destruction and that the process of killing is carried out humanely with the minimum of pain and distress to the poultry.

Personnel involved in the catching, transport, unloading and euthanasia of poultry must be suitably trained and competent to carry out the procedures to maximise the welfare of the poultry.

Suitable facilities must be available for the catching, holding and destruction of poultry to avoid stress and injury.

Injured poultry should be destroyed humanely as soon as practicable.

Poultry awaiting slaughter are to be treated with the same care as would be required under normal conditions and in accordance with legislation and Model Codes of Practice, including:

- The Welfare of Animals – Domestic Poultry.
- The Australian Animal Welfare Standards and Guidelines – Land Transport of Livestock.

The destruction process must ensure the poultry do not suffer undue stress or pain and where appropriate, pre-treatments to reduce stress (e.g. reduced lighting in housed poultry) should be considered ahead of destruction activities.

All staff should be briefed on welfare risks for birds from the selected destruction method. Appropriate persons must be nominated to monitor animal welfare outcomes on site. Should unconsciousness or death not occur within acceptable time frames, the slaughter process should be stopped and the system reviewed and improvements implemented.

## **D. Decision making – destruction options**

Poultry destruction methods that could be considered in the management of an emergency animal disease are detailed below. Some methods are not acceptable (e.g. for large scale premises or on welfare grounds) but are included for completeness. Advantages and disadvantages of each are detailed in Appendix 1 while Appendix 2 identifies the expected appropriateness of each destruction method against enterprise type.

The welfare of animals, WH&S, and technical skills (training and experience) are important general requirements for all methods/procedures listed here.

Where a Local Control Centre (LCC) is operational, the Infected Premises Operations (IP Ops) Manager within the LCC is responsible for working with the IP section (that includes the IP Site Supervisor (IPSS) and Infected Premises teams) to assess all destruction options and recommend the most suitable method. The formal decision making process must be documented. The IP Ops Manager should then get approval to use the recommended method from the LCC Operations Manager.

### **a. Inhaled agents**

#### ***i. Inhaled anaesthetics***

Inhaled anaesthetics may be used at high concentrations as a sole method of euthanasia or may be used to render birds unconscious

before application of other methods of euthanasia. Their use is practically limited to situations where there are sufficiently small numbers of birds to be euthanased and where anaesthetic equipment is readily available.

Human exposure to anaesthetic gases should be considered in the planning and operational phases of the response.

## ***ii. Carbon dioxide (CO<sub>2</sub>)***

CO<sub>2</sub> gassing often provides the most acceptable and operationally efficient system for destroying large numbers of poultry.

### ***Commercial poultry situations***

Field applications of CO<sub>2</sub> for broilers have resulted in stress levels similar to that invoked via routine handling or stress and distress similar to the handling or restraint required for other methods of euthanasia.

Neonatal birds may be more acclimated to high CO<sub>2</sub> concentrations, because the unhatched bird's environment typically has a high CO<sub>2</sub> concentration (as high as 14% in the embryonic chicken). Consequently, CO<sub>2</sub> concentrations required to achieve euthanasia of newly hatched chicks may be much higher (as much as 80% to 90%) than those for adults of the same species. In such cases, a cocktail of CO<sub>2</sub> and nitrogen should be considered. Diving birds also have physiologic adaptations to hypercapnia and may require higher CO<sub>2</sub> concentrations for euthanasia.

Use of CO<sub>2</sub> will, in many cases, be the preferred option for caged poultry in commercial poultry situations, however, a risk assessment considering the disease agent, human health impacts and manual labour requirements must be undertaken to determine whether it is preferred to remove poultry from cages prior to or following application.

While CO<sub>2</sub> application will also be an option for poultry on the ground (i.e. not in cages), gassing can be accomplished either in the trays/hoppers of trucks, in garbage skips, or in the poultry sheds themselves.

An option in deep litter sheds is gassing all poultry at once, if operationally efficient and safe. Modern commercial deep litter sheds appear to make this a possibility and this option can be

considered in decision making. It provides some opportunities to decrease exposure levels to people, especially if composting the carcasses and litter *in situ* inside the shed is a disposal option. If disposal is inside the shed, picking up of dead poultry requires less skilled labour than catching live poultry on litter and decreases the exposure risks of people to zoonotic diseases.

#### ***Non-commercial or small scale operations***

Where pet poultry, backyard poultry or aviary poultry are to be destroyed, small scale gassing operations can be constructed using small CO<sub>2</sub> cylinders or dry ice in bags and wheelie bins, cardboard boxes etc. as the container. Care must be taken to accommodate the particular sensitivities of these owners who generally will be more emotionally attached to their poultry.

### **b. Wet foam**

Wet foam depopulation is a process by which foam generating equipment is used to create a blanket of foam to immerse a group of poultry.

The process of foam generation uses a pump to shift water from a suitable water source into a foam generating system. Foam concentrate is inducted into the water stream and this solution is forced through a mesh screen to mix with air. The resulting combination of foam concentrate, water and air produces a foam blanket which is used to fill a poultry house and immerse poultry. Replacement of CO<sub>2</sub> in the foam bubbles over air yields no euthanasia advantage and carries with it an additional workplace health and safety hazard; its use is not recommended.

The method works by generating water-based foam and delivering it to floor-based chickens in a confined space so that a blanket of foam covers the birds and mechanically occludes their airways (asphyxiation) resulting in hypoxia and death. This destruction process takes approximately three minutes (Benson et al 2009, Benson et al 2012), which is comparable to CO<sub>2</sub> gassing.

Histopathological studies demonstrate that poultry do not drown and corticosteroid levels are comparable to those stress levels associated with routine management practices such as 'catching stress' (Benson, 2007).

Wet foam depopulation has a number of advantages in the management of zoonotic diseases such as avian influenza because it reduces exposure of humans to live birds by reduction or elimination of handling live poultry.

Wet foam has successfully been used in Australia and overseas for the destruction of broilers, layer hens, turkeys, chukars, quail and ducks (Benson et al, 2009). This method is only appropriate for ground based poultry as foam heights are not expected to be able to be reached in elevated/tiered poultry housing systems.

There are species specific differences in the time to death. Mean elapsed time to brain death using water based foam has been recorded as 133s, 183s, 193s and 283s for broilers, layers, turkeys and ducks respectively (Benson et al., 2012).

Key foam parameters to manage animal welfare risks are bubble size, depth, persistence and fluidity of the foam. More information on the use of the foam depopulation unit including *Standard Operating Procedure: Depopulating Poultry with a Foam Depopulation Unit* is available from the Victorian Department of Environment and Primary Industries.

#### **c. Injectable euthanasia agent**

Intravenous injection of an injectable euthanasia agent is one of the quickest and most reliable means of euthanizing birds when it can be performed without causing fear or distress.

Lethal injections are a useful method of euthanasia of small sized flocks. Barbiturates (e.g. pentobarbitone sodium) are the most likely widely available drug to be used in Australia. Record keeping requirements will vary by jurisdiction.

If it is decided that use of lethal injection is the preferred method of destruction, it is essential that the operational procedures and work site layout ensure minimum opportunity for accidental injection of the injector or the persons holding the poultry for injection. Physical separation of persons, skilled handlers and sufficient facilities for the task are essential.

In conscious birds, injectable euthanasia agents should only be administered intravenously. Otherwise, intracoelomic, intracardiac and intraosseous routes may be used in unconscious or anesthetized birds but using dual methods is not logistically practical in most cases.

#### **d. Cervical dislocation**

Cervical dislocation is acceptable if performed by skilled and experienced operators and is typically used for small birds (<200g) but can be performed successfully on birds as large as 2.3kg. However, when used on

larger and older poultry, it can require significant physical effort and care must be exercised to ensure operators are able to meet acceptable animal welfare standards.

Its use is most likely limited to small numbers of birds as operator fatigue frequently compromises the procedure when applied in larger flocks.

#### **e. Decapitation**

Decapitation is acceptable for small birds and small flocks where other options are not possible. However, due to the contamination of the environment with potentially infected blood, it is less desirable from a biosecurity viewpoint and creates a larger clean-up and decontamination job afterwards. The use of sharp and heavy implements for decapitation also has WH&S implications that need to be addressed in the planning and operational phases.

A modification of the decapitation option is to use large cattle burdizzos to sever/crush the neck and spinal cord while leaving the skin intact. Used properly, this method will render immediate death without the complication of environmental contamination with blood and feathers. Two operators are needed to use this method.

#### **f. Gunshot**

Gunshot is not recommended as a method for captive birds, where restraint is feasible. Furthermore, gunshot from a distance will require significant accuracy which, while it may be successful in killing a single bird, has great potential for evoking fear responses in those poultry in the immediate environment. Use of free-flying bullets has WH&S implications that need to be addressed in the planning and operational phases.

#### **g. Maceration**

Maceration causes immediate fragmentation and death of newly hatched poultry and embryonated eggs. The American Association of Avian Pathologists found that use of commercially available macerators for euthanasia of chicks, poults, and pipped eggs resulted in immediate death in poultry up to 72 hours old and that it occurs with minimal pain and distress.

Maceration requires special equipment that must be kept in excellent working order. Newly hatched poultry must be delivered to the macerator in a way and at a rate that prevents a backlog at the point of



entry into the macerator and without causing injury, suffocation, or avoidable distress before maceration.

#### **h. Captive bolt**

Captive bolt guns may also be used on larger birds including turkeys, chickens, geese, ducks and emu. Appropriate animal restraint is required when using the captive bolt.

#### **i. Unacceptable methods**

##### ***i. Ventilation shutdown***

While it is possible to produce death by overheating or suffocation (via the use of environmental controls such as shutting down ventilation), the duty of care in relation to animal welfare is severely compromised. Nationally, insufficient evidence exists to endorse the use of ventilation shutdown as a destruction method - therefore it is not currently approved as an acceptable method of destruction. This option may need to be revisited if community concerns/pressure forces the rapid depopulation of poultry sheds.

##### ***ii. Avicides***

An avicide is any substance (normally, a chemical) which can be used to kill birds. Alphachloralose or other agents may be suitable as an avicide, though the American Veterinary Medical Association does not consider it an acceptable euthanasia agent<sup>1</sup>.

The APVMA has determined that it is in the public interest for vertebrate pest control products containing alphachloralose to be restricted chemical products (RCPs), effective 16 December 2009. Alphachloralose is controlled under the *Agricultural and Veterinary Chemicals (Control of Use) Act 1995* and may only be supplied to or used by an authorised person. The restricted use of this chemical and label directions are designed to minimise exposure of non-target animals and birds to this compound.

##### ***iii. Other methods***

Intravenous injection of potassium chloride, exsanguination and thoracic compression should not be used in conscious or anaesthetised birds. The techniques may be used if poultry are

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<sup>1</sup> Ibid

unconscious or completely anaesthetised prior to the procedure and biosecurity concerns including environmental contamination of blood (through exsanguination for example) can be sufficiently addressed.

## **E. WH&S**

WH&S issues may occur due to the presence of zoonotic disease (e.g. avian influenza). This aspect needs special consideration during the on-site risk assessment done by the IPSS.

### **a. Site supervision**

The IPSS is to ensure that the site has been assessed for potential risks prior to commencement of operations. Identified risks must be addressed and all staff advised of the risk treatments or risk avoidance procedures to be implemented. Appropriate persons must be nominated to monitor WH&S on site and at least one such person should be on site at all times during large operations while destruction operations are occurring to monitor WH&S compliance. All staff should be advised on possible adverse psychological effects of such mass destruction events and debriefed appropriately.

### **b. Qualifications of equipment operators**

All operators of equipment must be appropriately qualified for operation of the equipment as required by law. In the case of operation of CO<sub>2</sub> equipment where qualifications are not specified, operators must be experienced in handling of the gas, or receive instruction to the satisfaction of the Infected Premises Operations Teams (IPOT) manager and Workplace Health and Safety Officer (WHSO.) The nature of instruction received and processes to be used are to be documented by the IPSS or Destruction Coordinator and filed in the LCC central file. Refer to the APVMA [Permit 7472](#) for conditions of use of CO<sub>2</sub>.

### **c. Operational procedures during an incident/emergency response**

Where a formal SOP has not been developed for a destruction activity, the IPSS or Destruction Team Leader or on-site WHSO is to record the procedure to be used, conduct and record a risk assessment, and modify the procedures to incorporate appropriate risk treatments or risk avoidance options. This must be submitted to the Destruction Coordinator in the LCC for sign off before commencement of activities.

Where bulk CO<sub>2</sub> is being used in enclosed/confined spaces (e.g. during shed depopulation, using skips as containers for euthanasia), at least one appropriately trained and equipped officer with self-contained breathing apparatus (SCBA) must be on site to assist in emergency situations that would necessitate entry to an enclosed/confined space containing CO<sub>2</sub>.

#### **d. Briefing and Induction**

All persons entering a destruction site or participating in destruction operations must be:

- briefed on the disease agent and any possible affects it might have on human health
- inducted into the appropriate area;
- briefed on identified risks and required WH&S procedures, including when undertaking CO<sub>2</sub> gas destruction, the adverse effects of CO<sub>2</sub> on humans and safety instructions, as applicable and
- provided with the Safety Data Sheets (SDS) for carbon dioxide or any other chemicals used e.g. pentobarbitone sodium.

#### **F. References**

AUSVETPLAN	Destruction of Animals Manual
Jurisdictional SOPs/work instructions	<ul style="list-style-type: none"> <li>• Mass destruction</li> <li>• Neck dislocation</li> <li>• Lethal injection</li> <li>• CO<sub>2</sub> gassing</li> <li>• Wet foam</li> </ul>
NASOPs	<ul style="list-style-type: none"> <li>• NASOP 01 - Personal decontamination - entry and exit procedure</li> <li>• NASOP 12 - Decontamination of large equipment</li> <li>• NASOP 09 - Inspection of a property before operational activities</li> </ul>
Legislation	Relevant state legislation
Model Codes of Practice	The Welfare of Animals – Domestic Poultry The Australian Animal Welfare Standards and Guidelines – Land Transport of Livestock
APVMA permit	Permit 7472

Scientific literature	Orosz S. Birds. In: American Association of Zoo Veterinarians (AAZV). <i>Guidelines for euthanasia of nondomestic animals</i> . Yulee, Fla: American Association of Zoo Veterinarians, 2006;46–49.
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	E. R. Benson, R. L. Alphin, M. K. Rankin, M. P. Caputo, D. P. Hougentogler, and A. L. Johnson. Mass Emergency Water-Based Foam Depopulation of Poultry. 2012 Avian Diseases 56”891-896.

## Appendix 1 - Destruction methods

Method	Population size	Definition	Advantages	Disadvantages
Inhaled anaesthetic	Small	Exposure of poultry to a predetermined gas mixture of air, oxygen, nitrous oxide or combination thereof and a commercially available inhalable anaesthetic. Usually delivered by mask or small container	<ul style="list-style-type: none"> <li>• Useful where equipment is available and where numbers of poultry are small</li> <li>• Preferred where tissue recovery is required with minimal artefact</li> <li>• Anaesthetic agents are readily available</li> <li>• Removal of poultry from cages ante-mortem facilitates ease of removal</li> </ul>	<ul style="list-style-type: none"> <li>• Requires specialised equipment</li> <li>• May require close human handling</li> <li>• Can be costly if applied across large numbers of poultry</li> <li>• Not appropriate for use in large container volumes (e.g. shed, skip etc.)</li> <li>• WH&amp;S risks for operators</li> </ul>
CO <sub>2</sub>	Small to large	Exposure of poultry to a predetermined gas mixture of air and CO <sub>2</sub> in an enclosed area (bin, skip, shed)	<ul style="list-style-type: none"> <li>• Applied in situ eliminates the need to handle live poultry</li> <li>• CO<sub>2</sub> is readily available</li> <li>• Reduces exposure of operators to zoonotic diseases</li> <li>• Removal of poultry from cages ante-mortem facilitates ease of removal</li> </ul>	<ul style="list-style-type: none"> <li>• Animal welfare problems when introducing gas too close to poultry (freezing/cooling issues)</li> <li>• In windy conditions, it can be difficult to maintain adequate gas concentrations in the container (e.g. garbage skips)</li> <li>• Difficulty in verifying death due to safety issues with operators</li> <li>• WH&amp;S risks for operators</li> <li>• Requires high concentrations for neonatal birds</li> </ul>
Wet foam	Small to large though practically only applied in medium to large populations	A process by which foam generating equipment is used to create a blanket of foam to immerse a group of poultry producing a mechanical obstruction of the airway leading to rapid hypoxia and death.	<ul style="list-style-type: none"> <li>• Death is produced in approximately three minutes which is comparable to CO<sub>2</sub> gassing</li> <li>• Eliminates the need to handle live poultry</li> <li>• Reduces exposure of operators to zoonotic diseases</li> <li>• Minimal or no restraint required</li> <li>• Requires minimal shed preparation</li> <li>• Provides the ability to quickly and effectively euthanase large numbers of poultry</li> <li>• Animal welfare consideration – research shows stress levels in foamed poultry are comparable to those associated with routine management practices such as catching stress.</li> <li>• Can result in time and labour savings</li> </ul>	<ul style="list-style-type: none"> <li>• Animal welfare consideration - the opaque foam blanket limits the ability to visualise bird behaviour during the foaming process.</li> <li>• Not suitable for poultry in elevated situations (e.g. tiered cages). Suitability restricted to floor based poultry.</li> <li>• Time to death can be longer in birds capable of breath holding for prolonged periods (e.g. 7 minutes in ducks).</li> </ul>

Method	Population size	Definition	Advantages	Disadvantages
Injectable euthanasia agent	Small	High doses of anaesthetic & sedative drugs, e.g. barbiturates	<ul style="list-style-type: none"> <li>• Death can be induced smoothly when used intravenously</li> <li>• Easily transportable and applicable for small numbers of poultry</li> <li>• May be useful for large birds (&gt;2.3kg)</li> </ul>	<ul style="list-style-type: none"> <li>• Skilled and experienced personnel required for administration</li> <li>• WH&amp;S risks for operators re: handling of barbiturates and poultry</li> <li>• Drugs often require administration by a veterinarian or under the direction of a veterinarian</li> <li>• Not appropriate for large numbers of birds</li> <li>• May require sedation prior to injection</li> <li>• Not to be used by intracoelomic, intraosseous or intracardiac means in conscious birds</li> <li>• Not practical for small birds</li> <li>• May affect the disposal choice (e.g. be cognizant of scavenging)</li> </ul>
Cervical dislocation	Small	Manual cervical dislocation to sever the spinal cord	<ul style="list-style-type: none"> <li>• Cheapest method as requires no equipment</li> <li>• Non-invasive</li> <li>• Quick</li> </ul>	<ul style="list-style-type: none"> <li>• Bird handling and restraint can be stressful to birds and operator</li> <li>• WH&amp;S risks for operators especially in regards to repetitive tasks</li> <li>• Is not consistently effective</li> <li>• Inconsistent &amp; unreliable results for large numbers</li> <li>• Operator fatigue &amp; distress</li> <li>• Difficult with large poultry (suitable only for birds &lt;2.3kg)</li> <li>• Not aesthetically pleasing</li> </ul>
Decapitation	Small	Manual removal of the head without anaesthesia	<ul style="list-style-type: none"> <li>• Quick and effective when used properly</li> <li>• Suitable for a range of species and body sizes</li> </ul>	<ul style="list-style-type: none"> <li>• May result in environmental contamination and human contamination by blood</li> <li>• Bird handling and restraint can be stressful to birds and operator</li> <li>• Inconsistent &amp; unreliable results for large numbers</li> <li>• Operator fatigue &amp; distress</li> <li>• Difficult with large poultry (suitable only for birds &lt;2.3kg)</li> <li>• Not aesthetically pleasing</li> <li>• Potentially dangerous to operators and by-standers</li> </ul>

Method	Population size	Definition	Advantages	Disadvantages
Gunshot	Small	A projectile(s) fired from a firearm causing physical damage to the brain	<ul style="list-style-type: none"> <li>• Quick &amp; effective when used properly</li> <li>• Minimal or no restraint required</li> <li>• Kill from a distance</li> </ul>	<ul style="list-style-type: none"> <li>• Potentially dangerous to operators and by-standers</li> <li>• Destruction of brain may prevent diagnosis of some diseases</li> <li>• Leakage of body fluid a biosecurity risk</li> <li>• Legal requirements e.g. licensing, training etc.</li> <li>• Unavailability of competent personnel</li> <li>• Aesthetically unpleasant for many</li> <li>• Requires skill and appropriate firearm</li> </ul>
Maceration	Small to large	Use of a specially designed mechanical apparatus having rotating blades or projections, causes immediate fragmentation and death of poultry up to 72 hours old and embryonated eggs	<ul style="list-style-type: none"> <li>• Preferred application is for newly hatched poultry (up to 72hours of age) and embryonated eggs</li> <li>• Generally safe for personnel</li> </ul>	<ul style="list-style-type: none"> <li>• Newly hatched poultry must be delivered to the macerator in a way and at a rate that prevents a backlog at the point of entry.</li> <li>• Not appropriate for birds older than 72 hours</li> <li>• Requires well maintained special equipment</li> <li>• Macerated tissues may present biosecurity risks</li> </ul>
Captive bolt	Small	Use of a specially designed apparatus that fires a captive penetrating bolt that causes physical damage to the brain	<ul style="list-style-type: none"> <li>• Low cost</li> <li>• Easy to use</li> <li>• Suitable for large birds</li> <li>• More than one operator can safely work in the same area</li> </ul>	<ul style="list-style-type: none"> <li>• Requires animal restraint</li> <li>• Potentially dangerous to operators and restrainers</li> <li>• Leakage of body fluid a biosecurity risk</li> <li>• Requires skill and appropriate tool</li> <li>• Suitable only for small numbers of animals as method is slow compared with other methods</li> </ul>
Ventilation shutdown	Small to large	The use of environmental controls such as shutting down ventilation is used to produce death by overheating or suffocation	<ul style="list-style-type: none"> <li>• Eliminates the need to handle live poultry</li> <li>• Reduces exposure of operators to zoonotic diseases</li> </ul>	<ul style="list-style-type: none"> <li>• Duty of care in relation to animal welfare is severely compromised</li> </ul> <p>Insufficient evidence exists nationally to endorse the use of ventilation shutdown as a destruction method - therefore it is <b>not currently approved</b> as an acceptable method of destruction.</p>
Avicides	Small	An external agent mixed with feed or water to	<ul style="list-style-type: none"> <li>• Suitable for wild species</li> <li>• May result in death</li> </ul>	<ul style="list-style-type: none"> <li>• Non-target animals may gain access in an open environment</li> </ul>

Method	Population size	Definition	Advantages	Disadvantages
		anaesthetise/poison poultry which can then be killed by another method	<ul style="list-style-type: none"> <li>• Biosecurity advantages for large numbers of diseased poultry</li> </ul>	<ul style="list-style-type: none"> <li>• Dose unregulated producing variable results</li> <li>• Animals may reject adulterated feed or water due to illness or flavour</li> <li>• Most often needs to be followed by killing</li> <li>• Care needed in preparation &amp; disposal for feed/water and disposal of contaminated carcasses</li> <li>• May affect the disposal choice (e.g. be cognizant of scavenging)</li> <li>• <b>Restricted use by the APVMA</b> for alphachloralose</li> </ul>



## Appendix 2 –Destruction method matrix<sup>2</sup>

Category of poultry / enterprise type	Pet/Zoo poultry/birds	Layers in cages Incl. breeders	Layers on the floor Incl. breeders	Layers free range Incl. breeders	Broilers on the floor Incl. started pullets	Broilers free range	Pullets in cages
Method of destruction	<ul style="list-style-type: none"> <li>individual or groups</li> <li>all species</li> <li>in transit</li> </ul>						
Inhaled agent – inhaled anaesthetic	<p>Appropriate.</p> <p>Must have specialised equipment.</p>	Not appropriate for large numbers of poultry					
<p>Inhaled agent – carbon dioxide</p> <p>Gas in container (wheelie bin, skip)</p>	<p>For larger groups.</p> <p>Can use small bins.</p>	<p>Good for large numbers of poultry.</p> <p>Uses a large number of team members.</p> <p>Availability of some resources may be rate limiting e.g. CO<sub>2</sub> supply, vaporisers.</p> <p>Welfare risks with inappropriate CO<sub>2</sub> management.</p> <p>Requires removal of birds from cages.</p>					

<sup>2</sup> Layers = chickens, quail, turkeys. Broilers = chickens, quail, turkeys, ducks, pigeons. Be mindful of breath holding in some aquatic birds and application in large birds for some euthanasia methods.

Category of poultry / enterprise type	Pet/Zoo poultry/birds	Layers in cages Incl. breeders	Layers on the floor Incl. breeders	Layers free range Incl. breeders	Broilers on the floor Incl. started pullets	Broilers free range	Pullets in cages
Method of destruction	<ul style="list-style-type: none"> <li>▪ individual or groups</li> <li>▪ all species</li> <li>▪ in transit</li> </ul>						
<b>Inhaled agent – carbon dioxide</b>  <b>Bulk gas in truck body or tray or other suitable large container</b>	Possible but inefficient	May be resource limited for large number of farms  Will require removal of birds from cages to container	Not applicable in all situations – will require catching of birds and removal to container	Not applicable in all situations – will require catching of birds and removal to container	Not applicable in all situations – will require catching of birds and removal to container	Not applicable in all situations – will require catching of birds and removal to container	May be resource limited for large number of farms  Will require removal of birds from cages to container
<b>Inhaled agent – carbon dioxide</b>  <b>In shed</b>  Preparation of sheds difficult. Allow timing to remove caged poultry from cages afterwards	Where building is near airtight, or can be covered completely	Controlled environment sheds or similar, need to wrap other sheds.	Controlled environment sheds or similar, need to wrap other sheds.	Not applicable in all situations – some free range operations use sheds to house poultry at night	Controlled environment sheds or similar, need to wrap other sheds.	Not applicable in all situations – some free range operations use sheds to house poultry at night	Controlled environment sheds or similar, need to wrap other sheds.

Category of poultry / enterprise type	Pet/Zoo poultry/birds	Layers in cages  Incl. breeders	Layers on the floor  Incl. breeders	Layers free range  Incl. breeders	Broilers on the floor  Incl. started pullets	Broilers free range	Pullets in cages
Method of destruction	<ul style="list-style-type: none"><li>▪ individual or groups</li><li>▪ all species</li><li>▪ in transit</li></ul>						
Wet foam	<p>Possible but inefficient.</p> <p>Must have specialised equipment</p>	<p>Not suitable for tiered systems</p> <p>Requires removal of birds from cages.</p>	<p>Avoid crowding / piling up.</p> <p>Will require enclosing poultry.</p> <p>Difficult to monitor welfare outcomes.</p>				<p>Not suitable for tiered systems</p> <p>Requires removal of birds from cages.</p>
Injectable euthanasia agent	<p><b>Preferred.</b></p> <p>Must have veterinary supervision</p>	<p>Must have veterinary supervision</p> <p>Skilled and experienced operators</p> <p>Slow for large numbers</p>					
Cervical dislocation	<p>Skilled and experienced operators only.</p> <p>Appropriate.</p> <p>May be aesthetically unpleasing for owners.</p>	<p>Not appropriate for large numbers of poultry</p> <p>Skilled and experienced operators only.</p>					

Category of poultry / enterprise type	Pet/Zoo poultry/birds	Layers in cages Incl. breeders	Layers on the floor Incl. breeders	Layers free range Incl. breeders	Broilers on the floor Incl. started pullets	Broilers free range	Pullets in cages
Method of destruction	<ul style="list-style-type: none"> <li>individual or groups</li> <li>all species</li> <li>in transit</li> </ul>						
<b>Decapitation</b>	<p>Appropriate.</p> <p>May be aesthetically unpleasing for owners.</p>	<p>Not appropriate for large numbers of poultry.</p> <p>Skilled and experienced operators only.</p>					
<b>Gunshot</b>	<p>Maybe useful for larger free range poultry e.g. emus, ducks</p>	Not appropriate					
<b>Maceration</b>	<p>Possible but inefficient.</p> <p>Only suitable for embryonated eggs and poultry up to 72 hours of age.</p> <p>Requires specialist equipment.</p>	<p>Only suitable for embryonated eggs and poultry up to 72 hours of age.</p> <p>Requires specialist equipment.</p>					

Category of poultry / enterprise type	Pet/Zoo poultry/birds	Layers in cages Incl. breeders	Layers on the floor Incl. breeders	Layers free range Incl. breeders	Broilers on the floor Incl. started pullets	Broilers free range	Pullets in cages
Method of destruction	<ul style="list-style-type: none"> <li>individual or groups</li> <li>all species</li> <li>in transit</li> </ul>						
Captive bolt	Maybe useful for larger poultry where there are limited numbers	Not appropriate for large numbers of poultry					
Ventilation shutdown	Not applicable or suitable.	Not recommended but could be used under extreme circumstances  Significant welfare issues					
Avicides	Alphachloralose to bait for difficult to catch poultry/birds then other method for euthanasia	Not appropriate	Not appropriate	Alphachloralose to bait for difficult to catch poultry/birds then other method for euthanasia	Not appropriate	Alphachloralose to bait for difficult to catch poultry/birds then other method for euthanasia	Not appropriate