

Mass euthanasia - Pigs

Mass euthanasia, or the humane killing of large numbers of farm animals, is most commonly required in the event of an emergency animal disease outbreak to control and prevent further spread of the disease. Other circumstances in which mass euthanasia may be required include natural disasters or for animal welfare reasons, such as where transport to an abattoir cannot occur causing on-farm overcrowding or feed shortages.

General considerations

In any circumstance where mass euthanasia is required, animal welfare must be one of the primary considerations when deciding on the most appropriate method. The purpose of this document is to provide general guidance on the animal welfare considerations associated with some of the current accepted methods for mass euthanasia.

Application of any method of mass euthanasia for farm animals must be subject to professional and expert advice and ensure compliance with relevant animal welfare legislation and with the Australian Model Codes of Practice for the Welfare of Animals. A person experienced in the killing of the species and trained in animal welfare aspects of euthanasia must be present at all times during the mass euthanasia process.

Further guidance on mass euthanasia can be found in:

[AUSVETPLAN Operational Manual: Destruction of animals Version 3.2, 2015](#)

[AVMA Guidelines for the Euthanasia of Animals: 2020 Edition](#)

[AVMA Guidelines for the Depopulation of Animals: 2019 Edition](#)

[EFSA Scientific Opinion Welfare of pigs during killing for purposes other than slaughter, 2020](#)

ANIMAL WELFARE

When mass euthanasia is required, there are three critical points in which animal welfare must be considered:

1. Animal handling prior to euthanasia
2. Effectiveness and choice of the euthanasia method
3. Confirmation of death

1. Animal handling prior to euthanasia

When handling animals, low-stress handling techniques must be used to handle animals in a calm and quiet manner with an awareness of their flight zone. Any animal handling or restraint must occur in a way that minimises pain, injury, suffering or distress to the animal. Those responsible for the euthanasia of animals must be appropriately trained and competent.

Regarding the order and priority in which certain animals should be euthanased, some welfare situations should override disease control/eradication considerations during the mass euthanasia process. Some of these welfare situations may include:

- potentially dangerous or aggressive animals (such as bulls, sows with litters, or boars) should be euthanased first (i.e., before young animals)
- animals that cannot obtain feed or water or that have compromised shelter/housing, should be euthanased as a matter of priority
- sick and distressed animals should be euthanased before healthy animals
- young animals should be euthanased as a matter of priority
- unweaned animals should be euthanased at the same time as their mothers
- special consideration should be given to animals in parturition or late pregnancy.

2. Effectiveness and choice of euthanasia method

The aim of euthanasia is to humanely kill animals. RSPCA Australia defines humane killing as when an animal is either killed instantly or rendered insensible until death ensues, without pain, suffering or distress. When possible, the method of mass euthanasia should be the same or similar to methods used for standard on-farm euthanasia of sick/injured animals or killing of animals determined unfit for human consumption at the time of slaughter.

Animal-related factors that must be considered when choosing the most appropriate euthanasia method include:

- type of infectious agent and sampling considerations
- species and age of animals
- number of animals involved
- state of domestication (tame, handled, wild)
- potential stress and amount of animal handling required
- location and housing system of the farm
- method and location of killing (on-farm, move to another location, abattoir/knackery)
- presence of nearby farms/premises with animals
- removal, disposal and destruction of carcasses.

Other factors that must also be considered when choosing the most appropriate euthanasia method include:

- public safety risk (i.e., zoonotic disease)
- facilities on farm
- availability of trained staff/equipment
- response time frame
- biosecurity and environmental issues
- decontamination
- human health and safety
- legal and regulatory requirements
- financial cost.

3. Confirmation of death

After the euthanasia method has been applied, at least three signs to confirm death must be checked on each individual animal. Signs to confirm death may include:

- 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)
- lack of corneal reflex or 'blinking' when the cornea is touched or stimulated (also happens in heavily anaesthetised animals)
- lack of pupillary reflex or pupils constricting in response to light (i.e., the pupils remain fixed and dilated)
- glazing of the eyes where the cornea becomes opaque, dry and wrinkled
- absence of heartbeat (requires expertise to detect; heartbeat can persist for some minutes)
- absence of a pulse (requires expertise to detect)
- loss of colour in the mucous membranes where they become pale and mottled, without refill
- lack of response to painful stimuli or withdrawal reflex (not a reliable method)
- lack of jaw muscle tension and slack tongue (may be difficult to determine)
- rigor mortis (onset after several hours).

Pigs

Euthanasia methods

Methods for mass euthanasia of pigs currently accepted include: carbon dioxide or inert gas, penetrating or non-penetrating captive bolt, firearms, and lethal intravenous injection.

Ventilation shutdown as a euthanasia method is not acceptable.

Injectable agents - IV Barbiturates only in piglets <5kgs

Appropriate dose rates must be used and must only be administered intravenously in conscious piglets as via other routes can cause significant irritation to tissue.

Welfare considerations

- Individual handling, catching and restraint of piglets must follow correct normal handling procedures.
- Requires appropriate IV administration.
- Requires veterinary administration or supervision.

Carbon dioxide gas (CO₂)

May be a suitable option for piglets and pigs. Using containers CO₂ has been used for piglets <5kg in an on-farm setting and has been explored for older pigs in a research setting. Although it requires minimal handling, which is a benefit, there are welfare concerns around the aversiveness of CO₂ due to ocular and nasal nociceptor activation by carbonic acid and the experience of breathlessness.

Welfare considerations

- A gradual displacement method must be used so that piglets are not exposed to CO₂ concentrations of >30% until they are unconscious. Pigs can show signs of aversion and discomfort with sudden exposure to high CO₂ concentrations due to ocular and nasal nociceptor activation by carbonic acid.
- Any set up must allow for pigs to comfortably sit and stand in the container.
- Ensure that the container allows for visual observation of piglets during gas exposure.
- Gas concentration, temperature and flow rate must be monitored at all times.
- Gas inlet and gas flow must not be directly aimed at piglets.
- Pigs must be kept exposed to the gas at appropriate concentrations and for adequate time to ensure death.
- Behavioural responses to CO₂ can differ due to pig genetics, with more excitable breeds often having more adverse reactions in comparison to calmer breeds.

Inert gases (nitrogen or argon)

Similar to CO₂, inert gases may be a suitable option for piglets <5kg in small purpose-built containers, in which multiple piglets can be euthanased at the same time. Inert gases have the benefit of being undetectable to pigs and therefore may be less aversive than CO₂.

Welfare considerations

- Any set up must allow for pigs to comfortably sit and stand in the container.
- Ensure that the container allows for visual observation of piglets during gas exposure.
- Gas concentration, temperature and flow rate must be monitored at all times.
- Gas inlet and gas flow must not be directly aimed at piglets.
- Pigs must be kept exposed to the gas at appropriate concentrations and for adequate time to ensure death.

Non-penetrating captive bolt

Suitable for piglets <5kgs. Non-penetrating captive bolt guns for small animals have been shown to be effective in euthanasia of piglets. The captive bolt gun must be calibrated and appropriate for the size of the piglet.

Welfare considerations

- Individual handling, catching and restraint of piglets must follow correct normal handling procedures.
- Selection of the appropriate cartridge strength, bolt head and bolt velocity.
- Correct positioning when firing is essential to ensure effective euthanasia.
- Captive bolt guns are at risk of over-heating with repeated use therefore it is essential that multiple captive bolt guns are available, and use is rotated.

Penetrating captive bolt

Suitable for piglets and pigs >5kgs. The captive bolt gun must be designed and calibrated for the size and age of the pigs.

Welfare considerations

- Individual handling, catching and restraint of pigs must follow correct normal handling procedures.
- Handling considerations by pig age/weight:
 - Weaners (5-25kgs) must be either confined to small pens or caught and restrained individually.
 - Growers and finishers (25-100kgs) must be confined to small pens, races or single-deck transport vehicles (as appropriate) when using a captive bolt gun.
 - Gilts, sows and boars (>100kgs) must be held in pens with sufficient space so as not to cause distress in pigs.
 - Nursing sows in farrowing crates must be removed from farrowing crates before euthanasia. Unweaned piglets must be euthanased concurrently with their mothers.
- Selection of the appropriate cartridge strength, bolt length and bolt velocity.
- Correct positioning when firing is essential to ensure effective euthanasia.
- Captive bolt guns are at risk of over-heating with repeated use; therefore, it is essential that multiple captive bolt guns are available, and use is rotated.
- To ensure death, a secondary method such as pithing or exsanguination after administering the bolt may be required, especially for adult pigs.

Firearms (free bullet)

Suitable for piglets and pigs >5kgs that may be housed outdoors and cannot be caught or handled. The type of firearm and bullet must be appropriate for the age and size of the pigs as well as the distance in which the shooting is taking place.

Welfare considerations

- Correct aiming when firing is essential to ensure effective euthanasia. Only head shots must be used.
- Pigs must be moved into small yards/pens, if possible, to allow for accurate aiming of the firearm and to facilitate carcass collection/disposal after euthanasia.
- Consideration must be given to how animals will be checked following gunshot to ensure death and if pithing or exsanguination as a secondary method is required.

New or previously un-used euthanasia methods

Other euthanasia methods not mentioned above must be subject to a humaneness assessment to determine the animal welfare impact of the method and whether it is justified, effective and humane. The humaneness assessment must also consider the three critical points where animal welfare can be negatively impacted during mass euthanasia, which includes the animal handling and restraint prior to killing, the stunning/killing method being used, and confirmation of death.