CHAPTER 7.6.

ANIMAL WELFARE AT THE TIME OF KILLING FOR PURPOSES OTHER THAN SLAUGHTER

Article 7.6.1.

Introduction

Animals are killed for a variety of reasons, ~~including those~~ that may not make their transport for *slaughter* or the safe use of their products possible. Such reasons may include for contagious disease control, in cases where their welfare may be compromised due to ~~of~~ natural or ~~man-made~~ human-made disasters, when they are otherwise suffering from disease or injuries, for animal population control or for economic reasons. It is important to ~~consider~~ ensure that ~~consider optimise their~~ *animal welfare* concerns are managed during such killing for purposes other than slaughter ~~this process within the practical constraint of the situation~~.

Article 7.6.2.

Scope

This chapter identifies hazards to animal welfare during *killing* for purposes other than *slaughter* and provides recommendations for the appropriate procedures for such *killing*. It provides animal-based and other measures to assess the level of welfare during the process and recommends appropriate remedial actions to be applied.

This chapter applies to the killing of domestic and *captive wild* ~~ruminants, equids, birds, pigs, rabbits, camelids and mustelids for all purposes, except for slaughter which is covered by Chapter 7.5. Animal welfare during slaughter~~ mammals and birds (hereafter animals). The number of animals killed is situation-dependent and may range from an individual to a large-scale population.

Killing of reptiles is covered by Chapter 7.14. Killing of reptiles for their skin, meat and other products and killing of dogs for population management ~~is~~ are covered by Chapter 7.7. Dog population management and Killing of animals used in research and education is covered by Chapter 7.8. ~~The numbers of animals killed is situation-dependent and could range from an individual to a large-scale population.~~

This chapter should be read in conjunction with the guiding principles for *animal welfare* provided in Chapter 7.1.

Article 7.6.3.

General principles ~~for the operations regarding the *killing* of animals~~

The decision as to whether to kill animals due to compromised welfare should not be delayed if there is any risk to the welfare of those animals. The recommendations in this Chapter are based on the premise that a decision to kill the animals has been made and they address the need to ~~ensure~~ ensure that ~~consider~~ ~~the~~ animal welfare concerns are managed prior to and during the killing process and until ~~of~~ the animals are dead ~~of the animals until they are dead~~.

During decision making and prior to *killing* the animals, appropriate husbandry, especially supply of feed and water and thermal comfort, should be maintained until the animals are killed. Medical care should be provided if needed in situations where there is an unavoidable delay before killing ~~if needed~~.

United States	**Comment category:** Additions **Proposed amended text**: During decision making and prior to *killing* the animals, appropriate husbandry, especially supply of feed and water and thermal comfort, should be maintained **as practical** until the animals are killed. ~~Medical care~~ **Veterinary care and**

	supervision should be provided if needed in situations where there is an unavoidable delay before killing ~~if needed~~. **Rationale:** Recommend the change in the first sentence to acknowledge that flexibility may be needed in some situations. Recommend the edit in the last sentence to clarify that veterinary care and supervision are important considerations that rely on the professional judgment of responders, particularly veterinarians, since not every scenario can be anticipated. **Supporting evidence**: AVMA Guidelines for the Depopulation of Animals: 2026 Edition

Advanced planning for various scenarios, including adverse events and large scale killing, should clearly identify operational procedures and responsibilities.

For large scale killing, specific planning and preparedness should be in place.

The decision as to whether to kill animals should not be delayed if their welfare is compromised. The decision maker should be clearly identified beforehand to ensure there is no delay in decision making ~~is not delayed~~.

All personnel involved in the killing of animals should have the relevant skills and competencies, acquired through training or experience.

~~As necessary, operational procedures~~ The selected method and associated operational procedures should be evidence-based adapted to the species and specific circumstances in the affected locations or on the premises ~~and~~ they should address, apart from animal welfare, resources requirements ~~the~~ ~~cost~~, the effectiveness~~,~~ and ~~the~~ speed of implementation of the method, operators' safety and mental health, biosecurity and environmental aspects relevant to the species.

United States	**Comment category:** Addition **Proposed amended text**: ~~As necessary, operational procedures~~ The selected method and associated operational procedures should be evidence-based adapted to the species and specific circumstances in the affected locations or on the premises ~~and~~ they should address, apart from animal welfare, resources requirements ~~the~~ ~~cost~~, the effectiveness~~,~~ and ~~the~~ speed of implementation of the method, operators' safety and mental health, biosecurity and environmental aspects relevant to the species **and oftentimes, the reduction of disease threat to animals and humans.** **Rationale:** The selection of killing methods must address scientific, practical, ethical, and public considerations. Animal welfare is paramount, but complex decisions need also account for other factors such as protecting public health and avoiding environmental contamination. **Supporting evidence**: N/A

~~During decision making and prior to killing the animals, normal husbandry, especially supply of feed and water, should be maintained until the animals are killed.~~

Animals might be killed on site or moved to a dedicated place for killing. The handling and movement of animals should be minimised and carried out in accordance with the recommendations described below.

When restraint is required ~~Animal restraint~~ it should be sufficient to facilitate effective killing, and in accordance with animal welfare and operator safety requirements~~. When restraint is required~~, and killing should follow without ~~minimal~~ delay. The type and size of restraint deployed should be appropriate for the

age, size and species of animal to be killed. When herding or corralling is applied, a low-stress method using appropriate apparatus to facilitate the safe and effective killing of animals should be used.

Wherever possible the witnessing of killing animals and dead animals by other animals should be avoided.

Killing methods used should result in immediate death or loss of consciousness lasting until death. When loss of consciousness is not immediate, induction of unconsciousness ~~should involve as little aversion as possible and~~ should not cause avoidable distress, fear and pain. A backup ~~procedure~~ method should be available and used to kill the animal immediately if the first method does not result in death or unconsciousness within the expected time frame.

~~Young animals should be killed before older animals on which they are dependent to reduce potential distress.~~

Planning should take into account the order in which animals are killed. Where possible higher risk or vulnerable animals should be killed as a matter of priority, which may include:

- groups with ~~symptomatic~~ animals showing signs of disease,
- animals suffering the highest levels of pain or injury,
- animals that are unable to ~~obtain~~ access feed or water,
- animals that have compromised housing or are without shelter,
- young ~~[REF]~~ or unweaned animals that should be killed before older animals on which they are dependent,
- potentially dangerous or aggressive animals, such as bulls, sows with litters, or boars,
- animals in the late stage of pregnancy or in parturition, and
- animals in-utero ~~may~~ should ~~need to~~ be ~~humanely~~killed following the killing of the dam if the amniotic sac is ruptured and foetal viability is apparent.

~~For disease control purposes and for biosecurity considerations, infected animals should be killed first, followed by in-contact animals, and then remaining animals.~~

There should be continuous monitoring of the operational procedures and corrective actions to ensure they are consistently effective regarding animal welfare, operator safety and mental health ~~and~~, *biosecurity* and environmental aspects.

When large scale or disease control~~, the~~ killing ~~operational~~ operations procedures are concluded, there should be a debriefing session or written report describing the practices adopted and their effect on animal welfare, operator safety and ~~welfare~~ wellbeing, *biosecurity* and environment, ~~responsible personnel~~ including any recommendations for improvement.

United States	**Comment category:** Editorial **Proposed amended text**: When large scale or disease control~~, the~~ killing ~~operational~~ operations **and** procedures are concluded, there should be a debriefing session or written report describing the practices adopted and their effect on animal welfare, operator safety and ~~welfare~~ wellbeing, *biosecurity* and environment, ~~responsible personnel~~ including any recommendations for improvement. **Rationale:** Edit provides clarity and sentence completion. **Supporting evidence**: N/A

Article 7.6.4.

Organisational structure for the operations ~~regarding~~ ~~the~~ of large scale killing or killing for disease control of animals

Plans for large scale killing or killing for disease control should contain details of responsibilities, management structure, contact details, disease control strategies, operational procedures and necessary equipment and resources. *Animal welfare* considerations should ~~always~~ be addressed as a priority in these plans. The plans should include a strategy to ensure that an adequate number of personnel competent in the *killing* of animals is available.

~~The personnel responsible for the handling, moving, restraining and killing the animals should follow the recommendations of this chapter.~~

In case of disease control or other large scale killing, o~~O~~perational activities should be led by the *Competent ~~authority~~ Authority* who has the authority to ensure the required *animal welfare* and *biosecurity* standards are met. In situations that do not necessarily involve the Competent Authority, the personnel responsible should follow the recommendations of this chapter.

The *Competent* ~~authority~~ *Authority* should nominate a responsible agent for all activities across one or more affected locations or premises who should be supported by coordinators for planning operations and logistics to facilitate efficient operations.

The nominated responsible agent ~~of the *Competent authority*~~ should provide overall guidance to personnel and logistic support for operations at all affected locations or premises to ensure consistency in adherence to the *Terrestrial Code's animal welfare* and animal health recommendations.

A specialist field team, led by a team leader answerable to the nominated responsible agent ~~nominated by the *Competent Authority*~~, should be deployed to work on each affected location or premises. ~~In some situations,~~ When needed, personnel may be required to fulfil more than one function. Each team should contain a competent *veterinarian* or have access to veterinary advice at all times.

~~Emergency plans should be in place and contain details of responsibilities, management structure, disease control strategies, operational procedures and necessary equipment and resources. *Animal welfare* considerations should always be addressed in these emergency plans. The plans should include a strategy to ensure that an adequate number of personnel competent in the *killing* of animals is available.~~

~~Depopulation under disease control emergency plans should be performed under the supervision of~~ The *Competent Authority* should address any *animal welfare* issues that may result from standstill or any other animal movement restrictions. This may involve welfare killing resulting from overcrowding or lack of access to feed or water.

In considering the *animal welfare* issues associated with *killing* animals, the key personnel, their responsibilities, and competencies required are described in Article 7.6.5.

~~Whenever animals are killed, for emergency or disease control purposes, the country's *Competent Authority* should be involved to protect animal welfare and biosecurity. In other situations that do not necessarily involve the *Competent Authority*, the personnel responsible should follow the recommendations of this chapter.~~

Article 7.6.5.

Responsibilities, training and competencies of the specialist team for ~~the operations regarding the mass~~ killing operations ~~of animals~~

All personnel have a crucial role to play in ensuring good animal welfare ~~conditions through to~~ leading up to and during the killing ~~process and through to death~~. Training for all personnel should emphasise the importance of animal welfare and their responsibility in contributing to the welfare of the animals. Individuals may play more than one role or alternate roles as required.

Competencies may be gained through a combination of formal training and practical experience. These competencies should be assessed, when relevant, by the *Competent Authority* or by an independent body recognised by the *Competent Authority*

1. Team leader

a) Responsibilities

i) plan overall operations on affected location or premises;

ii) determine, ~~and~~ address and monitor requirements for *animal welfare*, operator safety and *biosecurity*;

iii) organise and manage team of people to facilitate *killing* of the relevant animals on the location or premises in accordance with national regulations and these recommendations;

~~(iii)~~iv) determine logistics required;

~~v) monitor operations to ensure *animal welfare*, operator safety and *biosecurity* requirements are met;~~

v~~i~~) seek and use veterinary advice;

vi~~i~~) report upwards on progress and problems;

vii~~i~~) provide a written report or debrief at the conclusion of the *killing* operation, describing the practices adopted and their effect on *animal welfare*, operator safety, efficacy of *biosecurity* and environmental impact.

b) Training and c~~C~~ompetencies

i) ~~knowledge~~ understanding of and experience with relevant animal husbandry practices;

ii) ~~knowledge~~ understanding of *animal welfare*, impact of ~~,~~ different killing methods, and the details, planning and implementation of the *killing* operation~~,~~; ~~and the underpinning behavioural, anatomical and physiological processes involved in the *killing* operation;~~

iii) leadership and ability to ~~skills to~~ manage all activities on the location or premises ~~and deliver outcomes on time~~;

iv) awareness of psychological effects on farmer, team members or person(s) in charge of animals [AVMA, 2019], and general public;

~~iv)~~ v) awareness of fatigue effects on those carrying out repeated killing of large numbers of animals and on the effectiveness of the procedure [AVMA, 2019];

~~v)~~ vi) ability to communicate effectively with different audiences ~~communication skills~~;

~~vi)~~ vii) capacity to evaluate the environmental impacts caused by their operation.

2. Veterinarian

a) Responsibilities

i) advise on ~~determine~~ and supervise the implementation of the most appropriate *killing* method to ensure that animals are killed with minimal ~~without avoidable pain and distress~~ ~~minimising~~ pain, fear and suffering;

ii) determine and implement any necessary ~~the~~ additional requirements for *animal welfare*, including the order of *killing*;

iii) ensure that confirmation of the *death* of the animals is carried out by competent persons as soon as possible ~~at appropriate times~~ after the *killing* procedure;

iv) minimise the risk of disease spread within and from the location or premises through the supervision of *biosecurity*;

v) ~~continuously monitor~~ ~~ensuring~~ ensure *animal welfare* and *biosecurity* during the killing process;

vi) collaborate with the team leader on the written report or debrief at the conclusion of the *killing*.

b) Training and c~~C~~ompetencies

i) understanding of ~~ability to assess~~ *animal welfare* and ability to assess it;

ii) ~~Understanding~~ knowledge of ~~especially~~ the effectiveness of the *killing* process and ~~the~~ ability to correct any deficiencies;

iii) knowledge of the different killing methods and their impacts on animal welfare, and the underlying anatomy, physiological and behavioural processes involved in the killing operation.

iv) ability to assess *biosecurity* risks.

3. Animal handlers

a) Responsibilities

i) review on-site facilities ~~in terms of their~~ for appropriateness;

ii) design temporary animal handling facilities, when required;

iii) move and restrain animals;

iv) report *animal welfare* and *biosecurity* issues to the *veterinarian*.

b) Training and c~~C~~ompetencies

i) understand the species-specific behavioural patterns of the animals they are working with and the underlying principles and techniques for carrying out the required tasks including restraint;

ii) ~~animal handling in emergency situations and in close confinement is required;~~ capable ~~to~~ of identifying signs of distress, fear, and pain and to take preventive and corrective actions;

iii) understanding of *biosecurity*.

4. Personnel in charge of killing animals

a) Responsibilities

i) k*illing* of the animals using an appropriate method;

ii) when applicable confirm the unconsciousness of the animals;

iii) confirm the death of the animals.

b) Training and c~~C~~ompetencies

i) Safely and correctly use and maint~~e~~ain~~ance of relevant~~ equipment;

ii) Operate ~~familiarity with the techniques of~~ restraining and killing equipment for the species involved;

iii) ~~knowledge~~ ability to assess effective killing, to recognize signs of recovery of consciousness, and the skill to take immediate corrective action.

~~5. Personnel in charge of disposal of dead animals~~

~~a) Responsibilities~~

~~i) An ensuring efficient dead animal disposal so that (to ensure *killing* operations are not hindered) should be ensured~~

~~ii) understanding of biosecurity and ensuring compliance with Chapter 4.13~~

~~b) Training and Competencies~~

~~i) The personnel should be competent to safely use and maintain available equipment and apply techniques for the species involved.;~~

~~ii) Recognise signs of life.~~

5. Breeder, owner, farmer or keeper ~~or manager~~

a) Responsibilities

i) assist when requested.

b) Training and c~~C~~ompetencies

i) specific knowledge of ~~his/her~~ the animals that ~~are~~ they are responsible for and their ~~environment~~ premises.

Article 7.6.6.

Considerations in the planning of the operations regarding the ~~mass~~ large scale killing of animals

Many activities ~~will need~~ are to be conducted on affected locations or premises, including the *killing* of animals. The team leader should develop a plan and prepare for large scale *killing* of animals on the location or premises which should include consideration of:

a) minimising handling, restraint and movement of animals;

b) *killing* the animals on the affected locations or premises; however, there may be circumstances where the animals ~~may need to be~~ are moved to another location for *killing*; when the *killing* is conducted at a *slaughterhouse/abattoir*, the recommendations in Chapter 7.5. should be followed;

c) the species, number, age and size of animals to be killed, and the order of *killing* them, ensuring animals at higher risk of suffering or spreading disease are prioritized in the order of killing;

d) *killing* methods, and their resource requirements ~~of *killing* the animals, and their cost~~;

e) available resources, funding, ~~including cost,~~ staff numbers, required competencies and training needs, and any other practical elements;

f) description of the process and criteria to assess~~ment of state of~~ unconsciousness ~~and signs of life~~ and confirmation of death;

g) housing, husbandry, location of the animals as well as accessibility of ~~the farm or~~ the place they are situated;

h) the availability and effectiveness of equipment needed for *killing* of the animals, as well as the time necessary to kill the required number of animals using such methods;

i) the availability on the locations or premises of facilities that will be used to assist with the *killing*, and the necessity of any additional facilities;

j) potential *biosecurity* and environmental impact of the operations;

k) the health and safety of personnel conducting the *killing*;

~~l) any legal issues that may be involved, for example where restricted veterinary drugs may be used, or where the process may impact on the environment;~~

~~m) the presence of other nearby premises holding animals;~~

~~n) possibilities for removal and disposal of dead animals.~~

United States	**Comment category:** Addition

	Proposed amended text: l) possibilities for removal and disposal of dead animals. **Rationale:** This should be included as one of the considerations in the planning of the operations regarding a large-scale killing of animals because inappropriate carcass disposal can be hazardous to the environment (chemical and physical methods of killing can have residues), it can be unsightly for the public and may lead to further disease spread. **Supporting evidence**: AVMA. Animal Carcass Disposal. Accessed May 4, 2026. USDA. Carcass Management. Last updated January 11, 2026. Accessed May 4, 2026.

The plan should ensure ~~minimise the negative~~ animal welfare ~~impacts of~~ at the time of *killing* by taking into account the different phases of the procedures to be applied for *killing* including handling, restraint, killing method, confirmation of death and backup methods.

~~Competences and skills of the personnel handling and *killing* animals should be included in the operational plan.~~

Article 7.6.7.

Hazards to animal welfare

~~For the purpose of this chapter, *hazards* to *animal welfare* means a factor with the potential to adversely affect *animal welfare*.~~

When killing animals, they may be exposed to different *hazards* to *animal welfare* ~~hazards~~ including improper ~~restraining~~ restraint, rough handling, forced movement, absence of or improper design of premises, inadequate construction and maintenance of premises, witnessing other animals being killed, dying or dead, improper use of equipment, adverse weather conditions, unexpected loud noise and ~~ineffective~~ potentially aversive or ineffective *killing* methods.

Exposure to multiple hazards ~~to *animal welfare*~~ can have a negative cumulative effect on ~~the animals~~ *animal welfare* [Moberg and Mench, 2000].

Hazards to animal welfare can be minimised by appropriate ~~design of~~ premises, handling and restraint, ~~and~~ choice of equipment, ~~and method of~~ killing method ~~and through~~, good management, training and competency of personnel.

Article 7.6.8.

Measures to assess animal welfare at the time of killing for purposes other than slaughter

~~Hazards to a~~Animal welfare at the time of killing for purposes other than slaughter should be assessed using animal-based measures. ~~However, consideration should be given to the resources provided as well as the design and management of the method.~~

Measures to assess welfare during handling and restraint in Chapter 7.5 are applicable to this chapter.

~~These a~~Animal-based measures should be routinely used in the monitoring of the state of consciousness and death, with the most appropriate ~~to be~~ used ~~in relation~~ based on ~~to~~ the killing method applied and resources available.

1. The following animal-based measures can be useful indicators of animal welfare. These measures can be considered as tools to monitor the effectiveness of the loss of consciousness and confirmation of death ~~efficiency of design and management, given that they can affect animal welfare~~. It may be useful to use m~~M~~ultiple indicators ~~should be used~~ to determine effectiveness of the method.

    a) Immediate collapse

~~Effective~~ ~~stunning~~ ~~loss~~ Loss of consciousness can be recognised from the immediate loss of posture leading to collapse of the animal. ~~Ineffectively stunned~~ Conscious animals, on the other hand, will fail to collapse or will attempt to regain posture after collapse. ~~Some ineffectively stunned animals, may occur, for example, if captive bolt shooting position is wrong or electrically immobilised animals lose posture, but remain conscious~~. ~~The absence of immediate collapse is always indicative of consciousness~~

b) Tonic–clonic seizures

Effective electrical and in some cases captive bolt methods ~~stunning often~~ result in the presence of tonic–clonic seizures. Tonic seizures can be recognised by an arched back and rigidly flexed legs under the body and will last for several seconds. It is followed by clonic seizures lasting for seconds and manifested as leg kicking or paddling. The absence of tonic–clonic seizures may be indicative of consciousness [Van der Wal, 1971].

~~a) Righting reflex [Atkinson et al, 2013; Terlow et al, 2016]~~

~~The righting reflex refers to any reflex that tends to bring the body into its normal upright position. Ineffectively For example effectively stunned killed animals and those recovering consciousness will not attempt to raise their heads or shake their heads after stunning, which is referred to as righting reflex.~~

c) Absence of r~~R~~hythmic breathing [Atkinson et al, 2013; Kamenik et al, 2019, Vecerek et al, 2020]

Effective ~~stunning~~ killing will result in ~~immediate~~ onset of apnoea (absence of breathing). Ineffectively ~~stunned~~ killed animals and those recovering consciousness will start rhythmic ~~breathe~~ breathing~~in a pattern commonly referred to as rhythmic breathing~~, which may begin as gagging and lead to respiratory cycles of ~~inspiration~~ inhalation and ~~expiration~~ exhalation. Breathing can be recognised from the regular flank, abdominal, ~~and/~~or mouth and nostril movements. ~~Recovery of B~~breathing~~, if not visible through these movements,~~ can also be checked by holding a small mirror in front of the nostrils or mouth and checking for condensation~~to look for the appearance of condensation due to expiration exhalation of moist air~~. Rhythmic breathing is not to be confused with agonal breaths.

d) Corneal reflex:

The corneal reflex is elicited by touching or tapping the cornea and checking for a blink response, which will be absent in effectively killed animals. ~~Ineffectively stunned Conscious animals and those recovering consciousness will blink in response to the stimulus. Effectively stunned killed and stuck (bled) animals show the absence of the corneal reflex~~during any key stage. ~~On the other hand, ineffectively or poorly stunned animals and those recovering consciousness prior to sticking or during bleeding are expected to show the presence of the corneal reflex at any key stage. It is worth noting that placement of electrical stunning tongs (electrodes) over the eyes of animals may render this indicator invalid~~.

e) Palpebral reflex

The palpebral reflex is elicited by touching or tapping a finger on the inner/outer eye canthus or eyelashes and checking for a blink response, which will be absent in effectively killed animals. ~~Correctly stunned animals will not show a palpebral reflex. Ineffectively stunned Conscious animals and those recovering consciousness will blink in response to the stimulus at any key stage. It is worth noting that placement of electrical stunning tongs (electrodes) over the eyes of animals may render this indicator invalid. Effectively killed animals will not show a palpebral reflex.~~

f) Eye movement

Eye movements and the position of the eyeball can be recognised from close examination of eyes after stunning. Conscious animals and those recovering consciousness will show eye movements. ~~Correctly stunned~~ Effectively killed animals will show fixed eyes, and this can be recognised from wide open and glassy eyes with clearly visible iris/cornea in the middle. ~~Eyeballs may be obscured in some animals owing to rotation into the eye socket following effective stunning. Ineffectively stunned Conscious animals and those recovering consciousness will show eye movements [EFSA AHAW Panel, 2013, Kamenik et al, 2019]~~

2. The following animal-based measures can be used as indicators of consciousness, but their absence does not necessarily ~~but are not sensible to~~ indicate unconsciousness. Therefore, they can be used in addition to the previously mentioned animal-based measures:

~~b) Response to painful stimuli~~

~~Poor stunning can be recognised from the response to painful stimulus. The absence of response to a painful stimulus indicates unconsciousness following stunning. [Terlow et al, 2016. Kemenik et al, 2018]~~

a) ~~b)~~ Spontaneous blinking

Conscious animals may show spontaneous blinking resulting from ~~and therefore this sign can be used to recognise~~ ineffective ~~stunning~~ killing or recovery of consciousness ~~after stunning. However, not all the conscious animals may show spontaneous blinking~~. ~~Spontaneous blinking can be used as an indicator at all key stages of monitoring. It is worth noting that placement of electrical stunning tongs (electrodes) over the eyes of animals may render this indicator invalid.~~ [Gregory et al, 2007; Terlouw et al, 2016, Kamenik et al, 2018]

b) ~~c)~~ Vocalisation

Vocalisation indicates consciousness but ~~is expected only in conscious animals and can be used as an indicator in all key stages of monitoring. However,~~ not all conscious animals will vocalise~~, and hence the absence of vocalisation does not always mean that the animal is unconscious~~. [Atkinson et al, 2013; Kamenik et al., 2018]

c) Righting reflex [Atkinson et al, 2013; Terlow et al, 2016]

The righting reflex refers to any reflex that tends to ~~bring~~ restore the body into its normal upright position. ~~Ineffectively~~ For example ~~effectively stunned killed animals and those recovering consciousness will not attempt to raise their heads or shake their heads after stunning, which is referred to as a lack of righting reflex,~~animals that are effectively stunned or killed, as well as animals recovering consciousness, will not attempt to raise or shake their heads after stunning; such movements are indicators of the righting reflex.

United States	**Comment category:** Editorial **Proposed amended text:** The righting reflex refers to any reflex that ~~tends~~ **attempts** to ~~bring~~ restore the body into its normal upright position. ~~Ineffectively~~ For example ~~effectively stunned killed animals and those recovering consciousness will not attempt to raise their heads or shake their heads after stunning, which is referred to as a lack of righting reflex,~~animals that are effectively stunned or killed, as well as animals recovering consciousness, will not attempt to raise or shake their heads after stunning; such movements are indicators of the righting reflex. **Rationale:** The new word choice clarifies the definition of “righting reflex”. **Supporting evidence**: N/A

3. ~~The~~ A combination of the following animal-based measures can be used ~~as the confirmation~~ to confirm death ~~of death~~ before carcass disposal:

a) Muscle tone

Immediately after killing, dead animals will lose muscle tone, which can be recognized from the completely relaxed head, legs, floppy ears~~,~~ or drooping wings relaxed tongue and relaxed jaws.

a) Heartbeat

Onset of death leads to permanent loss of heartbeat, which can be ascertained physically by using a stethoscope or by heart or arterial palpation (checking for a pulse), where possible. [Vogel et al.,

2011] A pulse can be checked in suitable animals by a skilled operator commonly using a finger held lightly at the jugular (neck) or femoral (groin) area but is more difficult and less reliable compared to use of a stethoscope.

b) Dilated pupils

Fixed and d~~D~~ilated pupils (mydriasis) are an indication of death.

Article 7.6.9.

Handling of animals

Handling is the process of preparation of the animals for killing, and may include moving them to the killing point. Handling and moving can be stressful to animals, especially when they are isolated out of their primary home area or from their group. [Gavinelli et al. ,2014].

1. Animal welfare concerns

Exposure to novel ~~environments~~ circumstances (e.g. noise, lighting, flooring, smell) may cause fear and reluctance to move~~, or turning back~~. ~~Poorly designed facilities and~~ inappropriate handling (e.g. inappropriate use of electric~~al~~ goads, kicking, hitting with a stick), catching, herding and restraining animals~~)~~ will cause *distress*, fear and *pain*.

2. Animal-based and other measures:

a) animals slipping, falling and piling up;

b) animals turning around or moving backwards, attempting to escape or reluctant to move;

c) animals vocalising;

d) animals that collide with facility structures;

e) animals with broken or otherwise injured limbs;

f) animals that are unable to move by themselves due to reasons other than broken or injured limbs;

g) use of force by personnel;

h) inappropriate use of ~~electrical goads driving~~ handling aids.

3. Recommendations

The ~~D~~design of the facilities should promote the natural movements of animals, and, as far as possible, minimise human animal interaction.

Floor should be clean, dry and not slippery.

Raceways should be well lit so that animals can see where they are going.

The design of raceways should minimise distractions that may cause animals to stop, baulk or turn back (e.g. shadows, changes in flooring, moving objects, loud or sudden noises).

Animals that are injured, sick or unable to rise require immediate action and, when necessary, emergency *killing* should be performed ~~without moving them and~~ without delay. Animals should not be dragged, nor should they be lifted or handled in a way that might cause further *pain* and suffering or exacerbate injuries.

Personnel should be calm and patient, assisting animals to move using a soft voice and slow movements.

Animals should be moved in groups as this decreases fear and makes use of their natural tendency to follow other animals.

Handling aids such as panels or flags should be used in a manner to encourage and direct movement of the animals without causing *distress*, fear or *pain*.

Electric goads should not be used, except in extremely rare circumstances where the safety of human handlers or other animals is at risk and there is no other option ~~routinely, but only when other measures have been ineffective,~~ or the animal has no injury or other condition and there is room for the animal to move forward.

United States	**Comment category:** Change **Proposed amended text**: Electric goads should not be used, except in extremely rare circumstances where the safety of human handlers or other animals is at risk and there is no other option ~~routinely, but only when other measures have been ineffective, or~~ **and** the animal has no injury or other condition and there is room for the animal to move forward. **Rationale:** The insertion of the word "or" creates confusion and changes the meaning of the sentence from what WOAH's Terrestrial Animal Health Standards Commission (TAHSC) intended, based on its responses to various comments on the section in the February 2026 report, comment # 7.6.9._26_ on p 233. The use of "or" in this sentence could be misinterpreted as saying that that electric goad use is justified if the animal is healthy, uninjured, and has room to move forward which is not the intent of this sentence. **Supporting evidence**: Report of the Meeting of WOAH Terrestrial Animal Health Standards Commission

Only low-voltage goads should be applied to the hindquarters of adult pigs and large ruminants, and never to sensitive areas such as the eyes, mouth, ears, ano-genital region, udders or belly. Such instruments should not be used on equids, camelids, ratites, sheep and goats, pregnant animals or on calves or piglets. Shocks should not be used repeatedly if the animal fails to respond and should not last longer than one second.

The manual lifting of animals should be avoided; if it is necessary, animals should not be grasped or lifted in a manner which causes *pain* or suffering and physical damage (e.g. bruising, fractures, dislocations).

Animals should not be forced to move at a speed greater than their normal walking pace to minimise injury through slipping or falling.

Article 7.6.10.

Killing methods

~~The following killing methods are globally available and in use.~~ The main purpose of this part of the chapter is to provide information as guidance with the appropriate selection of killing methods for particular situations, and ensure that where killing methods are in use that they are undertaken in a manner that ensures that ~~optimises~~ ~~consider~~ *animal welfare* concerns are managed.

For each killing method the suitable animal species, a description of the killing method and its use in ~~animal~~ those species, animal welfare concerns, identification of animal-based and other welfare measures, recommendations for effective use to ~~optimise~~ ensure ~~consider~~ welfare, and any species-specific recommendations are presented in Articles 7.6.11. to 7.6.32.

Standard operating procedures should be in place that define key operating parameters and follow the manufacturer's recommendations for stunning ~~or~~ and killing.

For the purposes of this chapter:

A primary killing method is intended to cause death as a standalone procedure. While it should be sufficient on its own, a backup or alternative method may be required if the primary method fails to result in rapid death.

A secondary killing method is used as ~~a~~ the final step of a two-stage process. It is applied after the animal has ~~already been made~~ been rendered unconscious by an initial stunning method. The secondary method is considered a terminal procedure. While it should be sufficient on its own to cause rapid death ~~of an animal~~, a backup or alternative method may be required if ~~the method fails to result in rapid death~~ it fails to do so.

The killing methods covered are divided into two broad categories. Manual, individual killing methods which involve a human operator or operators manually performing a killing procedure on individual animals (Articles 7.6.11. to 7.6.22.); and automated large scale killing methods which involve automated procedures for large scale killing of many animals either sequentially (e.g. water baths) or simultaneously (e.g. atmospheric modification) (Articles 7.6.23. to 7.6.32).

Article 7.6.11.

Firearms

The method is suitable for all species covered by this chapter.

Firearms that fire free projectiles such as a shotgun, rifle, or handgun can provide a quick and effective primary killing method ~~for killing~~ when used properly. They require minimal or no restraint of the animals and can be used to kill from a distance by properly trained and competent ~~marksmen or markswomen~~ markspersons.

A firearm can be used from long range and may be aimed to penetrate the skull or soft tissue at the top of the neck of the animals (high neck shot) ~~and to cause irreversible concussion and~~ resulting in immediate death. ~~and should only be used by properly trained and competent marksmen~~. The firearm may also be aimed to penetrate the thoracic cavity and heart causing respiratory and heart failure and death. Firearms should only be used by properly trained, and where applicable, licensed competent markspersons.

1. Animal welfare concerns

   This method has the potential for non-lethal wounding of the target animal and lethal or non-lethal wounding of non-target animals. This may occur because of inappropriate cartridge, calibre or type of bullet or incorrect shooting position.

2. Animal-based and other measures

   Animal-based measures of an effective shot include [HSA, 2016b]:

   a) immediate collapse;

   b) apnoea;

   c) carcass appearance (tonic or relaxed);

   ~~d) duration of convulsions~~

   d) absence of eye movement;

   e) fixed and dilated pupils; ~~glazed expression~~

   f) absence of corneal reflex.

   Other measures:

   a) percentage of missed shots.

3. Recommendations

   ~~The method is suitable for all species covered by this chapter~~

   Firearms and ammunition should be selected based on the species and the distance to shoot the animals, and the skill and familiarity level of the operator. The correct cartridge, calibre and type of bullet for the different species age and size should be used. Firearms should be properly maintained.

   ~~Firearms are suitable for killing agitated animals in open spaces.~~

Firearms should not be used if trying to preserve ~~brain~~ tissue in the area targeted for diagnosis of diseases or when leakage of body fluids may present a biosecurity risk.

Training is essential for ensuring effective killing with firearms. This training ~~must~~ should include approaches that ensure skilled ~~marksmanship~~ markspersonship; an understanding of safety principles, animal anatomy, animal behaviour; animal handling; use of appropriate combinations of firearms and bullets for the intended purpose; and appropriate judgment under field conditions.

At short range, the ~~marksman or markswoman~~ marksperson should ensure that the animal is not moving and in the correct position to enable accurate targeting and the range should be as short as possible (5–50 cm for a shotgun) but the barrel should not be in contact with the head or other part of the animals.

Animals that are not killed by the initial shot, should be re-shot or killed by a backup method immediately.

~~The method is suitable for all species covered by this chapter~~.

4. Species-specific recommendations

None identified.

Article 7.6.12.

Penetrating captive bolt

The method is suitable for equids, camelids, cattle, sheep, goats, pigs, poultry, ratites, rabbits and captive wild animals.

The aim of this method is to produce a state of unconsciousness and cause severe damage to the brain by the impact and penetration of a captive bolt using a mechanical device. The captive bolt should be positioned on the skull to penetrate the cortex and mid-brain of the animal. The force of impact and the physical damage caused by the passage of the bolt should result in immediate unconsciousness. Physical damage to the brain caused by penetration of the bolt may result in death; however, a secondary ~~intervention~~ killing method such as pithing, bleeding or lethal injection may be required and if so should be performed as soon as possible ~~after the shot to ensure the death of the animal~~.

A penetrating captive bolt is fired from a ~~gun~~ device powered by either compressed air or a blank cartridge, designed to fire a retractable metal bolt into the animal's cranium. The bolt should be recessed into the body of the pistol to get the proper velocity required to penetrate the skull of the animal.

United States	**Comment category:** Editorial **Proposed amended text:** A penetrating captive bolt is fired from a ~~gun~~ device powered by either compressed air or a blank cartridge, designed to fire a retractable metal bolt into the animal's cranium. The bolt should be recessed into the body of the ~~pistol~~ **device** to get the proper velocity required to penetrate the skull of the animal. **Rationale:** To provide consistency with the edit from "gun" to "device" in the first sentence. **Supporting evidence**: N/A

1. Animal welfare concerns

An incorrect shooting position caused by poor restraint or incorrect captive bolt parameters (not hitting the skull with sufficient force) may leave the animal conscious. ~~will mis-stun the animal, leaving it conscious and~~ leading to serious wounds and consequently distress, fear and pain.

Regaining of consciousness before death due to delay in applying the secondary ~~intervention~~ killing method.

2. Animal-based and other measures

Animal-based measures of an effective shot include:

a) immediate collapse;

b) apnoea;

c) tonic seizures;

d) absence of eye movement;

e) absence of corneal reflex;

f) absence of palpebral reflex;

g) absence of righting reflex;

h) loss of muscle tone.

3. Recommendations

~~The method is suitable for equids, camelids, cattle, sheep, goats, pigs, poultry, ratites, rabbits and captive wild animals.~~

For cartridge powered and compressed air ~~guns~~ devices, the bolt velocity, cartridge power load and the length of the bolt should be appropriate to the species and type of animal, in accordance with the recommendations of the manufacturer.

Captive bolt ~~guns~~ devices should be frequently cleaned and maintained in good working condition. Regular check-up (e.g. daily during ongoing use) of the bolt velocity is recommended for effective stunning, operator safety, and improved animal welfare.

More than one ~~gun~~ device may be necessary to avoid overheating with repeated use, and a back-up ~~gun~~ device should be available in the event of an ineffective shot.

Animals should be restrained and the operator should ensure that the head of the animal is accessible. The method is difficult to apply in agitated animals.

Proper positioning of the captive bolt equipment is required as incorrect positioning causes inefficient stunning leading to pain and distress in animals.

Animal-based measures should be monitored continuously after application until *death* to ensure the absence of brain stem reflexes.

Suitable training and experience of operators in the application of captive bolt pistol, ergonomics and workload conditions should be considered for reducing fatigue in operators.

Penetrating captive bolt should not be used if preservation of brain tissue for diagnosis of diseases is needed or when leakage of body fluids may present a biosecurity risk.

The secondary killing method ~~intervention~~ should be performed ~~without delay~~ immediately after the shot to ensure the death of the animal.

~~The method is suitable for equids, camelids, cattle, sheep, goats, pigs, poultry, ratites, rabbits and *captive wild animals*.~~

4. Species-specific recommendations

The size of the skulls and the thickness of the skull bones should be taken into account when selecting parameters such as bolt diameter, bolt length and cartridge power in penetrative captive bolt ~~stunning~~. It is essential to follow the manufacturer's recommendations ~~for~~ regarding the most appropriate cartridges for different animals. ~~If~~ where there is doubt, a more powerful charge should be used.

Heavily horned animals should be stunned with penetrative captive bolt in the occipital position using a heavy-duty ~~contact-fired~~ captive bolt gun directed forward at the nose.

In new world camelids and hornless sheep and goats, the device should be placed at the crown position (highest point on the head) aiming downward to the base of the jaw [AVMA, 2020].

In turkeys the placement of the device should be directly on the midline of the skull and at the highest/widest point of the head with the captive bolt aimed directly down toward the brain.

In chickens (and poultry with comb development) the placement should be directly behind the comb and on the midline of the skull with the captive bolt aimed directly down.

In ratites a device with a short penetrating bolt and the smallest charge appropriate for poultry or rabbits should be applied to the top of the head at the midpoint of an imaginary line between the outer "ear" openings.

Article 7.6.13.

Pithing

Pithing is ~~not a standalone killing or stunning method~~, ~~it's it is~~ a secondary *killing* method ~~of *killing* animals which have~~ that should be use after ~~whereby~~ ~~been stunned by~~ a penetrating captive bolt has been applied, without immediate *death*. Therefore it is suitable for the same species as the penetrating captive bolt.

Pithing physically disrupts the central nervous system by the insertion of a flexible rod. The rod can be inserted caudally through the brain stem and spinal cord following ~~stunning by~~ the application of a penetrative captive bolt ~~or cranially through the spinal cord and brain stem following decapitation. Pithing can be used as a primary killing method for animals which have been stunned by a penetrating captive bolt, without immediate death or as a secondary method to ensure rapid death~~.

1. Animal welfare concerns

   Since pithing is not a primary killing method, but rather a~~n~~ ~~adjunct~~ secondary method, it ~~doesn't~~ does not have any welfare concerns of its own. However, it shares the welfare concerns of the primary method of killing ~~or stunning~~.

   Animals should be checked for unconsciousness before pithing takes place.

2. Animal-based and other measures

   ~~Absence of brain stem reflexes and other muscle movements (following initial violent muscle contractions) can be used to confirm successful pithing.~~

   a) absence of breathing,

   b) absence of corneal or palpebral reflex,

   c) fixed and dilated pupils,

   d) absence of muscle tone,

   e) absence of heartbeat.

   Heartbeat may continue for several minutes after effective pithing.

3. Recommendations

   Pithing is a~~n~~ ~~adjunct~~ secondary killing method that can be used in conjunction with penetrative captive bolt ~~stunning~~ application or decapitation to ensure that ~~an~~ the animal does not regain consciousness before it dies. ~~is dead (in the case of penetrative captive bolt stunning) or that an animal is no longer conscious (in the case of decapitation).~~

   Pithing should not be used ~~if trying to preserve~~ when preserving brain tissue for ~~diagnosis of~~ diseases diagnosis or when leakage of body fluids may ~~present~~ pose a biosecurity risk.

4. Species-specific recommendations

The pithing rod selected ~~must~~ should be of a suitable size to be able to fit within the spinal canal of the animal.

Article 7.6.14.

Non-penetrating captive bolt ~~followed by a secondary killing method~~

This method is suitable for turkeys, chickens, ratites, rabbits, lambs, calves, goat kids and piglet

Non-penetrating captive bolt ~~have~~ has a ‘mushroom headed bolt" which impacts the skull but does not enter the brain. It administers a blow to the animal’s skull of sufficient force to render the animal immediately unconscious. The ~~gun~~ device should be placed on the front of the skull to deliver a percussive blow which produces instantaneous unconsciousness. ~~A secondary intervention such as bleeding, cervical dislocation or lethal injection should be performed without delay after the shot to ensure the death of the animal.~~Physical damage to the brain caused by the bolt may result in death; however, a secondary ~~intervention~~ killing method such as bleeding or lethal injection may be required and should be ~~performed~~ carried out as soon as possible.

1. Animal welfare concerns

An incorrect ~~shooting~~ impact position or incorrect captive bolt parameters (not hitting the skull with sufficient force) will ~~mis-stun~~ fail to induce unconsciousness ~~the animal, leaving it conscious and~~ leading to serious ~~wounds~~ injuries and consequently distress, fear and pain.

Regaining of consciousness before death due to delay in applying the secondary ~~intervention~~ killing method.

2. Animal-based and other measures

Animal-based measures of an effective ~~shot~~ impact include:

a) immediate collapse;

b) apnoea;

c) tonic seizures;

d) absence of eye movement;

e) absence of corneal reflex;

f) absence of palpebral reflex;

g) absence of righting reflex.

3. Recommendations

~~This method is suitable for turkeys, chickens, ratites, rabbits, lambs, calves, goat kids and piglets.~~

For cartridge powered and compressed air ~~guns~~ devices, the velocity and diameter of the bolt should be appropriate to the species and type of animal, in accordance with the recommendations of the manufacturer.

Non-penetrating captive bolt ~~guns~~ devices should be frequently cleaned and maintained in good working condition. Regular check-up of the bolt velocity is ~~recommended~~ necessary for effective stunning, operator safety, and improved animal welfare.

More than one ~~gun~~ device may be necessary to avoid overheating~~,~~.

A~~and~~ ~~a~~ back-up ~~gun~~ device of a different kind should be available in the event of an ineffective ~~shot~~ impact.

Animals should be adequately restrained and the operator should ensure that the head of the animal is accessible. ~~The method is difficult to apply in agitated animals.~~

Proper positioning of the non-penetrating captive bolt equipment is required as incorrect positioning of the captive bolt causes inefficient stunning leading to pain and distress in animals.

Animal-based measures should be monitored continuously after application until death to ensure the absence of brain stem reflexes.

Suitable training and experience of operators in the application of non-penetrating captive bolt ~~pistol~~ device and ergonomics and workload conditions should be considered for reducing fatigue in operators.

The secondary ~~intervention~~ killing method should be performed ~~without delay~~ immediately after the shot to ensure the death of the animal.

~~This methods is suitable for turkeys, chickens, ratites, rabbits, lambs and goats kids (approximately up to 4.5 kg) and piglets (approximately up to 10.9 kg).~~

4. Species-specific recommendations

In turkeys the placement of the device should be directly on the midline of the skull and at the highest/widest point of the head with the captive bolt aimed directly down toward the brain.

In chickens (and poultry with comb development) the placement should be directly behind the comb and on the midline of the skull with the captive bolt aimed directly down.

In ratites a device with the ~~smallest~~ charge appropriate for poultry or rabbits should be applied to the top of the head at the midpoint of an imaginary line between the outer “ear” openings.

In rabbits the device should be placed in the ~~center~~ centre of the forehead, with the barrel in front of the ears and behind the eyes.~~The device should be discharged twice in rapid succession at the pressure recommended for the age and size of the rabbit~~.

In lambs and goat~~s~~ kids ~~up to approximately 4.5 kg~~ the preferred shooting position is with the muzzle of the non-penetrating captive bolt on the midline behind the poll (e.g., between the ears) with the chin tucked into the neck.

In piglets, a non-penetrative captive bolt provides immediate and irreversible loss of consciousness and brain death ~~in piglets up to 10.9 kg~~ with a single application on the frontal–parietal position [Grist et al., 2017, 2018a].

Article 7.6.15.

Bleeding

This method can be applied in all species covered by this chapter.

Bleeding is a method of *killing* animals through the severance of the major blood vessels in the neck or chest that results in a rapid fall in blood pressure, leading to cerebral ischaemia and *death*. Due to welfare and biosecurity concerns, it is not a preferred method where other options are available.

1. Animal welfare concerns

The process of *bleeding* ~~requires~~ causes significant tissue trauma and ~~this~~ ~~may~~ will be painful if the animal has not been rendered unconscious prior to the procedure [Gibson et al. 2009]. Consciousness may persist for periods of up to 20 or 60 seconds or much longer in some instances (depending on species) following blood vessel transection [Johnson et al. 2015]. Animals may experience fear, pain and *distress* during this period.

2. Animal-based and other measures

Animal-based and other measures that indicate loss of consciousness include all the following:

a) absence of muscle tone;

b) absence of corneal or palpebral reflex;

c) absence of rhythmic breathing.

Unconsciousness should be reassessed until death is confirmed. In addition, cessation of bleeding after a continuous and rapid blood flow can be used as an indicator of death.

3. Recommendations

~~This method can be applied in all species covered by this chapter.~~

Bleeding should only be used as a last resort in animals that are not already unconscious or can be rendered unconscious prior to severance of the blood vessels.

4. Species-specific recommendations

None identified.

Article 7.6.16.

Lethal injection

This method is most suitable for killing small numbers of dogs, cats, cattle, sheep, goats, pigs, equids, poultry, captive wildlife, but it can be used in all species.

Lethal injection is a killing method ~~procedure~~ that involves injecting one or more drugs into an animal to cause ~~rapid~~ death.

The animal is injected intravenously with a lethal dose of anaesthetic drugs and may also receive an initial injection of a sedative. In practice, barbiturates in combination with other drugs are commonly used. They induce a smooth transition from consciousness to unconsciousness and death by causing depression of the central nervous system and respiratory centres in the brain leading to cardiac arrest (Shearer, 2018).

The preferred route of administration is intravenous (HSA 18; AVMA, 2020), but in some cases it may be given via other routes according to the manufacturers' instructions (e.g. intramuscularly, intracardially ~~or,~~ intraperitoneally).

1. Animal welfare concerns

If routes of administration are inappropriate, consciousness may not be lost rapidly before death, causing pain ~~and,~~ fear and distress.

If doses of administration are ~~not correct~~ inadequate (sub-lethal), consciousness may not be lost rapidly and the animal may not die ~~before death,~~ causing pain, fear and distress.

Some combinations of drug type and route of administration may be painful and should only be used in unconscious animals.

During rapid injection, some drugs may cause pain, irritation and paralysis, which can cause the suppression of respiration while the animal is still conscious [EFSA, 2004].

Intracardiac administration can be extremely painful if penetration of the heart is not successful on the first attempt (EFSA, 2004).

Lethal injection for conscious animals requires restraint, which can cause distress.

Personnel lacking appropriate training and skills, or personnel suffering fatigue, or fractious animals unable to be properly restrained, may cause ineffective administration and be detrimental to animal welfare (Søren et al., 2020).

2. Animal-based and other measures

Each animal should be examined carefully to confirm loss of consciousness and death:

a) Loss of p~~P~~osture~~,~~

b) absence of rhythmic breathing~~,~~

c) absence of heart beat ~~auscultation,~~

d) absence of corneal or palpebral reflex~~,~~

~~e) vocalization~~

e) fixed and dilated pupils

~~f) and eyes movements.~~

~~g) absence of brain stem reflexes.~~

3. Recommendations

~~This method can be applied in all species covered by this chapter.~~

The animal ~~should~~ may be sedated before the lethal injection to ~~minimize~~ minimise stress, if required.

~~Lethal injection should only be performed by a qualified veterinarian or under their direct supervision.~~

Personnel performing this method should be trained and knowledgeable in anaesthetic ~~techniques~~ and injectable techniques.

Personnel should be trained to use appropriate ~~presentation~~ handling and restraining ~~of the animal~~ techniques. ~~and skilled intravenous administration to avoid extravasation of the drug and to use the correct dose according to the species and the animal live weight.~~

~~Personnel should be trained to use appropriate restraint in case it is necessary.~~

~~Intravenous administration is preferred, but intraperitoneal or intramuscular administration may be appropriate, especially if the agent is non-irritating.~~

~~The intracardiac route may be used in previously anesthetized or very small animals only.~~

~~Examine individual animals~~ Animals should be examined for signs of consciousness or life and a backup killing method ~~apply~~ applied ~~a secondary killing method as~~ a corrective measure~~, by giving a lethal injection of an anaesthetic drug if they are conscious or a lethal substance to kill them in case they are still alive but unconscious~~ [AVMA, 2020].

United States	**Comment category:** Editorial **Proposed amended text**: ~~Examine individual animals~~ Animals should be examined for signs of consciousness or life and a backup killing method ~~apply~~ applied ~~a secondary killing method as~~ **as** a corrective measure~~, by giving a lethal injection of an anaesthetic drug if they are conscious or a lethal substance to kill them in case they are still alive but unconscious~~ [AVMA, 2020]. **Rationale:** Edit to include “as” for sentence completion. **Supporting evidence**: N/A

The carcass of an animal that has been killed by lethal injection has to be disposed of properly and cannot be used for human or animal consumption or where there may be a risk of this occurring of ~~human or animal consumption~~ because of the residual toxicity ~~harmfulness~~ of the used drugs.

4. Species-specific recommendations

None identified.

~~The method is suitable for killing individual or small numbers of dogs, cats, cattle, sheep, goats, pigs, equids and poultry, but it can be used in all species.~~

~~In some species like cattle, restraint may be necessary prior to injection, if possible, to allow effective administration.~~

~~Venous access can be difficult in very small or young animals or animals with low blood pressure taking considerable veterinary skill and experience.~~

Article 7.6.17.

Cervical dislocation

The method is suitable for small birds, poultry, mice, rats and rabbits [Walsh, 2017], and should preferably be used in unconscious animals.

Manual or mechanical cervical dislocation comprises stretching and dislocating ~~twisting~~ the neck, resulting in ~~the separation~~ trauma to the ~~of~~ spinal cord ~~from the brain~~ and *death* from cerebral anoxia due to cessation of breathing or blood supply to the brain [AVMA, 2020].

1. Animal welfare concerns

Cervical dislocation even with separation of the spinal cord may fail~~s~~ to produce immediate loss of consciousness and in this case animals may die due to asphyxiation [Gregory and Wotton, 1990; Martin et al 2020].

~~For heavy rats and rabbits, the large muscle mass in the cervical region makes manual cervical dislocation physically more difficult.~~

2. Animal-based and other measures

Animal-based measures of an effective application of cervical dislocation are signs of death.

a) absence of breathing;

b) absence of corneal and palpebral reflex;

c) fixed and dilated pupils;

d) absence of heart beat;

e) loss of muscle tone.

3. Recommendations

~~The method is suitable for small birds, poultry, mice, rats and rabbits [Walsh, 2017].~~

~~Only Preferably to be used in unconscious animals.~~

Consistent results when performing manual cervical dislocation requires strength and skill so team members should be rested regularly to avoid fatigue and ensure consistently reliable results.

~~Mechanical cervical dislocation is preferred to manual as is more reliable and less prone to failure.~~

Cervical dislocation should not involve ~~by~~ crushing of vertebrae and spinal cord ~~should not be used~~.

Animals should be monitored continuously until death ~~to ensure the absence of brain stem reflexes~~.

~~The method is suitable for small birds, poultry, mice, rats and rabbits.~~

4. Species-specific recommendations

For heavy rats and rabbits, the large muscle mass in the cervical region makes manual cervical dislocation physically more difficult and therefore should be undertaken by skilled and experienced operator.

Manual cervical dislocation is applicable in birds weighing up to 3 kg and in rats up to 200 g

Mechanical cervical dislocation is applicable in birds weighing up to 5 kg.

~~None identified~~

Article 7.6.18.

Decapitation

This method can be used as a last resort for small mammals, such as rodents, as well as poultry.

Decapitation using a guillotine or knife results in death by cerebral ischaemia. Due to welfare and biosecurity concerns, it is not a preferred method where other options are available.

1. Animal welfare concerns

The process of decapitation requires significant tissue trauma and this may be painful if the animal has not been rendered unconscious prior to the procedure [Kongara et al. 2014]. There is evidence that decapitation may not itself cause immediate loss of consciousness, which [Bates 2010] may persist in decapitated animals for as long as 30 seconds [Mikeska and Klemm 1975].

2. Animal-based and other measures

Successful decapitation completely separates the head from the rest of the body and can be confirmed by visual inspection.

3. Recommendations

Decapitation should only be used as a last resort in animals that are ~~not~~ already unconscious or can be rendered unconscious prior to decapitation.

Equipment used for decapitation should be of sufficient construction and sharpness to complete the procedure quickly and without undue force.

4. Species-specific recommendations

~~Equipment used for decapitation should be of sufficient construction and sharpness to complete the procedure quickly and without undue force.~~

None identified.

Article 7.6.19.

Electrical — two-stage application

This method is suitable for cattle, sheep, goats and pigs.

This method is suitable for chickens, turkeys, ducks, geese and rabbits when followed by a suitable secondary ~~intervention~~ killing method, such as bleeding.

A two-stage application of low frequency electric current (50 Hz) ~~comprises firstly~~ is an application of current to the head by scissor-type tongs that spans the brain, immediately followed by either ~~an~~ the application of ~~the~~ tongs across the chest in a position that spans the heart or another secondary ~~intervention~~ killing method.

The application of sufficient electric current to the head will induce 'tonic-clonic' ~~epilepsy~~ seizures and unconsciousness. Once the animal is unconscious, the second stage will induce ventricular fibrillation (cardiac arrest) resulting in death.

1. Animal welfare concerns

   The main *hazards* preventing effective electrical stunning and killing are: incorrect electrode placement, poor contact, electrical arcing, ~~high contact resistance caused by hair or dirt on the animal's surface, too short~~ inadequate exposure time~~, and~~ inappropriate electrical parameters (low voltage/current or high frequency) and high contact resistance caused by wool, hair, a dirty or corroded electrode or dirt on the animal's surface.

   The second stage should only be applied to unconscious animals ~~to prevent unacceptable levels of pain~~.

2. Animal-based and other measures

   Before the application of the second stage, unconsciousness should be assessed with the following animal-based measures: ~~immediately collapse, tonic-clonic seizures; apnoea; absence of corneal or palpebral reflex.~~

   a) immediate collapse;

   b) tonic-clonic seizures;

   c) apnoea;

   d) absence of corneal or palpebral reflex.

   ~~Animal-based measures of ineffective stun or recovery of consciousness are: vocalisation; spontaneous blinking; righting reflex; presence of corneal or palpebral reflex; rhythmic breathing; spontaneous swallowing and head shaking.~~

   After the application of the second stage, death should be assessed with the following animal-based measures: ~~absence of muscle tone, apnoea, absence of corneal reflex, dilated pupils and absence of heartbeat.~~

   a) absence of muscle tone;

   ~~b) apnoea;~~

   ~~c) absence of corneal reflex;~~

   ~~d~~b) fixed and dilated pupils; ~~and~~

   ~~e~~c) absence of heartbeat.

3. Recommendations

   ~~This method is suitable for cattle, sheep, goats and pigs.~~

   ~~This method is suitable for chickens, turkeys, ducks, geese and rabbits when followed by a suitable secondary intervention killing method, such as bleeding.~~

   Two team members are recommended, the first to apply the electrodes and the second to manipulate the position of the animal to allow the second application to be made.

   Animals should be restrained ~~contained~~, at a minimum free-standing in a pen.

   The tongs should be of the correct design and size for the animal.

Immediately following application to the head, aA stunning current should be applied in a position that spans the brain for a minimum of 3 secondslong enough to induce unconsciousness; immediately following the application to the head. and aAfter ensuring that the animal is unconscious, the electrodes should be transferred to a position that spans the heart and the electrodes applied for long enough to induce cardiac arrest a minimum of 3 seconds.

Electrodes should be applied firmly for the intended duration of time with pressure not released until the stun is complete.

Animals should be monitored continuously after stunning until death to ensure the absence of brain stem reflexes until death.

Electrodes should be in good condition and cleaned regularly during and after use, to enable optimum electrical contact to be maintained.

The wool or hair should be entirely dry; if wet the electricity may flow (shunt) through the wet wool or hair rather than contacting the skin and passing through the brain or body.

Wetting the bare skin (not wool or hair) application area electrodes with water (especially salted water) can increase electrical contact.

Ineffective application of the first stage of the method should be followed by a backup method or the repetition of the first stage.

The method is suitable for calves, sheep and goats, and pigs.

4. Species-specific recommendations

Effective electrical parameters should be determined based on scientific data on regarding the welfare outcomes for different types of animals, in accordance with point 5 of Article 7.1.4.Effective electrical parameters should be determined based on scientific evidence for different types of animals.

For electrical stunning of the head, minimum parameters are recommended for the following species:

- 1.5 25 A for bovines cattle,
- 1.3 A for pigs,
- 1.8 A for sows and boars,
- 1.0 A for small ruminants.

Good placement of the tongs can be difficult on animals with horns and on sheep with woolly heads. Using electrodes with pins or with wet pins for woolly animals would help to overcome the problem. Alternatively, the wool should may be removed from the area where the electrodes will be positioned on the animal.

Article 7.6.20.

Head to body electrical killing

This method is suitable for cattle, sheep, goats and pigs.

Head-to-body electrical killing (electrocution) comprises the single application of sufficient electrical current to the head and back body, to simultaneously stun the animal and fibrillate the heart, resulting in cardiac arrest and death. Provided sufficient current is applied in a position that spans both the brain and heart at the same time, the animal will not recover consciousness.

1. Animal welfare concerns

The main *hazards* preventing effective electrical killing are: incorrect electrode placement, poor contact, dirty or corroded electrode, electrical arcing, high contact resistance caused by hair or dirt on the animal surface, too short insufficient exposure time and inappropriate electrical parameters (low voltage/current or high frequency).

2. Animal-based and other measures

~~Effective head to body electrical killing is characterise by tonic seizures during exposure to the method. After the exposure animals may have clonic seizures.~~

After application death should be assessed with the following animal-based measures: ~~absence of muscle tone, apnoea, absence of corneal reflex, dilated pupils and absence of heartbeat~~

a) tonic-clonic seizures;

b) absence of muscle tone;

c) apnoea;

d) absence of corneal reflex;

e) fixed and dilated pupils;

f) absence of heartbeat.

~~Animal-based measures of ineffective electrical killing are: absence of tonic-clonic seizures, presence of rhythmic breathing, presence of corneal or palpebral reflex or vocalisation.~~

3. Recommendations

~~This method is suitable for cattle, sheep, goats and pigs.~~

Animals should be restrained ~~contained~~ to avoid movement that can lead to interrupted contact with the electrodes.

The device should be of the correct design and size for the animal.

A current should be applied in a position that spans the brain and the heart for long enough to induce unconsciousness and cardiac arrest.

~~A current should be applied in a position that spans the brain and the heart at the same time, continuously for a minimum of 3 seconds.~~

~~The device should be applied firmly for the intended duration of time and pressure not released until the stun is complete.~~

Animals should be monitored continuously ~~after stunning~~ until death is confirmed. ~~to ensure the absence of brain stem reflexes.~~

Electrodes should be in good condition and cleaned regularly during and after use, to enable optimum electrical contact to be maintained.

The wool or hair should be entirely dry; if they are wet, the electricity may flow (shunt) through the wet wool or hair rather than through the brain or body.

Wetting the electrodes with water (especially salted water) can increase electrical contact. ~~Wetting the bare skin application area with water (especially salted water) can also increase electrical contact~~.

Ineffective application ~~of the first stage~~ of the method should be followed by a backup method or the repetition of the first stage.

~~The method is suitable for sheep and goats, and pigs.~~

4. Species-specific recommendations

Effective electrical parameters should be determined based on scientific evidence for different types of animals.

For head ~~-~~to ~~-~~body ~~stunning~~ electrical killing, minimum parameters are recommended for the following species:

- 1.3 A for pigs,
- 1.8 A for sows and boars,
- 1.0 A for sheep and goats.

~~Article 7.6.21.~~

~~**Head only electrical stunning followed by a secondary killing method**~~

~~Comprises the single application of sufficient electrical current to the head of the animal in a position that spans the brain, causing unconsciousness; this needs to be followed by a killing method such as cervical dislocation or bleeding.~~

~~1. Animal welfare concerns~~

~~The main hazards preventing effective electrical stunning are: inappropriate handling, inversion when applicable, incorrect electrode placement, poor contact, dirty or corroded electrode, electrical arcing, high contact resistance caused by hair or feathers or dirt on the animal surface and inappropriate electrical parameters (low voltage/current or high frequency).~~

~~An additional hazard could occur when second intervention doesn't kill the animal.~~

~~2. Animal-based and other measures~~

~~Multiple indicators should be used to determine whether a stun is effective and the animal is unconscious.~~

~~Animal based measures of an effective stun are: tonic-clonic seizures; apnoea; absence of corneal or palpebral reflex.~~

~~Animal-based measures of an ineffective stun or recovery of consciousness or for ineffective killing are: vocalisation; spontaneous blinking; righting reflex; presence of corneal or palpebral reflex; rhythmic breathing.~~

~~3. Recommendations~~

~~Animals should be stunned as soon as they are restrained.~~

~~In the case of ineffective stunning or recovery, animals should be re-stunned using a backup system or be killed immediately. Ineffective stunning or return to consciousness should be systematically recorded and the cause of the failure identified and rectified.~~

~~Stunning equipment should be used, cleaned, maintained and stored following the manufacturer's recommendations.~~

~~Constant current stunners ensure that the minimum current is provided to the animal independently from individual impedance and should always be preferred to constant voltage stunners.~~

~~Regular calibration of the equipment according to the manufacturer's procedure is recommended.~~

~~For the killing methods to be use after stun refer to Articles 7.6.X and 7.6.X.~~

~~This method is suitable for chickens, turkeys, ducks, geese and rabbits.~~

~~4. Species-specific recommendations~~

~~For head-only stunning, minimum parameters are recommended for the following species:~~

~~- 240 mA for hens and broiler chicken,~~

- 400 mA for turkeys,

- 600 mA for geese and ducks,

- 400 mA for rabbits.

Article 7.6. 212.

Water-bath killing

Electrocution leading to death can be achieved by drawing inverted and shackled poultry through an electrified water-bath. Electrical contact is made between the water and earthed shackle and, when sufficient current with a (50 Hz AC) waveform is applied, poultry will be simultaneously stunned and killed.

1. Animal welfare concerns

In electrical water-bath killing, inverting and shackling conscious poultry by the legs can cause stress, pain, distress and fear.

Hazards that increase the likelihood of animals experiencing pre-stun shocks are: poor handling at shackling, inappropriate line speed, physical contact between birds, incorrect angle of the entry ramp, the entry ramp wetted by charged water, incorrect water-bath height, and shallow immersion.

Hazards that may prevent effective electrical killing are: lack of contact between head and water, differences in individual bird resistance, improper system grounding, pre-stun shocks due to wings contacting water before the head, and the use of inappropriate electrical parameters (low voltage/current or high frequency) or too short insufficient exposure time.

Factors affecting individual bird resistance include the resistance between the shackle and the leg (leg/shackle interface), shackling on top of a severed foot, shackling by one leg, poor shackle position, incorrect shackle size, dry shackles, scale on the shackle surface, and keratinised skin on the legs (e.g. older birds).

Where insufficient electrical killing parameters are used, conscious animals are at risk of being electro-immobilised or paralysed causing pain and suffering.

2. Animal-based and other measures

Multiple indicators should be used to determine whether killing is effective.

Animal-based measures of an effective electrocution are: absence of muscle tone; apnoea; and absence of corneal or palpebral reflex; absence of vocalisation and absence of righting reflex.

a) loss of muscle tone;

b) absence of breathing;

c) absence of corneal or palpebral reflex;

d) absence of righting reflex;

e) absence of heart beat.

3. Recommendations

Poultry should be shackled by both legs. Shackles should match the species and size of the birds to guarantee a good contact.

Pre-stun shocks should be prevented and can be reduced by having a smooth shackle line and entry to the water-bath and by adjusting the water level of the bath to minimise overflow. Proper water-bath design, including a non-conductive entrance, will also help eliminate pre-stun shocks. Measures to calm

the birds or to reduce the frequency of wing flapping can be put in place such as: breast rubs, low lighting, smooth transition into the water-bath and gentle shackling such that this does not trigger wing flapping.

In multiple bird water-baths with constant voltage it is important to ensure that the number of birds in the water-bath is proportional to the intensity in the water-bath to ensure that all birds receive sufficient current to result in death ~~kill them~~.

Birds that are visibly injured including with leg abnormalities, or ~~runts~~ under-sized birds that may miss the water-bath, should not be shackled and instead should be killed by an alternative appropriate method.

Poultry should be submerged into the water up to the base of the wings.

A low frequency (50 Hz) current with a minimum of 400 mA per bird should be applied for a minimum of 3 seconds [EFSA, 2019].

Death should be confirmed before disposal.

In the case of ineffective killing, animals should be killed ~~without delay~~ immediately using a backup ~~system~~ killing method.

4. Species-specific recommendations

None identified.

Article 7.6.2~~3~~.

Maceration

This method is suitable for day-old-birds and for embryonated eggs.

Maceration, utilising a mechanical apparatus with rotating blades or projections, causes immediate fragmentation and death ~~in day-old-birds and for embryonated eggs~~.

1. Animal welfare concerns

Pain, fear, suffocation and distress due to a slow rotation of blades or rollers, overloading and rollers set too wide.

2. Animal-based and other measures

~~absence of signs of life~~

a) immediate fragmentation.

3. Recommendations

~~This method is suitable for day-old-birds and for embryonated eggs.~~

The capacity of the apparatus (power and sharpness) should be sufficient to ensure that all day-old-birds are killed instantaneously, even if they are handled in ~~a~~ large numbers. The rate of introducing the birds should not allow the equipment to jam. Only purpose built equipment should be used. Equipment should be ~~well~~ maintained and tested prior to killing animals.

The gap between rollers ~~must~~ should ensure day-old-birds' ~~heads~~ are crushed instantaneously leading to death [HSA, 2005].

Mechanical killing of day-old-birds should result in slurry, rather than recognisable body parts such as internal organs, legs, wings and heads, to ensure day-old-birds that were ~~truly~~ effectively macerated [HSA, 2005].

It is important to ensure that the speed of the equipment is appropriate for the batch size and that day-old-birds are dead when they come out of the machine.

Avoid adding more than one layer of day-old-birds at one time or in quick succession, including avoid the introduction of a batch into the macerator before previous day-old-birds are dead.

4. Species-specific recommendations

None~~t~~ identified.

~~Article 7.6.24.~~

~~**Addition of anaesthetics to feed or water**~~

~~An anaesthetic agent which can be mixed with *poultry* feed or water may be used to kill *poultry* in houses. Commonly used general anaesthetic agents are not intended or approved for oral use. *Poultry* which are only anaesthetised need to be killed by another method such as cervical dislocation.~~

~~1. Animal welfare concerns~~

~~Ingestion of an insufficient quantity of the drug or inappropriate drug not leading to unconsciousness. Failing to implement a secondary killing method before consciousness regained. Exposure of non-targeted animal or birds is a risk[https://www.hsa.org.uk]~~

~~2. Animal-based and other measures~~

~~Absence of signs of life including breathing, body movement, righting reflex.~~

~~3. Recommendations~~

~~To ensure that these anaesthetics have been effectively removed from the feeding or drinking water system and that no residue is left behind that could harm the next flock, a very careful cleaning procedure is necessary. Sufficient quantities of anaesthetic need to be ingested rapidly for effective response. Intake of sufficient quantities is facilitated if the birds are fasted or water is withheld. Should be followed by immediate killing if birds are anaesthetised only.~~

~~This method is suitable for confined poultry.~~

~~4. Species-specific recommendations~~

~~None identified~~

Article 7.6.2~~3~~5.

General principles of modified atmosphere killing

Modified atmosphere killing is performed by exposing animals to carbon dioxide (CO_2), inert gases or their mixtures, or reducing oxygen availability through low pressure.

This can be performed either by placing the animals in a prefilled gas container, ~~by placing transport modules or crates containing animals in a container and introducing a gas mixture, or by the~~ gas being introduced into the animal ~~a poultry~~ house, placing animals in a container and introducing a gas mixture or in the case of low atmosphere pressure killing removing air from the container.

~~Modified atmosphere~~ Foam can be used as an adjunct to modified atmosphere killing methods. ~~killing can also be administered by using gas-filled foam, medium or low density water based foam or through low atmosphere pressure (LAPS)~~.

Article 7.6.2~~4~~6.

Pre-filled gas container

This method is suitable for poultry, pigs, small ruminants and fur animals.

~~This method is the exposure of batches of animals to high concentrations of gas in pre-filled containers which can also be waste bins, skips or bags~~.

In this method, animals are manually caught in small batches and ~~dropped~~ placed into ~~the~~ a container with a controlled atmosphere. Containers can be specially designed or modified, waste bins, skips or bags ~~connected to gas cylinders~~.

The time to onset of death is related to the concentration of the gas and the duration of the exposure, i.e. lower concentration requires longer exposure [Raj and Gregory, 1990a,b].

When animals are exposed to the gas individually or in small groups in a container, the equipment used should be designed, constructed, and maintained in such a way as to avoid injury to the animals and allow them to be observed.

1. Animal welfare concerns

Manual catching and handling of animals cause fear, *pain* due to injuries and *distress*, especially when birds are carried in an inverted position.

If there is no immediate loss of consciousness~~.~~ , ~~I~~inhalation of high concentrations of gas ~~while conscious~~ is can be painful (in the case of carbon dioxide) and cause~~s~~ respiratory distress.

United States	**Comment category:** Editorial **Proposed amended text**: If there is no immediate loss of consciousness~~.~~ , ~~I~~inhalation of high concentrations of gas ~~while conscious~~ ~~is~~ can be painful (in the case of carbon dioxide) and cause~~s~~ respiratory distress. **Rationale:** Recommend keeping “can be” and removing “is” for sentence completion. **Supporting evidence**: N/A

The time and distance animals are carried depends on the location of the gas containers on the premises and on the type and size of the housings.

Overloading may lead to compression and suffocation caused by more animals being ~~dropped~~ placed into the container without a sufficient interval between two consequent batches of animals. In addition, each batch of animals ~~dropped~~ placed into the container will displace equal volume of gas into the atmosphere, which will result in fluctuating concentrations of gas.

~~Injection of~~ Direct exposure to cold gas ~~directly to the animals~~ causes hypothermia and can be painful.

Verifying *death* while the animals are in the *container* is difficult.

2. Animal-based and other measures

Animal-based measures are difficult to assess due to container design and the presence of gas.

Animal-based measures of an effective kill are: ~~absence of signs of life, such as breathing, righting reflex or body movement.~~

a) absence of breathing;

b) absence of muscle tone;

c) absence of heart beat.

3. Recommendations

~~This method is suitable for poultry, pigs, small ruminants and fur animals.~~

Containers should allow the required gas concentration to be maintained ~~and accurately measured~~.

Each batch of ~~birds~~ animals placed ~~dropped~~ in the containers (one layer) should be allowed sufficient time to die before adding the next batch of ~~birds~~ animals [Webster and Collett, 2012].

Containers should not be overcrowded and measures are ~~needed~~ should be put in place to avoid animals suffocating by climbing on top of each other.

Skilled catching teams are necessary.

~~This method is suitable for poultry and mink.~~

4. Species-specific recommendations

~~Non identified.~~

CO_2 is not effective for mink.

United States	**Comment category:** Change **Proposed amended text**: CO_2 is not effective for ~~mink.~~ **fox.** **Rationale:** Studies have shown that CO_2 can be effective for use in mink if delivered as gradual fill to 80%. Inconsistent responses in mink to CO_2 appears to be due to the rate of delivery and the concentration of CO_2. The amended text identifies that CO_2 should not be used in foxes due to lack of evidence of its efficacy in that species. **Supporting evidence**: Hawkins P, Playle L, Golledge H, et al. Newcastle consensus meeting on carbon dioxide euthanasia of laboratory animals. August 9, 2006. Accessed March 30, 2022. Korhonen HT, Cizinauskas S, Jesernics J, Eskeli P. Electrophysiological indices in mink (Neovison vison) during CO and CO2 euthanasia. In: Larsen PF, Møller SH, Clausen T, et al., eds. Proceedings of the Xth International Scientific Congress in Fur Animal Production. Brill Wageningen Academic; 2012:455–459. doi:10.3920/978- 90-8686-760-8_66 Cooper J, Mason G, Raj M. Determination of the aversion of farmed mink (Mustela vison) to carbon dioxide. Vet Rec. 1998;143(13):359–361. doi:10.1136/vr.143.13.359

Article 7.6.2~~5~~7.

Gas introduced into a container

This method is suitable for poultry and pigs

In this method, the crates or modules holding ~~birds or pigs~~ animals are loaded into a container. Small groups ~~of pigs~~ may also be walked into the container. Once the animals are in the container, a chosen gas, i.e. carbon dioxide, argon, nitrogen or mixtures of these gases, are administered to displace the atmospheric air in the container to create a lethal anoxic or hypercapnic situation (EFSA, 2019).

1. Animal welfare concerns

Manual catching and handling of ~~birds~~ animals causes distress~~, especially when birds are carried in an inverted position~~.

There is no immediate loss of consciousness. Exposure to ~~high~~ concentrations of CO_2 required for killing is reported to be aversive and painful ~~of birds and pigs (e.g. 40% or more) is reported to be aversive and painful~~ to inhale~~, and therefore these animals show escape attempts~~ (EFSA, 2019; 2020).

The lower the CO_2 concentration or higher the residual oxygen in inert gases the longer the time to induce death.

Exceeding the capacity of the equipment in terms of number of animals that can be loaded into the container with available floor space leading to overcrowding and animals climbing onto each other which results in injuries.

The time and distance animals are carried depend on the location of the gas containers on the premises and on the type and size of the housings.

Injection of cold gas directly into ~~the animals in the~~ container causes hypothermia and can be painful.

Verifying *death* while the animals are in the *container* is difficult.

2. Animal-based and other measures

~~Animal-based measures related to pain, fear and respiratory distress are head shaking, laboured breathing (gasping), escape attempts and high-pitched vocalisations.~~

Animal-based measures of an effective kill are: ~~absence of signs of life, such as breathing, righting reflex or body movement~~.

a) absence of breathing;

b) absence of muscle tone;

c) absence of heart beat;

d) fixed and dilated pupils.

Animal-based measures are difficult to assess due to container design and the presence of gas.

3. Recommendations

~~This method is suitable for poultry and pigs~~

~~Birds~~ Animals should be caught gently and placed in crates or modules of appropriate size and at appropriate stocking densities to allow all ~~birds~~ animals to sit down. ~~Pigs should also be moved gently and in small groups into the containers.~~

Containers should not be overcrowded and measures ~~are needed~~ should be put in place to avoid animals suffocating by climbing on top of each other.

Containers should allow the required ~~CO2 and inert~~ gas~~es~~ concentrations to be maintained. ~~and accurately measured~~.

Sufficient exposure time should be allowed for animals to die before the door is opened.

Each animal should be examined to ensure they are dead.

Any survivors should be killed ~~without delay~~ immediately with a backup method.

Staff ~~training~~ should be trained to acquire knowledge and skills necessary to proper calibration of equipment and monitoring of gas concentrations and relevant exposure times, to ensure that containers are fit for the purpose, gas is vaporised before injection, the rate of injection is correct and temperature inside the chamber is monitored.

~~This method is suitable for poultry and pigs.~~

4. Species-specific recommendations

CO_2 is not effective for mink.

United States	**Comment category:** Change **Proposed amended text**: CO_2 is not effective for ~~mink.~~ **fox.**

	Rationale: Studies have shown that CO_2 can be effective in mink if delivered as gradual fill to 80%. Inconsistent responses in mink to CO_2 appears to be due to the rate of delivery and the concentration of CO_2. The amended text identifies that CO_2 should not be used in foxes due to lack of evidence of its efficacy in that species. **Supporting evidence**: Hawkins P, Playle L, Golledge H, et al. Newcastle consensus meeting on carbon dioxide euthanasia of laboratory animals. August 9, 2006. Accessed March 30, 2022. Korhonen HT, Cizinauskas S, Jesernics J, Eskeli P. Electrophysiological indices in mink (Neovison vison) during CO and CO2 euthanasia. In: Larsen PF, Møller SH, Clausen T, et al., eds. Proceedings of the Xth International Scientific Congress in Fur Animal Production. Brill Wageningen Academic; 2012:455–459. doi:10.3920/978- 90-8686-760-8_66 Cooper J, Mason G, Raj M. Determination of the aversion of farmed mink (Mustela vison) to carbon dioxide. Vet Rec. 1998;143(13):359–361. doi:10.1136/vr.143.13.359

~~None identified~~

Article 7.6.26~~8~~.

Gas introduced into the barn or whole house gassing

United States	**Comment category:** General **Proposed amendment**: The U.S. supports providing additional content on the use of nitrogen in this article, including any available references. **Rationale:** Including the use of nitrogen as an emerging alternative to CO_2 appeared to be the intent of WOAH's Terrestrial Animal Health Standards Commission (TAHSC) based on its responses to various comments in the February 2026 report, comment # 7.6.28._5_ on p 371. We welcome review and addition of available references and practical guidelines for the use of nitrogen in whole house gassing as a method for large-scale animal depopulation. **Supporting evidence**: N/A

The method is suitable for all poultry species.

This method is the exposure of birds in their housing to an increasing gas concentration. In general, this means that the barn is equipped with gas measuring units and gas tubing for the injection of gas. The barn is closed, and ventilation and other openings are sealed. The gas is injected which results in a gradual increase of the ~~G~~gas. In practice mainly CO_2 is applied as this gas is most easy to apply and the desired concentration of >45% CO_2 in the breathing air can be reached relatively quickly.

United States	**Comment category:** Change **Proposed amended text**: This method is the exposure of birds in their housing to an increasing gas concentration. In general, this means that the barn is equipped with gas measuring units and ~~gas tubing~~ **appropriate equipment** for the injection of gas. The barn is closed, and ventilation and other openings are sealed. The gas is injected which results in a gradual increase of the ~~G~~gas. In practice mainly CO_2 is applied as this gas is most easy to apply and the desired concentration of >45% CO_2 in the breathing air can be reached relatively quickly.

	Rationale: Recommend this edit to clarify that additional equipment beyond gas tubing is required to ensure the barn is appropriately equipped for the injection of gas. **Supporting evidence**: Hill, J. (2025) A Better Means to a Humane Ending? Nitrogen Anoxia for the Mass Depopulation of Livestock. Recording: https://www.youtube.com/watch?v=8ats0zN_gY4 Powerpoint:https://www.vafaw.org/_files/ugd/231617_f76db69528b0489facb1a880a25fb4fb.pdf

1. Animal welfare concerns

   There is no immediate loss of consciousness. Inhalation of increased concentrations of gas while conscious cause fear and respiratory distress.

   The induction of the gas makes noise and can lead to a fear response from the birds. Injection of cold gas directly to the animals in the house causes hypothermia and can be painful.

2. Animal-based and other measures

   Animal-based measures are difficult to assess due to the presence of gas in the whole barn.

   Animal-based measures of an effective kill are: ~~absence of signs of life, such as breathing, righting reflex or body movement.~~

   a) absence of breathing;

   b) absence of muscle tone;

   c) absence of heart beat;

   d) fixed and dilated pupils.

   Gas concentrations should be monitored and used as a proxy for animal based measures

3. Recommendations

   ~~The method is suitable for all poultry species.~~

   The barns should be checked before starting the procedure to ensure they can be made air-tight enough for the required gas concentrations can be reached.

   Staff entering the barn to prepare the gassing procedure should work calmly to minimize fear reactions from the birds.

   Measures should be taken to minimise disturbance and stress associated with the release of gas into the area for example ~~e.g.~~ due to noise and temperature drops.

   Ventilation should be shut down as ~~quickly~~ short as possible before starting the gas inlet.

United States	**Comment category:** Addition **Proposed amended text:** **This method requires sourcing of large amounts of gas and specialized equipment in order to be effective.** **Rationale:** A recommendation regarding the logistics of this method should be added for completeness to assist with planning and mitigation measures. **Supporting evidence**: N/A

Before removing the gas equipment but after ventilating the barn there should be a check on the effectiveness of the method.

~~The method is suitable for all poultry species.~~

4. Species-specific recommendations

None identified.

~~Article 7.6.29.~~

United States	**Comment category:** General **Proposed amended text:** Recommend restoring this article in its entirety for pigs and poultry as well as consideration of the changes proposed by the U.S. comments during the previous cycle. **Rationale:** Water based foam is a necessary method of depopulation to include as an option of large-scale depopulation when other preferred methods may be unavailable. Like any depopulation method, the use of water based foam must be thoughtfully undertaken. The time to death and welfare measurements are adequate. Previous laboratory trials assessing this method show brain death in broiler chickens at 133 seconds and at 190 second for turkeys. In sows, the time to unconsciousness is 2 minutes, with brain death at 3 minutes, 10 seconds. Water based foam should only be undertaken where the right facilities exist, along with the right environmental factors and trained personnel who can properly monitor the situation. When using foam, sufficient foam height must be generated to be effective. The use of water based foam for depopulation during a disease situation, may help minimize potential fomite spread for example, from feathers and dust. Lastly, survey data indicates a positive reaction by observers of this method, in comparison to CO2, though, slip hazards are acknowledged. **Supporting evidence**: AVMA Guidelines for the Depopulation of Animals: 2026 Edition Campler, M.R., Cheng, T., Arruda, A.G., Flint, M., Kieffer, J.D., Youngblood, B.T., & Bowman, A.S. (2023). Refinement of water-based foam depopulation procedures for finisher pigs during field conditions: Welfare implications and logistical aspects. Preventive veterinary medicine, 217, 105974. Park, J.Y., Campler, M.R., Cheng, T., Youngblood, B.L., Torrisi, D.M., Cressman, M.D., Kieffer, J.D., Williams, T.E., Arruda, A.G., Flory, G.A., Hougentogler, D.P., Hill, J., Hunt, L., Canturri, A., Culhane, M., Miller, J., & Bowman, A.S. (2025). Assessment of three large-scale depopulation methods for swine. PLOS One, 20. Ting-Yu Cheng, Magnus R. Campler, Josie M. Rudolphi, Taylor J. Williams, Justin D. Kieffer, Steven J. Moeller, Andrew S. Bowman, Andréia G. Arruda Swine industry stakeholders' perception on the use of water-based foam as an emergency mass depopulation method PLOS One October 20th, 2023 *Janice Y. Park, Magnus R. Campler, Ting-Yu Cheng, Justin D. Kieffer, Andréia G. Arruda, Madonna E. Benjamin, Dale W. Rozeboom, Andrew S. Bowman Perceptions of swine industry stakeholders on the use of water-based foam, high-expansion nitrogen foam, and carbon dioxide gas as methods of swine depopulation, Preventive Veterinary Medicine,Volume 233, 2024,106356, ISSN 0167-5877*

	Additional references available upon request.

~~**Water based foam**~~

~~Water based foam is a low to high density foam created with air. The principle is that animals in their housing or in a confined area are covered with a blanket of foam and that the animals will die due to occlusion of the airways leading to cessation of brain and heart activity (Benson et al 2009). Due to the density, the foam will not penetrate narrow openings or mesh wire structures. This method requires little human-animal interaction and has the capacity to effectively kill large numbers of animals.~~

~~1. Animal welfare concerns~~

~~Animals do not immediately lose consciousness~~

~~Animals will experience distress as oxygen is lost from the environment.~~

~~2. Animal-based and other measures~~

~~Animal based measures are difficult to assess once animals are covered in foam. Distress behaviours such as escape attempts and vocalizations (pigs) may be seen or heard.~~

~~Animal based measures of an effective kill are: absence of signs of life such as breathing, righting reflex or body movement.~~

~~3. Recommendations~~

~~The temperature of the foam is determined mainly by the temperature of the water. The temperature of water used should be between (15 and 20 °C).~~

~~The foam should be produced with foaming agents that are proven to be non-irritating and having no aversive effect.~~

~~Foam should be applied after animals are contained.~~

~~Personnel should ensure that there is sufficient time allowed for each batch of animals to die before they are removed from the foam.~~

~~This method should only be applied to floor-reared animals.~~

~~This method is suitable for poultry, cattle, pigs, and small ruminants.~~

~~4. Species-specific recommendations~~

~~None identified~~

Article 7.6.2730.

Gas ~~infused~~ filled high expansion foam

This method is suitable for poultry, pigs and small ruminants.

A method for creating ~~way to introduce a high gas concentration or to create~~ a situation with very low oxygen (O_2) in containers or in buildings that are difficult to fill with gas is by using a high expansion foam filled with the gas. The most suitable gas is Nitrogen. The principle of the method is that animals are exposed to an environment of > 99% of N_2 (or other gas) and die due to hypoxia ~~anoxia~~. The high gas concentration is achieved due to the foam being produced using a gas from a pure source instead of with air.

Animals may be kept in their housing, in a confined area or in a special chamber or box. The building, confined area or box is then filled with gas-filled foam until the box is completely filled or the animals are ~~well~~ completely covered. As the bubbles burst the animals will breathe in an atmosphere containing only the gas released from the foam with less than 1% O_2. This very low O_2 concentration will induce a rapid loss of consciousness and death.

This method requires little human-animal interaction and has the capacity to effectively kill large numbers of animals however it does require specialized equipment.

1. Animal welfare concerns

   Animals do not immediately lose consciousness

   Animals ~~will~~ may experience respiratory distress as oxygen is lost from the environment.

   If the bubble size is too small, foam may be inhaled resulting in airway occlusion.

   Noise created by foam-generating machinery may cause fear.

2. Animal-based and other measures

   Animal based measures are difficult to assess once animals are covered in foam. Distress behaviours such as escape attempts and vocalizations (pigs) may be seen or heard.

   Animal-based measures of an effective kill are: ~~absence signs of life, such as breathing, righting reflex or body movement.~~

   a) absence of breathing;

   b) absence of muscle tone;

   c) absence of heart beat;

   d) fixed and dilated pupils.

3. Recommendations

   ~~This method is suitable for poultry, pigs and small ruminants.~~

   The foam should be generated with gas from a pure source (preferable >98%).

   The foam expansion ratio should be at least 300:1 and the bubble size (typically 10-15mm), should be appropriate ~~for~~ to the species and ~~animals'~~ size of the animals to ensure it does not readily enter or occlude their airways.

   Care should be taken, to ~~The gas should be pre-heated to~~ avoid freezing ~~up~~ of the nozzles while the foam is generated.

   The temperature of the foam is determined mainly by the temperature of the water therefore, the temperature of the water used should be between ~~(~~15 and 20 °C~~)~~.

   The foam should be produced with a foam agents that is proven to be non-irritating and having no aversive effect.

   Foam should be applied after animals are contained.

   Personnel should ensure that there is sufficient time allowed for each batch of animals to die before they are removed from the foam.

   ~~This method is suitable for poultry and pigs.~~

4. Species-specific recommendations

   None identified.

Article 7.6.28~~31~~.

Low atmosphere pressure stunning (LAPS)

The method should only be applied to chickens [Matin et al, 2020; Gent et al 2020].

In this method, the birds are placed in crates or modules into a specialised decompression chamber and are exposed to gradual decompression with a reduction of available oxygen to less than 5% [Martin et al., 2016a,b, c; Holloway and Pritchard, 2017].

When correctly applied, the LAPS procedure leads to loss of consciousness followed by death in all birds. The LAPS procedure does not induce immediate unconsciousness.

Mobile LAPS system can be used for on-farm killing.

1. Animal welfare concerns

   No immediate onset of unconsciousness.

   Rapid decompression and expansion of gases in the body cavity (i.e., sinuses, gut, or air sacs) can cause pain and respiratory distress. Furthermore, conscious birds might get injured from the convulsions of adjacent unconscious animals (i.e., strong wing flapping and leg paddling).

2. Animal-based and other measures

   Animal- based measures of aversion:

   a) escape attempts.

   Animal base measures of unconsciousness: ~~loss of posture; loss of posture; absence of movements; tonic-clonic convulsions (wing flapping)~~

   a) loss of posture;

   b) absence of movements;

   c) tonic-clonic convulsions (wing flapping).

   Animal-based measures of an effective kill are: ~~absence of signs of life such as breathing, righting reflex or body movement.~~

   a) absence of breathing;

   b) absence of muscle tone;

   c) absence of heart beat;

   d) fixed and dilated pupils.

a) Recommendations

   ~~The method should only be applied to chickens [Matin et al, 2020; Gent et al 2020] .~~

   During the first phase, the decompression rate ~~shall~~ should not be greater than equivalent to a reduction in pressure from standard sea level atmospheric pressure 760 to 250 Torr for a period of not less than 50 seconds.

   During the second phase, a minimum standard sea level atmospheric pressure of 160 Torr ~~shall~~ should be reached within the following 210 seconds.

   The pressure time curve ~~shall~~ should be adjusted to ensure that all animals are irreversibly stunned within the cycle time.

   The chamber should be leak tested and pressure gauges calibrated before each operational session and not less than daily during periods of use.

Low atmospheric pressure stunning equipment ~~shall~~ should be designed and built to ensure a vacuum within the chamber enabling slow gradual decompression with reduction in available oxygen and holding at minimal pressure.

The system ~~shall~~ should be equipped to measure, display and record continuously the absolute vacuum pressure, the time of exposure, the temperature, the humidity and to give a clearly visible and audible warning if the pressure deviates from the required levels. The device should be clearly visible to the personnel.

Rate of decompression, duration of exposure, ambient temperature and humidity are key parameters.

Emergency procedures associated with system failures should be put in place in accordance with the manufacturer's instructions for the use of the equipment.

~~This method is suitable for broiler chickens up to proximately 4kg liveweight.~~

b) Species-specific recommendations

~~None identified~~ Should only be used in chickens at this time.

~~Article 7.6.3229~~

United States	**Comment category:** General **Proposed amended text**: Recommend restoring this article in its entirety. **Rationale:** Ventilation shutdown with supplementation (VSD+) remains an essential depopulation method to retain in this section with its use best restricted to narrowly defined circumstances, including ongoing disease outbreaks, such as the global highly pathogenic avian influenza (HPAI) outbreak, where a substantial risk of further disease spread exists. As such, utilizing VSD+ can help rapidly halt disease spread and minimize the negative welfare impacts of unmitigated disease spread. Given higher welfare options exist, VSD+ should only be used when constrained circumstances exist and where facilities can support strict engineering process controls to ensure rapid death. All planning efforts should focus on higher welfare options as the preferred options for depopulation, with VSD+ existing as a last resort when significant disruptions, ongoing disease outbreaks, environmental factors, or other circumstances preclude the use of the higher welfare options. **Supporting evidence**: Anderson K, Livingston K, Shah S, et al. Evaluating Hen Behavior and Physiological Stressors During VSD for the Development of Humane Methodologies for Mass Depopulation During a Disease Outbreak. US Poultry and Egg Association; 2017. Final report project BRU007. Anderson KE, Malheiros RD, Eberle-Krish KN, et al. Evaluating the Impact of Ventilation Shutdown for Depopulation of Broiler Breeders During a Foreign Animal Disease Outbreak. US Poultry and Egg Association; 2021. Final report project BRF717. Eberle-Krish K. Using Ventilation Shutdown Plus in Response to a Foreign Animal Disease Outbreak. Quality Technology International Inc; 2019. Anderson KE, Eberle-Krish KN, et al. Evaluating Broiler and Turkey Behavior and Physiological Stress Indicators During Ventilation Shutdown (VSD) With Additions of Heat or CO2 for the Development of Methodologies for Mass Depopulation During a Disease Outbreak. US Poultry and Egg Association; 2019. Final report project BRF008. Anderson KE, Malheiros RD, Shah S, Harding KL, Martin M. Evaluating the Impact of Environmental Relative Humidity and Temperature With Ventilation Shutdown for

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~~**Ventilation shut down with supplementation**~~

~~Ventilation shut down with supplementation such as active heating must not be routinely used and should be regarded as a method of last resort for poultry where the risks associated with a delay in killing would outweigh the welfare outcomes associated with this method. This method must only be used as an interim measure while efforts are made to secure equipment, resources and personnel to implement more preferred methods.~~Ventilation shut down with supplementation such as active heating should not be routinely used and should be regarded as a method of last resort for poultry.

~~The method requires shutting down ventilation in animal housings that rely on the ventilation system to maintain constant temperature and air quality. It is a measure that kills animals predominantly~~ by ~~hyperthermia by heat stress and lack of fresh air. Active heating of the ambient air or increasing the humidity in the building during ventilation shut down~~ is required to ~~will shorten time to death and increase the effectiveness of the method.~~

~~This method can be effective at killing large numbers of animals with limited human-animal interaction and few resources. The effective implementation of the method can be challenging~~ based on ~~the ambient temperature at the facility and~~ how well ~~the facility can be sealed. It is critical that this method be implemented thoughtfully and only in facilities that can be appropriately sealed to allow complete depopulation.~~This method can be effective at killing large numbers of animals with limited human-animal interaction and few resources. The effective implementation of the method can be challenging based on the ambient temperature at the facility and how well the facility can be sealed.

~~1. Animal welfare concerns~~

~~The animals will experience heat stress, distress and suffering.~~

Time to loss of consciousness can be extended and variable based on environmental and species differences.

It can take a long time for animals to lose consciousness.

Animals will experience heat stress.

2. Animal-based and other measures

Animal based measures may only be assessed via video if available.

Animal- based measures of an effective kill are:of unconsciousness: Loss of posture, absence of movements.

a) absence of muscle tone

b) absence of breathing,

c) fixed and dilated pupils.

Animal-based measures of an effective kill are: absence of signs of life such as breathing, righting reflex or body movement.

3. Recommendations

This method is a method of last resort that can only be applied in poultry.

Ventilation shut down with supplementation should only be used as a method of last resort.

Ventilation shut down with supplementation should achieve greater than 95% mortality in one hour and complete killing within 3 hours.

Facilities must be properly sealed. Facilities that cannot be sealed properly or have poor insulation should not be used, due to the inability to hinder airflow and maintain uniform in-house temperatures depending on the season, and prolonging even further time to loss of consciousness.

Supplemental heaters should be used to increase the temperature of the facility.

Temperatures should be monitored at various heights and locations in the facility and the temperature should exceed 120° F or 49° C within 30 minutes and be maintained at that level for at least three hours.

Humidity should be monitored at various heights and locations in the facility.

This method is a method of last resort suitable for poultry.

4. Species-specific recommendations

None identified

This method can only be applied to poultry as a last resort.

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