Annex 4

**usa comments**

draft CHAPTER 7.5.

**ANIMAL WELFARE DURING SLAUGHTER**

Article 7.5.1.

**Introduction**

Providing good welfare to the animals at *slaughter* is ethically and economically beneficial. The implementation of animal welfare measures in addition to giving value to the product directly for ethical reasons, contributes to the improvement of workers' safety and product quality~~, and is essential for~~ (including food safety) and consequently to the improvement of economical returns [Blokhuis *et al.*, 2008; Lara and Rostagno, 2018].

Article 7.5.2.

**Scope**

This chapter identifies potential *animal welfare* *hazards* during *slaughter* and provides recommendations for arrival and *unloading*, *lairage*, handling, *restraint*, *stunning* and bleeding of animals in *slaughterhouses/abattoirs*. It provides animal-based measures to assess the level of welfare and recommends remedial actions to be applied, when necessary.

This chapter applies to the *slaughter* in *slaughterhouses/abattoirs* of free-moving animals ~~the following domestic animals~~, e.g. cattle, buffalo, bison, sheep, goats, horses, donkeys, mules~~,~~ and pigs, and animals in *containers* (e.g. rabbits and *poultry*). *~~,.~~* ~~hereafter referred as “animals”~~*~~.~~* ~~Recommendations consider whether animals arrive at the~~ *~~slaughterhouse/abattoir~~* ~~in~~ *~~containers~~* ~~or are free-moving.~~

This chapter should be read with the guiding principles for *animal welfare* provided in Chapter 7.1. and relevant provisions of Chapters 6.2. and 6.3.

The principles underpinning these recommendations may also apply to the *slaughter* of other species and those slaughtered in other places.

Article 7.5.3.

**Definition for the purpose of this chapter**

Bleeding means the act of severing major blood vessels that supply the brain, to ensure death.

Article 7.5.4.

**Animal welfare hazards**

*Hazards* to *animal welfare* during each of the pre-slaughter stages have a~~n~~ ~~additive~~ cumulative effect on the stress of the animals [Moberg and Mench, 2000].

At the *slaughterhouses/abattoirs*, animals are exposed to *animal welfare* *hazards* including fasting and water deprivation, mixing of unfamiliar *animals*, handling by humans, exposure to a novel environment (e.g. noise, lighting, flooring), forced movement ~~physical exercise~~, limited space allowance, extreme weather conditions and ineffective ~~inadequate~~ *stunning* and bleeding. These *hazards* can have negative impacts on the welfare of the animals that can be assessed through animal-based measures. ~~In addition r~~Resource-based measures and management-based measures may be used ~~as a substitute~~in addition to animal-based measure to assess the spectrum of animal welfare measures.

**RATIONALE:** Resource and management-based measures do not by themselves assure good animal welfare outcomes. Without assessment of animal-based measures welfare outcomes cannot be properly assessed. Also consistent with the description under 7.5.5 “criteria”.

*Animal welfare hazards* can be minimised by appropriate design of premises and choice of equipment, and through good management, training and competency of personnel.

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Article 7.5.5.

**Criteria (or measures)**

The welfare of animals at *slaughter* should be assessed using outcome-based measures. Although consideration should be given to the resources provided as well as the design and management of the system, animal-based criteria are preferential.

The routine use of these outcome-based measures and the appropriate thresholds should be adapted to the different situations in which animals are managed at a *slaughterhouse/abattoir*. It is recommended that target values or thresholds for *animal welfare* measurables be based on current scientific knowledge and appropriate national, sectorial or regional standards.

Article 7.5.6.

**Management**

The *slaughterhouse/abattoir* operator is responsible for the development and enforcement of a dedicated operating plan that should consider the following:

‒ training and competency of personnel;

‒ design of premises and choice of equipment;

~~‒~~ ~~training and competency of personnel;~~

‒ throughput (number of animals slaughtered per hour);

‒ maintenance and cleaning procedures;

‒ contingency plans;

‒ operating procedure and corrective actions.

Article 7.5.7.

**Training and competency of personnel**

*Animal handlers* and other personnel have a crucial role to play in ensuring good *animal welfare* conditions from the time of arrival of the animals at the *slaughterhouse/abattoir* through to their *death*. Training for all personnel should emphasise the importance of *animal welfare* and their responsibility in contributing to the welfare of the animals that come through the *slaughterhouse/abattoir*.

*Animal handlers* should understand the behavioural patterns of animals they are working with and their underlying principles to carry out the required tasks whilst ensuring good *animal welfare*. They should be experienced and competent in handling and moving the animals with knowledge about animal behaviour and physiology and able to identify signs of stress, fear, pain and suffering. Personnel in charge of *restraint* and of *stunning* and bleeding operations should be familiar with the relevant equipment, their key working parameters and procedures. Personnel *stunning*, shackling and bleeding animals should be able to identify effective *stunning* of the animal and signs of recovery of consciousness, should be able to detect if an animal is still alive has returned to sensibility prior to dressing or scalding and should be able to take corrective actions, if necessary [EFSA, 2013a; EFSA 2013b].

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

~~Only the personnel actively working on the slaughter line should be present in areas where animals are handled. The presence of visitors or other personnel should be limited in those areas in order to prevent unnecessary noise, shouting or movement.~~

In most situations the personnel actively working on the slaughter line would be limited in areas where animals are handled. The presence of visitors or other personnel not actively engaged in needed activity should be limited in those areas in order to prevent unnecessary noise, shouting or movement in areas where animals are handled. The slaughterhouse can assess that need and set criteria accordingly.

**RATIONALE:** Overly prescriptive as written. How to achieve the outcome of avoiding unnecessary noise, shouting or movement in the areas where animals are handled can best be decided by the slaughter establishment. In some cases, it will be necessary for personnel other than those actively working the slaughter line to be present for purposes such as ante-mortem inspection, auditing welfare or other valid reasons.

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Article 7.5.8.

**Design of premises and choice of equipment**

The design of premises and the choice of equipment used in a *slaughterhouse/abattoir* have an important impact on the welfare of animals. They should consider the animals' needs, in terms of their physical comfort including thermal comfort ~~conditions~~, ease of movement, protection from injury, ~~protection from sudden or excessive noise~~ fear and ability to perform natural and social behaviours as well as watering and feeding needs. Premises should be designed to eliminate distractions that may cause approaching animals to stop, baulk or turn back. Flooring should be non-slip to prevent injury and stress due to slipping.

The design of the *slaughterhouse/abattoir* and choice of equipment should take into consideration the species, categories, quantities, ~~and~~ size or weight and age of the animals. *Restraint*, *stunning* and bleeding equipment is critical for the welfare of an animal at the time of *slaughte*r. Appropriate back-up equipment should be available for immediate use in case of failure of the *stunning* equipment initially used.

Article 7.5.9.

**Throughput (number of animals slaughtered per hour)**

The throughput of the *slaughterhouse/abattoir* should never exceed the maximum specification of the design of the facilities or equipment. ~~and may~~ The *slaughterhouse/abattoir* operators should continuously monitor throughput and adjust it to any operational changes, such as staff numbers or line breakdowns. It may also need to be reduced depending on the welfare outcomes.

Personnel allocation should be adequate for the anticipated throughput and be sufficient to implement the *slaughterhouse/abattoir* operating plan as well as ante and post-mortem inspections.

Article 7.5.10.

**Maintenance and cleaning procedures**

All equipment should be clean and well maintained ~~in accordance with manufacturer’s instructions~~ in order to ensure *animal welfare* ~~and safety of personnel~~.

Maintenance and cleaning of handling, *unloading*, *lairage* and moving facilities contribute to ensuring that animals are handled smoothly, preventing pain and fear.

Maintenance and cleaning of *restraining*, *stunning* and bleeding equipment are essential to ensure reliable and efficient *stunning* and *slaughter*, thereby minimising pain, fear and suffering.

**RATIONALE:** Unnecessary specificity. If equipment is “clean and well maintained” then how that standard was met, be it by following manufacturer’s instructions or otherwise, is irrelevant.

Article 7.5.11.

**Contingency plans**

Contingency plans should be in place at the *slaughterhouse/abattoir* to protect the welfare of the animals in the event of an emergency. The contingency plans should consider the most likely emergency situations given the species slaughtered and the location of the *slaughterhouse/abattoir.*

Contingency plans should be documented and communicated to all responsible parties.

Each personnel who has a role to play in implementing contingency plans should be well trained on the tasks they have to perform in case of emergency.

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Article 7.5.12.

**Arrival of free-moving animals**

On arrival at the *slaughterhouse/abattoir*, animals will already have been exposed to *hazards* that may have negative impacts on their welfare. Any previous *hazards* will have a cumulative effect that may affect the welfare of the animals throughout the *slaughter* process. Therefore, animals should be transported to the *slaughterhouse/abattoir* in a manner that minimises adverse animal health and welfare outcomes, and in accordance with Chapters 7.2. and 7.3.

1. Animal welfare concerns:

Delay in *unloading* of animals is a major ~~the main~~ *animal welfare* concern at arrival [NAMI, 2017].

Animals in *vehicles* have smaller space allowances than on farm, undergo water and *feed* deprivation, may have suffered from an injury, ~~and~~ may be exposed to ~~thermal stress due to~~ adverse weather conditions. In addition, stationary *vehicles* may have insufficient ventilation. Delays in *unloading* animals will prolong or exacerbate the impact of these *hazards*. Under these circumstances, injured or sick animals requiring urgent attention ~~will~~ may not be identified or dealt with appropriately and therefore the duration of their suffering will be increased.

2. Animal-based and other measurables include:

It can be difficult to assess animal-based measures while animals are in the *vehicle*. Some measurables that may be assessed include animals with injuries, or those that are sick or have died. Panting, shivering and huddling may indicate thermal stress. Drooling and licking may indicate prolonged thirst.

Animals dead on arrival or condemned on arrival should be recorded and monitored as an indicator of *animal welfare* prior to and during transport.

Time from arrival to *unloading* and the environmental temperature and humidity can be used to establish relevant thresholds for corrective action.

3. Recommendations:

Animals should be unloaded promptly on arrival. This is facilitated by scheduling the arrival of the animals at the *slaughterhouse/abattoir* to ensure that there are sufficient personnel and adequate space in the *unloading* or *lairage* area.

Consignments of animals assessed to be at greater risk of *animal welfare hazards* should be unloaded first. When no space is immediately available, creating space should be a priority. Provisions should be made to provide shelter, shade or additional ventilation during waiting periods, or animals transported to an alternative nearby location where such provision ~~i~~s available.

Animals should be provided water as soon as possible after *unloading*.

Special consideration should be given to animals that have undergone long or arduous journey times, lactating or pregnant animals and young animals.

Lactating animals should be given special attention and given priority when *unloading* and processing.

Unweaned animals are especially sensitive to extreme temperatures and can find it difficult to regulate their body temperature. They are very susceptible to dehydration, illness and stress after transportation and handling. These animals must be given special attention and be given priority when *unloading* and processing.

**RATIONALE:** The two above points are not species-specific and thus belong under point 3 rather than the species-specific point 4 below.

4. Species-specific recommendations:

Pigs are especially sensitive to extreme temperatures and therefore special attention should be taken when dealing with delays in *unloading* this species.

Shorn sheep might be especially sensitive to extreme temperatures and therefore special attention should be taken when dealing with delays in *unloading*.

~~Lactating animals should be given special attention and given priority when~~ *~~unloading~~* ~~and processing.~~

~~Unweaned animals are especially sensitive to extreme temperatures and can find it difficult to regulate their body temperature. They are very susceptible to dehydration, illness and stress after transportation and handling. These animals must be given special attention and be given priority when~~ *~~unloading~~* ~~and processing.~~

**RATIONALE:** Moved to section above

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Article 7.5.13.

**~~Displacements~~ Handling of free-moving animals**

This article addresses the handling of animals during *unloading* and *lairage,* and in the killing area.

1. Animal welfare concerns:

During *unloading,* animals are exposed to similar *hazards* to those encountered when being loaded (see Chapters 7.2. and 7.3). Inappropriate equipment in the *vehicle* or the *slaughterhouse/abattoir*, such as a lack of lateral protection when *unloading*, excessively steep ramps or an absence of foot battens, may result in animals slipping, falling or being trampled, causing injuries~~. The absence of ramps or lifts can result in animals being pushed or thrown off the vehicle~~. The absence of ramps or lifts can result in animal harm. This should be assessed based on the conformation of the slaughterhouse.

**RATIONALE:** in facilities where the loading dock is at the same height as the vehicle being unloaded the use of a ramp is not necessary, thus ramps should be provided and used when needed if there is a height difference. The statement on absence of ramps could result in animals being pushed or thrown off vehicles is editorial and speculative. Recommendation to provide ramps when needed has been added to Article 7.5.13.3.

These *hazards* can also be associated with inappropriate handling and forced physical movement of animals that are unable to move independently as a result of weakness or injuries. Exposure to novel environments (e.g. noise, lighting, flooring) will cause fear and reluctance to move, or turning back.

2. Animal-based and other measurables include:

a) animals running, slipping and falling;

b) animals with broken or otherwise injured limbs;

c) animals turning-back, attempting to escape and reluctant to move;

d) animal vocalisation ~~and frequency of vocalisation especially for pigs and cattle~~;

**RATIONALE:** all animal vocalization is not an indication of animal welfare concerns. Pigs will grunt which is a vocalization but it does not indicate an animal welfare concern that might be associated with a squeal (NAMI Recommended Animal Handling Guidelines and Audit Guide: A Systematic Approach to Animal Welfare, page 60) agreed that not all vocalization is an animal welfare concern.

~~d~~ e) animals that are unable to move by themselves;

~~e~~ f) animals that strike against the facilities;

~~f~~ g)frequency of use of excessive force by personnel;

~~g~~ h*)* frequency of use of electrical prods.

Animals are safely handled when these measures are below an acceptable threshold.

3. Recommendations:

~~Ramps should be provided and used.~~ When ramps are used, they ~~Ramps~~ should be positioned so that the animals can be handled safely. There should be no gap between the *vehicle* and the ramp, the gradient should not be too steep preventing animals from voluntarily moving, and solid side barriers should be in place.

**RATIONALE:** in facilities where the loading dock is at the same height as the vehicle being unloaded the use of a ramp is not necessary, thus ramps should be provided and used when needed when there is a height difference and not at all times.

Design of the facilities should promote the natural movements of animals, and, as far as possible, with a minimal human interaction.

Preventive measures such as foot battens, rubber mats and deep groove flooring can help animals to avoid slipping.

The *unloading* area and raceways should be well lit so that animals can see where they are going.

The design of [*unloading*](http://www.oie.int/index.php?id=169&L=0&htmfile=glossaire.htm#terme_chargement_dechargement) areas and raceways should aim to minimise the potential for distractions that may cause animals to stop, baulk or turn back when being unloaded (e.g. shadows, changes in flooring, moving objects, loud or sudden noises). For details refer to Chapters 7.2. and 7.3.

Annex 4 (contd)

Animals that are injured, sick or unable to rise require immediate action and, when necessary, emergency killing should be performed ~~euthanised~~ without moving them and without delay. Refer to Articles 7.5.19. and 7.5.2~~0~~1. Such animals should never be dragged, nor should they be lifted or handled in a way that might cause further pain, suffering or exacerbate injuries.

Personnel should be calm and patient, assisting the animals to move using a soft voice and slow movements. They should not shout, kick, or use any other means that is likely to cause fear or pain to the animals. Under no circumstances should *animal handlers* resort to violent acts to move animals (see Article 7.5.20.).

Personnel should not stand between an animal and where they want it to move to as this may cause the animal to baulk.

Mechanical aids ~~and electric goads~~ should be used in a manner to encourage and direct movement of the animals without causing distress and pain. Preferred mechanical aids include panels, flags, plastic paddles, flappers (a length of cane with a short strap of leather or canvas attached), plastic bags and metallic rattles.

Electric goads should only be used in extreme cases and not on a routine basis to move animals.

The use of electric goads should be limited to ~~battery-powered~~ properly supplied electric currents (where the voltage of electric prods attached to AC current can be verified). G~~g~~oads applied to the hindquarters of adult pigs and large ruminants, and never to sensitive areas such as the eyes, mouth, ears, ano-genital region or belly. Such instruments should not be used on equids, sheep and goats of any age, or on calves or piglets.

**RATIONALE:** How the device is powered is not relevant.

~~Mechanical~~ Handling aids ~~and electric goads~~ should not be used as a substitute for good facility design and handling. They should not be used repeatedly if an animal fails to respond or move. In such cases it should be determined whether some physical or other impediment is preventing the animal from moving.

~~Electric goads should only be used in extreme cases and not on a routine basis to move animals.~~

~~The use of electric goads should be limited to battery-powered goads applied to the hindquarters of adult pigs and large ruminants, and never to sensitive areas such as the eyes, mouth, ears, anogenital region or belly. Such instruments should not be used on horses, sheep and goats of any age, or on calves or piglets.~~

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). (See Article 7.5.20.).

4. Species-specific recommendations:

None identified.

Article 7.5.14.

**Lairage of free-moving animals**

1. Animal welfare concerns:

Animals during *lairage* may be exposed to several *animal welfare hazards* including:

a) food and water deprivation leading to prolonged hunger and thirst,

b) absence of protection against ~~extremes~~ adverse ~~in~~ weather or climate conditions leading to thermal stress,

c) sudden or excessive noises, including from personnel, leading to fear,

d) insufficient space to lie down and move freely leading to fatigue and aggressive behaviour,

e) poor design and maintenance leading to distress and injuries,

f) mixing of unfamiliar animals leading to aggressive behaviour,

Annex 4 (contd)

g) limited access to resources (e.g. drinkers, bedding) leading to aggressive behaviour;

h) exposure to hard or abrasive surfaces leading to injury or lameness.

2. Animal-based and other measurables include:

a)thermal stress (e.g. panting, sweating, shivering, huddling behaviour),

b) space allowance,

c) excessive soiling with faeces,

d) injuries (e.g. lameness, open wounds, fractures),

e) illness (e.g. limping, diarrhoea, coughing),

f)aggressive behaviours (e.g. mounting, fighting),

g) animal vocalisation ~~frequency of vocalisation especially for pigs and cattle~~.

**RATIONALE:** all animal vocalization is not an indication of animal welfare concerns. Pigs will grunt which is vocalization but it does not indicate an animal welfare concern that might be associated with a squeal (NAMI Recommended Animal Handling Guidelines and Audit Guide: A Systematic Approach to Animal Welfare, page 60)

3. Recommendations:

Animals should have constant access to clean water. Water supply points should be designed according to the species and age of the animal, with environmental conditions that allow for effective consumption. The number and location of the water supply points should minimise competition.

Animals should be provided with *feed* in *lairage* if the duration between loading and expected time for *slaughter* exceeds 24 hours. ~~Animals which are not expected to be slaughtered after 12 hours of arrival should be fed as appropriate for the species and should be given moderate amounts of food at appropriate intervals.~~

**RATIONALE:** The original text should be retained with the 24-hour interval. Studies have shown that keratinazation and ulceration occur at 36 plus hours post-fasting thus a 24 hour fast is appropriate. Fasting swine has been shown to lead to positive food safety outcomes due to reduction of stomach content spilling on the carcass.

The *lairage* should provide animals with protection against adverse weather conditions including shade.

Animals should be protected from excessive and sudden noise (e.g. ventilation fans, alarms, or other indoor or outdoor equipment).

*Lairage* areas should be free from sharp edges and other *hazards* that may cause injury to animals.

The *lairage* should provide enough space for all animals to lie down at the same time, to move freely and to move away in case of aggressive behaviours.

*Lairage* areas should have adequate lighting levels to allow inspection of the animals.

Animals from different groups (or different species) should not be mixed.

4. Species-specific recommendations:

~~None identified.~~ None identified. ~~Pigs should be kept in small groups (up to 15) when resting in lairage, when moving to the stunner and when stunned.~~

**RATIONALE:** stocking density, not group size, is the most important factor for avoiding aggression in pigs. The pigs in lairage are most often kept in groups based on farm of origin for traceability, health, and welfare purposes and therefore include subgroups of pigs that have been socialized with each other during transit or at the farm. While it is desirable to have small groups when moving to the stunner and when stunned there is no welfare advantage to small group sizes in lairage. Although there is no optimal group size for minimizing aggression, it is generally accepted that relatively large group sizes are better than small sizes (Mendl, 1994; Arey and Edwards 1998; Spoolder et al., 2009). Research done in fattening pigs on farm concluded that body weight and feeding systems were the determining factor for welfare status while group size was not proven to affect the welfare (Meyer-Hamme et al., 2016). The large area in large pens may allow subordinate pigs to flee from fights or perform submissive behavior. It is also possible that pigs cannot form a social hierarchy in large pens due to too many pen mates (Turner et al., 2001).

Arey DS, Edwards SA. Factors influencing aggression between sows after mixing and the consequences for welfare and production. Lives. Prod. Sci. 1998; 56:61-70.

Spoolder HAM, Feudeke MJ, Van Der Peet-Schwering CMC, Soede NM. Group housing of sows in early pregnancy: A review of success and risk factors. Lives. Sci. 2009; 125:1-14.

Mendl M. The social behavior of non-lactating sows and its implications for managing sow aggression. Pig J. 1994; 34:9-20.

S.E.K. Meyer-Hamme, C. Lambertz, M. Gauly, 2016, Does group size have an impact on welfare indicators in fattening pigs?, Animal, Volume 10, Issue 1, Pages 142-149

Turner SP, Horgan GW, Edwards SA. Effect of social group size on aggressive behavior between unacquainted domestic pigs. Appl. Anim. Behav. Sci. 2001; 74:203-15.

Article 7.5.15.

**Restraint for stunning or bleeding (free-moving animals)**

1. Animal welfare concerns:

The purpose of *restraint* is to facilitate the correct application of the *stunning* or bleeding equipment. Incorrect *restraint* may not only lead to ineffective *stunning* or bleeding, but also cause pain and distress.

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Other *hazards* include:

a) slipping or falling of animals entering the restraining area;

b) struggling or escape attempts caused by insecure *restraint*;

c) injuries and pain caused by excessive force of *restraint*;

d) fear caused by prolonged *restraint*, which may exacerbate insecure or excessive *restraint*.

In addition, *slaughter* without *stunning* increases the risk of pain and fear due to the need for robust *restraint* of conscious animals for neck cutting, especially if animals are turned on their sides or backs [von Holleben *et al.*, 2010; Pleiter, 2010].

2. Animal-based and other measurables include:

a) animal slipping or falling;

b) struggling;

c) escape attempts;

d) vocalisation (cattle and pigs);

e) reluctance to enter the restrainer;

f) frequency of use of electric goads.

3. Recommendations:

Where individual restraint is used, ~~T~~the restrainer should be narrow enough that the animals cannot move ~~either~~ backwards ~~or~~ ,forwards or turn around.

The restrainer being used should be appropriate to the size of the animals and the restrainer should not be loaded beyond its design capacity.

In case of *slaughter* without *stunning*, the restrainer should restrain the head appropriately and should support the body of the animal appropriately.

The restraining should be maintained until the animal is unconscious.

When restrainers are used that hold an animal with its feet off the floor, the animal must be held in a balanced, comfortable, upright position.

When a restrainer is used to rotate an animal from an upright position, the body and head must be securely held and supported to prevent struggling and slipping within the device.

Restrainers should not have sharp edges.

Non-slip flooring should be used to prevent animals from slipping or falling.

Flooring and handling that intentionally cause loss of balance, slip or fall - i.e. a box with a floor that rises on one side upon entry to the box – should not be used.

Distractions (e.g. movements of equipment or people, loose chains or objects, shiny surfaces or floors) should be minimised to prevent baulking ~~balking~~ and improve ease of entry into the restrainer.

No animals should enter the restrainer until equipment and personnel are ready to slaughter that animal.

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No animals should be released from the restrainer until the operator has confirmed loss of consciousness.

Animals should not be left in conveyor style restrainers during work breaks, and in the event of a breakdown animals should be removed from the conveyor promptly.

The restrainer should be in a clean and non-slip condition.

4. Species-specific recommendations:

Gondolas for gas *stunning* of pigs should not be overloaded and pigs should be able to stand without being on top of each other.

Head *restraint* is recommended for cattle.

Article 7.5.16.

**Stunning of free-moving animals**

1. Animal welfare concerns:

The main *animal welfare* concern associated with *stunning* is ‘ineffective *stunning*’ which results in pain, distress or fear during induction of unconsciousness and possible recovery before *death*.

The most common methods for *stunning* are mechanical, electrical and exposure to controlled atmosphere.

*Stunning* prior to *slaughter* decreases or ~~avoid~~ prevents pain and suffering to animals and also improves workers’ safety.

**RATIONALE:** clarity

Mechanical *stunning* is divided into penetrating *stunning* and ~~non-penetrating~~ non-penetrative percussive *stunning* applications. Both applications use different types of devices aimed to induce immediate loss of consciousness as the impact of the bolt on the skull results in concussion and disruption of normal brain function [Daly *et al.*, 1987; EFSA, 2004]. Penetrative *stunning* devices propel a bolt which penetrates the skull and enters the cranium damaging the brain. Non-penetrative percussive *stunning* devices propel a blunt bolt which does not penetrate the skull, but results in rapid loss of consciousness from impact. The main *hazards* preventing effective mechanical *stunning* are incorrect shooting position and incorrect direction of the impact. These may cause ineffective *stunning* and pain or short-lasting unconsciousness. Poor maintenance of the equipment, ~~L~~low bolt velocity, misuse of cartridge ~~Low bolt velocity~~, narrow bolt diameter or short length of bolt leading to shallow penetration~~,~~ may also affect the effectiveness of *stunning*. In older animals with a thicker skull, low bolt velocity may result in an ineffective stun. In ~~non-penetrating~~ non-penetrative percussive *stunning* applications, high bolt velocity may cause fracture of the skull and ineffective *stunning* [Gibson *et al.*, 2014]. If not applied correctly, fracture of the skull and ineffective *stunning* are more likely to occur with young animals such as calves, when a higher bolt velocity is used.

Electrical *stunning* involves application of an electric current to the brain of sufficient magnitude to induce immediate unconsciousness [EFSA, 2004; Grandin, 1980]. The main *hazards* preventing effective electrical *stunning* are: incorrect electrode placement, poor contact, dirty or corroded electrode, low voltage/current or high frequency [EFSA, 2004].

Controlled atmosphere *stunning* methods involve the exposure to high concentrations of carbon dioxide (hypercapnia), low concentration of oxygen (hypoxia) or a combination of the two (hypercapnic hypoxia). Loss of consciousness is not immediate following exposure of animals to controlled atmosphere *stunning*. The main *hazards* causing increased distress during induction of unconsciousness are irritant or aversive gas mixtures, low gas temperature and humidity. The main *hazards* causing ineffective controlled atmosphere *stunning* are incorrect gas concentration and short gas exposure time [Anon, 2018; EFSA, 2004; Velarde *et al.*, 2007].

Gases or gas mixtures that are painful to inhale should preferably not be used to stun or kill pigs.

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2. Animal-based and other measurables include:

Effectiveness of *stunning* should be monitored at different stages: immediately after *stunning*, just before and during bleeding until death occurs ~~neck cutting, and during bleed-out~~ [EFSA, 2013a; EFSA, 2013b; AVMA, 2016].

No ~~single~~ indicator should be relied upon alone.

Mechanical *stunning:*

An effective stun is characterised by the presence of all the following signs: immediate collapse; apnoea; tonic seizure; absence of corneal reflex; absence of eye movements.

The presence of any of the following signs ~~may~~ indicate ~~an~~ a high risk of ineffective stun or recovery of consciousness: rapid eye movement or nystagmus, vocalisation; spontaneous blinking; righting reflex; presence of corneal reflex; rhythmic breathing.

Electrical *stunning:*

An effective stun is characterised by the presence of all the following signs: tonic-clonic seizures; loss of posture; apnoea; and absence of corneal reflex.

The presence of any of the following signs may indicate an ineffective stun or recovery of consciousness: vocalisation; spontaneous blinking; righting reflex; presence of corneal reflex; rhythmic breathing.

Gas *stunning*:

An effective stun is characterised by the presence of all the following signs: loss of posture; apnoea; absence of corneal reflex; absence of muscle tone.

The presence of any of the following signs may indicate an ineffective stun or recovery of consciousness: vocalisation; spontaneous blinking; righting reflex; presence of corneal reflex; rhythmic breathing.

3. Recommendations:

Animals should be stunned as soon as they are restrained.

When a two-step electrical stun-kill method is used, the electrical current must reach the brain before it reaches the heart otherwise the animal will experience cardiac arrest while still conscious.

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

*Stunning* equipment should be cleaned, maintained and stored following manufacturer’s recommendations.

Regular calibration of the equipment according to the manufacturer’s procedure are recommended. Effectiveness of the *stunning* should be monitored regularly.

*Slaughterhouses/abattoir*s should have standard operating procedures that define key operating parameters or follow the manufacturer’s recommendations for *stunning*, such as:

a)Mechanical:

‒ position and direction of the shot [AVMA, 2016];

‒ grain of the cartridge or air pressure appropriate to the type of animal (captive bolt) [Gibson 2014];

‒ length and diameter of the bolt (captive bolt);

Annex 4 (contd)

‒ calibre and type of gun and ammunition (free bullet).

b)Electrical:

‒ shape, size and placement of the electrodes [AVMA, 2016];

‒ ~~pressure~~ proper contact between electrode and head;

‒ electrical parameters (current, voltage and frequency);

‒ visual or auditory warning system to alert the operator to proper or improper function such as a device that monitors and displays voltage and applied current.

c)Controlled atmosphere:

‒ gas concentrations and exposure time;

‒ temperature and humidity;

‒ rate of decompression (law atmospheric pressure system for *stunning*);

‒

**RATIONALE:** This is already covering under 7.5.16.1.

4. Species-specific recommendations:

Non-penetrating captive bolt should not be used in mature cattle and pigs [Finnie, 1993 and Finnie *et al.*, 2003].

The *Competent Authority* should determine effective electrical parameters, based on scientific evidence for different types of animals.

Article 7.5.17

**Bleeding** **of free-moving animals**

1. Animal welfare concerns:

The main *animal welfare* concern at the time of bleeding following *stunning* is the recovery of consciousness due to prolonged stun-to-stick interval or due to incomplete severance of the main blood vessels.

Bleeding without prior *stunning* increases the *risk* of animal suffering because the incision to sever blood vessels results in substantial tissue damage in areas well supplied with nociceptors. The activation of these nociceptors causes the animal to experience pain [Gregory, 2004; Gibson *et al.*, 2009]. Loss of consciousness due to bleeding is not immediate and there is a period during which the animal can feel fear, pain and distress [Gregory, 2004; Johnson *et al.*, 2015].

Absence of or ineffective *stunning* may result in animals being released from the *restraint*, shackled, and further processed while they are still conscious or have the potential to recover consciousness.

2. Animal-based and other measurables include:

The main animal-based measurable is the blood flow (rate and duration).

For animal-based and other measurables of return of consciousness after *stunning*, see Article 7.5.16.

In cases of bleeding without *stunning* the animal-based and other measurables that indicate loss of consciousness include all the following: absence of muscle tone; absence of corneal reflex; absence of rhythmic breathing. In addition, cessation of bleeding can be used as an indicator of *death*.

Annex 4 (contd)

3. Recommendations:

a) both carotid arteries or the blood vessels from which they arise should be severed;

~~a~~ b) continuous and rapid blood flow should be assured after bleeding;

~~b~~ c*)* ~~cessation of blood flow~~ death should be assured before further processing;

~~c~~ d) bleeding knives should be sharpened for each animal.

In addition, the following should be considered:

*Slaughter* with *stunning*:

a) the stun-to-stick interval should be short enough to ensure that the animal will die before recovering consciousness;

b) unconsciousness should be confirmed before bleeding.

*Slaughter* without *stunning*:

a) bleeding should be carried out by a single incision; any second intervention should be recorded and analysed to improve procedures.

4. Species-specific recommendations

~~None identified.~~

Cattle are at risk of prolonged bleed out times and regaining consciousness if the bilateral vertebral arteries are not cut during a neck cut. If they are not cut, the vertebral arteries will continue to provide blood to the brain and can cause occlusion of the cut major arteries, slowing exsanguination. Therefore, bleeding with a cut of the brachiocephalic trunk should always be preferred in cattle.

Article 7.5.18.

**Slaughter of pregnant free-moving animals**

1. Animal welfare concerns:

Foetuses in the uterus cannot achieve consciousness [EFSA, 2017; Diesch *et al.*, 2005]. However, if removed from the uterus the foetus may perceive pain or other negative impacts.

2. Animal-based and other measurables include:

None identified.

3. Recommendations:

Under normal circumstances, pregnant animals that would be in the final 10% of their gestation period at the planned time of *unloading* at the *slaughterhouse/abattoir* should be neither transported nor slaughtered. If such an event occurs, an *animal handler* should ensure that pregnant females are handled separately.

The foetus should be left undisturbed in utero for at least 30 minutes after the *death* of the dam [EFSA, 2017; Anon, 2017]. The uterus could be removed as a whole, clamped and kept intact such that there is no possibility to the foetus to breathe.

In cases where the foetus is removed before 30 minutes has elapsed euthanasia (captive bolt followed by bleeding) should be carried out immediately.

Annex 4 (contd)

4. Species-specific recommendations:

None identified.

Article 7.5.19.

**Emergency killing of free-moving animals**

This article addresses animals that show signs of severe pain or other types of severe suffering before being unloaded or within the *slaughterhouse/abattoir*. These animals may correspond to animals unfit to travel as listed in Article 7.3.7. Principles described below may also apply to animals that are not suitable for *slaughter* for commercial reasons, even if they do not present signs of pain or suffering.

1. Animal welfare concerns:

Some animals can arrive at *slaughterhouses/abattoirs* with injuries or severe illnesses that can cause undue pain and suffering. This is more likely in animals of low economic value.

2. Animal-based and other measurables include:

Animals requiring emergency *killing* are unable to walk independently or present severe injuries such as fractures, large open wounds, or prolapses. They may also present clinical signs of serious illness or being in a state of extreme weakness. New-born animals or animals that gave birth within the last 48 hours may also belong to this category.

3. Recommendations:

Animals should not be moved unless it can be done without causing further pain or suffering.

*Animal handlers* should euthanise the animal as soon as possible.

Emergency *killing* should be systematically recorded and analysed in order to improve procedures and prevent recurrences.

4. Species-specific recommendations:

None identified.

Article 7.5.20.

**Methods, procedures or practices unacceptable on animal welfare grounds for free-moving animals**

1) None of the following practices for handling animals are acceptable and should not be used:

a) crushing or breaking tails of animals;

b) applying pressure using an injurious object or applying an irritant substance ~~to sensitive areas such as eyes, mouth, ears, anogenital region or belly~~;

c) hitting animals with instruments such as large sticks, sticks with sharp ends, ~~metal~~ piping, stones, fencing wire or leather belts;

d) kicking, throwing or dropping animals;

e) grasping, lifting or dragging animals only by some body parts such as their tail, head, horns, ears, limbs, wool or hair;

f) dragging animals by any body part with chains or ropes.

Annex 4 (contd)

2) None of the following practices for restraining animals are acceptable and should not be used:

a) mechanical clamping of the legs or feet of the animals as the sole method of [*restraint*](http://www.oie.int/index.php?id=169&L=0&htmfile=glossaire.htm#terme_immobilisation);

b) breaking legs, cutting leg tendons or blinding animals;

c) severing the spinal cord, by using for example a puntilla or dagger;

d) applying electrical current that does not span the brain;

e) suspending or hoisting conscious animals by the feet or legs;

f) severing brain stem by piercing through the eye socket or skull bone;

g) forcing animals to ~~the ground~~ sit or lay down by one or more handlers jumping on and lying across the animal’s back.

**RATIONALE:** Clarity

3) Breaking the neck while the animal is still conscious during bleeding is also an unacceptable practice.

Article 7.5.21.

**Arrival of animals in containers**

On arrival at the *slaughterhouse/abattoir*, animals will already have been exposed to *hazards* that may have negative impacts on their welfare. Any previous *hazards* will have a cumulative effect that may impair the welfare of the animals throughout the *slaughter* process. Therefore, animals should be transported to the *slaughterhouse/abattoir* in a manner that minimises adverse animal health and welfare outcomes, and in accordance with Chapters 7.2. and 7.3.

1. Animal welfare concerns:

Animals in *containers* have smaller space allowances than on farm, undergo water and *feed* deprivation, and may be exposed to thermal stress due to adverse weather conditions. In addition, stationary *vehicles* may have insufficient ventilation. Delays in *unloading* *containers* will prolong or exacerbate the impact of these *hazards*. Under these circumstances, injured or sick animals requiring urgent attention will not be identified and therefore the duration of their suffering will be increased.

2. Animal-based and other measurables include:

It can be difficult to assess animal-based measures while animals are in the *containers* and especially whenthe *containers* are on the vehicle*.* Some measurables that may be assessed include animals with injuries, or those that are sick or have died. Panting, shivering and huddling may indicate thermal stress. In rabbits drooling and licking may indicate prolonged thirst.

Time from arrival to *unloading* and slaughter, the environmental temperature and humidity can be used to establish relevant thresholds for corrective action.

3. Recommendations:

Animals should be slaughtered as soon as they arrive at the *slaughterhouse/abattoir*. If not possible, *containers* should be unloaded, or vehicles should be placed in lairage or in sheltered and adequately ventilated area, promptly on arrival. This is facilitated by scheduling the arrival of the animals at the *slaughterhouse/abattoir* to ensure that there are sufficient personnel and adequate space in the *lairage* area.

Consignments of animals assessed to be at greater risk of *animal welfare hazards* (e.g. from long journeys, prolonged lairage, end of lay hens) should be unloaded first or should be considered for prioritised *slaughter*. When no available space is immediately available, creating space should be a priority. Provisions should be made to provide shelter, shade or additional ventilation during waiting periods, or animals should be transported to an alternative nearby location where such provision ~~i~~s available.

Annex 4 (contd)

4. Species-specific recommendations:

Poultry is especially sensitive to extreme temperatures and therefore special attention should be taken when dealing with delays in *unloading* this species in extreme temperatures.

Birds may get trapped or their wings or claws may get caught in the fixtures, mesh or holes in poorly designed, constructed or maintained transport systems. Similarly, rabbits may trap their paws in the fixtures mesh or holes in poorly designed, constructed or maintained transport systems. Under these situations, operators *unloading* birds or rabbits should ensure gentle release of trapped animals.

Article 7.5.22

**Moving of animals in containers**

This article addresses the handling of containerised animals during *unloading* and *lairage,* and into the killing area.

1. Animal welfare concerns:

During *unloading* and moving *containers* animals can be exposed to pain and fear due to tilting, dropping or shaking of the *containers*.

2. Animal-based and other measurables include:

a) animals with broken limbs;

b) animals that strike against the facilities;

c) animals vocalizing;

d) body parts (i.e. wings or heads) stuck between *containers*;

e) animalsinjured by sharp projections inside *containers.*

3. Recommendations:

*Containers* in which animals are transported should be handled with care, moved slowly, and should not be thrown, dropped or knocked over. Where possible, they should be horizontal while being loaded or unloaded mechanically and stacked to ensure ventilation. In any case, *containers* should be moved and stored in an upright position as indicated by specific marks.

Animals delivered in *containers* with perforated or flexible bottoms should be unloaded with particular care to avoid injury by crushing or jamming of body parts.

Animals that are injured, jammed or sick require immediate action and, when necessary, should be taken from the *containers* and euthanised without delay. Refer to Articles 7.5.8, 7.5.9., 7.6.8 and 7.6.17.

Staff should routinely inspect the *containers* and remove the broken *containers* that should not be re-used.

4. Species-specific recommendations:

None identified.

Article 7.5.23

**Lairage of animals in containers**

1. Animal welfare concerns:

Animals during *lairage* may be exposed to several *animal welfare hazards* including:

Annex 4 (contd)

a) food and water deprivation leading to prolonged hunger and thirst,

b) absence of protection against extremes in climate leading to thermal stress,

c) sudden or excessive noises, including from personnel, leading to fear,

d) insufficient space to lie down and move freely leading to fatigue and aggressive behaviour.

2. Animal-based and other measurables include:

a) thermal stress (e.g. panting, shivering, huddling behaviour),

b) space allowance,

c) excessive soiling with faeces,

d) injuries (e.g. splay leg, open wounds, fractures),

e)dead animals.

3. Recommendations:

Animals should be slaughtered upon arrival at the *slaughterhouse/abattoir*.

The *lairage* should provide animals with protection against adverse weather conditions.

Animals should be protected from excessive noise (e.g. ventilation fans, alarms, or other indoor or outdoor equipment).

4. Species-specific recommendations:

None identified.

Article 7.5.24.

**Unloading** **animals from containers**

1. Animal welfare concerns:

Animals are removed manually or automatically by tilting (poultry) from the transport *containers*.

When the *containers* with birds are mechanically emptied by tipping, animals fall on to conveyors. Dumping, piling up and shock might happen, especially for the last birds which are often removed by mechanical shaking of the *containers*.

Other *hazards* include:

a) narrow openings or doors of the *containers*;

b) *containers* placed too far away from the place of *stunning*;

c) incorrect design of tipping equipment that cause animals falling from high and conveyor belts that are running too fast or too slow resulting in piling or injured animals.

2. Animal-based and other measurables include:

a) animal falling;

b) struggling, including wing flapping;

Annex 4 (contd)

c) escape attempts;

d) vocalisation;

e) injuries, dislocation, fractures;

f) pilling-off of animals.

1. Recommendations:

Removal of animals from the *containers* in a way that cause pain, e.g. by one leg, wings, neck or ears, should be avoided.

Animals should be removed from *containers* by the body or by both legs using both hands and one animal at a time. Animals should not be grabbed and lifted by one leg, the ears, wings or fur and they should not be thrown swing or dropped.

Modular systems that involve tipping of live birds are not conducive to maintaining good animal welfare. These systems, when used, should be incorporated with a mechanism to facilitate birds sliding out of the transport system, rather than being dropped or dumped on top of each other from heights of more than a metre.

1. Species-specific recommendations:

Birds with broken bones and/or dislocated joints should be humanely killed before being hung on shackles for processing.

Article 7.5.25.

**Restraint for stunning animals from containers**

1. Animal welfare concerns:

The purpose of *restraint* is to facilitate the correct application of the *stunning* or bleeding equipment. Incorrect *restraint* cause pain and distress and may lead to ineffective *stunning* or bleeding.

Other *hazards* include:

a) Inversion can provoke compression of the heart and lungs by the viscera and might compromise breathing and cardiac activity. This might cause pain and fear in conscious birds.

b) Shackling hanging birds upside down by inserting both legs into metal shackles. During shackling, the birds are also subjected to compression of their legs and wing flapping by their neighbour(s), possibly leading to pain and fear.

c) Inappropriate shackling may lead to pain and fear when shackles are too narrow or too wide, when the birds are hung by one leg, or when one bird is shackled on two different adjacent shackles.

d) Drops, curves and inclination of shackle line or high speed of the slackline create fear and possible pain due to the sudden changes in position as well as increase effects of inversion.

2. Animal-based and other measurables include:

a) struggling;

b) escape attempts;

c) vocalisation (poultry);

d) injuries and pain caused by excessive force of restraint or shackling;

Annex 4 (contd)

e) fear caused by prolonged restraint, which may exacerbate insecure or excessive restraint.

3. Recommendations:

Animals should be handled and restrained without provoking struggle or attempts to escape.

Avoid inversion of conscious animals.

Avoid shackling of conscious animals but there is no real way to prevent or correct shackling, however, as it is a part of some of the *stunning* methods most commonly used in slaughter plants.

Shackle lines must be constructed and maintained so they do not jolt birds as this is likely to stimulate flapping. Shackle line speeds must be optimised so that they do not cause the birds to struggle.

To minimise wing flapping, breast support should be provided to the birds from the shackling point up to the stunner.

Inappropriate shackling such as too narrow or too wide shackles, birds being pushed into the shackles with force, birds shackled by one leg, or shackled on two different adjacent shackles, should be avoided.

Inappropriate shackling can be prevented by training staff to handle birds with care and compassion, shackle birds gently by both legs and kill injured birds before shackling, by rotating staff at regular intervals to avoid boredom and fatigue and by using shackles that are appropriate to the species and size of the birds.

4. Species-specific recommendations:

*Rabbits*:

Restraining for head-only electrical *stunning* is manual and involves holding the rabbit with one hand supporting its belly, and the other hand guiding the head into the *stunning* tongs or electrodes.

Rabbits should not be lifted or carried by the ears.

*Poultry*:

Shackling should not be used with heavy birds like parent *flocks* or with birds that are more susceptible to fractures like end-of-lay hens.

Article 7.5.26.

**Head only electrical stunning**

1. Animal welfare concerns:

Electrical *stunning* involves application of an electric current to the brain of sufficient magnitude intensity to induce immediate unconsciousness [EFSA, 2004; Grandin, 1980]. The main *hazards* preventing effective electrical *stunning* are: incorrect electrode placement, poor contact, dirty or corroded electrode, inappropriate electrical parameters (low voltage/current or high frequency [EFSA, 2004]).

2. Animal-based and other measurables include:

Effectiveness of *stunning* should be monitored at different stages: immediately after *stunning*, just before and during bleeding until death occurs [EFSA, 2013a; EFSA, 2013b; AVMA, 2016].

No indicator should be relied upon alone.

An effective stun is characterised by the presence of all the following signs: tonic-clonic seizures; loss of posture; apnoea; and absence of corneal reflex.

Annex 4 (contd)

The presence of any of the following signs indicate a high risk of ineffective stun or recovery of consciousness: vocalisation; spontaneous blinking; righting reflex; presence of corneal 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 immediately using a backup system. Ineffective *stunning* or return to consciousness should be systematically recorded and the cause of the failure identified and rectified.

*Stunning* equipment should be cleaned, maintained and stored following manufacturer’s recommendations.

Regular calibration of the equipment according to the manufacturer’s procedure are recommended. Effectiveness of the *stunning* should be monitored regularly.

*Slaughterhouses/abattoirs* should have standard operating procedures that define key operating parameters or follow the manufacturer’s recommendations for *stunning*, such as:

‒ shape, size and placement of the electrodes [AVMA, 2016];

‒ contact between electrode and head;

‒ electrical parameters (current intensity, voltage and frequency);

‒ visual or auditory warning system to alert the operator to proper or improper function such as a device that monitors and displays voltage and applied current.

4. Species-specific recommendations:

The *Competent* *Authority* should determine effective electrical parameters, based on scientific evidence for different types of animals.

Article 7.5.27.

**Electrical water-bath stunning**

1. Animal welfare concerns:

In electrical water-bath *stunning* poultry are inverted and hung by the legs from a shackle line. The bird’s head has direct contact with the water-bath, and an electric current is passed from the water through the bird to the leg shackle. *Hazards* that may prevent effective electrical *stunning* are: lack of contact between head and water, pre-stun shocks due to wings contacting water before the head, and the use of inappropriate electrical parameters (low voltage/current or high frequency [AVMA 2016]).

2. Animal-based and other measurables include:

Effectiveness of *stunning* should be monitored at different stages: immediately after *stunning*, just before and during bleeding until death occurs [EFSA, 2019, EFSA, 2013a; EFSA, 2013b; AVMA, 2016].

No indicator should be relied upon alone.

An effective stun is characterised by the presence of all the following signs: tonic-clonic seizures; loss of posture; apnoea; and absence of corneal reflex.

The presence of any of the following signs indicate a high risk of ineffective stun or recovery of consciousness: vocalisation; spontaneous blinking; righting reflex; presence of corneal reflex; rhythmic breathing.

Annex 4 (contd)

3. Recommendations:

The height of the water-bath stunner must be adjusted so that the birds cannot pull themselves up and avoid the stunner. Avoid distractions such as people walking under the birds can cause birds to pull up.

Personnel should watch for short or stunted birds as these birds will not be able to make contact with the water and will not be stunned.

The rail of the shackle line should run smoothly. Sudden movement such as jolts, drops or sharp curves in the line may cause birds to flap and avoid the stunner.

Pre-stun shocks can be reduced by having a smooth shackle line and by adjusting the water level of the bath.

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

*Stunning* equipment should be cleaned, maintained and stored following manufacturer’s recommendations.

Regular calibration of the equipment according to the manufacturer’s procedure are recommended. Effectiveness of the *stunning* should be monitored regularly.

*Slaughterhouses/abattoirs* should have standard operating procedures that define key operating parameters or follow the manufacturer’s recommendations for *stunning*, such as:

‒ water level;

‒ contact between water and head;

‒ electrical parameters (current intensity, voltage and frequency);

‒ visual or auditory warning system to alert the operator to proper or improper function. such as a device that monitors and displays voltage and applied current.

Ensure an optimum combination of voltage and frequency during electrical water bath *stunning* practices, to maximize the effectiveness of *stunning*.

4. Species-specific recommendations:

The *Competent Authority* should determine effective electrical parameters, based on scientific evidence for different types of birds.

Article 7.5.28.

**Mechanical stunning**

The mechanical methods described here are captive bolt, percussive blow to the head, cervical dislocation and decapitation.

Effective mechanical *stunning* requires a severe and immediate damage to the brain by the application of mechanical force. For that reason, cervical dislocation and decapitation cannot be considered as *stunning* methods.

1. Animal welfare concerns:

Mechanical methods required precision and often physical strength to restrain and stun the animals. A common cause for misapplication of these methods is the lack of proper skill and the operator fatigue.

Annex 4 (contd)

*Captive bolt*

An incorrect shooting position or incorrect captive bolt parameters will mis-stunned the animal leading to serious wounds and consequently pain and fear.

Improper captive bolt parameters may be linked to the use of improper gun (diameter), improper cartridges, overheated or badly maintained gun.

*Percussive blow to the head*

An incorrect application of the blow, by not hitting the brain with sufficient force will also mis-stunned the animals leading to serious wounds and consequently pain and fear.

In addition, the blow might not be consistently effective when delivered to an animal held upside down by its legs (part of the energy is dissipated by the movement of the body instead of damaging the brain).

*Cervical dislocation and decapitation*

Because neither method apply to the brain, the loss of consciousness is not immediate and, in some cases, when the method is not properly applied the pain and fear of the animal might be prolonged.

In addition, decapitation is associated with an open wound leading to intense pain.

2. Animal-based and other measurables include:

*Captive bolt and percussive blow to the head*

With birds, severe convulsions (wing flapping and leg kicking) occur immediately after shooting. This is due to the loss of control of the brain over the spinal cord. Since mechanical *stunning* is applied on individual animals, its efficacy can be assessed immediately after the stun.

*Cervical dislocation and decapitation*

Death can be confirmed from several indicators: permanent absence of breathing, absence of corneal or palpebral reflex, dilated pupil, or relaxed carcass [EFS, 2013].

3. Recommendations:

Captive bolt and percussive blow to the head should only be used as backup or for small-scale slaughtering as in small *slaughterhouses/abattoirs* or on-farm slaughter.

*Captive bolt*

The captive bolt gun should be cleaned, maintained and stored following manufacturer’s recommendations.

Effectiveness of the *stunning* should be monitored regularly.

Because it requires precision, this method should only be applied with proper restrain of the head of the animals. In addition, in the case of birds, they should be restrained in a bleeding cone to contain wing flapping.

The captive-bolt should be pointing perpendicularly on the parietal bones of birds.

Placement is different for birds with or without combs:

*Without comb*

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 [AVMA, 2020].

Annex 4 (contd)

*With comb*

As far as captive bolt in chickens (and poultry with comb development) is concerned, the placement should be directly behind the comb and on the midline of the skull with the captive bolt aimed directly down [AVMA, 2020].

*Rabbits*

The device should be placed in the 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. [Walsh *et al.,* 2017].

The power of the cartridge, compressed air line pressure or spring should be appropriate for the species and size of birds. Cartridges should be kept dry and the gun regularly inspected and maintained.

As an indication for broiler chickens, the appropriate specifications for captive bolt *stunning* are a minimum of 6-mm bolt diameter driven at an air pressure of 827 kPa to a penetration depth of 10 mm [Raj and O’Callaghan, 2001].

There should be sufficient bolt guns such that they are allowed to cool between operations, and they should be cleaned and maintained according to manufacturer’s instructions.

*Percussive blow to the head*

This method should be dealt with a single sufficiently strong hit placed in the frontoparietal region of the head resulted in loss of auditory evoked potentials in broilers and broiler breeders.

Fatigue of the operator can lead to inconsistency in application, creating concern that the technique may be difficult to apply humanely to large numbers of birds. It should not be done with the animal’s head hanging down since inversion is stressful and part of the energy of the blow will be dissipated by the movement of the body.

Considering that the application of this method is entirely manual and prone to error, percussive blow might be used only when no other *stunning* method is available and, by establishing a maximum number of animals per operator in time to avoid errors due to operator fatigue.

It should not be used as a routine method and should be limited as a back-up method limited to small size animals (e.g. up to 3kg liveweight manually and up to 5 kg mechanical).

This method should not be used in rabbits because of the difficulties to apply this method efficiently.

*Cervical dislocation*

Cervical dislocation should be avoided since it does not render the animal unconscious immediately.

It should not be used as a routine method and should be limited as a back-up method limited to small size animals (e.g. up to 3kg liveweight manually and up to 5 kg mechanical).

Mechanical dislocation should be preferred to manual dislocation as the efficiency of the first is less dependent on the operator’s strength than the later.

*Decapitation*

Decapitation should not be used.

4. Species-specific recommendations:

Because of their size, heavy animals such as turkeys, geese or mature rabbits should not be stunned through percussive blow to the head or cervical dislocation.

Annex 4 (contd)

Article 7.5.29.

**Controlled atmosphere stunning**

Animals may be exposed to controlled atmosphere *stunning* methods either directly in crates or after being unloaded on a conveyor belt. Animals are not subject to restraint. Controlled atmosphere *stunning* includes exposure to carbon dioxide, inert gases or low atmosphere pressure.

1. Animal welfare concerns:

A common concern of all controlled atmosphere *stunning* methods is the risk of insufficient exposure of animals to the modified atmosphere, which can result in animals returning to consciousness before bleeding. The insufficient exposure to modified atmosphere may be due to either a too short exposure time, a too low concentration of gas or a combination of these variables.

These variables are critical because animals being stunned in large groups need special attention to ensure unconsciousness prior to neck cutting. For this reason, the duration of unconsciousness induced needs to be longer than required by other *stunning* methods to ensure animals do not recover prior to being killed.

Furthermore, in the case of exposure to carbon dioxide, there is a risk that animals are exposed to a too high concentration of this gas, leading to pain. Exposure of conscious animals to more than 40% carbon dioxide (CO2) will cause painful stimulation of the nasal mucosa and aversive reactions.

Low atmospheric pressure systems (LAPS) should not be confused with decompression. LAPS utilise a slow removal of air where animals exhibit minimal to no aversive behaviours. Decompression is a fast process that is associated with induction of pain and respiratory distress.

1. Animal-based and other measurables include:

It may be difficult to monitor the effectiveness of controlled atmosphere *stunning* due to limited access to observation of animals during the *stunning* process. All chamber-type systems should have either windows or video cameras so that problems with induction can be observed. If problems are observed, there is a need to take immediately any corrective measure that could alleviate the suffering of the animals concerned.

Therefore, it is essential that the death of animals is confirmed at the end of the exposure to the controlled atmosphere.

Death can be confirmed from permanent absence of breathing, absence of corneal or palpebral reflex, dilated pupils and relaxed carcass.

Since animal-based measures are difficult to monitor, resource-based measures should be used such as gas concentration, exposure time and decompression rate (for low atmosphere pressure).

1. Recommendations:

Conscious animals should not be exposed to carbon dioxide exceeding 40%.

The duration of exposure and the gas concentration should be designed and implemented in such a way that all animals are dead before being shackled.

Gas concentrations and exposure time, temperature and humidity must be monitored continuously at the level of the animal inside the chamber.

In case of low atmosphere pressure *stunning* decompression rate should be monitored continuously. The decompression rate should not be greater than or equivalent to a reduction in pressure from standard sea level atmospheric pressure (760 Torr) to 250 Torr in not less than 50 s. During a second phase, a minimum atmospheric pressure of 160 Torr shall be reached within the following 210 s.

Annex 4 (contd)

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

1. Species-specific recommendations:

Low atmosphere pressure *stunning* has only been scientifically studied on commercial broilers and therefore should not be used for other animals until further information is available.

The recommended CO2 displacement rate for rabbits is 50-60% of the chamber or cage volume/min as this results in a significantly shorter time to insensibility and death (Walsh *et al.*, 2016, AVMA 2020). Exposure to CO2 at high concentrations can reduce pre-stun handling and produce irreversible *stunning* in rabbits. With a stun to stick interval of up to 2 min, 200 s of exposure at 80%, 150 s at 90% and 110 s at 98% are recommended (Dalmau *et al.*, 2016). While there are advantages to high CO2 exposure in rabbits, it is not without welfare concerns (aversion, vocalisation).

Article 7.5.30.

**Bleeding in animals arriving in containers**

1. Animal welfare concerns

In poultry, the most common animal welfare concern at the time of bleeding is recovery of consciousness due to ineffective electric water bath *stunning* practices. There are a lot of factors that determine the efficacy of a *stunning* procedure such as type of chicken (broiler, breeder, layer), animal weight, voltage, frequency, impedance and duration of *stunning* [Zulkifli *et al.*, 2013; Raj, 2006; Wotton & Wilkins, 2004].

Improper *stunning* practice leads to the risk of animal suffering from pain, during and after *slaughter* if they regain consciousness. There is also an additional risk of injury on bones (coracoid and scapula), wings and joints due to flapping if birds regain consciousness.

Bleeding without prior *stunning* increases the risk of animal suffering because the incision to sever blood vessels results in substantial tissue damage in areas well supplied with nociceptors. The activation of these nociceptors causes the animal to experience pain [Gregory, 2004; Gibson et al., 2009]. Loss of consciousness due to bleeding is not immediate and there is a period during which the animal can feel fear, pain and distress [Gregory, 2004; Johnson *et* *al.*, 2015].

In case of bleeding without *stunning*, higher cases of injury, bruises, haemorrhage and broken body parts are expected to occur due to wing flapping and violent muscular contractions [McNeal *et al.*, 2003).

Bleeding duration also plays an integral part in processing, where animals that have not undergone a sufficient bleeding period (min 40 sec), may still be alive upon reaching the scalding tank. Live and conscious birds, if not removed prior to scalding, will then be subjected to additional pain stimulators from the heat inside the scalding tank.

1. Animal-based and other measurables include:

The main animal-based measurable is the blood flow (rate and duration). For animal-based and other measurables of return of consciousness after *stunning*, see Article 7.5.16.

One of the most common parameters in determining bleeding efficiency is the percentage of blood loss, where the amount of blood loss is estimated through the difference between pre-slaughter weight and post-slaughter weight [Velarde *et al.*, 2003; Sabow *et al.*, 2015].

The effectiveness of a *stunning* procedure on birds can be seen through the following signs: absence of corneal reflex, loss of posture tonic-clonic seizures and apnoea. Presence of one or more signs during bleeding may be the result of ineffective *stunning* procedure.

Annex 4 (contd)

1. Recommendations:

The *slaughterhouse/abattoir* operators should ensure that:

‒ qualified personnel take random samples of birds between the end of *stunning* and before bleeding to ensure birds are not showing signs of consciousness;

‒ qualified personnel right after bleeding check that the jugular veins, carotid artery and windpipe were cut thoroughly, guaranteeing a well bleeding process afterwards;

‒ the slaughter line speed allows a minimum bleeding period of 40 seconds (for chickens) so that there is minimum blood loss of 60 percent before reaching the scalding tank or other potentially painful operation;

‒ qualified personnel check that at the bleeding line, especially before scalding, birds are completely dead. Birds that are still alive need to be removed from shackle.

Decapitation should not be used as a bleeding technique because it does not allow monitoring possible return of consciousness.

1. Species-specific recommendations

None identified.

Article 7.5.31

**Emergency killing on animals arriving in containers**

This article addresses animals that show signs of severe pain or other types of severe suffering before being unloaded or within the *slaughterhouse/abattoir*. These animals may correspond to animals unfit to travel as listed in Article 7.3.7. Principles described may also apply to animals that are not suitable for *slaughter* for commercial reasons, even if they do not present signs of pain or suffering.

1. Animal welfare concerns:

Some animals can arrive at *slaughterhouses/abattoirs* with injuries or severe illnesses that can cause undue pain and suffering.

2. Animal-based and other measurables include:

Animals requiring emergency *killing* are those with severe injuries such as fractures, bone dislocations, and large open wounds.

3. Recommendations:

*Animal handlers* should euthanise the animal as soon as they are identified at arrival, during lairage or at the time of shackling.

Emergency *killing* should be systematically recorded and analysed to improve procedures and prevent recurrences.

4. Species-specific recommendations:

None identified yet.

Annex 4 (contd)

Article 7.5.32.

**Methods, procedures or practices unacceptable on animal welfare grounds for animals arriving in containers**

1) None of the following practices for handling animals are acceptable and they should not be used:

a) applying pressure using an injurious object or applying an irritant substance to any part of the body of the animal;

b) hitting animals with instruments such as large sticks, sticks with sharp ends, metal piping, stones, fencing wire or leather belts;

c) throwing or dropping animals;

d) grasping, lifting or dragging animals only by some body parts such as their tail, head, ears, limbs, hair or feathers.

2) None of the following practices for restraining animals are acceptable and should not be used:

a) mechanical clamping of the legs or feet of the animals as the sole method of [restraint](http://www.oie.int/index.php?id=169&L=0&htmfile=glossaire.htm#terme_immobilisation);

b) breaking legs, cutting leg tendons or blinding animals;

c) applying electrical current that does not span the brain such as the use of the electrical *stunning* method with a single application leg-to-leg;

d) severing brain stem by piercing through the eye socket or skull bone;

In poultry, electro-immobilisation for neck-cutting or preventing wing flapping during bleeding, or the method of brain piercing through the skull without prior *stunning*.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Annex 4 (contd)

**References**

Anonymous (2017). Animal welfare aspects in respect of the slaughter or killing of pregnant livestock animals (cattle, pigs, sheep, goats, horses). EFSA Journal 15:4782.

Anonymous (2018). Scientific Opinion on monitoring procedures at slaughterhouses for bovines. EFSA Journal 11:3460.

Anonymous (2018). Technical Note No 19 Carbon Dioxide cx and Killing of Pigs. Humane Slaughter Association, UK. https://www.hsa.org.uk/downloads/technical-notes/tn19-carbon-dioxide-stunning-and-killing-of-pigs.pdf

AVMA Guidelines for the Humane Slaughter of Animals (2016). Available from: <https://www.avma.org/KB/Resources/Reference/AnimalWelfare/Documents/Humane-Slaughter-Guidelines.pdf>

Dalmau, A., Pallisera, J., Pedernera, C., Muñoz, I., Carreras, R., Casal, N., Mainau, E., Rodríguez, P., Velarde, A.. (2016). Use of high concentrations of carbon dioxide for stunning rabbits reared for meat production. World Rabbit Science, 24: 25-37.

Daly, C.C., Gregory, G. and Wotton, S.B. (1987). Captive bolt stunning of cattle: effects on brain function and role of bolt velocity. British Veterinary Journal 143 574-580.

EFSA (2004). Welfare aspects of animal stunning and killing methods. Scientific Report of the Scientific Panel for Animal Health and Welfare on a request from the Commission related to welfare aspects of animal stunning and killing methods. Available from: <http://www.efsa.europa.eu/de/scdocs/doc/45.pdf>.

EFSA AHAW Panel (EFSA Panel on Animal Health and Welfare) (2013a). Scientific opinion on monitoring procedures at slaughterhouses for bovines. EFSA Journal 2013. 11, 3460. Available from: <http://dx.doi.org/10.2903/j.efsa.2013.3460>.

EFSA AHAW Panel (EFSA Panel on Animal Health and Welfare) (2013b). Scientific opinion on monitoring procedures at slaughterhouses for sheep and goats. EFSA Journal 2013. 11, 3522. Available from: <http://dx.doi.org/10.2903/j.efsa.2013.3522>.

EFSA AHAW Panel (EFSA Panel on Animal Health and Animal Welfare) (2017) Scientific Opinion on the animal welfare aspects in respect of the slaughter or killing of pregnant livestock animals (cattle, pigs, sheep, goats, horses). EFSA Journal 2017;15(5):4782, 96 pp. Available from : <https://doi.org/10.2903/j.efsa.2017.4782>

EFSA AHAW Panel (EFSA Panel on Animal Health and Animal Welfare) (2019) Scientific Opinion on the Slaughter of animals: poultry. EFSA Journal 2019;17(11):5849, 91 pp. Available from : <https://doi.org/10.2903/j.efsa.2019.5849>

Finnie, J.W. (1993). Brain damage caused by captive bolt pistol. J. Comp. Patholo. 109:253–258.

Finnie, J.W, J. Manavis, G.E. Summersides and P.C. Blumbergs. (2003). Brain Damage in Pigs Produced by Impact with a Non-penetrating Captive Bolt Pistol. Aust. Vet. J. 81:153-5.

Gibson, T.J, Johnson, C.B, Murrell, J.C, Hulls, C.M., Mitchinson, S.L., Stafford, K.J., Johnstone, A.C. and Mellor, D.J. (2009). Electroencephalographic responses of calves to slaughter by ventral neck incision without prior stunning. New Zealand Veterinary Journal 57 77-83.

Gibson, T.J., Mason, C.W., Spence, J.Y., Barker, H. and Gregory, N.G. (2014). Factors Affecting Penetrating Captive Bolt Gun Performance. Journal of Applied Animal Welfare Science 18 222-238

Grandin, T. (1980). Mechanical, electrical and anesthetic stunning methods for livestock. International Journal for the Study of Animal Problems, 1(4), 242-263

Gregory, N.G.(2004). Physiology and Behaviour of Animal Suffering. Blackwell Science, Oxford, p. 227. ISBN: 0-632-06468-4.

Johnson, C.B., Mellor, D.J., Hemsworth, P.H. and Fisher, A.D (2015). A scientific comment on the welfare of domesticated ruminants slaughtered without stunning. New Zealand Veterinary Journal 63 58-65.

Mellor, D.J., Diescha, T.J., Gunn, A.J. and Bennet, L. (2005). The importance of ‘awareness’ for understanding fetal pain. Brain Research Reviews 49 (2005) 455–471.

Moberg, G. and Mench, J. (2000). The Biology of Animal Stress: Basic Principles and Implications for Animal Welfare, CABI.

Recommended Animal Handling Guidelines & Audit Guide: A Systematic Approach to Animal Welfare (2017). Rev. 1, North American Meat Institute (NAMI). <http://animalhandling.org/producers/guidelines_audits>

Annex 4 (contd)

Pleiter, H. (2010). Review of Stunning and Halal Slaughter. Meat and Livestock Australia.

von Holleben, K., von Wenzlawowicz, M., Gregory, N., Anil, H., Velarde, A., Rodriguez, P., Cenci Goga, B., Catanese, B., Lambooij, B. (2010). Report on good and adverse practices—animal welfare concerns in relation to slaughter practices from the viewpoint of veterinary sciences. Dialrel report. Deliverable. 1, 3. <http://www.dialrel.eu/images/veterinary-concerns.pdf>

Lara, L. and Rostagno M. (2018). Animal welfare and food safety in modern animal production, in Advances in Agricultural Animal Welfare, Food Science, Technology and Nutrition, Pages 91-108.

Blokhuis, H., Keeling, L., Gavinelli, A. and Serratosa, J. (2008) Animal welfare’s impact on the food chain. Trends in Food Science & Technology, 19 (2008), 79-88.

Walsh JL, Percival A, Turner PV. Efficacy of blunt force trauma, a novel mechanical cervical dislocation device, and a non-penetrating captive bolt device for on-farm euthanasia of pre-weaned kits, growers, and adult commercial meat rabbits. Animals (Basel) 2017;7:100.