Definitions

Pig production systems are defined as all commercial systems in which the purpose of the operation includes some or all of the breeding, rearing and management of pigs intended for production of meat.

For the purpose of this chapter management is defined at the farm management level and at the animal handler level. At the level of farm management, human resources management practices including selection and training, and animal management practices, such as best practice in housing and husbandry and implementation of welfare protocol and audits all impact on animal welfare.

At the animal handler level this requires a range of well-developed husbandry skills and knowledge to care for animals.

For the purpose of this chapter environmental enrichment: means increasing the complexity (e.g. foraging opportunities, social housing, etc.) of the animal’s environment to foster the expression of normal behaviour and reduce the expression of abnormal behaviour and provide cognitive stimulation. The endpoint of enrichment should be to improve the biological functioning of the animal (Newberry, 1995).

Scope

This chapter addresses the welfare aspects of pig production systems. However, captive wild pigs are not considered.

Commercial pig production systems

Commercial pig production systems include:

1. **Indoors**

   These are systems in which pigs are kept indoors, and are fully dependent on humans to provide for basic animal needs such as food and water. The type of housing depends on the environment, climatic conditions and management system. The animals may be kept in groups or individually.

2. **Outdoors**

   These are systems in which pigs live outdoors with shelter or shade, have some autonomy over access to shelter or shade, and may be fully dependent on humans to provide for basic animal needs such as food and water. They are typically confined in paddocks or pasture according to their production stage.

   **Rationale:** In outdoor production, gestating and lactating pigs are commonly kept on pasture with huts.

3. **Combination systems**

   These are systems in which pigs are managed in any combination of indoor and outdoor production systems, depending on weather or production stage.
**Rationale:** A similar statement was not required in Chapter and Article 7.10.2., which describes the broiler production systems. The reasons for including this statement in the swine chapter and not the broiler chapter are not clear.

**Article 7.X.4.**

**Criteria (or measurables) for the welfare of pigs**

The following outcome-based criteria, specifically animal-based criteria, can be useful indicators of animal welfare. The use of these indicators and their appropriate thresholds parameters should be adapted to the different situations in which pigs are managed. Consideration should also be given to the design of the systems. These criteria can be considered as a tool to monitor the efficiency of design and management, given that both of these can affect animal welfare.

**Rationale:** A welfare threshold is a set point for the animal that does not change based on the environment. We suggest the word parameters which more appropriately refers to the measurements taken and allows for a range of acceptable outcomes (system flexibility).

1. **Behaviour**

   Certain behaviours could indicate an animal welfare problem. These include changes of feed and water intake, altered locomotory behaviour and posture, altered lying time, altered respiratory rate and panting, coughing, shivering and huddling, increased agonistic behaviours and stereotypic, apathetic or other abnormal behaviours (e.g. tail biting).

Stereotypy is defined as a sequence of abnormal, repetitive and unvarying behaviors caused by known factors such as frustration, coping attempts, or dysfunction of the central nervous system, invariant motor acts, which provide no obvious gain or purpose for the animal. Some stereotypies commonly observed in pigs include sham chewing, tongue rolling, teeth grinding, bar biting and floor licking.

**Rationale:** We propose using the definition of stereotypies from the Canadian Code of Practice for the Care and Handling of Pigs (2014). The new definition is more descriptive of the behaviors in question. Additionally, the language in the current proposed definition that states “provide no obvious gain or purpose for the animal” is incorrect. Most stereotypic behaviors are considered to be coping mechanisms (Dantzer and Mormede, 1983; Jones et al., 1989; Cooper and Nicol, 1993; Mason and Latham, 2004; Tuyttens, 2007) so while the behavior may appear to human observers to have no obvious gain or purpose, these behaviors do indeed serve a purpose to the animal and its potential welfare.


2. Morbidity rates

Infectious and metabolic diseases, lameness, peri-partum and post-procedural complications, injury and other forms of morbidity, above recognised thresholds, may be direct or indirect indicators of the animal welfare status to which the whole herd is exposed. Understanding the aetiology of the disease or syndrome is important for detecting potential animal welfare problems. Mastitis and metritis, leg and hoof, and reproductive diseases are also particularly important animal health problems for pigs. Scoring systems, such as for body condition, lameness and injuries, can provide additional information.

**Rationale:** Based on the OIE definition of animal welfare, welfare status should be applied to individuals and not groups or herds. Reference to the assessment of groups must always include both an overall level of welfare and the degree of variation among individuals; in particular, whether the welfare of any animal in the group is below the acceptability threshold.

Both clinical and post-mortem pathologic examination and pathology should be utilised as to identify indicators of disease, injuries and other problems that may compromise animal welfare. **Rationale:** Clarification. Examinations are not in themselves indicators, but may be used to detect issues that can lead to compromised animal welfare.

3. Mortality and culling rates

Mortality and culling rates affect the length of productive life and, like morbidity rates, may be direct or indirect indicators of the animal welfare status. Depending on the production system, estimates of mortality and culling rates can be obtained by analysing the causes of death and culling and their temporal and spatial patterns of occurrence. Mortality and culling rates, and their causes, when known, should be recorded regularly, e.g. daily, and used for monitoring e.g. monthly, annually.

Necropsy is useful in recommended when needed to establishing the cause of death.

**Rationale:** Improved clarity

4. Changes in body weight and body condition

In growing animals, body weight changes outside the expected growth rate, especially excessive sudden weight loss, are indicators of poor animal welfare and health.

**Rationale:** Improved clarity

In mature animals, body condition outside an acceptable range may be an indicator of compromised animal welfare, health and reproductive efficiency.

5. Reproductive efficiency

Reproductive efficiency can be an indicator of animal welfare and health status. Future performance of sows or gilts can be affected by under- or over-nutrition at different stages of rearing. Poor reproductive performance, compared with the targets expected for a particular breed or hybrid, can indicate animal welfare problems.
Examples may include:

- low conception rates,
- high abortion rates,
- metritis and mastitis,
- low litter size,
- low numbers born alive,
- high numbers of stillborns or mummies.

6. Physical appearance

Physical appearance may be an indicator of animal welfare and health. Attributes of physical appearance that may indicate compromised welfare include:

- **Body condition score**
- presence of ectoparasites,
- abnormal texture or hair loss,
- excessive soiling with faeces in indoor systems,
- swellings, injuries or lesions,
- discharges (e.g. from nose or eyes),
- feet and leg abnormalities,
- abnormal posture (e.g. rounded back, head low),
- emaciation or dehydration.

**Rationale:** Body condition scoring is a valuable assessment tool that animal handlers can be trained to perform.

7. Handling response

Lack of desensitization or improper handling can result in fear and distress in pigs. Fear of humans may be an indicator of poor animal welfare and health. Indicators include:

- evidence of poor human-animal relationship, such as disturbed behaviour when being moved or when animal handlers interact with pigs enter a pen,

**Rationale:** Pigs that are not used to being handled on a regular basis will naturally respond to animal handlers with fear and distress. It is normal behavior for pigs to display a startle reaction when animal handlers initially enter a pen. Pigs will disperse and move away from the handler as they are considered a novel addition to the pen. Based on prior positive experiences with people and as pigs become used to the handler, they will begin to move closer and begin to interact with the handler. The rate at which this occurs can be dependent on the status of the pig within the group’s social hierarchy.

- animals slipping or falling during handling,
- injuries sustained during handling, such as bruising, lacerations and fractured legs,
- animals vocalising abnormally or excessively during restraint and handling.

**Rationale:** While vocalization during slaughter restraint can be an indicator of a problem with equipment, it is not a good measure of problems with restraint methods used on the farm – primarily with the use of a nose snare. Pigs will vocalize during
restraint using a nose snare even when there is a good human-animal relationship and the restraint is performed properly and is not prolonged to cause undue distress.

8. Lameness

Pigs are susceptible to a variety of infectious and non-infectious musculoskeletal disorders. These disorders may lead to cause lameness and to gait abnormalities. Pigs that are lame or have gait abnormalities may have difficulty reaching food and water and may experience pain. Musculoskeletal problems have many causes, including genetic, nutrition, sanitation, floor quality, and other environmental and management factors. There are several gait scoring systems available.

**Rationale:** Improved clarity

9. Complications from common painful procedures

Some procedures such as surgical castration, tail docking, teeth clipping or grinding, tusk trimming, identification, nose ringing and hoof care are commonly may be performed in pigs to facilitate management, to meet market requirements and or improve human safety and animal welfare.

**Rationale:** Some of the procedures listed are no longer commonly performed or may no longer be commonly performed in the near future. Additionally, while a procedure may be performed to meet a market requirement, this does not necessarily mean that it was performed to improve human safety or animal welfare.

However, if these procedures are not performed properly, animal welfare and health can be unnecessarily compromised.

**Rationale:** Welfare will be compromised by these procedures simply being performed; however if they are performed improperly there will be additional unnecessary negative impacts.
Indicators of such problems could include:

- post-procedure infection and swelling,
- post-procedure lameness,
- behaviour indicating pain, fear and distress,
- morbidity, mortality and culling rates,
- reduced feed and water intake,
- post procedure body condition and weight loss.

**Article 7.X.5.**

**Recommendations**

Ensuring good welfare of pigs is contingent on several management factors, including system design, environmental management, and animal management practices which include responsible husbandry and provision of appropriate care. Serious problems can arise in any system if one or more of these elements are lacking.

Articles 7.X.6. to 7.X.X. provide recommendations for measures applied to pigs.

Each recommendation includes a list of relevant outcome-based measurables derived from Article 7.X.4.

This does not exclude other measures being used where or when appropriate.

**Article 7.X.6.**

**Housing**

When new facilities are planned or existing facilities are modified, professional advice on design in regards to animal welfare and health should be sought.

Housing systems and their components should be designed, constructed and regularly inspected and maintained in a manner that reduces the risk of injury, disease and stress for pigs. Facilities should allow for the safe, efficient and humane management and movement of pigs.

**Rationale: Editorial**

There should be a separate area where sick and injured animals can be treated and monitored. When a separated space is provided, this should accommodate all the needs of the animal e.g. recumbent or lame animals or animals with severe wounds may require additional bedding or an alternative floor surface.

Pigs should not be tethered as part of their normal housing systems.

Good animal welfare outcomes can be achieved in a range of housing systems. The design and management of the system are critical for achieving good animal welfare and health outcomes.

Pigs are social animals and prefer living in groups, therefore housing systems where pregnant sows and gilts can be kept in groups are recommended; however, the increased husbandry skills required to successfully manage group housing systems must be present.

**Rationale: The keys are environmental complexity and skilled management/husbandry. Stability of social structure, non-competitive feeding systems, environmental enrichment, comfortable resting areas, space etc., all play into sow welfare. Group housing may provide certain welfare-improving elements that are difficult to reproduce in individual housing, but may also be problematic if environmental and management factors are missing. Review of the scientific literature demonstrates that individual and group housing systems have advantages and**
disadvantages to their design and management and both can result in good animal welfare outcomes (EFSA, 1997; Barnett et al., 2001; McGlone et al., 2004; Rhodes et al., 2005; and McGlone, 2013). Additionally, recent data would suggest that pregnant sows and gilts don’t always prefer to live in groups all of the time (Pajor, 2010).


Outcome-based criteria (or measurables): physical appearance (injuries), behaviour, changes in body weight and body condition, handling response, reproductive efficiency, lameness and morbidity, mortality and culling rates.

Article 7.X.7.

**Personnel training**

Pigs should be cared for by a sufficient number of personnel, who collectively possess the ability, knowledge and competence necessary to maintain the welfare and health of the animals.

All people responsible for pigs should be competent through formal training or practical experience in accordance with their responsibilities. This includes understanding of and skill in animal handling, nutrition, reproductive management techniques, behaviour, biosecurity, signs of disease, and indicators of poor animal welfare such as stress, pain and discomfort, and their alleviation.

Outcome-based criteria (or measurables): handling response, physical appearance, behaviour, changes in body weight, body condition, reproductive efficiency, lameness and morbidity, mortality and culling rates.
Handling and inspection

Pigs should be inspected at least once a day when fully dependent on humans to provide for basic needs such as food and water and to identify welfare and health problems.

Some animals should be inspected more frequently, for example, farrowing sows, newly born piglets, newly weaned pigs and newly-mixed gilts and sows.

Pigs identified as sick or injured should be given appropriate treatment at the first available opportunity by competent animal handlers. If animal handlers are unable to provide appropriate treatment, the services of a veterinarian should be sought.

Recommendations on the handling of pigs are also found in Chapter 7.3. In particular handling aids that may cause pain and distress (e.g. electric goads) should be used only in extreme circumstances and provided that the animal can move freely. The use of electric prods should be avoided (see also point 3 of Article 7.3.8.), and in any case should not be used in sensitive areas including the udder, face, eyes, nose or ano-genital region.

When moving pigs, exposure to sudden movement or changes in visual contrasts should be minimised where possible to prevent stress and fear reactions. Pigs should not be handled aggressively (e.g. kicked, walked on top of, held or pulled by one front leg, ears or tail). Pigs should not be thrown. Pigs that become distressed during handling should be attended to immediately.

Rationale: Pigs are susceptible to stress during moving, however exposure to stimulating experiences maybe be beneficial at other times (e.g., environmental enrichment), especially early in life, as it promotes a calm temperament.

Pigs should be restrained only for as long as necessary and only appropriate, well-maintained restraint devices should be used.

Outcome-based criteria (or measurables): physical appearance, behaviour, changes in body weight and body condition, handling response, reproductive efficiency, lameness and morbidity, mortality and culling rates.

Painful procedures

Some procedures such as surgical castration, tail docking, teeth clipping or grinding, tusk trimming, identification, nose ringing and hoof care are commonly may be performed in pigs to facilitate management, to meet market requirements and or improve human safety and animal welfare.

Rationale: Some of the procedures listed are no longer commonly performed or may no longer be commonly performed in the near future. Additionally, while a procedure may be performed to meet a market requirement, this does not necessarily mean that it was performed to improve human safety or animal welfare.

These procedures have the potential to cause pain and thus should be performed in such a way as to minimise any pain and distress to the animal.

Examples of Options for enhancing animal welfare in relation to these procedures include the internationally recognised ‘three Rs’ which involves replacement (entire or immunocastrated males vs. castrated males), reduction (tail docking and teeth clipping only when necessary) and refinement (providing analgesia or local anaesthesia).

Rationale: The details provided in parentheses implies that these are the only options for meeting the three R requirements, and does not account for other alternatives or emerging and future technological developments.


Outcome-based criteria (or measurables): complications from common procedures, morbidity rates, mortality and culling rates, abnormal behaviour, physical appearance and changes in weight and body condition.

Article 7.X.10.

Feeding and watering of animals

The amount of feed and nutrients pigs require in any management system is affected by factors such as climate, the nutritional composition and quality of the diet, the age, gender, breed, size and physiological state of the pigs (e.g. pregnancy, lactation, growth), genetics, and their state of health, growth rate, previous feeding levels and level of activity and exercise.

Rationale: Different breeds may require different nutritional profiles and feed amounts. Other changes are editorial.

All pigs should receive adequate quantities of feed and nutrients each day to enable each pig to:

‒ maintain good health;
‒ meet its physiological demands; and
‒ avoid metabolic and nutritional disorders.

Feed and water should be provided in such a way as to prevent undue competition and injury.

Pigs should be fed a diet with sufficient fibrous feedstuffs in order to reduce as much as possible the occurrence of gastric ulcers (Hedde et al., 1985).

Rationale: The idea that lack of fibrous feedstuffs in the diet causes gastric ulcers is outdated and incorrect. Rather, more recent research has shown gastric ulcer development is related to the feed particle size (Cabrera et al., 1994; Wondra et al., 1995a; Wondra et al., 1995b; Wondra et al., 1995c; Wondra et al., 1995d; Eisemann et al., 1999; Hancock et al., 2001). This concern is already addressed in the previous sentence stating that feed should be provided in such a way as to prevent undue injury – Therefore, no additional language is needed.


All pigs should have access to an adequate supply of palatable water at a temperature that does not inhibit drinking and that meets their physiological requirements and is free from contaminants hazardous to pig health (Patience, 2013).

Outcome-based criteria (or measurables): changes in body weight and body condition, agonistic behaviour at feeding and watering places and abnormal behaviour such as tail biting, mortality and culling rates, and morbidity rates (gastric ulcers).

Article 7.X.11.

Environmental enrichment

Animals should be provided with an environment that provides complexity and cognitive stimulation (e.g. foraging opportunities, social housing, etc.) to foster normal behaviour, reduce abnormal behaviour and improve biological function.

Pigs should be provided with multiple forms of enrichment that aim to improve the welfare of the animals through the enhancement of their physical and social environments, such as:

- sufficient quantity of suitable materials to enable pigs to fulfil their innate needs to look for feed (edible materials), bite (chewable materials), root (investigable materials) and manipulate (manipulable materials) (Bracke et al., 2006);
- social enrichment which involves either keeping pigs in groups or individually with visual, olfactory and auditory contact with other pigs;
- positive human contact (such as pats, rubs and talking).

Outcome-based criteria (or measurables): physical appearance (injuries), behaviour (stereotypies, tail biting), changes in body weight and body condition, handling response, reproductive efficiency, lameness and morbidity, mortality and culling rates.

Article 7.X.12.

Prevention of abnormal behaviour
In pig production there are a number of abnormal behaviours that can be prevented or minimised with management procedures. Many of these problems are multifactorial and minimising their occurrence requires an examination of the whole environment and of several management factors. However, examples of some common stereotypes with recommendations to that may reduce their occurrence include:

**Rationale:** The management recommendations for reducing the occurrence of the four listed stereotypic behaviours implies that employing these specific management strategies are required for compliance with the OIE standard. These recommendations may also be misleading because they suggest that they are the only remedies to the behaviour and that they will reliably reduce the occurrence of the behaviour. In fact, some of these environmental changes may increase the incidence of the behaviour or lead to the expression of alternate stereotypic behaviours. As an example, increasing dietary bulk can increase sham-chewing (Broom and Potter, 1984). Indeed, many stereotypic behaviours are pervasive and unresponsive to intervention (Wolfle, 2000). While these interventions may reduce the occurrence of these behaviours some of the time, as demonstrated in the literature cited, they are not effective in eliminating the behaviour all of the time.


1) Oral stereotypies (e.g. bar biting, sham chewing, excessive drinking) in adult pigs can be minimised by providing environmental enrichment and increasing feeding time and satiety by increasing fibre content in the diet or foraging roughage (Robert et al., 1997; Bergeron et al., 2000).

**Rationale:** If oral stereotypies are not mitigated early in life, they lead to neurological changes and persist even in an enriched environment. As such, use of enrichments and other preventive strategies should be implemented throughout the animals’ lifespan rather than applying them only to adults.

2) Tail biting may be reduced by providing an adequate enrichment material and an adequate diet (avoiding deficiencies of sodium or essential amino-acids), and avoiding high stocking densities and competition for feed and water (Walker and Bilkei, 2005). Other factors to consider include animal characteristics (breed, genetics, gender) and social environment (herd size, mixing animals) (Schroder-Petersen and Simonsen, 2001; EFSA, 2007; Taylor et al., 2010).

3) Belly nosing and ear sucking may be reduced by increasing the weaning age, and providing feed to piglets prior to weaning to avoid the abrupt change of feed (Marchant-Forde, 2009; Sybesma, 1981; Worobec, 1999).

4) Vulva biting may be reduced by minimising competition in accessing the feeding area (Bench et al., 2013; Leeb et al., 2001; Rizvi et al., 1998).

Outcome-based criteria (or measurable): physical appearance (injuries), behaviour (abnormal behaviour), morbidity rates, mortality and culling rates, reproductive efficiency and changes in body weight and body condition.

Article 7.X.13.
Space allowance

Space allowance should be managed taking into account different areas for lying, standing, and feeding and elimination. Crowding should not adversely affect normal behaviour of pigs and durations of time spent lying.

**Rationale:** Standardizing language with the rest of the section.

Insufficient and inadequate space allowance may increase stress, the occurrence of injuries and have an adverse effect on growth rate, feed efficiency, reproduction and behaviour such as locomotion, resting, feeding and drinking, agonistic and abnormal behaviour (Gonyou et al., 2006; Ekkel, 2003; Turner, 2000).

1. **Group housing**

   Floor space may interact with a number of factors such as temperature, humidity, floor type and feeding systems (Marchant–Forde, 2009; Verdon, 2015). All pigs should be able to rest simultaneously, and each animal lie down, stand up and move freely. Sufficient space should be provided to enable animals to have access to feed, water, to separate lying and elimination areas and to avoid aggressive animals.

   If abnormal behaviour is seen, corrective measures should be taken, such as increasing space allowance and providing barriers where possible.

   In outdoor systems where pigs have autonomy over diet selection, stocking density should be matched to the available feed supply.

   Outcome-based criteria (or measurables): reduction or variation in body weight and body condition, increasing agonistic and abnormal behaviour such as tail biting, injuries, morbidity, mortality and culling rates, and physical appearance (e.g. presence of faeces on the skin).

2. **Individual pens**

   Pigs must be provided with sufficient space so that they can stand up, turn around and lie comfortably in a natural position, and that provides for separation of dunging elimination, lying and eating areas.

   **Rationale:** Consistency with previous language in this Chapter.

   Outcome-based criteria (or measurables): increasing abnormal behaviour (stereotypies), morbidity, mortality and culling rates, and physical appearance (e.g. presence of faeces on the skin, injuries).
3. **Stalls (crates)**

Stalls must be sized appropriately to allow pigs to:

- be able to stand up in their natural stance without contact with either side of the stall,
- stand up without touching the top bars,
- stand in a stall without simultaneously touching both ends of the stall,
- lie comfortably on their sides without disturbing neighbouring pigs.

Outcome-based criteria (or measurables): physical appearance (e.g. injuries), increasing abnormal behaviour (stereotypies), reproductive efficiency, lameness and morbidity, mortality and culling rates (e.g. piglets).

**Flooring, bedding, resting surfaces**

In all production systems pigs need a well-drained and comfortable place to rest.

Floor management in indoor production systems can have a significant impact on pig welfare (Temple *et al.*, 2012; Newton *et al.*, 1980). Flooring, bedding, resting surfaces and outdoor yards should be cleaned as conditions warrant, to ensure good hygiene, comfort and minimise risk of diseases and injuries. Areas with excessive faecal accumulation are not suitable for resting.

Floors should be designed to minimise slipping and falling, promote foot health, and reduce the risk of claw injuries.

If a housing system includes areas of slatted floor, the slat and gap widths should be appropriate to the claw size of the pigs to prevent injuries.

Slopes of the pens and stalls should allow water to drain and not pool in the pens.

**Rationale:** To make the sentence more inclusive of varied indoor housing systems.

In outdoor systems, pigs should be rotated between paddocks to ensure good hygiene and minimise risk of diseases.

If bedding or rubber matting is provided it should be suitable (e.g. hygienic, non-toxic, uncontaminated, safe) and maintained to provide pigs with a clean, dry and comfortable place on which to lie.


Outcome-based criteria (or measurables): physical appearance (e.g. injuries, presence of faeces on the skin, bursitis), lameness and morbidity rates (e.g. respiratory disorders, reproductive tract infections).

**Air quality**

Good air quality and ventilation are important for the welfare and health of pigs and reduce the risk of respiratory discomfort and diseases. Dust, micro-organisms and noxious gases, including ammonia, hydrogen sulphide, and methane due to decomposing animal waste, can be problematic in indoor systems due to decomposing animal waste (Drummond *et al.*, 1980).

**Rationale:** Editorial.
Air quality is influenced strongly by management and building design in housed systems. Air composition is influenced by stocking density, the size of the pigs, flooring, bedding, waste management, building design and ventilation system (Ni et al., 1999).

Proper ventilation is important for effective heat dissipation in pigs and to prevent the build-up of effluent gases (e.g. ammonia and hydrogen sulphide), including those from manure and dust in the housing unit. The ammonia level in enclosed housing should not exceed 25 ppm. A useful indicator is that if air quality is unpleasant for humans it is also likely to be a problem for pigs.

Outcome-based criteria (or measurables): morbidity, mortality and culling rates, behaviour (especially respiratory rate or coughing), reductions in weight and body condition.

Article 7.X.16.

Thermal environment

Although pigs can adapt to different a range of thermal environments particularly if appropriate breeds and housing are used for the anticipated conditions, sudden fluctuations in temperature can cause heat or cold stress.

**Rationale:** Clarification, the ability to adapt is not unlimited.

1. **Heat stress**

   Heat stress is a serious problem in pig production. It can cause significant discomfort, as well as reductions in weight gain and fertility, or sudden death (Werremann and Bazer, 1985).

   **Rationale:** Including consideration of affective state.

   The risk of heat stress for pigs is influenced by environmental factors including air temperature, relative humidity, wind speed, stocking density, shade and water availability in outdoor systems, wallows, animal factors including breed, age and body condition (Heitman and Hughes, 1949; Quiniou and Noblet, 1999).

   **Rationale:** Inclusion of more types of housing designs.

   Animal handlers should be aware of the risk that heat stress poses to pigs and of the thresholds in relation to heat and humidity that may require action. If the risk of heat stress reaches very high levels the animal handlers should institute an emergency action plan that gives priority to access to additional water and could include provision of shade and wallows in outdoor systems, fans, reduction of stocking density and provision of cooling systems as appropriate for the local conditions.

   Outcome-based criteria (or measurables): behaviour (feed and water intake, respiratory rate, panting, agonistic behaviour), physical appearance (presence of faeces on the skin), morbidity, mortality and culling rates, and reproductive efficiency.

2. **Cold stress**

   Protection from cold should be provided when these conditions are likely to create a serious risk to the welfare of pigs, particularly in neonates and young pigs and others that are physiologically compromised (e.g. ill animals). This could be provided by insulation, extra bedding, heat mats or lamps and natural or man-made shelters in outdoor systems (Blecha and Kelley, 1981).

   **Rationale:** Risk to welfare should be addressed whenever a foreseeable welfare compromise may result. The current language specifies a “serious” risk, which implies a lower duty of care in relation to this parameter which seems unwarranted. The primary strategy for indoor housing includes proper sealing or buildings to support adequate heat within the facility.

   Outcome-based criteria (or measurables): morbidity, mortality and culling rates, physical appearance (long hair, piloerection), behaviour (especially abnormal postures, shivering and huddling) and changes in body weight and body condition.
Article 7.X.17.

Noise

Pigs are able to cope with a range of adaptable to different levels and types of noise. However, exposure of pigs to averse sudden or loud noises should be minimised where possible to prevent stress and fear reactions. Ventilation fans, feeding machinery or other indoor or outdoor equipment should be constructed, placed, operated and maintained in such a way that they cause the least possible amount of noise (Algers and Jensen, 1991).

Rationale: Responses to noise do not match a conventional definition of “adaptation.” Desensitization may occur, but high levels of noise have deleterious effects on sow-piglet communication and hearing. That said, sudden loud noises with positive meaning (feeding systems, play calls) may still be acceptable when not aversive.

Outcome-based criteria (or measurables): behaviour (e.g. fleeing and vocalisation), physical appearance (e.g. injuries), reproductive efficiency, changes in body weight and body condition.

Article 7.X.18.

Lighting

Indoor systems should have light levels sufficient to allow all pigs to see one another, to investigate their surroundings visually and to show other normal behaviour patterns and to be seen clearly by staff to allow adequate inspection of the pigs. The lighting regime shall be such as to prevent health and behavioural problems. It should follow a 24-hour rhythm and include sufficient uninterrupted dark and light periods, preferably no less than 6 hours for both.

A minimum of 40 lux of lighting is recommended for a minimum of 6 hours per day (Martelli et al., 2005; Taylor et al., 2006).

Rationale: The United States objects to the inclusion of prescriptive standards that violate the OIE’s guiding principle for developing outcome-based standards as described in Chapter and Article 7.1.2.8. If there is an outcome for the pigs related to lighting, then we welcome the elaboration of that outcome in this chapter.

Artificial light sources should be located so as not to cause discomfort to the pigs.

Outcome-based criteria (or measurable): behaviour (locomotive behaviour), morbidity rates, reproductive efficiency, physical appearance (injuries) and changes in body weight and body condition.

Article 7.X.19.

Farrowing and lactation

Sows and gilts need time to adjust to their farrowing accommodation before farrowing. Nesting material should be provided where possible some days before farrowing (Yun et al., 2014). Sows and gilts should be observed frequently around their expected farrowing times. As some sows and gilts may need assistance during farrowing sufficient space and by competent staff are needed.

Rationale: Second Sentence: This is a resource-based recommendation that violates Chapter and Article 7.1.2.8. There are scientific studies that detail the advantages of providing nesting material. If there is an outcome for the pigs related to the provision of nesting prior to farrowing, then we welcome the elaboration of those outcomes in this Article. Third Sentence: editorial.

Outcome-based criteria (or measurables): mortality and culling rates (piglets), morbidity rates (metritis and mastitis), behaviour (stereotypies), reproductive efficiency, physical appearance (injuries).
Weaning

Weaning can be a stressful time for sows and piglets and good management is required. Problems associated with weaning are generally related to the piglet’s size and physiological maturity. Early weaning systems require good management and nutrition of the piglets.

An average weaning age of three weeks or older is recommended (Worobec et al., 1999), when possible.

**Rationale:** A disease outbreak may require an earlier weaning age to break the disease cycle or prevent further pre-weaning mortality.

Regardless of age, low weight piglets require additional care and can benefit from being kept in small groups in specialised pens until they are able to be moved to the common nursery area.

Newly weaned pigs are susceptible to disease challenges, so adherence to high-level hygiene protocols is important. **It should be ensured that the area that piglets are weaned into is should be** clean and dry.

**Rationale:** Editorial.

All newly weaned pigs should be monitored during the first two weeks after weaning for any signs of ill-health.

**Rationale:** All pigs should be monitored for any signs of ill-health – regardless of age or phase of production. The requirement for pig observation is already addressed in Article 7.X.8 Handling and Inspection.

Outcome-based criteria (or measurable): mortality and culling rates (piglets), morbidity rates (respiratory disease, diarrhoea), behaviour (belly nosing and ear sucking), physical appearance (injuries) and changes in body weight and body condition.

Mixing

Mixing of unfamiliar pigs can result in fighting to establish a dominance hierarchy, and therefore mixing should be minimised as much as possible (Moore et al., 1994; Fabrega et al., 2013). When mixing, strategies to reduce aggression and injuries should be implemented, and animals should be observed after mixing and interventions applied if pigs become injured or their welfare is significantly compromised.

**Rationale:** The term “supervised” is unclear and confusing. We believe the intent is that pigs should be observed or monitored after mixing and interventions applied if pigs become injured or their welfare is significantly compromised. The proposed wording provides clarity on the intent.

Measures to prevent excessive fighting and injuries could include (Arey and Edwards, 1998):
- providing additional space and a non-slippery floor,
- feeding before mixing,
- feeding on the floor in the mixing area,
- provision of straw in the mixing area,
– providing opportunities to escape and to hide from other pigs, such as visual barriers,
– mixing previously familiarised animals whenever possible,
– mixing young animals should be mixed as soon after weaning as possible,
– avoiding the additional of adding one or small number of animals to a large established group.

avoiding significant body size differences in groups.

Rationale: Inconsistent sizing within groups can lead to increased injuries to smaller animals. Other changes noted are editorial in nature.

Outcome-based criteria (or measurables): mortality, morbidity and culling rates, behaviour (agonistic), physical appearance (injuries), changes in body weight and body condition and reproductive efficiency.

Article 7.X.22.

Genetic selection

Welfare and health considerations should balance any decisions on productivity and growth rate when choosing a breed or hybrid for a particular location or production system.

Selective breeding can improve the welfare of pigs for example by selection to improve maternal behaviour, piglet viability, temperament and resistance to stress and disease and to reduce tail biting and aggressive behaviour (Turner et al., 2006).

Outcome-based criteria (or measurable): physical appearance, behaviour, changes in body weight and body condition, handling response, reproductive efficiency, lameness, and morbidity, mortality and culling rates.

Article 7.X.23.

Protection from predators

In outdoor and combination systems pigs should be protected from predators.

Outcome-based criteria (or measurable): morbidity, mortality and culling rates, behaviour, and physical appearance (injuries).

Article 7.X.24.

Biosecurity and animal health

1. Biosecurity and disease prevention

Biosecurity plans should be designed, implemented and maintained, commensurate with the best possible herd health status, available resources and infrastructure, and current disease risk and, for listed diseases in accordance with relevant recommendations in the Terrestrial Code.

These biosecurity plans should address the control of the major sources and pathways for spread of pathogens including:

– acquisition of pigs, including introductions to the herd,
– young animals coming from different sources,
– other domestic animals, wildlife, and pests,
– people, including sanitation practices,
– equipment, including vehicles, tools and facilities,
– vehicles,
– air,
– biological inputs, including air, water supply, semen, feed and bedding.
In case of disease or injury, when treatment has failed or recovery is unlikely (e.g. pigs that are unable to stand up, unaided or refuse to eat or drink), the animal should be humanely killed as soon as possible in accordance with Chapter 7.6.
Outcome-based criteria (or measurable): morbidity, mortality and culling rates, reproductive efficiency, behaviour (apathetic behaviour), lameness, physical appearance (injuries) and changes in body weight and body condition.

b) Emergency plans for disease outbreaks

Emergency plans should cover the management of the farm in the event of an emergency disease outbreak, consistent with national programmes and recommendations of Veterinary Services as appropriate.

Article 7.X.25.

Emergency plans

Where the failure of power, water and feed supply systems could compromise animal welfare, pig producers should have contingency plans to cover the failure of these systems. These plans may include the provision of fail-safe alarms to detect malfunctions, back-up generators, contact information for key service providers, ability to store water on farm, access to water cartage services, adequate on-farm storage of feed and an alternative feed supply.

Preventive measures for emergencies should be input-based rather than outcome-based. Contingency plans should be documented and communicated to all responsible parties. Alarms and back-up systems should be checked regularly.

Article 7.X.26.

Disaster management

Plans should be in place to minimise and mitigate the effect of disasters (e.g. earthquake, fire, flooding, blizzard and hurricane). Such plans may include evacuation procedures, identifying high ground, maintaining emergency feed and water stores, destocking and humane killing depopulation when necessary.

Rationale: Depopulation is a specific type of killing where humane considerations may be limited by the prevailing circumstances and as such, should not be confused with euthanasia.

Procedures for humane killing procedures for sick or injured pigs should be part of the disaster management plan.

Rationale: Changes provide greater clarification.

Reference to emergency plans can also be found in Article 7.X.25.

Article 7.X.27.

Euthanasia (Humane killing)

Allowing a sick or injured animal to linger unnecessarily is unacceptable. Therefore, for sick and injured pigs a prompt diagnosis should be made to determine whether the animal should be treated or humanely killed.

The decision to kill an animal humanely and the procedure itself should be undertaken by a competent person.

Reasons for humane killing may include:

– severe emaciation, weak pigs that are non-ambulatory or at risk of becoming non-ambulatory,

– severely injured or non-ambulatory pigs that will not stand up, refuse to eat or drink, have not responded to therapy,

Rationale: A pig may be severely injured but still be ambulatory. If the severely injured pig does not respond to therapy, the animal should be humanely killed.

– rapid deterioration of a medical condition for which therapies have been unsuccessful,

– severe, debilitating pain,
**Rationale:** While we agree that severe and debilitating pain is a welfare concern and may be a reason for humane killing, this is a very subjective criteria. There are very limited scientific methodologies available to adequately assess levels of pain in swine and most of these methods are not suitable for on-farm application. The lack of pain-severity assessment tools makes this criterion for humane killing impossible to implement at the farm level. Additionally, severe and debilitating pain may be associated with a treatable condition (e.g. lameness) where the animal will be able to recover and have good welfare.

– compound fracture,

– spinal injury,

– central nervous system disease.

**Rationale:** These are very specific conditions that daily caretakers may not be able to immediately diagnose without veterinary consultation. Rather than list them specifically, we believe these conditions are covered by the amended second bullet in this list – severely injured or non-ambulatory pigs that will not stand up, refuse to eat or drink, have not responded to therapy. Additionally, some diseases that impact the central nervous system are treatable (e.g. deficiencies or bacterial infections) and therefore, not criteria for humane killing.

– multiple joint infections with chronic weight loss,

– piglets that are premature and unlikely to survive, or have a debilitating congenital defect, and

– as part of disaster management response.

For a description of acceptable methods for humane killing of pigs see Chapter 7.6.
Scientific references


