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 (Sus scrofa) intended for production of meat.

For the purposes 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 of handlers, and animal management practices, such as best practice in housing and husbandry and implementation of welfare protocols and audits, all have an 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 purposes of this chapter, 'environmental enrichment' means increasing the complexity (e.g. foraging opportunities, social housing) of the animal's environment to foster the expression of normal behavior, provide cognitive stimulation and reduce the expression of abnormal behavior. The endpoint aim of providing enrichment should be to improve the biological functioning of the animal (Newberry, 1995).

For the purposes of this chapter stereotypy is 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. Some stereotypies commonly observed in pigs include sham chewing, stone chewing, tongue rolling, teeth grinding, bar biting and floor licking (NFACC, 2014; Tuyttens, 2007; Mason and Latham, 2004).

Rationale: Editorial

For the purposes of this chapter apathy means that the animal ceases to respond to stimuli that would normally elicit a response (Wood-Gush and Vestergaard, 1989). Furthermore, apathetic behavior has been described as an abnormal or maladaptive behavior, indicated by reduced activity, lack of interest or concern (i.e. indifference) and lack of feeling or emotion (impassiveness).

For the purposes of this chapter agonistic behavior is a continuum of behaviors expressed in conflict situations, and includes offence, defense and submissive or escape components. The behaviors involved may include contact, such as biting and pushing, or non-contact, such as threats in the form of body postures and gestures. Aggressive behavior is a component of agonistic behavior (Petherick and Blackshaw, 1987).

Scope

This chapter addresses the welfare aspects of domestic 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, feed 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 but may be fully dependent on humans to provide for basic animal needs such as food, feed and water. They Pigs are typically confined in paddocks or pastures according to their production stage. The animals may be kept in groups or individually.

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.

**Article 7.X.4.**

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

The following outcome-based criteria (or measurables), 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:** Clarification. Based on the OIE definition, animal welfare is an individual assessment and so this text should not be open to interpretation that a higher degree of comprised welfare may be acceptable in some systems. Rather, the welfare requirement should be uniform and the methods by which it is assessed may vary depending on the risks and hazards more prevalent in a given system. Similarly, when speaking of a range that may be impacted by a system used, it is more appropriate to use the term “parameters” which refers to the measurements taken, rather than “threshold” which may be interpreted as referring to the welfare of the animal.

1. **Behaviour**

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

   Certain behaviours are indicators of good animal welfare. These may include positive social behaviour and play behaviour.

   Stereotopy is defined as a sequence of 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.

2. **Morbidity rates**

   Rates of infectious and metabolic diseases, lameness, peri-partum, peripartum and post-procedural complications, injury and other forms of morbidity, above recognised thresholds in individual animals, may be direct or indirect indicators of the animal welfare status of the whole at the herd level. Understanding the aetiology of the disease or syndrome is important for detecting potential animal welfare problems. Mastitis and metritis, leg and hoof problems, shoulder ulcers in sows, skin lesions, respiratory and digestive diseases, and reproductive diseases are also particularly important animal health problems for pigs. Scoring systems, such as for body condition, lameness and injuries, and information gathered at the slaughterhouse/abattoirs can provide additional information.
**Rationale:** Based on the OIE definition of animal welfare, welfare status should be applied to individuals and not to groups or herds. Reference to the assessment of groups must always include both the overall level of welfare and the degree of variation among individuals.

Both clinical and post mortem pathologic examination and pathology should be utilised as indicators of disease, injuries and other problems that may compromise 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 at the herd level 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 establishing the cause of death.

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.

In mature animals, a body condition outside an acceptable range or large variation amongst individual animals in the group may be an indicator of compromised animal welfare, and health, and reproductive efficiency in mature animals.

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 efficiency, compared with the targets expected for a particular breed or hybrid, can indicate animal welfare problems (Hemsworth et al., 1981, 1986, 1989, 1994, Munsterjelm et al., 2006).

Examples may include:
- low conception rates,
- high abortion rates,
- metritis and mastitis,
- low small litter size (total born),
- 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,
- presence of ectoparasites,
- abnormal texture or hair loss,
- excessive soiling with faeces in indoor systems.

**Rationale:** Excessive soiling with fecal material can be an indicator of poor welfare or management in both indoor and outdoor systems.
reddish skin discoloration.

Rationale: Skin discoloration can be a sign of several types of diseases but may not always be red in color. Discoloration may be purple, pink, black or blue (e.g. septicemia, toxemia, erysipelas, classical swine fever, african swine fever, mastitis, necrosis, etc.) (Cameron, 2012).


- swellings, injuries or lesions,
- discharges (e.g. from nose or eyes, including tear staining) (Telkänranta et al., 2016).
- feet and leg abnormalities,
- abnormal posture (e.g. rounded back, head low),
- emaciation or dehydration (in piglets).

Rationale: Emaciation or dehydration are welfare concerns for pigs of any age. Observation of emaciation or dehydration should not only be limited to piglets.

7. Handling response

Improper handling or lack of human contact can result in fear and distress in pigs. Fear of humans may be an indicator of poor animal welfare and health. Indicators may include:

Rationale: While the indicators listed below may be indicators of poor human-animal relationships, they can also be indicators of poor facility design or maintenance. For example, animals may slip and fall during handling in the absence of non-slip flooring. Injuries may be sustained during handling if there are sharp edges or “pinch-points” on equipment of facilities in the handling pathway.

- evidence of poor human-animal relationship, such as marked avoidance of handlers and abnormal or excessive vocalisation disturbed behaviour when being moved or when animal handlers interact with pigs enter a pen.

Rationale: The domestic pig has a diverse vocal repertoire utilizing unique calls in different situations (Tallet et al., 2013). Pigs perform a variety of vocalizations when interacting with people including short single grunts associated with investigatory behaviour, long single grunts as a contact call, and short rapidly repeated grunts as a greeting or threat (Marchant et al., 2001). Scream vocalizations indicate distress and are distinctive in their sound features (Dupjan et al., 2008 and Vandermeulen et al., 2015). When defining evidence of poor human-animal relationships, it is essential to specify the type of vocalization that would be associated with this situation.


- 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.

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 severely lame or have severe gait abnormalities may have difficulty reaching food and water and may experience pain and distress. 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: Pigs can experience varying thresholds of lameness (Karriker et al., 2003 and Nalon et al., 2014). Only severely lame pigs that are unable to bear weight on the affected limb when standing or walking will have difficulties accessing feed and water. Additionally, not all thresholds of lameness or gait abnormalities will induce the same levels of pain or distress (Tapper et al., 2013; Pairis-Garcia et al., 2014; Mohling et al., 2014; Parsons et al., 2015)


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

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

Indicators of such problems associated with these procedures 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.26. provide recommendations for measures applied to pigs.

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

This does not exclude other criteria 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 welfare and health of animals 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 or stress for pigs. Facilities should to allow for the safe, efficient and humane management and movement of pigs.

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

Pigs are social animals and prefer living in groups, therefore housing systems where pregnant sows and gilts can be kept in groups are recommended.

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.26.
Training of 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 and complications from common procedures.

Article 7.X.7.

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, sick or injured animals, pigs and pigs those showing increased abnormal behaviours such as tail biting nibbling.

Rationale: Replace the term “nibbling” with “biting” for consistency throughout the document when referring to this behaviour.

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 when other methods fail in extreme circumstances and provided that the animal can move freely. The use of electric prods goads should be avoided (see also point 3 of Article 7.3.8.), and in any case should not be repeatedly used on the same animal, and not be used in sensitive areas including the udder, face, eyes, nose or ano-genital region.

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

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

Well designed and maintained handling facilities assists proper handling.

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.

Article 7.X.8.

Painful procedures

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

Rationale: The United States recommends re-instating “and improved human safety”. Human safety is a critical component of human-animal...
interactions and must be taken into consideration when dealing with large animals that have the potential to be dangerous and cause injuries to humans.

These procedures are painful or have the potential to cause pain and thus should be performed only when necessary and in such a way as to minimise any pain and distress to the animal, e.g. using anaesthesia or analgesia under the recommendation or supervision of a veterinarian.

**Rationale:** The previous paragraph states “These procedures should only be performed to facilitate management, meet market or environmental requirements, or safeguard animal welfare”. This proposed addition of “only when necessary” creates confusion and is superfluous. Indeed, it is not clear what or whom would determine the necessity for performing the procedure -- whereas the first paragraph clearly defines when these procedures should be performed.

Options for enhancing animal welfare in relation to these procedures include the internationally recognised ‘three Rs’ which involves: replacement (e.g., using entire or immunocastrated males vs. rather than castrated males), reduction (e.g., tail docking and teeth clipping only when necessary) and refinement (e.g., providing analgesia or anaesthesia under the recommendation of a veterinarian) (Bonastre et al., 2016 and Hansson et al., 2011).

**Rationale:** Enhancing animal welfare in relation to painful procedures can be achieved by implementing any one or a combination of the three R’s. Replacing “and” with “or” when listing the three R’s will better reflect this.

The details provided in parentheses imply that these are the only options for meeting the “three R” requirements and OIE endorsement of these specific methods and procedures. Providing specific examples also does not account for other alternatives or emerging or 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.9**

**Feeding and provision of water for 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, genetics, size and physiological state of the pigs (e.g. pregnancy, lactation, growth), and their state of health, growth rate, previous feeding levels and level of activity and exercise.

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

– maintain good health;
– meet its physiological and behavioural requirements demands.

**Rationale:** It is not clear what is meant by “behavioural” requirements or how farmers can demonstrate this requirement has been met using outcome based measures. In addition, this recommendations is inconsistent with other OIE Code chapters on animal welfare and species-specific production systems. While feeding requirements to meet physiological needs have been defined for beef production (OIE TAHC Chapter 7.9), broiler production (OIE TAHC Chapter 7.10), or dairy production (OIE TAHC Chapter 7.11), feeding requirements to meet behavioural needs has not been addressed for any other species in the OIE Terrestrial Code.
Feed intake of breeding animals is commonly restricted to prevent excess weight gain and fat deposition, which can cause farrowing and locomotion problems for the sow (Meunier-Salaun et al., 2001). Rushen and colleagues (1993) suggest that restricted feeding may meet the animal’s nutritional needs but also may result in low level of satiety and reduced feeding behaviour. Feed restriction and the inability to express foraging behaviour are suspected to cause the development of stereotypes in sows (Rushen et al., 1993 and Lawrence and Terlouw, 1993). However, not all feed-restricted sows will display these stereotypical behaviours. Further, stereotypic behaviour may be a potential warning sign of poor welfare - but it should not be used as the sole index of welfare (Mason and Latham 2004). While stereotypic behaviours can arise in some feed-restricted sows, there is no consistent evidence of increased aggression, stress, or injuries when using a wholistic approach to evaluating welfare (Verdon et al., 2015).

Several sources have suggested satiety and feeding motivation could be met by increasing the fiber content of the diet while maintaining the energy requirement. (Robert et al., 1997; Robert et al., 2002; de Leeuw et al., 2004). However, conflicting data would suggest high-fiber diets do not affect satiety based on operant responses to a feed reward (Lawrence et al., 1989; Ramonet et al., 2000, Bergeron et al., 2000; and Jensen et al., 2012). The contradiction in results is most likely due to the different sources of fiber used in the diet and whether the fiber is soluble, insoluble, or highly fermentable (de Leeuw et al., 2008; Souza da Silva et la., 2012).

Additionally, rooting motivation is thought to be independent of hunger and more related to exploration behaviour (Horrell et al., 1997). A farmer’s ability to access various types of high-fiber feedstuffs will vary depending on geography and on environmental and sustainability considerations. Therefore, a farmer may not be able to successfully and sustainably implement this OIE requirement.


- 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).

All pigs should have access to an adequate supply of palatable, drinkable 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, physical appearance (dehydration in piglets), behaviour (agonistic behaviour at feeding and watering places and abnormal behaviour such as tail biting), mortality and culling rates, and morbidity rates (gastric ulcers).

**Rationale:** Dehydration is a concern in pigs of any age, not only piglets.

**Article 7.X.10.**

**Environmental enrichment**

Animals should be provided with an environment that provides complexity, manipulability and cognitive stimulation (e.g. foraging opportunities, social housing) to foster normal behaviour (e.g. rooting, and biting/or chewing), reduce abnormal behaviour (e.g. tail, ear, leg and flank biting and apathetic behaviour) and improve biological function (Dudnik et al., 2006; Elmore et al., 201; Newberry, 1995; Van de Weerd et al., 2006; Wittaker et al., 1999).

**Rationale:** These behavioural examples are confusing and misleading. Rooting, biting and chewing behaviours may be classified as normal or abnormal depending on the context in which these behaviours are performed and where they are directed. For example, chewing or biting penning components (i.e. gates, chains) may be a normal behaviour if performed in an exploratory manner. Chewing penning components repetitively and unvaryingly would be considered a stereotypical behaviour.
Pigs should be provided with multiple forms of social, occupational, physical, sensory or nutritional enrichment that aim to improve their welfare of the animals through the enhancement of their physical and social environments, such as:

**Rationale:** These are the five categories of enrichment types (Bloomsmith et al., 1991). Listing the five categories informs the reader of the types of enrichments options to consider. It is important to note that the categories are not mutually exclusive and that a specific enrichment may satisfy multiple categories. For example, straw could meet occupational, nutritional and physical enrichment for pigs (Mench et al., 2010). Additionally, there may be genetic differences between breeds, lines, or strains of pigs that affect their use of, or responses to, enrichment (Hill et al., 1998). Therefore, the categories should be listed with an "or" to denote choice in the type(s) of enrichment used.


- sufficient quantity of suitable materials to enable pigs to fulfil their innate needs to explore and look for feed (edible materials), bite (chewable materials), root (investigable materials) and manipulate (manipulable materials) (Bracke et al., 2006); novelty is another aspect that is very important in so as to maintaining interest in the provided materials (Trickett et al., 2009; Abou-Ismail and Mendil, 2016; Tarou and Bradshaw 2007);
- 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 regular direct physical contact associated with positive events, which may include food or scratching, or pats, rubs and talking when the opportunity arises) (Hemsworth and Coleman, 2011; Hemsworth and Coleman, 1994).

**Rationale:** Providing regular human contact in association with events that are benign or enjoyable will reduce their stress and distress at being handled.

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.

**Prevention of abnormal behaviour**

In pig production there are a number of abnormal behaviours that can be prevented or minimised with appropriate 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 some recommendations to Management procedures that may reduce their occurrence of some of these behavioural problems include:

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**OIE Terrestrial Animal Health Standards Commission/Feburary 2017**
**Rationale:** As stated, it would be impossible to recommend a successful intervention to prevent or minimize abnormal behaviour without first examining the whole environment and management factors. Rather than recommending specific interventions, the chapter should list management procedures that could be considered by the producer.

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).

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). General health, thermal comfort and air quality.

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 measurables): 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.612.**

**Housing (including outdoor production systems)**

When new facilities are planned or existing facilities are modified, professional advice on design in regards to welfare and health of animals 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 or and stress for pigs. Facilities should allow for the safe, efficient and humane management and movement of pigs. In systems where pigs could be exposed to adverse weather conditions they should have access to shelter to avoid thermal stress and sunburn.

There should be a separate pen or area where sick and injured animals or animals that exhibit abnormal behaviour can be isolated, treated and monitored. Certain animals may need to be kept individually. 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, and water and food must be within reach.

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

Good outcomes in the welfare and health of animals can be achieved in a range of housing systems. The design and management of the system are critical for achieving these outcomes. Regardless of the design, housing and management systems should:

- Provide every animal access to appropriate food and water;
- Promote good air quality and allow proper sanitation;
- Protect pigs from environmental extremes;
- Reduce exposure to hazards or conditions that result in injuries, pain, distress, fear, or disease;
- Facilitate the observation of individual pigs to assess their welfare;
- Provide pigs with adequate quality and quantity of space that allows pigs to assume normal postures and express normal patterns of behaviour. (AVMA 2015)

**Rationale:** The proposed addition provides outcome based criteria that are applicable to all housing designs, management systems, and life stages of the pig regardless of geographic location. The 6th bullet above, in particular, is intended to replace the 1st
sentence in the paragraph below that begins with “Sows and gilts are social animals...” It is well documented in the scientific literature 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).

Pigs Sows and gilts are social animals and prefer living in groups (Stolba and Wood-Gush, 1989; Newberry and Wood-Gush, 1988; Gonyou, 2001). Therefore housing systems where pregnant sows and gilts should preferably be housed can be kept in groups are recommended (Anil et al., 2005; Barnett et al., 2001; Boyle et al., 2002; Broom et al., 1995; Karlen et al., 2007; Marchant and Broom, 1996; McGlone et al., 2004; AVMA, 2015). Sows and gilts can be successfully mixed early after breeding, without any reproduction consequences (Spoolder et al., 2009).

Rationale:

Regarding the 2nd sentence in the paragraph above that begins with “Sows and gilts can be successfully mixed...”, studies evaluating the impact of timing of mixing pregnant gilts and sows have generated conflicting data making it difficult to identify the “best” moment of grouping for optimal reproductive performance (Spoolder et al., 2009).

In a review by Arey and Edwards (1998), effects of mixing sows in the first 10 days after breeding results in reduced pregnancy rates in most studies and litter size reduced in a few studies. More recent data also shows mixing sows prior to embryo implantation reduces conception and farrowing rates and is further exacerbated in housing systems that use dynamic grouping and multiple mixings occur before embryo implantation. (Li and Gonyou 2013 (mixed d2-9 post-insemination) and Knox et al., 2014 (mixed d3 post-insemination)).

Sows mixed early in gestation had more skin injuries, greater incidence of lameness, and more vulva injuries at 7 days after mixing than sows mixed later in gestation (Knox et al., 2014 and Stevens et al., 2015). This is primarily due to sows mixed pre-implantation being more aggressive than sows that were introduced post-implantation (Hemsworth et al., 2006; Strawford et al., 2008; Stevens et al., 2015). Hemsworth et al., (2006) concluded that housing sows in stalls after mating and delaying mixing until pregnancy is confirmed may provide welfare advantages over housing sows in large groups for the entire gestation.

Spoolder et al. (2009) attributes the variation in study results to other factors related with the group housing system or the type of sows used. They recommend avoiding stress (e.g. social, thermal, physical, etc.) to sows during the first month of pregnancy to minimize negative reproductive consequences.


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.13.

Space allowance

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

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 lie down, rest simultaneously, and each animal lie down, to 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 abnormally aggressive behaviour is seen, corrective measures should be taken, such as increasing space allowance and providing barriers where possible.
In outdoor systems where pigs have some 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. excessive presence of faeces on the skin).

2. **Individual pens**

Pigs should only be housed in individual pens if necessary. In 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 separate areas for separation of dunging/elimination, lying and eating areas.

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

3. **Stalls and crates**

Feeding, gestation and insemination, gestation, stalls and farrowing stalls and crates. Stalls should must be sized appropriately to allow pigs to be able to:

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

**Rationale:**

- Sentence 1 - editorial clarifications.
- Bullets points - Pigs may choose to be in contact with the stall or with neighbouring pigs based on their laying preferences, but should not be forced to do so because of space restrictions.

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).

**Article 7.X.14.**

**Flooring, bedding, resting surfaces**

In all production systems pigs need a well-drained, dry 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 slot and gap widths should be appropriate to the claw size of the pigs to prevent injuries.

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

In outdoor systems, pigs should be rotated between paddocks or pastures 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) 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).

Article 7.X.15.

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 and abnormal behaviour. Dust, toxins, microorganisms, and noxious gases, including ammonia, hydrogen sulphide, and methane caused by decomposing animal waste, can be problematic in indoor systems due to decomposing animal waste (Drummond et al., 1980).

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 concentration in enclosed housing should not exceed 25 ppm. A useful indicator is that if air quality at the level of the pigs is unpleasant for humans it is also most likely to be a problem for pigs.

Outcome-based criteria (or measurables): morbidity, mortality and culling rates, physical appearance (excessive soiling and tear staining), behaviour (especially respiratory rate, or coughing and tail biting), change in body 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.

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).

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

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 too 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, water-based cooling systems (dripping or misting), 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, laying postures and patterns), physical appearance (presence of faeces on the skin), morbidity, mortality and culling rates, and reproductive efficiency.

Rationale: Laying postures and patterns can be a form of thermoregulation. Pigs that are cold will huddle very close together in a dense pile in one area of the pen. Pigs that are hot will spread out throughout the pen and avoid physical contact with other pigs in the pen. Pigs experiencing thermal comfort will typically have body contact with each other but do not pile excessively (Shao et al., 1997)


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

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 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).

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 should 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:** Pigs evolved as nocturnal, forest-dwelling animals (Curtis et al., 2001) so their auditory, vision and olfactory senses have adapted for dim lighting. Pigs can distinguish colors and maintain visual acuity at illuminations as low as 12 lux (Graf, 1976). Providing pigs with 40 lux instead of 12 lux has little effect on the pigs’ ability to distinguish visual cues (Zonderland et al. 2008). It is also not surprising that pigs do not generally show a strong preference for light or darkness (Baldwin and Start, 1985 and van Rooijen, 1985). When given the choice, pigs tend to spend more time in environments with dim illumination than those with bright illumination and have the same general level of active behaviours in all four illuminances with the exception of defecation. Pigs show preference to defecate more in spaces with higher illuminance (40 and 400 lux) (Baldwin and Start, 1985 and Taylor et al., 2006) indicating these locations are less desirable (Olsen et al., 2001). These studies demonstrate that pigs can successfully see one another, investigate their surroundings visually and show other normal behaviour patterns at lower illuminances than the prescribed 40 lux. Lighting may need to be brighter to facilitate human observation but there is no scientific data to suggest that 40 lux of lighting is needed for an extended period of time from the pig’s perspective.


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

Outcome-based criteria (or measurables): 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 should be provided 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 need assistance during farrowing, there should be sufficient space and competent staff.

Rationale: A farmer’s ability to access various types of nesting materials will vary depending on geography and on environmental and sustainability considerations. Therefore, a farmer may not be able to successfully and sustainably implement this OIE requirement. Furthermore, the farm’s manure management system may prohibit the use of nesting materials.

The benefits to pig well-being of providing nesting materials must be balanced with pig and human health. Providing nesting materials increases the risk of introducing pathogens can negatively impact pig health and, potentially, also human health. For example, *Toxoplasma gondii* infections not only impact pig health but pose a risk to human health (Centers for Disease Control and Prevention, 2017). The 2006 National Animal Health Monitoring System (NAHMS) survey found that pigs housed with partial or full outside exposure were 7.7 times more likely to be seropositive for *Toxoplasma gondii* than pigs housed exclusively indoors. Transmission of *T. gondii* occurs when pigs ingest organic matter containing oocysts. Consequently, production practices that eliminate these sources of exposure can reduce the risk of *Toxoplasma* infection in pigs, and reduce the likelihood of human infection from consumption of infected pork (Hill et al., 2010).


When new buildings are planned, professional advice on design in regards to welfare and health of animals should be sought. Loose housing systems for farrowing sows and gilts should be considered. (Baxter et al., 2012; Cronin et al., 2014; KilBide et al., 2012; Morrison et al., 2013; Weber, 2007).

**Rationale:** For consistency with previous language used in this chapter (Article 7.X.12. Housing).

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

**Article 7.X.20.**

**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 piglets’ size and physiological maturity. Early weaning systems require good management and nutrition of the piglets.

An average *piglets* *should* be weaned *aging* age of *on average* at three weeks or older is recommended (Hameister *et al.*, 2010; Smith *et al.*, 2010; Gonyou *et al.*, 1998; Worobec *et al.*, 1999). Piglets may be weaned earlier than three weeks in circumstances where the welfare or the health of the sow or piglets is being compromised (e.g. during a disease outbreak). Earlier weaned piglets require special management and diets and should be moved into clean and disinfected housing separate from housing where sows are kept, in order to minimise the transmission of diseases to the piglets.

Delivering weaning to the age of four weeks or more may produce benefits such as improved bowel gut immunity and *reduced* less diarrhoea and *less* preventive use of antimicrobial agents (EFSA, 2007; Hameister *et al.*, 2010; McLamb *et al.*, 2013; Smith *et al.*, 2010; Gonyou *et al.*, 1998; Bailey *et al.*, 2001).

**Rationale:**

Paragraph 1: Weaning age recommendations should be presented as an average as many farms utilize a batch farrowing protocol to protect and manage herd health. Batch farrowing protocols require batch weaning which means not all piglets in the batch will be the exact same age. Additionally, a provision for earlier weaning should be allowed as weaning piglets prior to 3 weeks of age can be an effective strategy to minimise or prevent vertical transmission (i.e. sow to piglet) of several diseases (Alexander *et al.*, 1980; Dritz *et al.*, 1996; Harris and Alexander, 1999; and Whiting and Pasma, 2008). Specifically, segregated early weaning can prevent or minimise the vertical transmission of transmissible gastroenteritis virus (TGEv), porcine epidemic diarrhea virus (PEDv), porcine reproductive and respiratory syndrome virus (PRRSv), *Actinobacillus pleuropneumoniae, Mycoplasma hyopneumoniae, Serpulina hyodysenteriae, Bordetella bronchiseptica*, toxigenic *Pasteurella*, and *Haemophilus parasuis*.

Paragraph 2: Weaning is a gradual process and has been defined as the point when maternal investment begins to decrease (Martin, 1984). Between 3 and 4 weeks post-farrowing, sows terminate almost all suckling bouts and begin to restrict access to the udder and the amount of milk withdrawal by piglets (Jensen, 1988 and Jensen and Recen, 1989). Overall, there are no lasting differences in pig well-being, piglet
development, or sow reproductive performance when piglets are weaned at 3 weeks of age as compared to those weaned at 4 weeks of age. Further, the optimal lactation length for an individual herd will be influenced by its particular management and environmental and characteristics (Xue et al., 1993).

Most physiological and behavioural differences found between weaning ages disappear as the pig ages (Hohenshell et al., 2000). This is primarily because neither HPA axis programming nor long term function is impacted by weaning age (Klemcke et al., 1995; Hay et al., 2001; Mason et al., 2003; Jarvis et al., 2008).

Generally, sow reproductive performance is impacted by weaning age. As lactation length increases, wean-to-estrous interval decreases and farrowing rate, subsequent litter size, and sow longevity increases. However, these sow reproductive performance parameters were statistically similar for 3 and 4 week lactation lengths indicating that a lactation length longer than 3 weeks does not benefit sow reproduction (Levis, 1997).

The environment pigs are reared in and the diet they receive pre- and post-weaning can have as much impact on gut development and function and pig health as weaning age does. Prenatal stress experienced during late gestation has a negative influence on the immune system of the offspring in pigs (Couret et al., 2009 and Merlot et al., 2013). Maternal factors such as diet composition and antibiotic treatments can induce changes in maternal microbiota and colostrum and milk composition, leading to changes in piglet gut functions (Bauer et al., 2006; Le Huerou-Luron and Ferret-Bernard 2015).

When reviewing the current literature on morphometric evaluation of postnatal gut development and the impact of age, weaning and feeding regimes, Masri et al. (2015) found that all weaning ages temporarily reduced villus height and width and that there was no clear impact on crypt depths. Pigs weaned between 1 and 4 weeks of age experience a 60% decrease in villus height which recover within 2 weeks post-weaning to heights comparable to unweaned control animals independent of weaning age (Wijtten et al., 2012). Pigs weaned into clean and disinfected environments will have less pathogen exposure regardless of weaning age. Diets can be specifically formulated and tailored to a pig’s state of immune and gut development based on their age. Specializing diets to weaning age is particularly important since luminal nutrition plays a major role in the integrity and maturation of the structure and function of the small intestine after weaning (Masri et al., 2015). Further, teeth used for masticating feed have erupted and are starting to occlude by 3 weeks of age enabling their ability to consume solid feed ensuring weight gain. (Tucker and Widowski, 2009; Tucker et al., 2010a; Tucker et al., 2010b).


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 and appropriate diet is important. The area that piglets are weaned into should be clean, and dry and warm.

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

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

**Rationale:** Weaning age can have as important of an impact on sow well-being as it does on the piglets. Sow body condition and reproductive health are influenced by lactation length (see previous comments) and so their well-being and longevity in the herd should also be considered as an outcome-based measurable.

Article 7.X.21.

**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 the aggression is intense or prolonged, and pigs become injured supervised.

Measures to prevent excessive fighting and injuries can include (Arey and Edwards, 1998, Verdon *et al.*, 2015):

- providing additional space and a non-slippery floor,
- feeding before mixing,
- feeding on the floor in the mixing area,
- provision of providing straw or other suitable enrichment materials 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 addition of adding one or small number of animals to a large established group.

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 measurables): physical appearance, behaviour (e.g. maternal and agonistic 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 and pests**

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

*Pigs should also be protected from pests such as excessive numbers of flies and mosquitoes.*

**Rationale:** General pest management is already addressed in relation to hygiene and health in the subsequent section on biosecurity and disease prevention (Article 7.X.24.1). A requirement for protection against pests, specifically flies and mosquitoes, is an impractical requirement for pig production systems that house pigs outdoors or in combination systems. Additionally, the requirement is overly broad as written as only biting flies pose a welfare concern and may not be geographically relevant if biting flies are not present in a region. Finally, a requirement for protection from pests has not been addressed for any other species in the OIE Code (beef production - Chapter 7.9, broiler production - Chapter 7.10, or dairy production - Chapter 7.11).

Outcome-based criteria (or measurables): 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 pathogenic agents including:

   - pigs, including introductions to the herd, especially from different sources,
   - young animals semen coming from different sources,
   - other domestic animals, wildlife, and pests,
   - people, including sanitation practices,
   - equipment, including vehicles, tools and facilities,
   - vehicles,
   - air,
   - air, water supply, semen, feed and bedding,
– waste, including manure, waste garbage, and disposal of dead animals,
– semen.

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

a) Animal health management

Animal health management should optimise the physical and behavioural health and welfare of the pig in the herd. It includes the prevention, treatment and control of diseases and conditions affecting the herd (in particular respiratory, reproductive and enteric diseases).

There should be an effective programme for the prevention and treatment of diseases and conditions, formulated in consultation with a veterinarian, when appropriate. This programme should include the recording of production data (e.g. number of sows, piglets per sow per year, feed conversion, and body weight at weaning), morbidity, mortality and culling rate and medical treatments. It should be kept up to date by the animal handler. Regular monitoring of records aids management and quickly reveals problem areas for intervention.

For parasitic burdens (e.g. endoparasites, ectoparasites and protozoa) and fly control, a programme should be implemented to monitor, control and treat, as appropriate.

Rationale: General pest management is already addressed in relation to hygiene and health in the previous section on biosecurity and disease prevention (Article 7.X.24.1). A requirement for fly control is an impractical requirement for pig production systems that house pigs outdoors or in combination systems. Finally, a requirement for fly control has not been addressed for any other species in the OIE Code (beef production - Chapter 7.9, broiler production - Chapter 7.10, or dairy production - Chapter 7.11).

Lameness can be a problem in pigs. Animal handlers should monitor the state of feet and legs and take measures to prevent lameness and maintain foot and leg health.

Those responsible for the care of pigs should be aware of early specific signs of disease or distress, such as coughing, abortion, diarrhoea, changes in locomotory behaviour or apathetic behaviour, and non-specific signs such as reduced feed and water intake, changes in weight and body condition, changes in behaviour or abnormal physical appearance.

Pigs at higher risk will require more frequent inspection by animal handlers. If animal handlers suspect the presence of a disease or are not able to correct the causes of disease or distress, they should seek advice from those having training and experience, such as veterinarians or other qualified advisers, as appropriate.

Non-ambulatory. Nonambulatory pigs should not be transported or moved unless absolutely necessary for treatment, recovery, or diagnosis. Such movements should be done carefully using methods that avoid dragging the animal or lifting it in a way that might cause further pain, suffering or exacerbate injuries.

Animal handlers should also be competent in assessing fitness to transport, as described in Chapter 7.3.

In case of disease or injury, when treatment has failed, is not feasible 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 measurables): 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.**

**Contingency Emergency plans**

Where the failure of power, water and or 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 when necessary.

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

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

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.

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

The establishment should have documented procedures for on-farm humane killing. Staff should be trained in the humane killing procedures appropriate for each class of pig.

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, or have not responded to therapy treatment,
- rapid deterioration of a medical condition for which therapies have been unsuccessful,
- severe, debilitating pain,
- compound fracture,
- spinal injury.
– central nervous system disease,
– 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


Trickett, S.L., Guy, G.H. and Edwards, S.A. (2009). The role of novelty in environmental enrichment for the


