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# Animal Welfare in pig production

## *Syllabus*

*Training activities on Animal Welfare mainly for EU Member States  
under the 'Better Training for Safer Food' Initiative.*

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# 1

## Presentation

### BTSF Programme: purposes and expected outcomes

Better Training for Safer Food – BTSF – is an initiative of the European Commission aimed at organising an EU training strategy in the areas of food law, feed law, animal health and animal welfare rules, as well as plant health rules.

Article 51 of Regulation (EC) No 882/2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules, provides the legal instrument for this initiative.

Training is designed for staff of competent authorities of EU Member States involved in official control activities so as to keep them up-to-date with all aspects of Community law in the areas specified above and ensure that controls are carried out in a more uniform, objective and adequate manner in all Member States.

It is also essential that third countries and in particular developing countries are familiar with EU standards and import requirements. For this purpose, training organised for Member States in the EU is also available to participants from third countries and specific training activities are organised for third country participants on the spot.

The main objective of the BTSF initiative is the organisation and development of a Community training strategy with a view to:

- Ensuring and maintaining a high level of consumer protection and of animal health, animal welfare and plant health;
- Promoting a harmonised approach to the operation of Community and national control systems;
- Creating an equal level playing field for all food businesses;
- Enhancing trade of safe food;
- Know-how transfer on effective inspection methods and best practices;
- Ensuring fair trade with third countries and in particular developing countries.

Within the BTSF Programme, training and education are key elements to convert food safety policy into action. Expected outcomes of the Programme are:

- Promoted an integrated and global approach to the legislation;
- Increased competence and expertise of controlling authorities, imposing high standards on control officials in the Member States;
- Encouraged an harmonized approach to EU and national control systems;
- Spread knowledge and awareness of EU law in the specific fields.

## Purposes of the syllabus

This syllabus is conceived as a source of technical information on **animal welfare in pig production**. It is based on contents and relevant issues, arising from training courses organised in this field under the BTSF Programme (Service Contract n. 2012 96 04 - IZSAM Contractor).

Intended to provide a common message concerning legislation in force, this document reflects the approach to be taken by control officials in their activities.

The syllabus includes material, data and references also useful for the production of communication tools for knowledge transfer and dissemination.

The website [www.sancotraining.izs.it](http://www.sancotraining.izs.it) includes in depth information on the course programmes, tutors, presentations. Readers interested in implementing training courses on the basis of this syllabus are invited to consult the website.

# 2

## Introduction

The Commission has been developing animal welfare legislation for over 30 years and has been at the forefront of initiatives to promote it internationally by its active participation in, and support for, initiatives of the Council of Europe and the World Organisation for Animal Health (OIE) and in the Food and Agriculture Organisation of the United Nations (FAO).

Animals are recognised as sentient beings by Article 13 of the Treaty on the Functioning of European Union (TFEU). In formulating and implementing the Union's agriculture, fisheries, transport, internal market, research and technological development and space policies, the Union and the Member States (MS) shall pay full regard to the welfare requirements of animals.

The European Commission adopted its EU strategy for the protection and welfare of animals 2012-2015 in January 2012. The strategy builds on the experience gained through the 2006-2010 Action Plan to propose lines of EU action for the next four years. This strategy in particular considers enforcement as priority and stresses the importance of training in this regard.

The EU legislation on the protection of animals on the farm aims to ensure that animals are kept and raised respecting the minimum physiological needs and to minimise painful practices. In particular, Council Directive 98/58/EC on the protection of animals kept for farming purposes lays down general rules for the protection of animals of all species kept for the production of food, wool, skin or fur or for other farming purposes, including fish, reptiles or amphibians. Moreover, specific EU legislation exists on the welfare of poultry, pigs and calves. Council Directive 1999/74/EC lays down minimum standards for the protection of laying hens and Council Directive 2007/43/EC, applying as of 30 June 2010, lays down minimum standards for the protection of chickens kept for meat production. Council Directive 2008/120/EC lays down minimum standards for the protection of pigs and Council Directive 2008/119/EC lays down minimum standards for the protection of calves.

The EU strategy for the Protection and Welfare of animals 2012-2015 includes, as a key objective, support for international cooperation. It also includes standards for the protection of animals used for experimental purposes. At international level, the OIE has adopted standards on the protection of animals at the time of killing and during transport. Moreover the OIE is also developing standards on animal welfare in different production systems. FAO is also working on capacity building on good animal welfare practices which may benefit livestock related livelihood in developing countries.

In this context the EU has actively promoted consideration of animal welfare within the framework of veterinary agreements with other Third Countries trading partners. The Sanitary and Phytosanitary (SPS) Agreement with Chile was the first ever bilateral agreement between the EC and a Third country to include animal welfare within its scope. It was followed by the EC-Canada JMC/Veterinary Agreement. Furthermore, Cooperation Forums on Animal Welfare were established with New Zealand and Australia.

# 3

## The relevant European context

There is ongoing work at the Commission in order to improve the welfare of pigs and to increase awareness on this issue among stakeholders and consumers.

Council Directive 2008/120/EC of 18 December 2008 lays down minimum standards for the protection of pigs. This Directive repeals Directive 91/630/EC and consolidates the standards which are already in force in a single text.

The text provides details for improving several aspects of the welfare of pigs ( e.g. housing, painful operations).

Minimum standards apply to all categories of pigs kept for rearing and fattening, e.g. piglets (from birth to weaning), weaned piglets (from weaning to 10 weeks old), fatteners (more than 10 weeks old), sows, gilts and boars.

These animals are, apart from some exceptions (farrowing sows, boar), to be raised in groups. Farmers must implement measures aimed at fulfilling basic needs and preventing aggression within the group. In particular, pigs must have permanent access to a sufficient quantity of enrichment material in order to enable proper investigation and manipulation activities.

Pregnant sows and gilts must, if necessary, be treated against external and internal parasites. Tethering sows and gilts has been prohibited since 1 January 2006.

One week before farrowing, sows and gilts can be isolated. An unobstructed area must be available for natural or assisted farrowing. Boxes must be equipped with piglet protection systems.

No piglets shall be weaned from the sow at less than 28 days of age unless the welfare or health of the dam or the piglet would otherwise be adversely affected.

Measures shall be taken to ensure that the animals do not fight. Pigs are to be kept in groups and must not be mixed (except if necessary before weaning or during the week following weaning). Aggressive animals are to be kept away from the group (as are injured animals). Tranquilising medicaments are to be used only to facilitate mixing in exceptional conditions and after consultation with a veterinarian.



A veterinarian or “carer”, trained in aspects relating to animal welfare is authorised to carry out the following:

- ✓ reduction of piglets’ corner teeth,
- ✓ docking of tails (before the seventh day of life or after this age if carried out by a veterinarian and under anaesthesia and with additional prolonged analgesia),
- ✓ castration of males (before the seventh day of life or after this age if carried out by a veterinarian and under anaesthesia and with additional prolonged analgesia),
- ✓ nose-ringing in outdoor husbandry systems.

Neither tail-docking nor reduction of corner teeth must be carried out routinely but only where there is evidence that injuries to sows’ teats or to other pigs’ ears or tails have occurred. Before carrying out these procedures, other measures shall be taken to prevent tail-biting and other vices, taking into account environment and stocking densities. For this reason inadequate environmental conditions or management systems must be changed.

Sick or injured pigs are to be placed in individual enclosures.

The Directive also provides for standards concerning feeding in “sufficient quality” and “permanent” access to drinking water. All pigs must have access to food at the same time as other animals in the group. Animals must be fed at least once a day.

Standards concerning floor area are set according to the weight of the animal: between 0.15 m<sup>2</sup> for pigs weighing less than 10 kg and 1 m<sup>2</sup> per animal over 110 kg, 1.64 m<sup>2</sup> per gilt, 2.25 m<sup>2</sup> per sow, 6 m<sup>2</sup> for a boar (10 m<sup>2</sup> if the boar is used for natural service).

Floors must be smooth but not slippery so as to prevent injury to the animals.

The lying area must be comfortable, clean and dry.

Continuous noise as loud as 85 dB is to be avoided. Light intensity is to be at least 40 lux for eight hours.

Member States must carry out inspections each year on a statistically representative sample.

The Commission may send veterinary experts to make on-the-spot checks in the farms with the assistance of national inspectors.

Member States may apply stricter provisions on their own territory than those laid down in this Directive. In this case, they shall inform the Commission of any such measures beforehand.

# 4

## Learning objectives

This syllabus is mainly dedicated to official veterinarians belonging to the National Competent Authorities of EU Countries, Candidate and Third Countries involved in:

- official controls on Animal Welfare aspects concerning the farming of pigs;
- development of best practices to improve the implementation of European norms and/or international standards (where appropriate).

This booklet is intended to support the implementation of training and dissemination initiatives aiming at spreading out knowledge on the welfare of pigs at farm level, in Member States. It is referred to a residential training programme, aiming at facilitating the improvement of the following skills:

- a) interpret relevant EU legislation;
- b) apply scientific basis for proper housing, management (including provisions of enrichment material, group housing of sows and gilts, feeding practices for dry pregnant sows and gilts, mutilation procedures such as tail-docking, tooth clipping and castration) and handling of pigs;
- c) assess compliance of existing farming systems (including requirements for manipulability and rooting materials, flooring types, etc.) with the current EU legislation;
- d) monitor animal welfare outcomes, throughout practical experience on the farm;
- e) carry out efficient inspections at farm level, including practical guidance on how to verify compliance of farming systems and management practices with the EU legislation;
- f) be aware on how a strong cooperation between competent authorities and stakeholders in the production chain can improve the welfare conditions of pigs at farms.



# 5

## Course contents

### EU legislation concerning the welfare of intensively kept pigs

The purpose of this paragraph is to provide information on the legal framework characterising the welfare of pigs.

Council Directive 98/58/EC on the protection of animals kept for farming purposes established general rules for the protection of animals of all species kept for the production of food, wool, skin or fur or for other farming purposes, including fish, reptiles or amphibians. These rules are based on the European Convention for the Protection of Animals kept for Farming Purposes and reflect the so-called 'Five Freedoms' as adopted by the Farm Animal Welfare Council:

- ✓ Freedom from hunger and thirst - access to fresh water and a diet for full health and vigour,
- ✓ Freedom from discomfort - an appropriate environment with shelter and comfortable rest area,
- ✓ Freedom from pain, injury and disease - prevention or rapid treatment,
- ✓ Freedom to express normal behaviour - adequate space and facilities, company of the animal's own kind,
- ✓ Freedom from fear and distress - conditions and treatment which avoid mental sufferings.

The Council Directive 2008/120/EC lay down minimum standards for the protection of pigs and aims to ban individual stalls for pregnant sows (since 1.1.2013), establish a minimum space for each category of pigs, foresee the use of rooting material instead of tail-docking and the improvement of the quality of the flooring surface.

As concerns group housing of sows, Article 3 (4) states that Member States shall ensure that sows and gilts are kept in groups during a period starting from 4 weeks after the service to 1 week before the expected time of farrowing. Since 1 January 2013, group housing of sows is compulsory in all EU pig holdings with 10 sows or more.

With reference to the use of manipulable materials, it is stated that neither tail-docking nor reduction of corner teeth must be carried out routinely. Before carrying out these procedures, other measures shall be taken to prevent tail-biting and other vices, taking into account environment and stocking densities.

Inadequate environmental conditions or management systems must be changed and in general pigs must have access to a sufficient quantity of material to enable proper investigation activities, such as straw, hay, wood, etc.

Moreover, in the legislation there is reference to the introduction of higher level of training and competence on welfare issues for the stockmen and the personnel in charge of the animals.

The two Directives were initially proposed by the Commission on the basis of the Scientific Committee's report "The Welfare of Intensively Kept Pigs", available at the link:

[http://ec.europa.eu/food/animal/welfare/farm/pigs\\_en.htm](http://ec.europa.eu/food/animal/welfare/farm/pigs_en.htm)

The Council Directive 2001/88/EC amends the Council Directive 91/630/EC laying down minimum standards for the protection of pigs and aims in particular to :

- Ban the use of individual stalls for pregnant sows and gilts during a period starting from 4 weeks after service to 1 week before the expected time of farrowing and the use of tethers,
- Improve the quality of the flooring surfaces,
- Increase the living space available for sows and gilts,
- Allow the sows and gilts to have permanent access to materials for rooting,
- Introduce higher level of training and competence on welfare issues for the stockmen and the personnel in charge of the animals,
- Request new scientific advice in relation to certain issues of pig farming.

From 1 January 2003 these requirements are applicable to all holdings newly built or rebuilt. From 1 January 2013 these provisions shall apply to all holdings.

In parallel, the Commission has adopted Directive 2001/93/EC amending the Annex to Council Directive 91/630/EEC on the welfare of pigs. Supplementary improvements have been achieved for all categories of pigs. The Standing Veterinary Committee supported the proposal of the Commission aimed to introduce improved standards concerning the following issues:

- Light requirements and maximum noise levels,
- Permanent access to materials for rooting and playing,
- Permanent access to fresh water,
- Additional restrictive conditions to carry out mutilations on pigs,
- Minimum weaning age of four weeks.

The Member States have to apply the new requirements from 2003 on.

The two Directives were initially proposed by the Commission on the basis of the Scientific Committee's report "The Welfare of Intensively Kept Pigs".

EFSA has adopted a number of scientific opinions on the welfare aspects of pig farming:

- ✓ *Scientific Opinion on the welfare aspects of the castration of piglets*
- ✓ *Scientific Opinion on the welfare of weaners and rearing pigs: effects of different space allowances and floor types*
- ✓ *Scientific Opinion on animal health and welfare in fattening pigs in relation to housing and husbandry*
- ✓ *Scientific Opinion on the animal health and welfare aspects of different housing and husbandry systems for adult breeding boars, pregnant, farrowing sows and unweaned piglets*
- ✓ *Scientific Opinion on the risks associated with tail biting in pigs and possible means to reduce the need for tail docking considering the different housing and husbandry systems*
- ✓ *Scientific Opinion on Food safety aspects of different pig housing and husbandry systems*

# OIE general principles and challenges to develop outcome based standards

The need to fight animal diseases at global level led to the creation of the Office International des Epizooties through the international Agreement signed on January 25th 1924.

In May 2003 the Office became the World Organisation for Animal Health but kept its historical acronym OIE. The OIE is the intergovernmental organisation responsible for improving animal health and welfare worldwide.

The OIE Animal Welfare Working Group was inaugurated in 2002, and since then, the World Assembly of OIE Delegates (representing the 178 Member Countries and Territories) has adopted nine animal welfare standards in the Terrestrial Animal Health Code and four animal welfare standards in the Aquatic Animal Health Code.

Chapter 7.1 of the Terrestrial Animal Health Code “Introduction to the recommendations for animal welfare” provides four articles covering: guiding principles for animal welfare, scientific basis for recommendations and general principles for the welfare of animals in livestock production systems.

OIE encourages participation by all OIE Members in the standard setting process, and works with a wide range of stakeholders to raise awareness at all levels of OIE’s international animal welfare standards, and strengthen collaboration between private and public partners for effective implementation of these standards.

## The welfare of pigs

This section of the booklet is dedicated to various aspects of welfare of pigs as concerns scientific basis for proper housing, management and handling of pigs, measures and indicators to assess compliance of farming systems and animal welfare outcomes.

### Biology and behavior of pigs

Animal welfare can be defined in a number of different ways, but there is a growing consensus that whatever the definition, it has to include three elements: the emotional state of the animal, its biological functioning and its ability to show normal patterns of behaviour.

Farm animals kept in semi-natural environments have been shown to express most of the behavioural patterns of their wild ancestors. When animals are prevented from performing a particular behaviour pattern, a stress response may follow. Moreover, negative emotional states often result from the animal’s inability to show appropriate behavioural responses and thereby failing to cope with the situation.

Pigs have well developed senses and learning ability. Pigs have wide-angle vision, but only have limited forward binocular vision and poor perception of depth. This means that they can detect objects and movements beside and behind them, but can only judge distances directly ahead. Pigs use its hearing and smell to situate itself in its surroundings using sight as a complement to the information gathered by these two senses. Pigs can hear over a greater range of frequencies.

Pigs are homoeothermic, which means they are able to maintain a relatively constant deep body temperature that differs from the environmental temperature within certain limits. Thermal comfort and the relationship between animals and their thermal environment are explained using the concept of thermoneutral zone. This is defined as the range of ambient temperatures that provides a sensation of comfort and minimises stress. The effects of the thermal environment are not solely dependent on air temperature, but on “effective temperature”, which is the end-result of the interaction between air temperature, relative humidity, ventilation and flooring. Pigs have great difficulty in losing heat and may therefore suffer heat stress at ambient temperatures close to the upper limit of their thermoneutral zone and at high humidity. Heat stress may result from poor ventilation, inadequate housing and an overly high stocking density.

In an omnivorous species, such as the pig, some exploration is expected to be closely linked to foraging behaviour. Exploration develops early under natural conditions and constitutes a substantial part of the time budget of free-ranging domestic pigs. Pigs may be motivated to explore even if there are no obvious novel *stimuli* which may elicit the behaviour. In some circumstances, the inability to perform such behaviour patterns may cause distress and lead to the development of damaging behaviours. For example, tail biting may reflect the lack of opportunity to perform rooting.

All farm species are social animals and as such are strongly motivated to have contact with conspecifics. Positive social interactions such as social licking have a desirable effect on welfare for at least two reasons. First, they have been shown to elicit physiological responses known to be pleasant. Second, they reduce the negative effects of stressful events; this is known as “social buffering” of the stress response. Negative social interactions, such as aggression, impair animal welfare. Aggression may result in injuries, pain and, in extreme cases, the death of the animal. Secondly, aggression leads to fear and stress within the whole group. Fear is an aversive emotional state and, although fear behaviour can be adaptive in ideal circumstances, its sudden, intense or prolonged elicitation (and the consequences thereof) is a major welfare problem. Stress may harm body functioning by impairing immune function and reproductive performance, and decreasing food intake. Negative social interactions may also interfere with the expression of normal behaviour, particularly in low ranking animals, and thereby reduce food intake and resting time which may in turn lead to debilitation and health problems, such as lameness.

## Relevance of animal based indicators for pig welfare assessment

The integration of various parameters is the key point to make a correct assessment of animal welfare, because regardless of whether welfare is defined as the result of a subjective experience by the animal or the cost that it supposed to adapt to a given environment is, in itself, a very complex phenomenon. Therefore, any attempt to assess the well-being using a single parameter is doomed to failure. It is necessary, therefore an assessment and monitoring system that captures variables from many sources. It is often possible, and simple, simplify observing the environment where the animals live (many legislative revolve around issues such as the density inside the pens). These resource-based measures (environment) are often relevant, but they are only linked to the experience of the animals in an indirect way, providing long lists of things that can affect animal welfare but few aspects that measure welfare directly. Another option is to look at measures based on the handling of the animals (management), which are important because they are issues that may affect their welfare. Even so, they are not direct measures of this being. Thus, the two types of actions (based on the environment and management) indicate if the environment where the animal moves is satisfactory or not, that is, the risk to an animal to have poor welfare. However, it is based on the assumption that there is a relationship between these factors and the welfare of the animals, but they do not provide an accurate assessment of the state of being of an individual at a given time. The third approach is the use of measures based on the animals themselves. The welfare of an individual is often evaluated based on the effort they have to do in order to overcome the social and physical conditions to which the environment is submitting them, which is, in turn, a reflection of their mental state. In connection with this effort of adaptation, the individual can be found in three different situations. First, the animal is overcome by ambient conditions. In this case, pigs would suffer diseases and even die. Secondly, the animal gets adapt to environmental conditions, but that overcoming are difficult from the

point of view of costs. This cost is the result of two factors: firstly, the possible negative consequences of the physiological response of stress and, moreover, the possible negative consequences of the behavior changes showing the animal. The stress response can result in reduced growth, reproductive function and the effectiveness of the body's defense mechanisms against pathogens. Behavioral changes include reduced appetite and inhibition of reproductive behavior, or the emergence of stereotypies, repetitive movements with no obvious purpose, like chewing with an empty mouth. Finally, the third situation in which an animal can be found is a good adaptation to the environment without any biological cost. In this case, animal welfare will be optimal. Thus, high levels of cortisol in plasma or faeces, elevated heart rates, escape behaviors, attack, fear or stereotypies, and a poor body condition, disease or presence of wounds are valid measures to assess the welfare of pigs. However, not all of these measures can be used in a practical way on the farm. For example, physiological measures such as blood sampling require handling of animals that are themselves a source of stress if the animal is not used to this handling. Therefore, most of the times, it is better select measures of health behavior and requiring minimal handling of the animals. Keep in mind, finally, that animal-based measures compared to those based on resources, are more difficult to obtain and more time consuming.

The Welfare Quality® (2009) project has stressed the importance of animal based indicators to assess animal welfare. Several examples of these animal based indicators can be provided to illustrate their validity and appropriateness.

#### *1. Neonatal mortality.*

Piglet mortality is a major welfare and economic concern in the pig industry. The evolutionary strategy adopted by pigs is to produce a large number of relatively undeveloped offspring and, thus, an inherent variation in neonatal competitiveness and success is expected (Edwards, 2002). However, the average figures on most farms of 15% of piglet mortality are higher than what would be the acceptable values, and some farms do achieve lower percentages. This indicates that piglet survival is the outcome of complex interactions between the sow, the piglet and the environment. Genetics to improve maternal ability have proved to be one of the strategies to reduce mortality, together with environmental solutions. For a piglet to survive, sow factors like a good maternal ability and own piglet factors like appropriate first time behaviours are necessary. Therefore, animal based indicators like sow behaviour (responsiveness towards piglet crushing, calmness, lying behaviour) and piglet behaviours (vitality to find udder, ability to find teat and suckle...) should be taken into account when trying to reduce piglet mortality by means of either genetic or environmental strategies.

#### *2. Manure on the body.*

Manure on the body is one of animal based indicators used by the Welfare Quality® protocol which may help to reveal differences between production systems in terms of animal welfare final status. A study carried out by Temple et al. (2012) showed that significant and consistent differences in parameters like “moderately soiled” and “severely soiled” body condition could be found between extensive systems of pig production (Iberian pigs or Mallorcan Black pigs) and more intensive ones (concrete, indoor straw systems).

#### *3. Human animal relationship.*

Training of stockpeople and veterinarians may be one of the most cost effective strategies to improve animal welfare. Studies carried out by Hemsworth et al. (1986; 1991) demonstrated the importance of the human factor to increase both animal welfare and performance records. More recently, Temple et al. (2012) found that an animal based indicator used in the Welfare Quality® protocol like “panic” towards humans revealed significant differences between farms, but not between production systems. Therefore the authors suggested that the fear response could be somehow influenced by environmental factors such space allowance or enrichment, but that genetic background and stockmanship practices were as well of great importance.

#### *4. Aggression.*

Aggression is an important welfare problem in growing pigs and group-housed sows. Skin lesions can be used as a proxy trait to assess welfare. When comparing group-housing systems for sows, Chapinal et al. (2010) found that for that particular welfare trait, the number of aggressions and intensity was higher for the Fitmix system compared to the Biofix. The study also found significant differences in the location where the aggressions were carried out, being, as expected, more pronounced in the feeding area for the Fitmix system, whereas in the

biofix the rest of the pen was the place where aggressions took place. Another study carried out by Fàbrega et al. (2011) used carcass lesions to detect potential welfare differences in pigs kept in conventional systems with several different mixings during the fattening period, compared to wean-to-finish systems without mixing. It was found that non mixing systems resulted in lower aggressions, especially after split marketing compared to the conventional mixing system.

#### 5. *Stereotypies.*

Stereotypic behaviour has been defined as an abnormal behaviour, repetitive, invariant and without apparent function. They have been associated with frustration, repeated attempts to cope and/or dysfunctions of the Central Nervous System. Several studies have clearly demonstrated that the incidence of stereotypies is clearly higher in sows kept in stalls compared to loose group housing systems. The causes of these stereotypies in stalls are associated with the prevention of a highly motivated like rooting, combined with hunger and imitation.

#### 6. *Pain.*

Pain is associated with negative experiences like disease or injuries caused by other animals or the environment. Although the assessment of pain is challenging, several animal based indicators like certain type of vocalizations in procedures like castration or post tail-docking behaviours like reduction in play behaviour or tail wagging can be used as proxy indicators of a welfare concern.

Therefore, these examples do illustrate that animal welfare indicators are reliable and useful when assessing animal welfare. They allow the comparison of different production systems and their effects on animal welfare, although some adjustments may be necessary for certain production systems.

## **Relevance of resource based indicators for pig welfare assessment**

The importance of an adequate environment for the welfare of pigs has been pointed out by Hughes (1976) in defining animal welfare as the “state of complete mental and physical health in which an animal is in harmony with its environment”.

EU legislation establishes the enforceable minimum standards across member states, which are in turn implemented through national legislations. Most of these standards have been set up according to the scientific evidence to provide the pigs with a minimum level of welfare in terms of physical conditions and environment in which the pigs are allowed to live.

Among the most important features of livestock environment is the microclimate (temperature, humidity, air flow), light, gas and dust concentration, noise, the type of housing (single or collective, fixed or free, open or closed), the living space for each animal, the type of flooring (full, slatted, with litter), the shape and distribution of the living space, hygiene conditions and the microbial environment, the feeding system (size and type of equipment to supply feed, location of feeding areas), the water distribution system.

The systems to evaluate animal welfare can be subdivided into the following categories:

- systems based on functional farm equipment and facilities tests in order to verify performance and correlation with animals' welfare;
- diagnostic systems based on “animal based” indicators to assess the welfare of individual animals (behavior, health and physiology);
- on-farm index systems based on “resource based” indicators to estimate the potential of farming methods and structures to provide animals with a certain level of welfare.

On-farm index systems:

- estimate the potential of farming methods, structures and management to provide a certain level of welfare for farmed animals
- are based on technical parameters established and developed through research, experimentation and experience of farmers and technicians, besides the current legislation
- are not contrary or alternative of diagnostic systems, but simply offer a different service.

Animal welfare may help pig farmers to improve housing and husbandry techniques in order to improve health status and productive performances too. It can be considered as an opportunity if considered as a basic condition to improve farm efficiency and to differentiate livestock production and not only as a further complication of the rules imposed on farms.

Comparison between outcomes of resource based and animal based assessment for the same criteria and circumstances are welcome to understand:

- how much animal based measures are likely to be useful to check compliance of pig farms with animal welfare rules;
- how much housing systems and management (resource based measures) affect the welfare of pigs (animal based measures) in order to collect useful information for designing and testing innovations in terms of animal friendly housing systems.

## **Welfare assessment protocol on farm**

To evaluate the welfare of pigs on farm the protocol developed within the Welfare Quality ® project for fattening pigs and sows will be presented. This protocol is based on four basic principles: good feeding, good housing, good health and appropriate behavior. The principle of good feeding includes the absence of prolonged hunger and thirst. For the first criterion, we evaluate the body condition by visual inspection and palpation of the bones of the hip and spine. For the second criterion we consider the number of drinkers, their operation and cleaning. The principle of good housing takes into account three criteria. The first is the comfort during resting, which is evaluated by the presence of bursitis in the extremities and the presence of feces on the body. Animals resting on a hard and abrasive surface develop bursitis, which are evaluated according to their number, size and status (presence of necrosis, open wound etc). The presence of feces in the body, which indicates that the animals are resting on a dirty area (intentionally or unintentionally), it's a clear sign of discomfort during this period. A second criterion of good housing principle is an appropriate effective temperature. Cold stress is evaluated from the presence of animals huddling or shivering. Heat stress is collected from the presence of animals panting. The third criterion is the ease of movement, and it is measured from the space availability in different areas used by the pigs. The third principle to consider is that of good health. The first criterion of this principle is the absence of injuries, either in the form of bodily injury caused by fighting or hitting, or lameness. In the protocol only severe cases (when the animal does not support a limb) or very severe cases (when the animal can not get up) of lameness are assessed. The second criterion is the absence of disease. Animals are evaluated for respiratory problems (coughing, sneezing) digestive (diarrhea, rectal prolapse, constipation), reproductive (mastitis, uterine prolapse, lesions on the vulva), splay leg in piglets, skin condition (generalized inflammations, burns, scabies), abscesses and presence of inguinal or umbilical hernias that impede the movement of animals or with signs of necrosis. The third criterion is the absence of pain induced by management, such as surgical intervention (eg, castration or dehorning). Finally, the last principle of animal welfare is the appropriate behavior. The first and second criterion to consider is that pigs may show two behaviors important to the species, such as social and exploratory (rooting). For evaluation, repeated observations of the animals are carried out and then are characterized: firstly in two categories; inactive animals (lying and sleeping) and active animals. Then, these active animals are classified in performing social behaviors, exploratory behaviors or other behaviors. Within social behavior distinguishes between positive or negative



(biting, move to another animal, fights...). Within the exploratory behaviors differences between exploration of the environment/facilities and enrichment material exploration are clearly defined. In pregnant sows it is also evaluated the presence of stereotypies. The third criterion to consider is the human animal relationship. When the viewer enters the pen the animals may ignore it, moving away, moving to sniff or running with panic behavior. The latter is the only one of the four possibilities that is considered as very negative values in the protocol for pigs, being scored as panic for the whole group when more than 60% of the animals show this reaction. A pig scariest suffer greater stress to any human-induced management in either vaccination or during a load on the truck. Finally, the last criterion assesses the emotional state of the animals through a test of qualitative behavior in different parts of the farm.

## **Mutilation procedures: welfare implication and new strategies**

The main motive of castration is to prevent the boar taint which is present in the meat of some intact boars when they reach puberty. Castration is currently performed surgically and without anaesthesia during the first week of the animal's life. Although it is a rapid procedure, it induces a series of physiological and behavioural changes in the piglet which are clearly indicative of pain and stress. Post-surgical pain can last for 5 days.

The scientific community is looking for alternatives to castration without anaesthesia which eliminate the boar taint without causing the animal to suffer. As well as eliminating the pain associated with castration, breeding intact males also presents certain advantages with respect to the production of barrows. For the production of intact males to be economically viable it is necessary to have the means to control the presence of boar taint in the carcass. Immunological castration consists of the stimulation of the immune system of the animal so that it can produce specific antibodies, in this case against GnRH (gonadotropin releasing hormone). These antibodies inhibit the normal activity of GnRH, reduce the plasmatic concentrations of LH and FSH, and inhibit testicular development and functioning. In this way the levels of androstene and skatole in the fat are reduced, and therefore the incidence of boar taint in the carcasses is also reduced. Spermatic selection consists of the sexing of the spermatozooids with the objective of producing only females.

Tail-biting is an important cause of injuries in pigs. According to the most widely accepted hypothesis, tail biting is a form of redirected behaviour derived from the thwarting of normal exploratory, feeding, social and sexual motivations. Tail-biting is a welfare problem because of the pain and suffering experienced by the bitten animal (not only due to the biting but also to secondary infections), the stress caused to the group (restlessness), and the likely frustration of the biting animal. As is true for other behaviour problems in intensive pig production, tail biting is a multi-factorial problem involving both internal and environmental risk factors; these include genetic background, sex, age, health status, diet, feeding management and different characteristics of the pen. Tail docking is carried out to prevent tail biting. However, the pain associated with tail docking procedures normally lasts a few days, but in some cases chronic pain may also result. Though these management procedures are often carried out on young animals they too can feel pain. Tail docking should not be carried out routinely, only where there is evidence that injuries to other pigs' tails have occurred. Before carrying out these procedures, other measures shall be taken to prevent tail-biting and other vices, taking into account environment and stocking densities. For this reason inadequate environmental conditions or management systems must be changed.

## **Animal health and welfare aspects of different housing and husbandry systems for pig production**

Animal health and welfare aspects are tightly related, since good health is one of the basis for a sound welfare state, and proper welfare guarantees a better health. It is widely acknowledged that the repeated activation of the stress system has, on the long term, negative effects on the immune function. The higher levels of circulating glucocorticoids in chronically stressed individuals decrease the response to anti-inflammatory signals and may



increase the cytokine mediated inflammatory processes. Finally, the result is an inappropriate immune response in chronically stressed animals, which is clearly related to the incidence of the so-called multifactorial or production diseases. In these diseases a causative agent is present (ie a bacteria, virus), however the negative effects of stress increase the predisposition to develop them.

Stress is an additive phenomena, and two major components which can result in stressful situations are environmental/housing conditions and husbandry practices. Several examples can illustrate how different housing and husbandry practices do have different welfare and health consequences.

*Group housing vs. stalls in pregnant sows.* A study carried out by Karlen et al. (2006) draw the conclusion that when comparing these two systems on different aspects, group housing appeared to be more challenging at the beginning when the animals were introduced to the group, due to aggression, whereas stall negative outcomes were more pronounced after several weeks, due to stress accumulative effects. Along this line, lameness score, a clear welfare indicator, was found to be worse in stall kept sows after 9 and 15 weeks of remaining in the system. On the contrary, incidence of skin lesions was higher during the first week in group housed sows compared to sows in stalls. The study also found that the neutrophil/lymphocyte ratio significantly different, being higher for those sows kept in stalls after several 9 weeks in the system.

*Effect of castration and housing system.* A study carried out by Merlot et al. (2010) indicated that the number of leucocytes during the 5<sup>th</sup> month of age and the percentage of lymphocytes during the 4<sup>th</sup> and 5<sup>th</sup> month of age were higher in entire than in castrated males. The same result was found both in a slatted floor and an enriched environment. Since lymphocytes T are the major population of circulating lymphocytes and since lymphocytes T differentiate in the thymus, both results suggested a positive effect of male sexual hormones on the thymic activity.

*Effect of husbandry system on skin lesions.* Fàbrega et al. (2011) compared pigs which were conventionally mixed during growing versus unmixed pigs, it was found that the practice of mixing had an effect on hierarchy re-establishment after split marketing. The remaining pigs after split marketing from the non-mixed group presented a lower incidence of skin lesions compared to the mixed pigs.

Therefore, animal health and animal welfare are clearly interwoven fields. It is important, then, to find sound methods to prevent situations which may impair both health and welfare. First of all, good stockmanship practices have been said to influence to a great extent animal welfare. Some of the requirements of the welfare legislations demand more skilled personnel and with a higher motivation. Secondly, keeping good records of all health and welfare incidences may help to trace back problems and prepare prevention and intervention strategies. Along this line, a combination of on farm and on line information together with disease control programs and detection of sub clinical states would serve to improve both health and welfare. More recently, the concept of precision livestock farming has received more attention and different technologies have been developed to predict and improve both health and welfare. Examples of such technologies would be the detection of early stages of respiratory diseases by having cough records monitored or prediction of lameness using devices which measure static claw pressure distribution.

In conclusion, improvement of animal health and welfare by understanding and predicting the effects of different housing and husbandry practices may help not only to the animals themselves but also to the efficiency of the production system.

## **Group housing and feeding strategies for sows and gilts**

Council Directive 2008/120/EC places a number of requirements on farmers in relation to the housing and feeding of sows and gilts. These include the requirement for group housing with a specified minimum floor space provision, ability to access food without severe competition, access to high fibre food and the control of aggression.

Addressing these requirements must focus on adequate floor space and appropriate group size, adequate resource provision, suitable type and design of feeding system and the management of satiety.

Research will be briefly summarised to give guidance on addressing each of these key issues. Briefly, studies suggest that the current EU minimum floor space allowance for sows and gilts is appropriate from an animal stress perspective. Specifically, provision of less space than the legal minimum leads to increased skin lesions from aggression, whilst significant additional space provision above the legal minimum does not lead to great reductions in lesions compared to the minimum requirement. In research on breeding pigs, group size is often confounded with feeding system type and space allowance. Large group sizes in young pigs (independent of changes in feeding system and space allowance) tend to depress growth rate, but have no effect on food intake or aggression. This suggests that the change in growth rate may result more from the increased activity possible in large pens rather than social stress. A large group size therefore does not appear to be problematic so long as it is well managed. The advantages and disadvantages of each of the major sow feeding systems will be highlighted. A compromise is required between the minimisation of competition between animals on the one hand and the costs of installation of the feeding system and the labour costs of its daily use on the other hand. Systems which minimise feed competition (e.g. full length manual lock-in feeding stalls) require greater space and labour input than alternative systems such as dump feeding. Equally important, however, is the specific design and location of feeding systems and examples will be provided of where the sub-optimal design or location of an otherwise good feeding system can increase aggression associated with feed competition.

## **Environmental enrichment to improve pig welfare: use of manipulable and rooting materials**

EU regulations require that [...] pigs must have permanent access to a sufficient quantity of material to enable proper investigation and manipulation activities, such as straw, hay, wood, sawdust, mushroom compost, peat or a mixture of such, which does not compromise the health of the animals. [...]

When signs of severe fighting appear [...] providing plentiful straw to the animals, if possible, or other materials for investigation. (*Council Directive 2008/120/EC*).

The intention of the Directive is to improve the welfare of pigs by providing rooting materials in order to reduce the risk of abnormal behaviours. The most common housing systems for weaning and fattening are not able, generally, to meet the behavioural needs of pigs and, in particular, they do not allow the expression of exploratory behaviour.

The lack of suitable manipulable and rooting materials is one of the major problems for welfare and production, and the inability to express the exploratory behaviour has been indicated as the main cause of adverse and potentially dangerous abnormal behaviours in pigs, such as tail biting and excessive aggressive behaviours.

EU legislation also prohibits routine tail docking, as farmers should modify inadequate housing and management conditions. Tail docking is practised to reduce the welfare and production problem of tail biting, but it is controversial because it causes pain and distress, increases the risk of infection, can lead to chronic pain (neuromas), and - above all - does not address the inadequacy in housing and/or management.

Tail biting is a multifactorial problem, which causes of poor welfare (pain and frustration) and impair the production (carcase damage and decrease of daily weight gain). Tail biting is an abnormal behaviour that starts as exploratory/foraging behaviour and, if uncontrolled, it leads easily to cannibalism. Many factors resulting from inadequate housing or management increase the likelihood of an outbreak of tail biting: barren environment, restlessness, overcrowding, social instability, nutrition and animal characteristics (*EFSA, 2007*).

To reduce the incidence and the severity of tail biting, a proper environmental enrichment is recommended; however, which will be the most effective material is still under discussion.

Exploratory behaviour, composed by different specific behavioural elements, is a need in pigs, which are highly motivated to explore as they have developed a behavioural repertoire adapted for complex environments (Jensen and Toates, 1993; Studnitz et al., 2007). In nature, pigs are omnivorous with a large home range area; they spend more 1/2 of their daytime foraging (rooting and grazing) and 1/4 in locomotion and investigation of environment. Exploratory behaviour is important for finding food or a comfortable place to rest, and to obtain information about the environment (Wood-Gush and Vestergaard, 1989) and it involves mouth and snout by rooting, sniffing, biting and chewing edible and indigestible materials.

Intensively reared pigs are kept in barren environments (concrete flooring, lack of rooting materials, etc.) and the exploratory behaviour is directed at the only substrates available, the pen-mates and pen components (Scott et al., 2009).

According to the complexity of the enrichment, production systems can be classified in alternative enriched (e.g. The Family Pen System), straw-based, and pens with point-source enrichment-objects (Van der Weerd e Day, 2009). Each of these systems has different implications: straw-based is the most effective in reducing negative behaviour and increasing the welfare of intensively reared pigs (Scott et al., 2009). Environmental enrichment with straw or other rootable materials satisfies the need of searching, manipulating, and eating, and reduces tail biting by encouraging normal exploring behaviour. Many researches have shown that no environmental enrichment can guarantee an occupational level similar to the provision of straw as bedding material.

Destructible materials like wood and straw in a rack, as well as not destructible materials like chains and rubber toys are less effective since they do not allow animals expressing all the specific behavioural elements (rooting, sniffing, biting and chewing). However, the majority of pigs in EU are housed in buildings with slatted floors and liquid manure management, where straw cannot be a feasible option for farmers, who need to identify the most suitable environmental enrichment, such as plastic and wooden object suspended on a chain, suspended ropes or object presented on the floor.

The effectiveness of not destructible objects is controversial and they are not adequate on their own to reduce adverse abnormal behaviours. Suspended objects are more interesting and are preferred because more accessible - they are offered at pig head level – and cleaner - material presented on the floor becomes soiled by faecal material and loses interest by pigs (Averos et al., 2010). Moreover, the stimulus value of a material increases in relation to some properties to maintain its function over time: complexity, changeability, destructibility and edibility (Studnitz et al., 2007).

## Measures to fulfil basic needs and prevent aggression within groups

A large number of requirements are specified in Council Directive 2008/120/EC regarding the control of aggression in both young pigs and in breeding females. The actions required for compliance by farmers are clear for some of these requirements (e.g. compliance with specific floor space allowances) but are less clear for others. In particular the Directive requires that '*When pigs are kept in groups, measures must be taken to prevent fighting which goes beyond normal behaviour*'. Furthermore, it requires that '*When pigs are mixed they shall be provided with adequate opportunities to escape and hide from other pigs*'. Here we will examine the impacts of aggression which underlie the emphasis in the Directive on the control of aggression. We will also consider how aggression can be quickly monitored on farms and the actions that can be taken to reduce its impacts on social stress.

Aggression reduces growth rate, feed intake, food conversion efficiency, immune competence, reproductive success and meat quality. As one example, the reduction in growth rate following mixing into new social groups is at least 10% for a period of two weeks or more. This corresponds to the time taken for social stability to return to pre-mixing levels as shown by the number of fresh skin lesions which only return to baseline 2-3 weeks post-mixing. Aggression has also been identified as the single greatest risk for negative pre-natal stress effects on foetal piglets emphasising the need to control aggression between pregnant females.

The variation in aggressiveness between individual pigs will be highlighted and the use of skin lesions as a validated and rapid method to record aggressive behaviour will be described. Additionally, the location of lesions on the body has been shown to relate to different forms of aggressive behaviour (eg two-sided fighting as compared to one-sided bullying) and this has value as a way to assess the causes of injuries on a farm.

Efforts to reduce aggression through preventing pigs from forming dominance hierarchies have failed. Methods that accept the necessity and motivation of pigs to establish dominance relationships and that encourage this to occur efficiently and easily are likely to be much more successful. This demands that pigs have adequate space to show appropriate submission when defeated and that the environment is sufficiently complex for submissive animals to separate themselves from dominant ones. In the longer-term, aggressiveness has been shown to be heritable at a similar level to growth rate and should respond well to selective breeding. A summary will be given of the technical possibilities and likely consequences of selection for reduced aggressiveness.

## Farmers, industry, retailers, and NGOs perspectives

During each course, the positions of other relevant stakeholders are included to provide participants with a broad definition of the current debate on the protection of animals kept for farming purposes – pigs in this case.

Invited speakers from representative farmer associations, industry, retailers, as well as NGOs, are called to express the view of the organisations they represent.

Details on their key issues and messages are provided through their whole presentations, but are not reported in this syllabus, since they may vary from course to course.

# Legislation

## All farm species

European Convention for the protection of animals kept for farming purposes

[http://ec.europa.eu/food/animal/welfare/references/farmspc/jour323\\_en.pdf](http://ec.europa.eu/food/animal/welfare/references/farmspc/jour323_en.pdf)

European Convention for the protection of animals for slaughter

[http://ec.europa.eu/food/animal/welfare/references/slaughter/jour137\\_en.pdf](http://ec.europa.eu/food/animal/welfare/references/slaughter/jour137_en.pdf)

The Treaty of Lisbon <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2008:115:0001:01:EN:HTML>

78/923/EEC: Council Decision of 19 June 1978 concerning the conclusion of the European Convention for the protection of animals kept for farming purposes

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31978D0923:EN:HTML>

88/306/EEC: Council Decision of 16 May 1988 on the conclusion of the European Convention for the Protection of Animals for Slaughter

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31988D0306:EN:HTML>

Council Decision 92/583/EEC of 14 December 1992 on the conclusion of the Protocol of amendment to the European Convention for the Protection of Animals kept for Farming Purposes

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992D0583:EN:HTML>

Council Directive 93/119/EC of 22 December 1993 on the protection of animals at the time of slaughter or killing

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31993L0119:EN:HTML>

Council Directive 98/58/EC of 20 July 1998 concerning the protection of animals kept for farming purposes

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31998L0058:EN:HTML>

Regulation (EC) No 882/2004 of the European parliament and of the Council of 29 April 2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:165:0001:0141:EN:PDF>

Council Regulation (EC) No 1099/2009 of 24 September 2009 on the protection of animals at the time of killing

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:303:0001:0030:EN:PDF>

## Pigs legislation

COUNCIL DIRECTIVE 91/630/EEC of 19 November 1991 laying down minimum standards for the protection of pigs

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31991L0630:EN:HTML>

COUNCIL DIRECTIVE 2001/88/EC of 23 October 2001 amending Directive 91/630/EEC laying down minimum standards for the protection of pigs

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2001:316:0001:0004:EN:PDF>

COMMISSION DIRECTIVE 2001/93/EC of 9 November 2001 amending Directive 91/630/EEC laying down minimum standards for the protection of pigs

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2001:316:0036:0038:EN:PDF>

COUNCIL DIRECTIVE 2008/120/EC of 18 December 2008 laying down minimum standards for the protection of pigs

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:047:0005:0013:EN:PDF>

## Relevant literature

The welfare of intensively kept pigs. Report of the Scientific Veterinary Committee adopted on 30 September 1997

*The reports examines in detail the welfare of pigs kept in intensive farming systems, and in particular the welfare of sows reared in varying degrees of confinement and in groups, as well as the socio-economic implications of different systems of rearing.*

[http://ec.europa.eu/food/animal/welfare/farm/out17\\_en.pdf](http://ec.europa.eu/food/animal/welfare/farm/out17_en.pdf)

Opinion of the Scientific Panel on Animal Health and Welfare (AHAW) on a request from the Commission related to welfare aspects of the castration of piglets (2004)

*The EFSA Scientific Panel on Animal Health and Welfare was invited by the EU Commission to draw up an opinion on the Welfare Aspects of Piglet Castration.*

<http://www.efsa.europa.eu/en/efsajournal/pub/91.htm>

Opinion of the Scientific Panel on Animal Health and Welfare (AHAW) on a request from the Commission related to welfare of weaners and rearing pigs: effects of different space allowances and floor (2005)

*EFSA was invited by the European Commission to draw up an opinion on the welfare of weaners and rearing pigs considering the effects of different space allowances and floor types.*

<http://www.efsa.europa.eu/en/efsajournal/pub/268.htm>

Opinion of the Scientific Panel on Animal Health and Welfare on a request from the Commission related to animal health and welfare in fattening pigs in relation to housing and husbandry (2007)

*Council Directive 91/630/EEC, as amended, laying down minimum standards for the protection of pigs, requires the Commission to submit to the Council a report, based on a scientific opinion of the European Food Safety Authority (EFSA), concerning the welfare various aspects of housing and husbandry systems for farmed pigs. EFSA has therefore been required to provide a Scientific Opinion on several aspects of this, one concerning fattening pigs. The opinion should include: the effects of stocking density, including group size and grouping methods, space requirements and the impact of stall design and different flooring types taking into account different climatic conditions. The Scientific Opinion was adopted by the Panel on Animal Health and Welfare (AHAW) on 6 September 2007.*

<http://www.efsa.europa.eu/en/efsajournal/pub/564.htm>

Animal health and welfare aspects of different housing and husbandry systems for adult breeding boars, pregnant, farrowing sows and unweaned piglets[1] - Scientific Opinion of the Panel on Animal Health and Welfare (2007)

*Council Directive 91/630/EEC, as amended, laying down minimum standards for the protection of pigs, requires the Commission to submit to the Council a report, based on a Scientific Opinion of the European Food Safety Authority (EFSA), concerning the welfare various aspects of housing and husbandry systems for farmed pigs. EFSA was then required to provide a Scientific Opinion on the animal health and welfare aspects of different housing and husbandry systems for adult breeding boars, farrowing and pregnant sows. The opinion should consider, inter alia, the effects of stocking density, the implications of space requirements and the impact of stall design and different flooring types taking into account different climatic conditions, the latest developments of group housing systems for pregnant and farrowing sows with piglets through weaning and the latest developments of loose-house systems for sows in the service area and for farrowing sows with piglets through weaning. The Scientific Opinion was adopted by the Scientific Panel on Animal Health and Welfare (AHLAW) on 10 October 2007.*  
<http://www.efsa.europa.eu/en/efsajournal/pub/572.htm>

The risks associated with tail biting in pigs and possible means to reduce the need for tail docking considering the different housing and husbandry systems - Scientific Opinion of the Panel on Animal Health and Welfare (2007)

*Council Directive 91/630/EEC[1], as amended, laying down minimum standards for the protection of pigs, requires the Commission to submit to the Council a report, based on a scientific opinion of the European Food Safety Authority (EFSA), concerning the welfare various aspects of housing and husbandry systems for farmed pigs. Following a request from the European Commission, the Panel on Animal Health and Welfare was asked to deliver a Scientific Opinion on the risks associated with tail biting in pigs and possible means to reduce the need for tail docking considering the different housing and husbandry systems. The Scientific Opinion was adopted by the Panel on Animal Health and Welfare (AHLAW) on 6 December 2007*  
<http://www.efsa.europa.eu/en/efsajournal/pub/611.htm>

Food safety aspects of different pig housing and husbandry systems - Scientific Opinion of the Panel on Biological Hazards (2007)

*Use of pig production systems based on good/hygienic farming practices, including provision of optimal animal welfare, increases the pigs' resistance to infections and leads to a reduction of the food safety risks associated with the resulting carcasses. Therefore, in principle, on-farm pig welfare assurance contributes to the resulting carcass meat safety assurance of the resulting carcass meat. However, some on-farm practices that are considered beneficial for pig welfare such as holding in groups, use of bedding, use of non-slippery floors (that are difficult to sanitise) and access to outdoor spaces, may increase risks of a greater survival rate of, and/or exposure to, and/or spread of, food-borne pathogens in slaughter pigs. It is important to keep in mind that the closer to slaughter that a factor relevant for food safety occurs on farm, the greater is the carcass safety risk it poses. Extension of coordinated animal welfare-food safety research programmes on the compatibility, or otherwise, of on-farm measures aimed at facilitating and improving either pig welfare or pork safety, or both, should be encouraged and supported so as to improve the desired synergism between the two approaches. If food safety risks are increased by factors promoting animal welfare, it is recommended to consider additional risk reducing measures before their implementation.*

<http://www.efsa.europa.eu/en/efsajournal/pub/613.htm>

ALCASDE – Final Report "Study on the improved methods for animal-friendly production, in particular on alternatives to pig castration"

*ALCASDE is an European project with the aim of developing and promoting alternatives to the surgical castration of pigs and the dehorning of cattle. The European Union has progressively developed a harmonized legislation with the aim of keeping a high status of animal health and welfare. In this context, the overall objective of the project is to develop and promote alternatives to the surgical castration of pigs and to develop and promote alternatives to the dehorning of cattle. The aim of the contract is to provide research results that will support EU policy to promote demand and acceptance by consumers of pig meat from entire males or produced with alternatives to the surgical castration and also to encourage cattle production systems that do not require the dehorning of cattle.*

[http://ec.europa.eu/food/animal/welfare/farm/alcasde\\_study\\_04122009\\_en.pdf](http://ec.europa.eu/food/animal/welfare/farm/alcasde_study_04122009_en.pdf)



Improving the quality of pork and pork products for consumers, Q-PorkChains final report, September 2012  
*The document reports the results of the project “Q-PorkChain”, an integrated five-year project funded under the 6th Framework Programme for Research and Technological Development.*

[http://www.q-porkchains.org/~media/Qpork/docs/pdf/leaflets/final\\_report\\_QPC\\_september2012\\_web.aspx](http://www.q-porkchains.org/~media/Qpork/docs/pdf/leaflets/final_report_QPC_september2012_web.aspx)

#### EconWelfare

*EconWelfare is a European research project aiming to provide suggestions for national and European policy makers to further improve farm animal welfare. In collaboration with stakeholder groups it collates and investigates policy options and their impacts on the livestock production chain, the animal and European society.* <http://www.econwelfare.eu/>

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