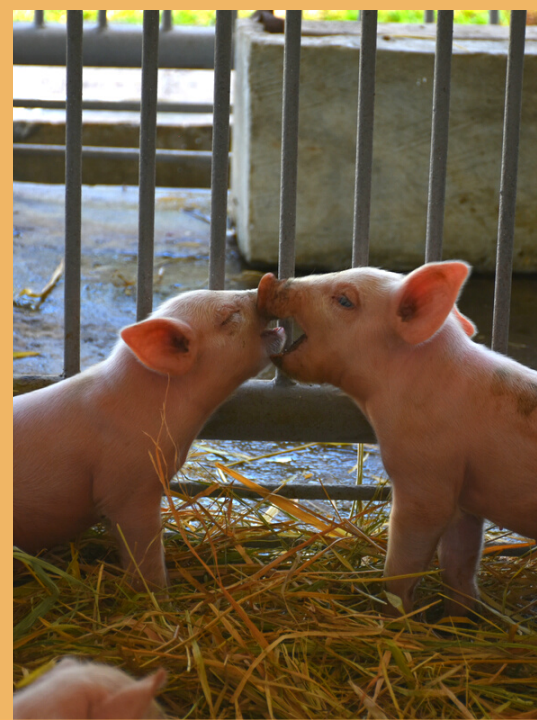




GOOD ANIMAL HUSBANDRY PRACTICES (GAHP) FOR SWINE

PNS/BAFS 267:2019
EXPLANATORY MANUAL



Good Animal Husbandry Practices
for Swine (PNS/BAFS 267:2019)

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Introductory Note

The Philippine National Standard (PNS) Code of Good Animal Husbandry Practices (GAHP) for Swine sets out the general principles of good practice and minimum requirements in commercial and backyard rearing/farming of swine for breeding and food use.

The purpose of this Code is to ensure that the farming practices of the establishment provide consumers with products that are safe and fit for human consumption while ensuring health safety, and comfort to both the farmworkers and the animals, without any degradation to the environment.

Consequently, the Explanatory Manual on GAHP for Swine is developed to harmonize the interpretation of the standard through examples, anecdotal experiences, and supplementary images provided in the box of explanatory notes. This is to facilitate better appreciation and adoption of minimum requirements of the standards. The explanatory notes are a guide only and shall not be construed as mandatory requirements unless otherwise specified by the regulatory agency implementing the said standard.

This manual also aims to contribute to the Department of Agriculture's efforts to revive and repopulate the Philippine swine industry which was heavily affected by the African Swine Fever (ASF) outbreak in 2019.

For more information, please visit our website <http://www.bafs.da.gov.ph> and Facebook page (<https://www.facebook.com/da.bafs>).

Director's Message



As the standard-setting agency of the agriculture sector, the Bureau of Agriculture and Fisheries Standards (BAFS) develops different standards to ensure that food is safe for human consumption and can compete in the world market.

Animals are considered to be an important source of human food and are an essential component of food security. Considering the vital role of animals in food production, sustainable practices should be observed.

The Bureau aims to help the readers better understand the standard requirements stated in the provisions of the Philippine National Standard (PNS) Code of Good Animal Husbandry Practices (GAHP) for Swine which sets out the general principles of good practice and minimum requirements in commercial and backyard rearing/farming of swine for breeding and food use.

We initiated the development of an Explanatory Manual that provides supplemental explanation through examples, anecdotal experiences, and supplementary images. Through this information, better appreciation and harmonized level of interpretation are expected when reading a specific PNS, contributing to its ease of adoption and implementation.

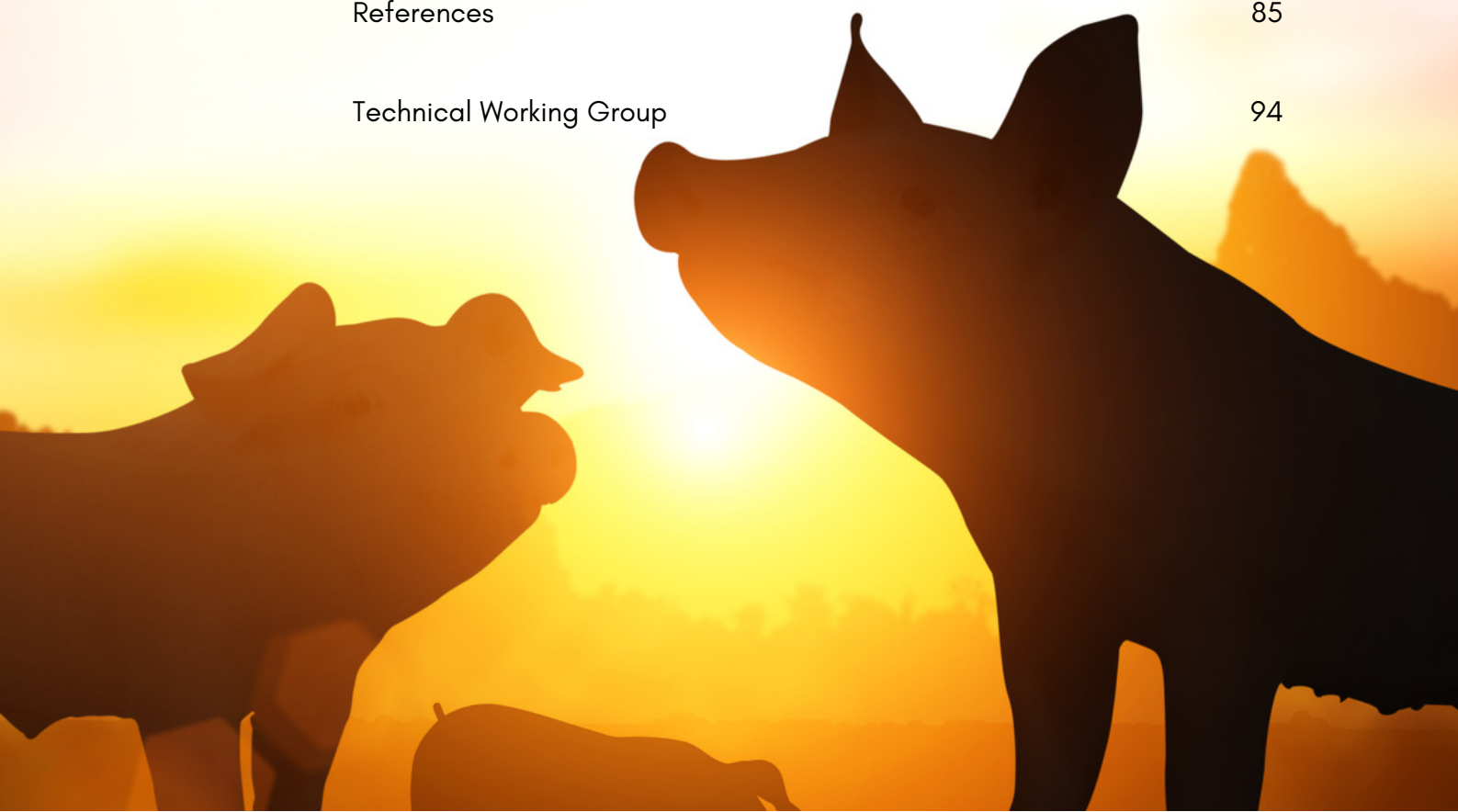
However, we would like to remind everyone that explanatory notes are a guide only and should not be construed as mandatory requirements unless otherwise specified by the regulatory agency implementing the said standard.

Through this Manual, we also aim to contribute to the Department of Agriculture's efforts in strengthening the Philippine swine industry.

Vivencio R. Mamaril, PhD
Director IV

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Foreword

The Philippine National Standard (PNS) Code of Good Animal Husbandry Practice (GAHP) for Swine has been prepared by the Technical Working Group (TWG) for GAHP for Swine as per Department of Agriculture Special Order No. 776 series of 2016 and approved by the Secretary of the Department of Agriculture.

The main objective of this Code is to ensure that the farms' farming practices shall provide consumers with products that are safe and fit for distribution and/or human consumption. It shall also ensure safety and comfort to farmworkers and animals without degrading the environment.

Any development of the industry's specific requirements for the swine production system should satisfy the minimum requirements set out in this Code.

This document was drafted by BAFS in collaboration with the Technical Working Group (TWG) members in accordance with the editorial rules of the ISO/IEC Directives, Part 2.

Scope and Normative reference

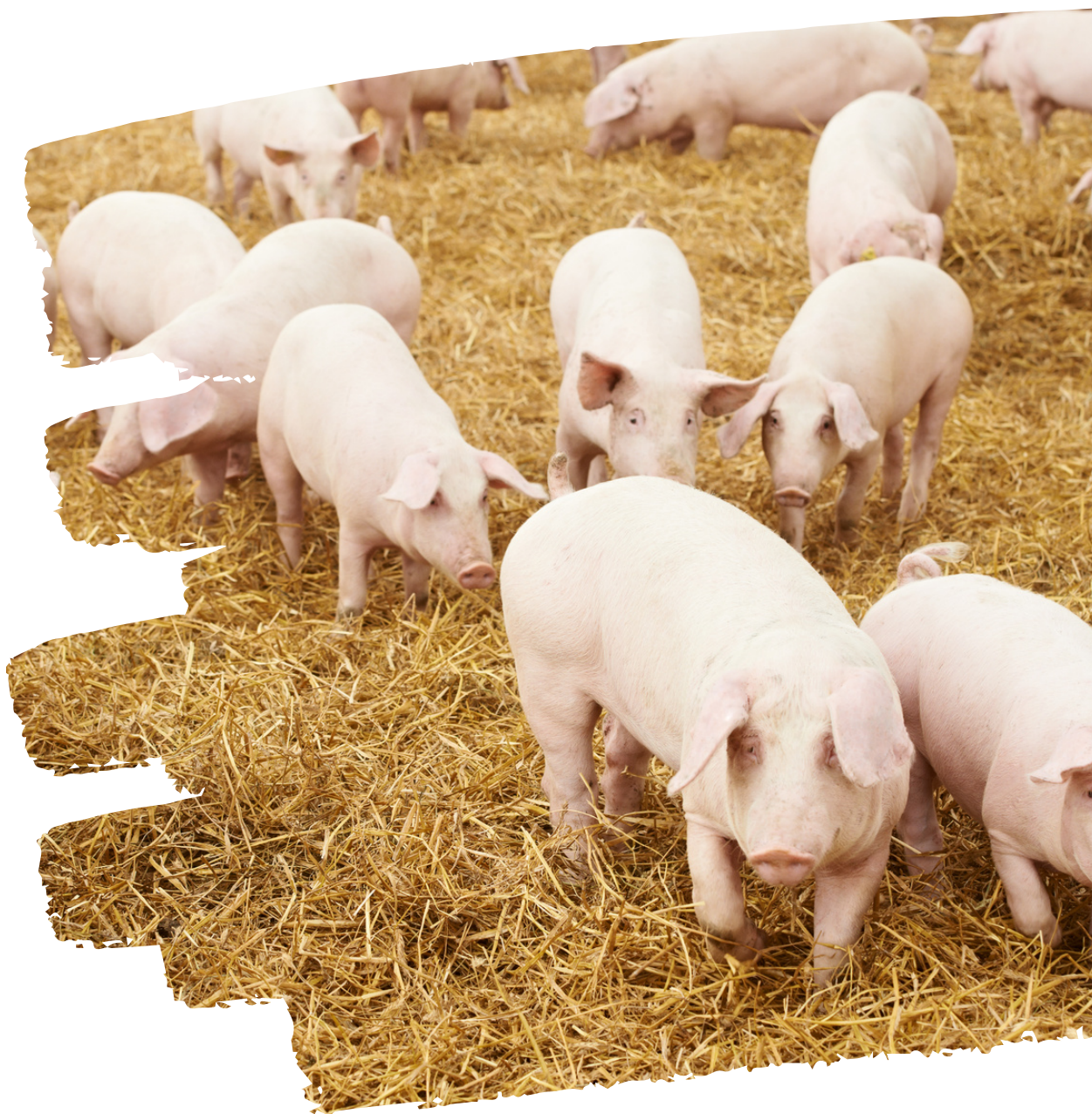


1 Scope

This Code sets out the general principles of good practice and minimum requirements in breeding, commercial and backyard rearing/farming of swine for breeding and food use.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes the requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. Republic Act 8485, Animal Welfare Act, 1998 Republic Act 10631, Amended Animal Welfare Act of 2013.



Compliance Requirement:

Farm establishment, Location and Facilities

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in red font color.



5 Farm establishment, Location and Facilities

5.1 Establishment

The establishment of the farm should be compliant with related laws and regulations of competent authority, including local government units. This covers the management of environmental issues, farm location, animal welfare requirements, disease control, production of wholesome food and occupational hazards in animal farming.

5.2 Location

5.2.1 The farm should be located in an appropriate area for pig raising.

- a. The farm should be strategically located within the approved land use of the local government and compliant with the DENR regulations and other regulations as prescribed by law (e.g. Laguna Lake Development Authority).

Explanatory Note:

According to Resolution No. R- 674 Series of 2000 of Housing and Land Use Regulatory Board, now reconstituted as the Department of Human Settlements and Urban Development (DHSUD), piggery farms shall be located in the agricultural zone and outside urban with the following considerations:

- The farm shall be situated preferably in a rolling terrain to have good drainage.
- Flood-prone areas and other environmentally critical areas like watersheds, sources of water supply, and others as defined by the Environmental Management Bureau (EMB) shall be avoided.
- The farm shall not be built on soils with high moisture levels but must be well-drained and porous.
- There shall be a buffer zone of at least 5 meters in width around the lot's boundaries and shall be planted with trees or shrubs.

- b. The distance of the farms from the center of the national highway shall be three (3) kilometers for commercial swine farms. However, with the application of advanced waste management technology, exceptions may be granted.

Explanatory Note:

Buffer distances refer to the required distances for piggeries to prevent unreasonable impact on the locality's amenities (e.g., roads) which aims to:

- ensure that noise, odor, visual impact, dust, and flies do not cause unreasonable interference to the impact areas;
- ensure surface water does not become contaminated by the piggery development; and
- provide a measure of protection and security of operation for the owner of the enterprise.

Water quality degradation, dust and odors are examples of environmental pollution. This can be controlled by good piggery design and management practices and by restricting pig numbers and maintaining suitable buffer distances between piggeries and impact areas (Guidelines for establishment of Intensive piggeries in South Australia, 1998).

Moreover, according to the Department of Animal Husbandry and Dairying of India, buffer distances are also one way of ensuring the piggery farm's biosecurity as vehicles can transmit swine pathogens when manure containing disease agents adheres to vehicle tires or bodywork. Examples are *Actinobacillus pleuropneumoniae* and *Streptococcus suis*, which can be spread by contaminated vehicles. Lorries, trailers, vans, and even motorbikes used to transport pigs or carcasses to render plants represent a high risk for disease transmission.

Buffer distances are being measured from the closest point of the piggery complex to the closest point of the receptor (Guidelines for establishment of Intensive piggeries in South Australia, 1998).

- c. The farm shall have a distance of at least one (1) kilometer from each other and from the boundary of built-up areas.

Explanatory Note:

The piggery site shall be at least 1 kilometer from its neighboring pig farms to minimize the spread of pests and diseases and reduce the concentration of air pollutants in a given area.

Porcine reproductive and respiratory syndrome virus (PRRS) and *Mycoplasma hyopneumoniae* can be transmitted via aerosol within 4.5 km. Under specific climatic conditions, some strains of foot and mouth disease (FMD) virus can be carried by the wind for up to 20 km, although it is unlikely that pigs would be infected through this route, and pseudorabies virus for up to 9 km. (FAO, 2010).

On flat land, air streams from a barn can remain in a concentrated plume and are thought to spread pathogens for long distances under certain climatic conditions.

- d. The farm should have a continuous supply of adequate electrical power

- 5.2.2 The farm should be located in an area away from physical, chemical and biological hazards.
- a. The farm should be located in areas away from physical, chemical and biological hazards that may pose threat to both farm workers and pigs.
 - b. The farm should be located at least 5 km away from slaughterhouse and animal holding facilities. Otherwise the farm shall have proper disease control measures in place.

Explanatory Note:

Slaughterhouses are a risk point for the spread of animal diseases. Animals from different species and of different origins are all concentrated in one location, and there is an important movement of people and vehicles.

- c. The farm must not be prone to flooding. Perimeter canals connected to a closed lagoon may be constructed to prevent runoff from contaminating bodies of water and/or adjacent farms.
- d. If there is available data/information from relevant government agencies or organizations on the prior land use, then they should be used as references to ensure that the site is not a possible source of physical, chemical and microbiological hazards. However, when these data are not available and uncertainty exists as to the suitability of the land for agricultural use, it is recommended to have the soil and/or water analyzed for heavy metal contamination, etc.

Explanatory Note:

Heavy metals may enter the animal body indirectly, like eating or grazing contaminated fodder, drinking contaminated water, and sometimes respiration with polluted air.

Prolonged exposure to these heavy metals such as lead, mercury, cadmium, and arsenic causes deleterious health effects in animals. It primarily affects the liver, kidney, brain, and other body systems.

Moreover, chronic exposure of the reproductive system to heavy metals causes steroid genic dysfunction, fetal abnormality, and embryotoxicity. They can also act as an endocrine-disrupting substance that manipulates hormones and receptor activity. Some heavy metals are highly associated with estrogen-mimicking action, and it causes physiological dysfunction related to reproduction (Verna et al., 2018)

5.3 Layout and infrastructure of farm

5.3.1 The farm should be well designed by locating and arranging areas, such as areas for pig raising, feed storage, isolation and treatment of sick pigs, carcass disposal, and pig selling.

- a. The farm should have enough area to facilitate the design of farm layout, such as the distance between pig houses and the arrangement of working areas. The appropriate farm layout shall provide good ventilation; serve as a preventive measure for disease spread between pig houses and other areas; and promote farm sanitation as well as the control, prevention and eradication of diseases within the farm.
- b. The farm should be well designed and all working areas should be clearly located in order to facilitate the efficiency of farm managements on pig raising, transportation and pig selling and to prevent cross-contamination between working areas.
- c. The farm should have proper routes to transport equipment, feed, and pig products within farm; with appropriate width, and without any obstruction for the convenience of practice.
- d. The following working areas should be included but not limited to:
 - Office building, parking area, and dormitory
 - Changing and shower room
 - Water resource
 - Pig houses
 - Feed storage, feed mixing
 - Pig quarantine pen
 - Area for sick pigs
 - Area for destruction and disposal of pig carcasses
 - Area for waste and trash collection
 - Area for waste water and solid waste treatment
 - Area for selling pigs

Explanatory Note:



Image 1. Sample layout of the farm (Source: (Photo taken at Agricultural Training Institute -International Training Center for Pig Husbandry, 2022)

5.3.2 The farm should have perimeter fences or natural barrier to prevent entry of stray animals.

The fence, including its posts and gates, should be effectively designed to prevent entry of stray animals (e.g. cattle, buffaloes, dogs, cats, etc.), and escape or injury of the farm animals. If electric fence is used, it should be operated as per manufacturer's instructions.

Explanatory Note:

Dogs and cats, feral or domesticated, are considered stray animals. Dogs that potentially carry leptospirosis can travel to different farms, posing a biosecurity risk.

On the other hand, cats and other felids can host parasites that can complete an entire life cycle and excrete more than 10 million oocysts or parasite eggs through their feces per day for 3 to 10 days that are environmentally resistant and infectious. Pigs become infected when they accidentally ingest oocysts in soil or water, and it takes only one oocyst to infect a pig (Pork Information Gateway).



Image 2.

Dog standing on a pig (Source: Canva. n.d)



Image 3.

Pig with a stray cat (Source: Canva. n.d)

5.4 Pig Houses

5.4.1 The farm building should be designed and constructed appropriately for the intended purpose, and should provide proper ventilation, easy maintenance and cleaning.

- a. The building intended for keeping animals should be constructed in the orientation that minimizes the adverse effects on animal performance and eliminates possible hazards to its surroundings.
- b. The building should be designed and constructed using materials that
 - should not cause any injury or impart hazard to the welfare of the animal;
 - provide comfort;
 - can be easily cleaned and disinfected;
 - can be easily replaced when damaged;
 - create efficient stock management; and
 - enhance biosecurity.

Explanatory Note:

Image 4.

Pig toys as enrichment materials
(Source: Florida grower farm courtesy of BAI. n.d)



- c. Painting materials used for the building and facilities should not be hazardous to the animals.

Explanatory Note:

Equipment, containers, and utensils should be made of materials with no toxic effect for the intended use.

Coatings, paints, chemicals, lubricants, materials used for surfaces or equipment that may have contact with feed should be food grade so that they will not contribute to unacceptable contamination of feed.

Coats and paints, especially those with lead, causes bioaccumulation in brain, bone, and kidney tissues (FAO, 2020).

- d. There should be an effective drainage system in place at the building.
- e. Pens and pathways should:
- be designed and constructed to prevent animals from escaping;
 - be free from protruding objects or structures (e.g. nails and bolts) that may cause injury to the animals and farm operators and farm workers.

Explanatory Note:



Image 5.

Pens and pathways in dry and pregnant unit (Source: Photo taken at ATI-ITCPH, 2022)



Image 6.
Pens and pathways in farrowing unit (Source: Photo taken at ATI-ITCPH, 2022)



Image 7.
Pens and Pathways in Finisher unit (Source: Photo taken at ATI-ITCPH, 2022)

- f. Housing design (particularly roof height and sides) should provide proper ventilation (whether natural or artificial) to maintain a comfortable environment.
- g. Animal buildings should have adequate lighting to ensure that animals can be thoroughly inspected as required.

Explanatory Note:

Image 8.

Natural ventilation (Source: Photo taken at ATI-ITCPH, 2022)



Image 9.

Natural ventilation (Source: Universal Robina Corporation (URC), n.d)



Image 10.
Artificial ventilation using exhaust fan (Source: Photo taken at ATI-ITCPH, 2022)



Image 11.
Artificial ventilation using cooling pads (Source: Photo taken at ATI-ITCPH, 2022)

- h. Electrical installations and wirings should be protected and should not be accessible to the animals.

Explanatory Note:

Using electricity efficiently is crucial when designing and installing a swine facility. This is to provide safety for both workers and animals and minimize potential hazards caused by fire.

Presence of ammonia, hydrogen sulfide and corrosive gases (in combination with moisture and dust) causes deterioration of electrical components. Many existing swine buildings have been using materials that cannot withstand these conditions that causes deterioration to the point of danger (Stetson et al., 2006).



Image 12.



Image 13.

Proper placement of wirings in the farm (Source: Photo taken at ATI-ITCPH, 2022)

Electrical hazards on the farm can result in electrical shock to humans or livestock and possibly result in a fire within structures or operating equipment (Doss et al., n.d.).

Also based on anecdotal experiences, some animals, specifically, piglets, tend to nibble the wiring when accessible. In cases like this, similar to tail-biting cases, the following may be the reason - boredom, frustration, or fanatics (2010, The Pig Site). To improve this, environment enrichment is usually applied using objects or materials in order to keep pigs occupied in non-harmful behavior.

Recommended enrichment materials should fulfill the following:

- **Edible or feed-like**, so that pigs can eat or smell them, preferably with some nutritional benefits.
- **Chewable**, so that pigs can bite them and also provides information on taste/odor.
- **Investigable**, so that pigs can investigate them, allowing pigs to root with their snout.
- **Manipulable or deformable**, so that pigs can change their location, appearance, or structure.

Items not suitable as enrichment for pigs:

- **Non-virgin wood**. This can contain sharp objects, e.g., nails or splinters from older, dried wood, which can hurt pigs when chewing and can be treated with chemicals that are toxic to pigs (e.g., railway sleepers).
- **Synthetic rope**, if swallowed in pieces may cause intestinal obstruction.
- **Tires**, as some may contain wire or metal strips which could cause harm to the pigs.
- **Materials with the risk of biological or chemical contaminants**, e.g. peat or mushroom compost can harbor disease-causing agents or dog chew-like pig ears that are made from animal products and could present a disease risk to pigs.
- **Dirty or soiled enrichment objects**, may provide a reservoir for disease-causing agents.

Types of enrichment:

- a. **Substrates used as bedding** - Straw, hay, elephant grass (miscanthus), wood shavings, shredded paper, or silage
- b. **Enrichment material not used as bedding** - Sisal rope, wood, rubber or plastic items, balls, toys, pipes, hose, chains and some commercially available items



Image 14.
Piglet on a hay kind of beddings (Source: Canva, n.d.)

- i. Floors and pathway used by the animals should be made from non-slippery materials, safe, stable and well-lighted to prevent injury or abnormal gait to the animals.

Explanatory Note:



Image 15.
Plastic matting (Source: Photo taken at ATI-ITCPH, 2022)



Image 16.
Plastic matting (Source: Photo taken at ATI-ITCPH, 2022)



Image 17.
Steel matting (Source: Photo taken at ATI-ITCPH, 2022)



Image 18.
Concrete flooring (Source: Photo taken at ATI-ITCPH, 2022)



Image 19.

Elevated flooring (Source: Photo taken at ATI-ITCPH, 2022)

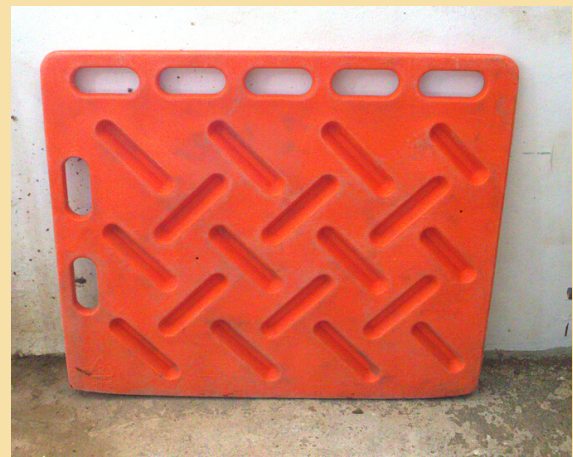
- j. The design of alleys and chutes should allow effective management of the animals
 - Floors of alleys and chutes should be properly built to provide good footing, preventing slippage and injuries.
 - Alleys and chutes should have sides of sufficient height to prevent animals from jumping off or falling.
- k. The farm should provide effective and appropriate facilities to restrain or handle animals without causing undue stress and injury to both animals and farm workers.

Explanatory Note:*Image 20.*

Restraining facilities (Source: Photo taken at ATI-ITCPH, 2022)

*Image 21.*

Flapper (Source: Photo taken at ATI-ITCPH, 2022)

*Image 22.*

Driving board (Source: Photo taken at ATI-ITCPH, 2022)

Flapper

It is being used to tap the side of the neck to assist with directional change.

Driving board

It is being placed behind pigs when moving through a race to encourage them forward and prevent them from turning around (New South Wales Department of Education, n.d)

- l. The premises should be kept clean at all times to prevent disease occurrence, establishment of breeding ground for pests and avoid environmental degradation.
- m. Pig housing should be secured from stray animals and birds.

5.4.2 Pig house should have sufficient space for pig raising and should have good condition of environment inside the houses, and should correspond to pig breed, size and age.

Animals should be provided with sufficient floor space suitable for their age and condition, body weight and size to allow animals to feed and drink comfortably.

a. The feeding and drinking equipment and facilities should conform with the standards/requirements for swine and should be constructed and conspicuously placed such that:

- animals are allowed to eat and drink freely, allowing them to behave normally; and
- contamination with animal feces and urine is minimized.

5.4.3 Controlled environment housing must have an alarm system in case of power failure and/or significant temperature variance. An alternative ventilation system must be available.



Compliance Requirement: **Feeds and Nutrition**

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are considered Explanatory Notes inside a yellow box in red font color.



6 Feeds and Nutrition

6.1. The farm operator should:

- a. Ensure that animals are provided with optimum level of nutrition at all times, as required for their respective functions and well-being.
- b. Provide the animals with safe, clean, and adequate rations or feeding materials suited for pigs.
- c. If animals are provided with commercial feed, ensure that the source or feed mill has been officially registered with the Animal Feeds, Veterinary Drugs and Biologicals Control Division (AFVDBCD) of the Bureau of Animal Industry (BAI).
- d. Keep feed mixing equipment clean at all times and with regular preventive maintenance schedule.
- e. Provide a daily feeding management or schedule.

Explanatory Note:

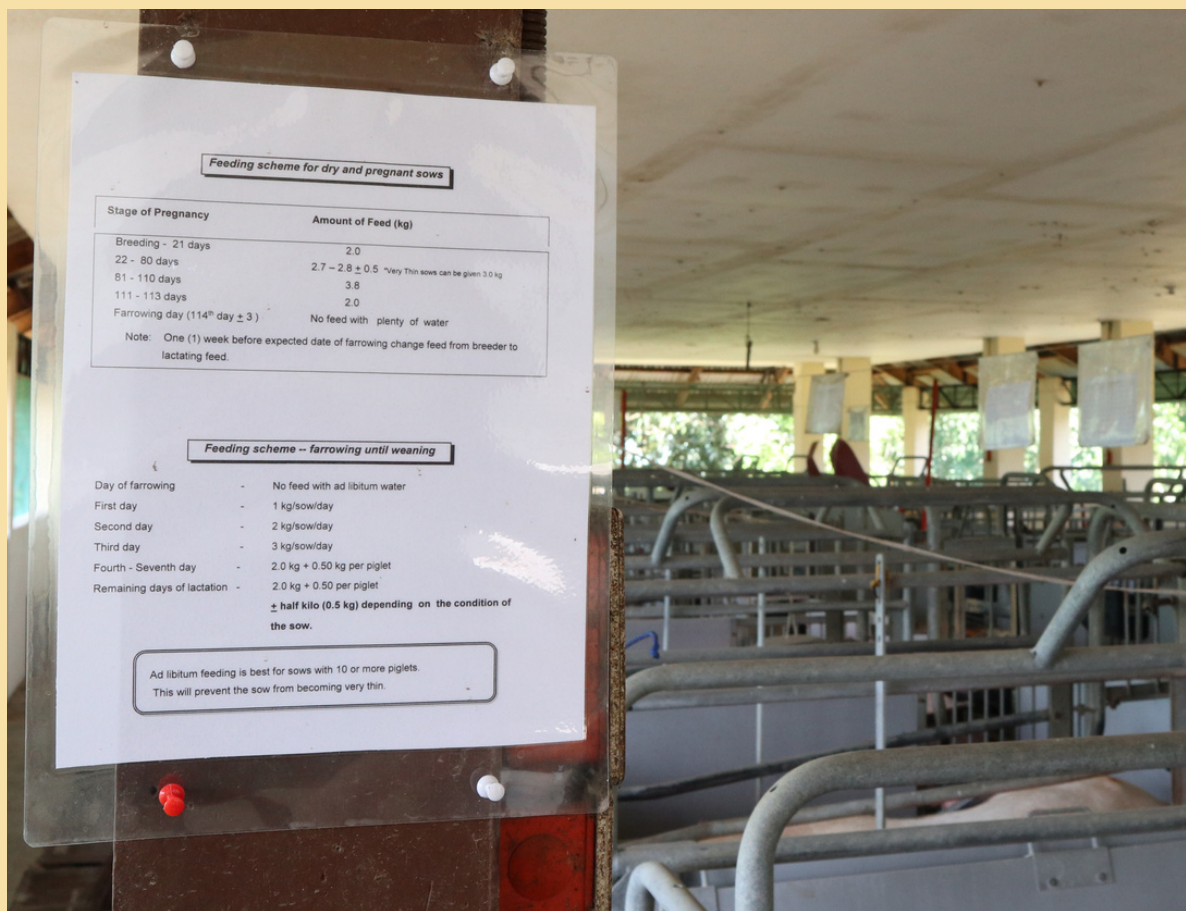


Image 23.

Daily feeding scheme for dry and pregnant sows (Source: Photo taken at ATI-ITCPH, 2022)

- f. Swill feeding should not be allowed. However, if it can't be avoided, the swill feed shall be heated to 90°C for 60 minutes with continuous stirring or the swill should be maintained at a temperature of at least 121°C for at least 10 minutes at an absolute pressure of 3 bar.

Explanatory Note:

According to the Philippine College of Swine Practitioners Technical Advisory No. 005 Series of 2020, swill feeding is recognized as a source of high protein feed option for animals like pigs, however, it also poses a risk. This is because pathogens causing diseases in pigs like ASF, FMD, CSF, PRRS, and humans (bacterial pathogens of food safety concerns) can survive in contaminated meat waste. Contaminated meat waste can harbor endemic or toxic diseases. As such, attention should be given to the use of food wastes in feeding pigs, including processed pork products that have not been heated.

Swill feeding is the identified entry point of ASF in the Philippines. The index case in Rizal identified hotel, restaurant, and airline food wastes as the culprit. This happened even with the issuance of DA Memo 22, series of 2018. The reported new cases involving small-scale farms also identified swill feeding as the cause.

Nonetheless, in developing countries, restaurant waste and kitchen scraps are often used as feed, because they allow rapid fattening of pigs, owing to the high energy and protein contents. If swill is to be fed to pigs, it must be heated to a minimum temperature for a sufficient period (e.g., 121°C for at least 10 minutes at an absolute pressure of 3 bar).

- g. Procurement documents of feed concentrates should be kept and updated properly to include:
- supplier or source of feed concentrate and its registration number;
 - type of feed and supplements;
 - quantity;
 - declaration of ingredients;
 - document of feed analysis;
 - date of delivery; and
 - date of manufacturing and batch number.

- h. Record the type and quantity of ration being fed to the animals

- 6.2 The use of medicated feed should be under the supervision of a licensed veterinarian and should be stored separately from non-medicated feed with clear label/signage.

- a. In case of farm-mixed feed formulation, farm operators should only use ingredients from reputable and traceable suppliers. Records of purchases should be kept.
- b. Not use banned drugs, feed additives, supplements and any form of medication in the diet of the animals, including those disallowed by the authorities or importing countries.

Explanatory Note:

A list of registered vaccines can be accessed through the BAI website:
<https://bit.ly/UpdatedListofVBPR>.

- c. For medicated feed, strictly follow instructions of medication, paying special attention to the withdrawal period of each specific drug being administered before the animals are sent to market.

Explanatory Note:

Medicated feeds are instrumental in maintaining animal health and promoting growth and feed efficiency. However, medicated feeds must be properly manufactured, and withdrawal times be observed.

Other routes of medication are as follows:

Through injection:

- Intravenous
- Intramuscular
- Subcutaneous
- Intra-dermal
- Intra-vulva
- Intra-peritoneal

Through oral route:

- Oral manual
- In-feed
- In-water

Through Topical medication:

- via Par-vagina/ par-prepuccial
- via Par-rectal

The withdrawal time is the period required for an animal health product to be metabolized, broken down, or excreted. The level remaining in the meat and organs is below the level established as safe for human consumption.

- 6.3 Feeds and raw materials should be kept in the way to prevent contamination and deterioration.
- Feed storage facilities should be kept clean at all times.
 - Feed storage should have adequate ventilation, adequate protection from moisture to prevent development of molds, and should be vermin-proof.
 - “First in – first out” rule should be practiced.
 - Machinery, equipment and other toxic chemicals should be stored separately from feeds to prevent contamination.

Explanatory Note:

Image 24.

Unkept feed storage (Source: Photo taken at ATI-ITCPH, 2022)



Image 25.
Well kept feed storage (Source: URC, n.d)



Image 26.
Feed bodega (Source: MM Swine Breeding Farm Facility courtesy of BAI, n.d)

Compliance Requirement:

Water for Pigs

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are provided as Explanatory Notes inside a yellow box in red font color.



7 Water for Pig

7.1 Water shall be clean, potable, sufficient, and free from any hazardous substances.

- a. The farm should have a continuous supply of clean and potable water.
- b. Water quality should be tested at least once at the beginning of production and during the time when water quality is suspicious. Test results should be recorded and maintained.

Explanatory Note:

As pigs grow, their water demand also increases. To maintain such demand, the daily water requirement per day of different pig's ages are listed below:

Table 1. The daily water requirements for pigs vary according to their age

Age of Pig	Daily water requirements L/day
Lactating sow	24 to 45
Dry sow and boar	15 to 15
Finisher	9 to 12
Grower	5 to 7
Weaner	3 to 5

(Source: Dawson S. 2021)

The quality of a water sample is evaluated according to three broad criteria namely, physical, chemical, and microbiological.

Physical criteria include the following qualities:

Turbidity: The cloudiness of water – is often due to silt or clay suspended in the water and is rarely a problem for pigs. However, water that scores greater than five nephelometric turbidity units (NTU) should have additional chemical and microbiological (bacterial) analysis.

Color Colored water is usually due to particles in the water. In Western Australia, this is often iron oxide. High levels of iron in the water can reduce the effectiveness of the water-soluble antibiotic apramycin. Therefore, if this is a medication you may be required to use, it may be essential to test the iron concentration in the water on your farm

Odor: Livestock water should not have an odor. An odor may indicate bacterial contamination or organic compounds such as sulfur. Bacterial contamination could be a source of disease to your herd; this is a particular risk for surface-sourced water, although groundwater can also contain pathogens.

Water can also become contaminated by various microbial pathogens. The number of coliforms per milliliter of water, for instance, determines the level of water contamination by bacteria. According to an Alltech factsheet on water quality in pig production, 50 colony-forming units (cfu) are fine, but anything higher than 100cfu/ml requires treatment.

The chart below, courtesy of AHDB Pork in the UK, outlines how long pathogens associated with swine diseases can survive in water.

Table 2. Number of days pathogen can survive in water

Pathogens	No. of days
Swine influenza	>32 days
<i>Actinobacillus pleuropneumoniae</i> (pleuropneumonia - APP)	21 days
<i>Streptococcus suis</i>	7 - 14 days
<i>Salmonella spp.</i>	54 days
<i>Brachyspira hyodysenteriae</i> (swine dysentery)	61 days at 5°C
<i>Porcine reproductive and respiratory syndrome virus</i> (PRRSV)	11 days
<i>E.coli</i>	<365 days
<i>Mycoplasma hyopneumoniae</i> (Enzootic Pneumonia)	31 days

Chemical factors affecting water quality include pH, hardness, total dissolved solids (TDS), nitrates and nitrites, sulphates, iron and lead (Kober 1993).

Water pH It measures the acidity or alkalinity of water. Water will be safe if it is in 6.5 to 8.5. Water pH affects the solubility of some medications.

Hardness This is the level of calcium and magnesium in the water. It does not affect animal health, but it can lead to an accumulation of scale in water delivery, treatment, and cooling equipment, blocking nipple drinkers and filters. Very hard water measures greater than 180 mg/L, and soft water is less than 60 mg/L.

Total dissolved solids (TDS)	It measures salinity. It also measures the total levels of bicarbonates, chlorine, sulfate, sodium, calcium, and magnesium in the water. TDS below 1000 milligrams per liter (mg/L) is ideal for pigs, while TDS between 1000 to 3000 mg/L is suitable. However, if weaners are suddenly introduced to this water, it may cause transient diarrhea for a few days. If there is no alternate water source, water containing 3000 to 5000 mg/L TDS can be used cautiously but discuss water management with your nutritionist or feed supplier.
Nitrates	Nitrates and nitrites can contaminate groundwater through leaching from the soil or through surface water run-off that has been exposed to material with high nitrogen levels, e.g. animal wastes, nitrogen fertilizers, decaying organic matter, silage juices, soils high in nitrogen-fixing, etc. A high level of either nitrites or nitrates may be indicative of bacterial contamination (Kober 1993).
Sulphates	A water sulfate level of less than 1,000 ppm may not affect pig performance. Water with up to 3,300 ppm causes a laxative effect and increases water intake in pigs. Higher levels cause diarrhea and make water unsuitable for pigs (Anderson and Stothers 1978 Table 4; AAFRD 1993; Gomez et al. 1995; NRC 1998). Sulfate in the drinking water will inevitably lead to diarrhea in most classes of swine (Veenhuizen et al. 1992). Younger pigs are most susceptible, but even sows will have transient diarrhea if rapidly switched to water high in sulfates. For young pigs, levels as low as 750ppm can be problematic, while older animals are tolerant of even higher levels. Because sulfate causes diarrhea of an osmotic nature, care must be taken not to assume that performance is impaired. On the other hand, diarrhea, even of osmotic origins, can increase the pig's susceptibility to secondary causes of gastrointestinal disturbance that might have a much more profound impact on performance and health.

The following provides suggested water treatments for different water quality problems:

- Coliform count -Chlorinate water.
 - e.g., *Some farms use dosatron, water-powered, non-electric chemical injectors for water chlorination at 4ppm inclusion in the water system to clean the water and prevent biofilm accumulation in the pipes (Dr. Quintos, National Federation of Hog Farmers Inc.*
- Water hardness- Install a softener.
- High nitrates or other minerals- Ion exchange or reverse osmosis treatment systems.
- Iron - Filtration
- High water pH - Acidification

- 7.2 Water should be adequate for all pigs to drink.
- a. The drinking equipment and facilities should be properly designed, constructed and conspicuously placed to allow animals to drink freely, prevent contamination with animal feces and urine and conform with the standards/requirements for each species.
 - b. In case of nipple drinkers, the water pressure should be set at appropriate level and no sediment exist to cause pipes obstruction. Water pipes should be routinely cleaned to avoid biofilm and sediment build-up.

Explanatory Note:

Table 3. Recommended flow rates for nipple drinkers and different classes of pig

Classes	Flow rate	Maximum pressure (kilopascals/kPa)
Lactating sow	2L/minute	No limit (avoid wastage)
Dry sow and boar	1L/minute	No limit (avoid wastage)
Finisher	1L/minute	140 to 175
Grower	1L/minute	140 to 175
Weaner	0.5L/minute	85 to 105

(Source: Dawson S., 2021)

Compliance Requirement:

Farm Management

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are considered Explanatory Notes inside a yellow box in red font color.



8 Farm management

8.1 Manual for farm management

The farm manual should demonstrate the details of important farm operations such as pig husbandry, feeding and watering, cleaning of houses and equipment.

Procedures for disease prevention and control like quarantine procedure for newly purchased and/or transferred pigs prior to entry and contingency plans for disease outbreak should also be included in the manual.

Explanatory Note:



Image 27.

Personnel reading farm manual (Source: Photo taken at ATI-ITCPH, 2022)

8.2 Personnel

8.2.1 Farm operators and owners

- a. The farm operator/owner should be responsible for the welfare of the personnel giving adequate provisions so that they are able to perform at their responsibilities efficiently.
- b. In cases of housed staff, the farm owner/operator should provide adequate accommodation for the workers.
- c. The farm operator/owner should always promote a safe and healthy working condition in the farm. Accident and emergency procedures should be available with clear instructions for all workers. First aid kits and fire extinguishers should be easily available at all times, and placed conspicuously in strategic locations.

Explanatory Note:

Image 28.
First aid kit
 (Source: URC. n.d)



Image 29.
Fire extinguisher
 (Source: Photo taken at ATI-ITCPH, 2022)

8.2.2 Training

- a. Farm personnel should be continuously trained on the necessary knowledge and skills about basic procedures of farm management including the correct handling of animal, routine management practices and usage of farm tools or equipment.
- b. Training certificate of farm personnel should be kept and properly recorded.

8.2.3 Farm personnel hygiene

- a. All persons entering the farm should take a shower, have hair washed and wear protective clothing supplied by the farm. The procedure for shower- cloth changing should be shown at the entrance of the farm.

Explanatory Note:

All personnel entering the farm, including farmworkers and visitors, should have no recent contact with other pigs. Places to avoid when entering a pig farm should include other pig farms, slaughterhouses, animal renders, and post-mortem rooms.



Image 30.

ITCPH personnel explaining protocols inside the farm including the shower-cloth procedure (Source: Photo taken at ATI-ITCPH, 2022)



Image 31.

Storage area of PPEs (Source: BAI, n.d)

One of the preventive measures in reducing the spread of disease before entering the farm is to comply with biosecurity measures of the farm.

The following are some of the biosecurity measures being done on the farm:

1. *"shower-in, shower out"*

This is done by taking a shower and changing all clothes of the visitors/personnel before entering the farm.

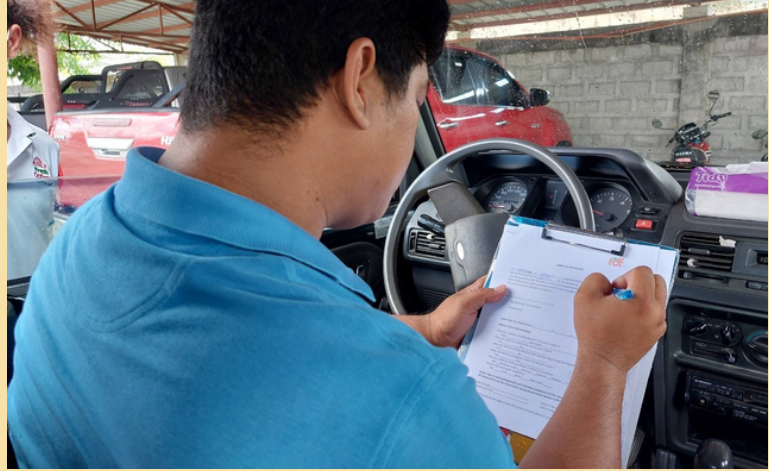
2. *Downtime*

Some pig farmers (with large farm) requires a two-nights downtime. In case that the visitors resisted on the downtime period, you may track down if they visited contaminated places like pig farms, slaughter houses, animal renderers or post-mortem rooms.

3. *Waiver*

Most farms require visitors to sign their documents stating that they have not visited contaminated places.

Image 32.
Visitor filling-out the waiver before entering the farm
 (Source: BAI, n.d)



- b. The farm owner/operator should provide farm workers with appropriate attire and footwear for protective measures.

Explanatory Note:



Image 33.
Personnel wearing Personal Protective Equipment (PPE) inside the farm
 (Source: Photo taken at ATI-ITCPH, 2022)



Image 34.
Personnel wearing boots
 (Source: Photo taken at ATI-ITCPH, 2022)

- c. Appropriate working uniform/attire and footwear should be provided to visitors who need to be at the production area, as may be deemed necessary.

Explanatory Note:

Image 35.

Personnel wearing PPE outside the farm pens (Source: Red Dragon Farm (Ayala Farm courtesy of BAI, n.d))

- d. The owner/operator should ensure that all farm operators and farm workers undergo annual routine health check-up/medical examination.
- e. Personnel who have been sick such as fever, respiratory or gastrointestinal infection should not be allowed to enter the farm unless they have been recovered.

Explanatory Note:

Transmission of pathogens from sick humans to pigs through direct contact is possible, as in the case of pandemic H1N1 2009 influenza. People with clinical symptoms of influenza should not be in contact with pigs until at least seven days after the onset of illness. Workers in direct contact with pigs should be vaccinated and provided with protective clothing.

8.3 Biosecurity and Farm Sanitation

8.3.1 Biosecurity measures

Explanatory Note:

Biosecurity is defined as the implementation of measures that reduce the risk of disease agents being introduced and spread. It requires that people adopt

a set of attitudes and behaviors to reduce risk in all activities involving domestic, captive/exotic, and wild animals and their products (FAO/OIE/World Bank, 2008). Biosecurity measures should be used to avoid the entry of pathogens into a herd or farm (external biosecurity) and to prevent the spread of disease to uninfected animals within a herd or farm and to other farms when the pathogen is already present (internal biosecurity).

To improve the farm biosecurity measures, classify them into three goals: isolation, sanitation, and traffic control. It can also be classified into segregation, cleaning and disinfection.

Based on Administrative order 07 series of 2021 "Implementing guidelines for the 'Bantay ASF sa Barangay' Program" below are the procedures in the recovery and repopulation

- Cleaning**
- Remove all organic debris from the farm and uproot/cut grass to expose rat burrows and hiding places.
 - Clean and wash all equipment, all movable and non-movable facilities, and grounds around the buildings.
 - Empty lagoon and pits where pig manures are collected. The solid wastes removed should be buried in a pit lined and topped with hydrated lime.
 - Repair and/or install bird proofing nets/system.
- Disinfection**
- Use a foaming agent to disinfect the entire facility/building before cleaning.
 - Ensure all organic debris from the farm facilities and equipment is removed.
 - Disinfect all equipment, movable and non-movable facilities, and grounds around the buildings.
 - Use only approved disinfectants for ASF Control. Ensure correct dilution, coverage, and contact time.
 - Focus on equipment where viruses are likely to persist.
 - Treat with caustic soda and spray with hydrated lime.
- Downtime**
- Downtime for 20 days, after cleaning and disinfection, shall be implemented to decrease the bacterial load of the area further and the risk of residual ASF virus.
- Environmental sampling**
- This validates the quality of cleaning and disinfection using laboratory tests. Samples will be collected coming from a farm water source, the topsoil of the burial site, surfaces of gestating pens, farrowing pens, nursery/ growing pens, pathways canals, stock room of feeds, weighing/market, and others.
- First screening-* shall be done on day 7. Provincial Veterinary Office/Consulting Veterinarian Office (CVO)/MAO collects environmental samples and submit them to Regional Animal Disease Diagnostic Laboratory (RADDL) for testing

Second screening- shall be done on day 14 or after the initial test (7 days). CVO/MAO collect environmental samples and submit them to RADDL for testing using PCR

Introduction of sentinel animals Sentinel animals should be in a normal stocking rate (10%) or as approved by veterinary officers and should be at least 60 days old, weighing 15–20 kgs. Personnel that include owners and staff selected to carry out repopulation should have undergone biosecurity training.

Monitoring and Testing This should be done weekly to ensure the absence of clinical signs of ASF; otherwise, disease investigation will be conducted.

Fecal samples are used in screening tests. The samples will be collected on days 7 and 21 using the ASF test kit as recommended by DA. Validation using PCR is required. DA AO No.22 s. 2020 shall be implemented if the result is positive. After which, sentinel animals shall be disposed of following the all-in all-out principle.

- a. The farm should have a written protocol of biosecurity measures. Proper warning signage should be provided.

Explanatory Note:

Image 36.
Entrance to the shower room with biosecurity signage (Source: Photo taken at ATI-ITCPH, 2022)





Image 37.
Signages before entering the farm (Source: MM Swine Breeding Farm facility courtesy of BAI, n.d)



Image 38.
Insertion of material belongings in the fumigation box (Source: MM Swine Breeding Farm facility courtesy of BAI, n.d)

- b. Biosecurity procedures should be well implemented and continuously monitored to prevent introduction of disease into the farm and/or to control its spread within the farm.

Explanatory Note:

Routes of Disease Transmission

Direct Pig to Pig contact	Most potent route of transmission for pig diseases. Transmission is affected by exposure of susceptible animals to sufficient infectious doses. Healthy animals may also shed pathogens and act as silent carriers.
Semen	Most systematic viruses can be excreted through semen thus, their transmission is possible. This transmission route is observed in pseudorabies, parvovirus, classical swine fever virus, and porcine reproductive and respiratory syndrome (PRRS). Bacterial contamination of semen is also possible as in the case of brucellosis and leptospirosis.
Airborne Transmission	<p>Airborne transmission of swine diseases was observed in some diseases where its distance could be affected by the pathogen size.</p> <p>Some of the swine diseases observed to be transmitted through air or aerosols are:</p> <ul style="list-style-type: none"> • Short distances (i.e., 100–500 meters): <i>Actinobacillus pleuropneumonia</i>, <i>Streptococcus suis</i>, <i>Pasteurella multocida</i> • Intermediate distances (up to 3 km): Enzootic pneumonia, Porcine Respiratory Coronavirus, PRRS • Long distances (9kms): Pseudorabies, FMD
People	People can transmit pathogens through their footwear, clothes, hands, and nasal mucosae.
Vehicles and other fomites	Vehicles and equipment contaminated with manure are considered key to the spread of swine diseases. This was observed in ASF, <i>Actinobacillus</i> , TGE, and <i>Streptococcus suis</i> .
Pig feed including swill feeding and drinking water	Feed and water with contaminated meat waste are a possible cause of pathogen transmission in pigs, as documented in CSF, FMD, and ASF cases.
Pig manure and bedding	Possible pathogens present in manure are <i>Ascaris</i> , <i>Taenia</i> , <i>Cryptosporidium</i> , <i>Yersinia</i> and <i>Salmonella</i> , <i>Campylobacter</i> , fecal coliforms, fecal Streptococci, and other pathogens as Hepatitis E. virus.

Stray animals such as birds, bats, feral, wild, and domestic animals

Birds can transmit *Bordetella* spp., erysipelas, and avian tuberculosis. There is also evidence that birds can transmit the viruses that cause CSF, PRRS, influenza, and TGE to pigs. Wild animals can harbor brucellosis, leptospirosis, trichinella, pseudorabies, and many other pathogens.

Arthropods

Certain viruses, including those responsible for ASF, JE, and PRRS, can be hosted by arthropods, such as ticks or mosquitoes, on which they can replicate, thereby complicating control and eradication programs. Ticks cannot travel to pigs, but pigs can be in contact with ticks when they graze or sleep in tick-infested areas. ASF is an excellent example of a tick-borne virus; its control requires knowledge of the arthropod and the host's behavior.

Flies are attracted to organic matter, such as manure and carcasses, and can mechanically spread pathogens such as TGE and *Streptococcus suis*.

To prevent disease transmission, one of the preventive measures on the farm is the "All in, All-out" procedure. This keeps the animals together, thus preventing them from mixing with other animals. It is done by moving a group of pigs to a certain area or phase of production, such as into an empty nursery. After which, the group of pigs is moved out of that phase according to a production schedule. When a group moves forward, the facility is completely emptied.

The new digital biosecurity system in some developed countries was based on two on-farm hardware pieces. Each farmworker wears small Bluetooth transmitters called "beacon". Farmworkers are required to wear this device inside the facility. With this, real-time monitoring of farmworkers' movement can be easily detected.



Image 39.

Map of readers to track farm workers movement inside the farm
(Source: Piñeiro C., 2020)

- c. The biosecurity measures should take into consideration the relevant diseases identified by local regulations/authority.

Explanatory Note:

Under Administrative Circular No. 3 Series of 2018, "Amendment to DA Administrative Order No. 01, Series of 2012 on declaring the list of notifiable animal diseases". Below is the list of Notifiable diseases:

- African Swine Fever Virus
- Classical Swine Fever (Hog Cholera) Virus
- Taenia solium (Porcine Cysticercosis)
- Nipah Virus Encephalitis
- Infection with Porcine Reproductive and Respiratory Syndrome (PRRS)
- Transmissible Gastroenteritis
- Aujesky's Disease (Pseudorabies)
- Atrophic Rhinitis
- Brucella

- d. The farm should have the appropriate and functional lay-out and infrastructure to ensure effective implementation of the biosecurity measures. This should include facilities for disinfection at entry/exit point of the farm and the building.

Explanatory Note:



Image 40.

Vehicle disinfection at the farm entrance (Source: Photo taken at ATI-ITCPH, 2022)

Image 41.
Disinfection using limestone powder before entering pig houses
(Source: Photo taken at ATI-ITCPH, 2022)



Image 42.
Boot brush at the exit point of the farm premises (Source: Photo taken at ATI-ITCPH, 2022)

This reference provides recommended biosecurity measures per pig production system type, such as scavenging pig production, small-scale confined production, large-scale confined production, and large-scale outdoor production. Accessible through: <https://www.fao.org/3/i1435e/i1435e.pdf>

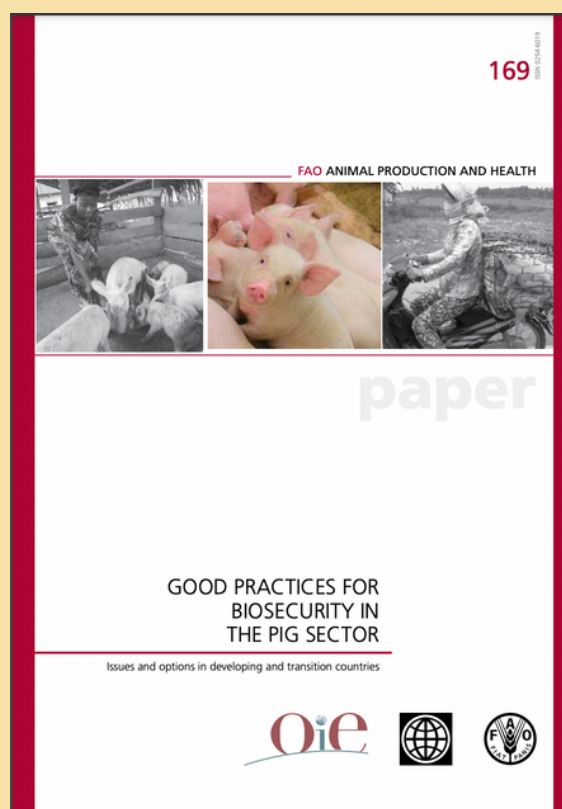


Image 43.
Cover page of an FAO publication providing guide about biosecurity

- e. All incoming animals should undergo the appropriate quarantine measures.

Explanatory Note:

Newly purchased pigs should be quarantined for a minimum of 30 days should clinical signs develop. The same length of time should be observed when moving sows and boars from one location to another for mating.

Moreover, animals that have not been sold to live-animal markets should not be reintroduced back into the home herd without a quarantine period. Live-animal markets are mixing points and a potential source of disease spread.

During quarantine, the animals should be observed frequently for signs of disease. Quarantine should take place in a separate facility, such as at the village's periphery, to avoid potential contamination of the entire pig population. Clothing and footwear changing or careful cleaning and disinfection should be observed to ensure that quarantined animals are always dealt with last (FAO).

- f. Stray animals should not be allowed within the premises.

Explanatory Note:

Birds and bats are particular risks for disease spread in open piggeries. Birds (e.g., sparrows, starlings, seagulls, and crows) come into close contact with pigs during the cooking of feed, thus, may contaminate other herds with droppings. Birds can transmit *Bordetella* spp., erysipelas, and avian tuberculosis. There is also evidence that birds can transmit the viruses that cause CSF, PRRS, influenza, and TGE to pigs.



Rodents, particularly rats and mice, commonly live in close contact with pigs and are involved in endemic disease transmission in pig operations. Rodents can travel for up to 3 or 4 km from infected areas where pigs are kept, carrying infections. Rodents can carry the agents that cause atrophic rhinitis, *E. coli* diarrhea, leptospirosis, rotaviral diarrhea, salmonellosis, swine dysentery, PRRS, *Streptococcus suis* infection, and encephalomyocarditis. Wild animals can harbor brucellosis, leptospirosis, trichinella, pseudorabies, and many other pathogens. Among other diseases, feral and wild pigs may transmit CSF, ASF, FMD and pseudorabies. (FAO).

- g. Imported live animals and animal by-products should be accompanied by official documentation from the competent authority.

8.3.2 Farm Sanitation and Environmental Management Program

- a. The farm should have a written hygiene and sanitation program that includes integrated pest management.

Explanatory Note:



Image 44.

Farm practicing Integrated Pest Management sanitation (Source: Duy D.T, 2020)



Image 45.

Houses with nets (Source: Duy D.T, 2020)

- b. The farm should have a proper and functional drainage system towards a water treatment facility. Solid and liquid waste should be managed and disposed according to existing relevant guidelines imposed by competent authorities.

Explanatory Note:

Image 46.

Drainage system (Source: Photo taken at ATI-ITCPH, 2022)



Image 47.

Perimeter canal (Source: Red Dragon Farm (Ayala Farm) courtesy of BAI, n.d)



Image 48.
Drainage system underneath the pens
(Source: Photo taken at ATI-ITCPH, 2022)



Image 49.
Drainage routes towards biogas facility
(Source: Photo taken at ATI-ITCPH, 2022)

- c. The farm operator should take necessary measures to ensure that activities related to livestock farming do not contribute to the degradation of the environment (i.e., land, water, air) and cause destruction to bio-diversity.
- d. Farm premises should be kept clean and free of potential conditions conducive to breeding of pests, animal parasites and disease outbreak. This is to avoid negative effects on the landscape, environment and animal welfare.
- e. The farm operator should maintain and display clear instructions on procedure for disposal of farm solid wastes and farm chemical wastes (e.g. expired pesticide/weedicide and containers, paint, etc.).

Explanatory Note:



Image 50.

Composting area for waste disposal system (Source: Photo taken at ATI-ITCPH, 2022)



Image 51.

Hazardous waste material area (Source: Florida grower farm courtesy of BAI, n.d)

- f. Organic materials, like pig manure or leftover feeds, should be removed as necessary from contact surfaces (i.e., floors, pen partitions). Where bedding is used, it should be replaced as necessary.
- g. Garbage and trash should be collected and stored in closed containers and disposed of using appropriate methods for each type of garbage. Hazardous or infected waste should be kept and disposed separately from general garbage to avoid contamination.

Explanatory Note:

According to National Solid Waste Management Commission- Environmental Management Bureau (NSWMC-EMB), ecological solid waste management refers to the systematic administration of activities that provide for segregation at source, segregated transportation, storage, transfer, processing treatment, and disposal of solid waste and all other waste management activities which do not harm the environment.

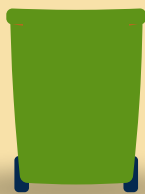
In addition, solid waste refers to all discarded household, commercial waste, non-hazardous institutional and industrial waste, street sweeping, construction debris, agricultural waste and other non-hazardous and non-toxic solid waste.

Residual Wastes



Non-compostable and non-recyclable (sanitary napkins, Disposable diapers, worn-out rugs, candy wrappers/sachets, cartons etc.)

Recyclable Wastes



Materials that can be converted into suitable beneficial use (newspaper, tin cans, non-ferrous scrap material, etc.)

Compostable Wastes



Biodegradable wastes (food, animal and human waste etc.)

Special Wastes



Household hazardous wastes (paints, thinners, electronics and batteries, furniture, oil, tires, etc.)

Explanatory Note:

Image 52.

Proper disposal of used needles
(Source: Photo taken at ATI-ITCPH, 2022)



Image 53.

Proper disposal of used needles
(Source: URC, n.d)

- h. The farm should take appropriate measures to minimize excessive odor coming from the farm which may be associated with waste decomposition.
- i. The air quality inside the building should be maintained at acceptable levels.

Explanatory Note:

Ammonia (NH_3) is a toxic gas that comes from fecal of animals. This toxic gas irritates digestive, respiratory, ocular mucosa, and skin. The presence of ammonia is an indicator of the build-up of obnoxious gases. In an enclosed pig house, it shall not be allowed to exceed 20 parts per million (ppm) of air as per DA Administrative Order 41 series of 2000.

Higher and more prolonged exposure causes high severity. It can affect the villi in the intestine, which delays nutrient absorption, inflammation in other parts of the body (conjunctivitis and pododermatitis), and tail biting. Furthermore, high concentrations of ammonia may adversely affect the animals' welfare, health, and performance, like retarded growth (Soriano, 2021). In addition, this has also been shown to increase the symptoms of coughing, sneezing, salivation, excessive lachrymal secretions, loss of appetite, and lethargic behavior (Xu W. et al., 2014).

Explanatory Note:

According to Department of Agriculture Administrative Order 41, series of 2000, Code of Practice and Minimum Standards for the Welfare of Pigs, the following are the standard procedures for preventing and controlling diseases:

- Personnel whose responsible must be aware of the signs of ill-health. They shall also maintain a high standard of personal hygiene as part of any program to prevent disease in pigs. Vaccination, culling, disposal of dead pigs, post-mortem, and medication must be included in the health program.
- All procedures must be carried out with skill and concern for the pig's welfare.
- Records detailing deaths, sick animals, treatments given and responses to treatment shall be kept to assist disease investigations.
- Veterinary advice must be sought if clinical signs of ill-health, high mortality, and ill-thrift persist despite attempted remedial action persists.
- Sick and injured animals must be treated as soon as possible. If necessary, they shall be isolated.
- Pigs with incurable diseases or painful deformities must be humanely disposed of.
- Dead pigs must be promptly removed from other pigs and, if not required for post-mortem examination, disposed of by burning or burying.
- Pigs must be regularly inspected for signs of disease, including internal and external parasites, and treatment instituted where abnormalities or infestations.
- If there is a notifiable disease outbreak in epidemic proportion, the BAI-Animal Health Division must always be notified. The BAI personnel shall be allowed to enter, inspect and investigate the farm premises. They shall observe biosecurity measures being implemented by the farm.
- In the case of using the burial method, the site should be enough space, non-flooding, and away from water sources. Dead animals should be buried at least 50 centimeters in depth, poured with limestone or disinfectant, and adding soil over the burial area for at least 50 centimeters in height for the prevention of animal digging.
- In the case of mortality/carcass pit, the dead animal should be dropped in a specific mortality/carcass pit with good hygienic practices.
- For other methods, it should be done in accordance with the instruction from the competent authority.

Table 4. Negative effects found in the animals depending on environmental ammonia concentration as expressed in parts per million (ppm)

10 ppm	Lesions in the pulmonary surface
20 ppm	Higher susceptibility to respiratory diseases (odor can be detected by humans)
50 ppm	Reduced growth by 5%
100 ppm	Ocular and respiratory problems + reduced growth by 15%



Image 54.
Tool used in measuring air quality (Anemometer, %RH, Temperature, Lux)
 (Source: Photo taken at ATI-ITCPH, 2022)

- j. Measures should be in place to keep noise from barns to acceptable levels, particularly if the farm is located close to urban centers.
- k. The farm operator should be familiar with the proper procedure for disposal and schedule of actions to be taken, especially at times of emergency.
- l. The farm should have proper handling and disposal system for sick, injured and dead animals, and should be in accordance to existing regulations of the authority.
 - In the case of using burial method, there should be enough space, non-flooding, and away from water sources. dead animals should be buried at least 50 centimeters in depth, pouring with limestone or disinfectant and adding soil over burial area for at least 50 centimeters in height for prevention of animal digging.

- In the case of mortality/carcass pit, dead animal should be dropped in a specific mortality/carcass pit with good hygienic practices.
- For other methods, it should be done in accordance with instruction from competent authority.

In some cases, where there is an increasing number of mortality (catastrophic or natural disasters), the United States Department of Agriculture (USDA) recommends Above Ground Burial (AGB). This method is a hybrid between deep burial and composting. AGB was field-tested, focusing on carcass degradation, nutrient migration, and pathogen inactivation.

It involves digging a shallow trench, placing one foot of carbonaceous material in the bottom of the trench followed by a layer of carcasses, covering the carcasses with the excavated material, and seeding the mound.

The recommended site selection criteria are:

- permission of site owner;
- approved by state environmental agency;
- soils are considered suitable for AGB based on the National Resource Conservation Service (NRCS) web survey;
 - use caution installing AGB units in low-permeability soils where heavy rainfall may occur over one year; these conditions can flood the units, preventing proper decomposition.
- not prone to flooding or in a low-lying area;
- at least 2–4 feet of separation from the bottom of the trench and the groundwater table (or as directed by a qualified soil scientist).
- at least 2–4 feet of separation from the bottom of trench and bedrock or restrictive layer (or as directed by qualified soil scientist);
- at least 200 feet from wells or springs or as directed by a qualified soil scientist;
- at least 100 feet from surface water bodies;
- at least 100 feet from property lines, sinkholes or rock outcrops, structures, and drain tiles; and
- sufficient space for staging of carbon and equipment as well as constructing AGB units.



Image 55.

Hospital pen for sick and injured pigs (Source: Red Dragon farm (Ayala Farm) courtesy of BAI, n.d)



Image 56.

Above Ground Burial (AGB) (Source: FAO, 2018)

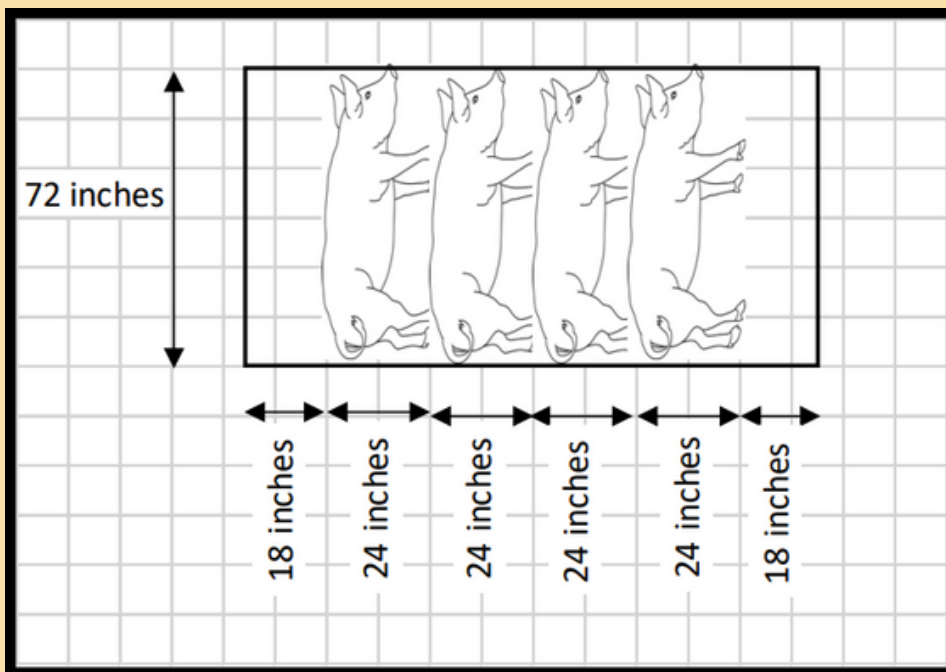


Image 57.
Aerial view of AGB (Source: United States Department of Agriculture, 2021)



Image 58.
Mortality pit (Source: BAI, n.d)

8.3.3 Post-harvest cleaning

- a. After removing pigs, the house should be cleaned by using proper methods that can effectively remove all manure and dirty debris out of the floor in such a way that does not become a source of pathogens.
- b. The cleaning and disinfection of pig house and its equipment should be conducted prior to the introduction of new batch of pigs into the house. If disease outbreak occurs, the measures specified by competent authority should be followed.

Explanatory Note:

Image 59.

Use of blowtorch in disinfecting facilities (Source: Photo taken at ATI-ITCPH, 2022)



Image 60.

Apog located in the entrance of hog pens (Source: Photo taken at ATI-ITCPH, 2022)

- c. The detergents and disinfectants registered with competent authority should be used, under the supervision of farm veterinarian. Moreover, the use of such chemical should be in accordance with procedural manual.

Explanatory Note:

Table 5. Common disinfectants.

Chemical compound	Gram + Bacteria	Gram - Bacteria	TB-like	Fungi	Virus	Best pH range for activity	Activity when organic matter present	Common uses **
Chlorhexidene	SA*	SA*	SA*	SA*	Most	Wide range	Good	E/P/F
Formaldehyde and analdehydes	**	**	**	**	**	Wide range	Good	E/P/F
Chlorine Chloramines	**	**	SA	**	SA	Acid	Very poor	CS/E
Iodophors	**	**	SA	**	SA	Acid	Fair to poor	CS/E
Sodium hydroxide	**	**	SA	**	**	Alkaline	Good	P
Quaternary ammoniums	**	*	No	SA	SA	Alkaline	Fair	CS/E
Phenols	**						+Good	E/P/F

*SA- some activity

**E- equipment; P-premises; F-foothbaths; CS- clean surfaces
(Source: Dawson S.,2021)

Explanatory Note:

Table 6. General properties of common disinfectants.

Disinfectant	Bacteria	Virus	Fungi	Spores	Mycobacterium	Human health risk
Alcohol	Cidal	Cidal	Cidal	Inhibitory	Inhibitory	Flammable, strong odor
Formaldehyde	Cidal	Cidal	Cidal	Cidal	Cidal	Irritating, explosive, carcinogen, allergen
Glutaraldehyde	Cidal	Cidal	Cidal	Cidal	Cidal	Allergen
Halogens; chlorine, bromine, iodine	Cidal	Cidal	Cidal	Cidal	Cidal in alcohol	Irritating, explosive, carcinogen, allergen
Phenols	Cidal	Cidal	Cidal	Inhibitory	Cidal	Toxic, absorbed through the skin, bio-accumulative
Quarternary ammoniums	Cidal	Cidal/Lipophilic		Inhibitory	Inhibitory	
Peroxides	Cidal	Cidal	Cidal	Cidal	Cidal	Explosive, irritating
Acids	Cidal	Cidal	Cidal			Corrosive

(Source: FAO/OIE/WB, Good practices for biosecurity in the pig sector, 2010)

Compliance Requirement: **Recording**

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are considered Explanatory Notes inside a yellow box in red font color.



9 Recording

9.1. The farm should keep and maintain complete records of farm operations, management protocols, and animal health records like disease monitoring and medication. These records should be easily retrievable and readily available for inspection.

9.2. Records include, but are not limited to, the following:

- a. Animal identification including applicable data such as sex, breed, date of birth, marking number, birth weight, weaning weight, and sow and boar identification number;
- b. In case of boar and sow, breeding information like age, weight at mating, time, heat testing, parturition, weaning;

Explanatory Note:

There are various identification methods available in pig production. In some practices, permanent identification is made. Pigs for slaughter that have a permanent tattoo (e.g., ear notching and tattooing) helps in identification and traceability.

Below are some examples needed in the traceability of the animals:

1. Animal identification
 2. Registration
 3. Traceability and movement control
-
1. Are pigs identified (individually or at a group level)?
 2. Provide a description of the traceability system, including methods of animal identification and establishment or herd registration, applicable to all susceptible species.
 3. How are pig movements controlled in the country or zone, or between zones of the same or different status for all susceptible species?
 4. Provide evidence of the effectiveness of animal identification and movement controls and a table describing the number, origin and destination of the pigs and their products moved within the country in the past 24 months.
 5. Describe the risk management strategy for uncontrolled movements of pigs.
 6. Describe the actions available under national legislation. Provide information on illegal movements detected in the past 24 months and the action taken



Image 61.
Ear notch. (Source: Photo taken at ATI-ITCPH, n.d)

Reading notched ears:

There are 2 zones: Litter ear and Individual ear

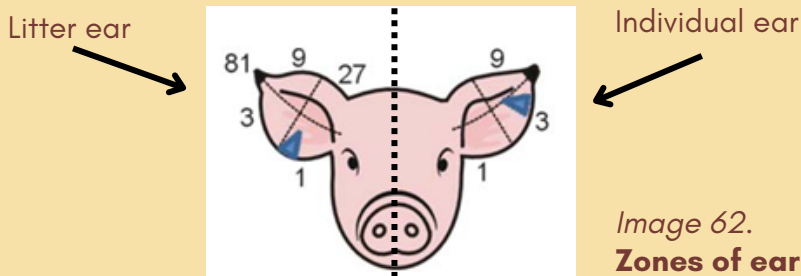


Image 62.
Zones of ear. (Source: Fisher A, n.d)

Litter ear consists of five designated zones (1,3, 9, 27,and 81) and Individual ear with three designated zones (1, 3, 9, and 27). There can only be two notches, thus if there are two notches in all 4 zones, that would represent litter 80.

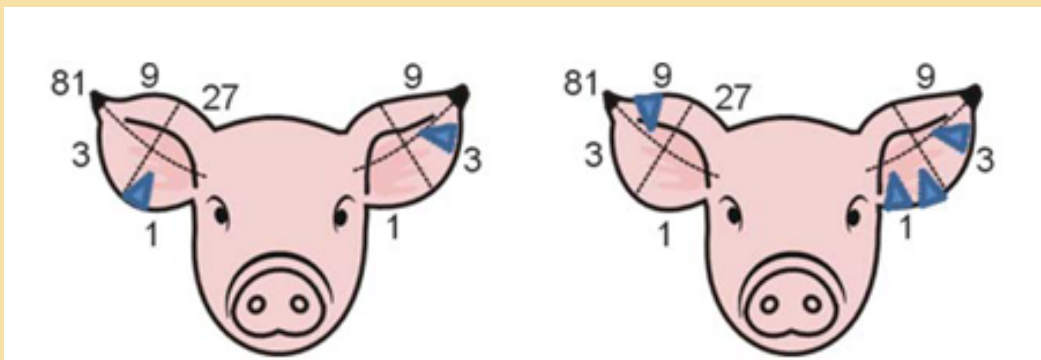


Image 63.
Notches of ears. (Source: Fisher A, n.d)

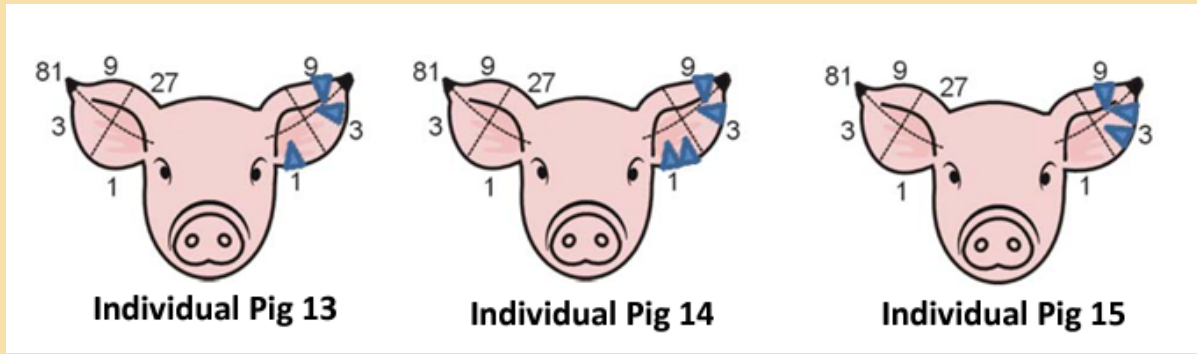


Image 64.
Example notches of ears. (Source: Fisher A, n.d)

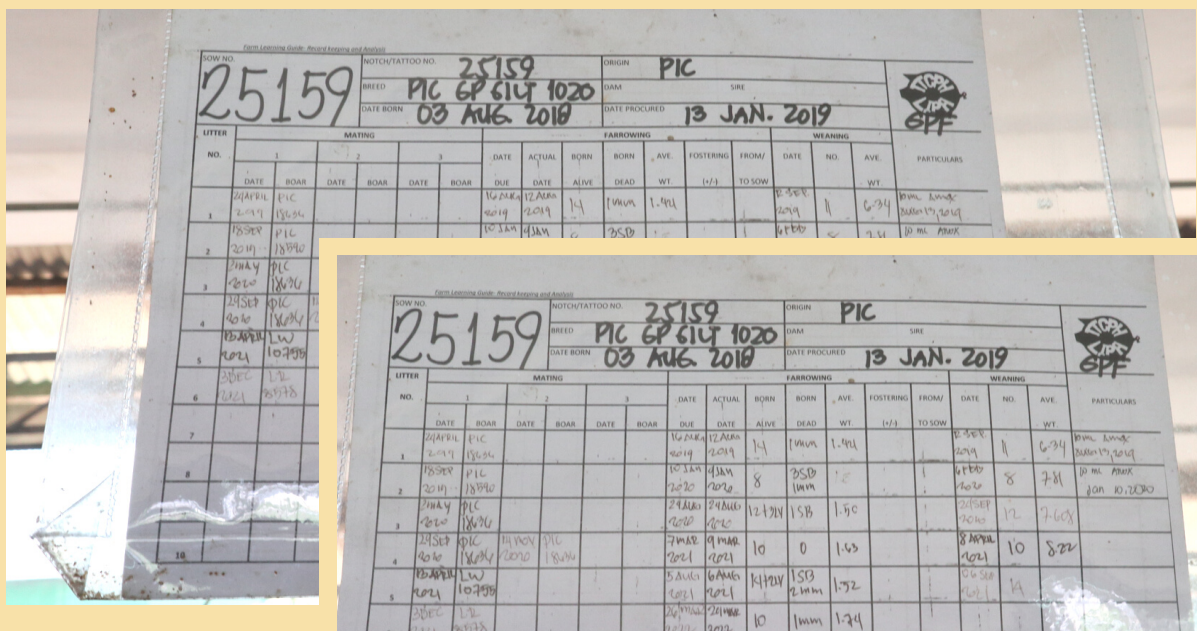


Image 65.
Record system (Source: Photo taken at ATI-ITCPH, 2022)



Image 66.
Ear tag (Right tag (female); Left (male)) (Source: Photo taken at ATI-ITCPH, 2022)

Precision agriculture or Agriculture 4.0 refers to agricultural innovations that utilize geospatial and ICT-based R&D ecosystems and bring breakthroughs in technology innovation in agriculture farming. Below are some of the swine technologies under the Agriculture 4.0:



Image 67.
Automatic Individual Pig detection and Tracking
(Source: Zhang L. et.al. 2019)



Image 68.
Accelerometer
(Source: Chapa J.M et.al. 2020)

- c. Entry and exit of pigs;
- d. Vehicles and visitors entry and exit;
- e. Animal health records including disease detection and surveillance (e.g. post-mortem findings, mortality and morbidity reports, test results, diagnosis, etc.), and intervention or treatment done (e.g. veterinary products and supplies used in medication, vaccination, deworming, medicated feeds, and other chemical usage including batch number, quantity, number of animals treated, name of person who administered medicine with recommendation from veterinarian on authorized persons, date and route of administration, withdrawal period, and identification of animals treated, etc.);

- f. Feed management such as feed receiving, mixing, and feeding;

Explanatory Note:

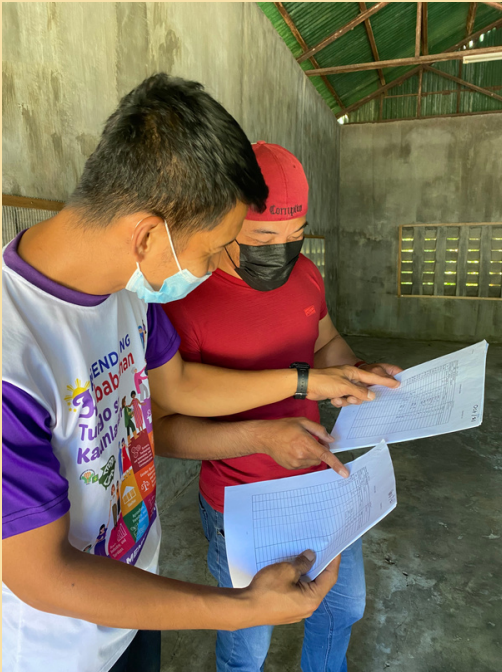


Image 69.

Record of feed management
(Source: Photo taken at ATI-ITCPH, 2022)

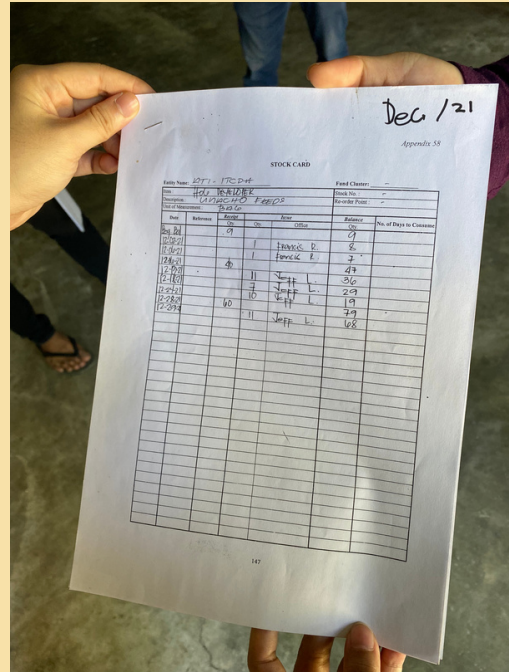


Image 70.

Sample records of feed management
(Source: Photo taken at ATI-ITCPH, 2022)

- g. Procurement records containing date or purchase, product name, batch number, expiry date, name of supplier, and quantity purchased; and
- h. Health examination and training records of farm personnel.

9.3 All pertinent documents such as but not limited to farm operations, management protocols and animal health records should be kept for at least 3 years.

Compliance Requirement: **Animal Health**

The provisions of the standard are written in black font color. The explanatory notes are indicated in red font color inside a yellow box. Photos and images are also found in succeeding pages.



10 Animal Health

10.1 Responsibility of the licensed veterinarian

- a. The licensed veterinarian should be the overall responsible person for animal health and welfare management and shall update license from competent authority.
- b. The health status of the animals in the farm should be monitored and recorded regularly by the farm, and veterinary assessment of the establishment should be carried out annually by a licensed veterinarian and/or by a competent authority.
- c. There must be a written animal health program in place, including vaccination and deworming, that is updated regularly and in accordance with the requirement adopted against the diseases specified by the competent authorities.

Explanatory Note:

Vaccines are available for many major infectious diseases, including FMD and CSF, but not ASF. Vaccination reduces the pressure of pathogens, shedding, and disease pressure in the region. However, the use of vaccines must be controlled. Recommended vaccines must have been tested for efficiency, appropriate to the context and produced in accordance with existing standards (i.e. OIE).

For list of vaccines you may visit BAI's website:

<https://www.bai.gov.ph/index.php/vdap-product-registration/category/29-registered-vbpr-vaccine>

- d. Sick, injured or disabled animals should be isolated from herd and kept in a specific area for treatment and prevention of transmitting disease to other pigs.

Explanatory Note:



Image 71.
Sick and injured pig
(Source: Canva. n.d)

- d. Sick, injured or disabled animals should be isolated from herd and kept in a specific area for treatment and prevention of transmitting disease to other pigs.

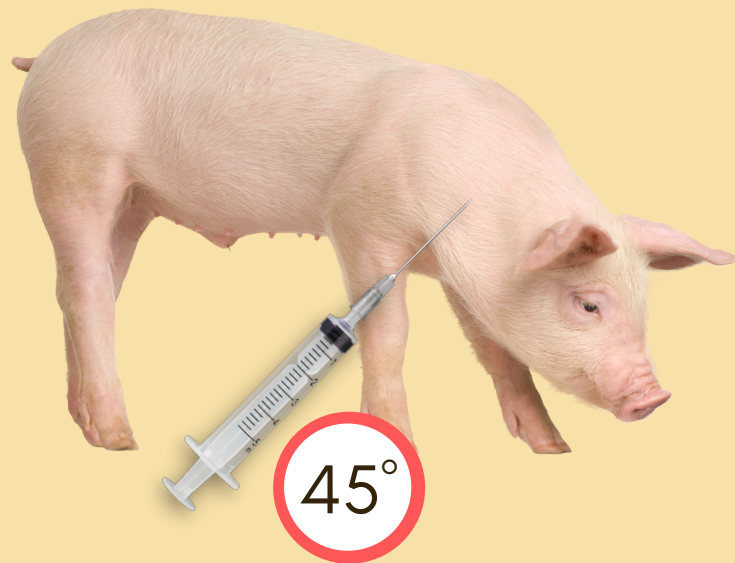
10.2 Use of veterinary products

- a. Drugs, medicines, and vaccines should be administered appropriately by a licensed veterinarian or trained personnel under the supervision of a licensed veterinarian.

Explanatory Note:

Image 72.

Adult pig (Source: Canva. n.d)



Injection sites:

Intramuscular (IM)

Purpose: To deliver medication immediately into the bloodstream. Effects are desired over a longer period of time; for oily solutions or microcrystalline formulation that are poorly soluble in water *e.g. procaine or penicillin G*. (Cafasso, 2022).



Use a spot behind the ear on the side of the neck. Pull the skin forward slightly before inserting the needle. After the needle is inserted, release the skin, give the injection, and remove the needle.



Avoid injections into the fat.

Intravenous (IV) (ear, jugular vein, anterior vena cava)

Purpose: To deliver medication over a couple of hours. Commonly used for anesthetic agent administration.



Ear vein is the preferred site. Sedation can be used to ensure good access. Apply with veterinary guidance and instruction.

Subcutaneous

Purpose: To deliver medication slowly over a period of time.



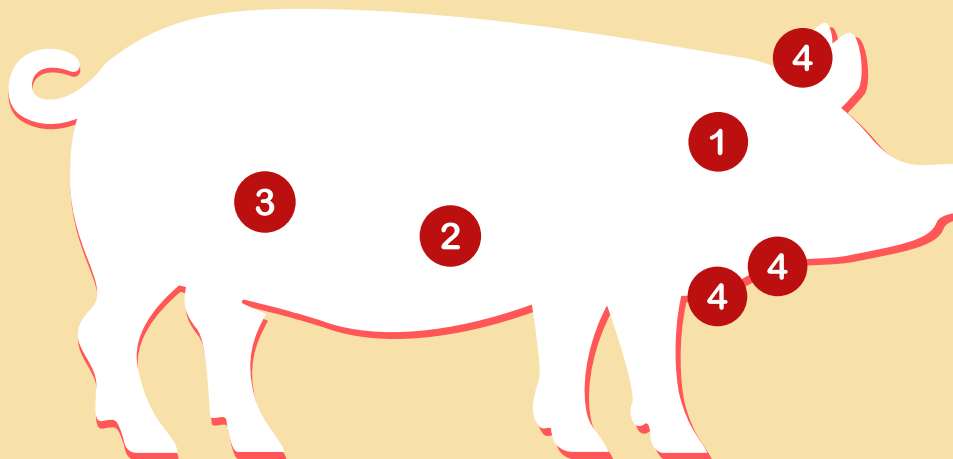
Use the loose flaps of skin in the flank and elbow (for small pigs); behind the ears (sows). Slide the needle under the skin away from the site of skin puncture before depositing the product.

Intraperitoneal (IP)

Purpose: To deliver medication specifically for antimicrobial administration.



Mostly used in small animals, however, it is being used to treat pigs with diarrhea. Antibacterial drug is combined with fluids for rehydration.



Legend:

- 1 Intramuscular (IM) and Subcutaneous
- 2 Intravenous (ear, jugular and anterior vena cava)
- 3 Subcutaneous
- 4 Intraperitoneal (IP)

- b. Drugs or medicines should only be used for prophylactic, metaphylactic and treatment reasons.
- c. The use of illegal and banned medication and vaccines should be prohibited (use vaccines registered with BAI; the same with controlled drugs.)

Explanatory Note:

Vaccines help reduce the effect of pathogens and diseases in animals. Legal vaccines have undergone efficiency tests and are produced following existing standards.

Meanwhile, banned medication per several government issuances are summarized below:

Chloramphenicol

Banned per DA Administrative Order 60 series of 1990 and DOH Administrative Order 91 series of 1990. The Codex Alimentarius was not able to establish any maximum residue limit as bioaccumulation is observed. It may cause hemotoxicity to humans in the form of bone-marrow depression (dose-related and reversible) and severe aplastic anemia (non-dose-related and irreversible).

Nitrofurans

Banned as per DA-DOH Joint Administrative Order No. 2 series of 2000. The Codex Alimentarius was not able to establish a "No observable effect level (NOEL)" which is a requirement in establishing an MRL. Nitrofurazone is also found carcinogenic while Furazolidone is carcinogenic and genotoxic.

Olaquinox and Carbadox

Banned as per DA AO 1 series of 2000 and DOH AO 4-A series of 2000. Both drugs have a long withdrawal period of about 70 days. As such, no MRLs were established. These were also observed to be genotoxic to humans.

Beta-agonist

Banned as per DA AO 14 series of 2003. Similar to Nitrofurans, NOEL was not established for this drug. Tremors, shakiness, and food poisoning were among the effects seen in these drugs except for Ractopamine where MRL was adopted by the Codex Alimentarius Commission in 2012.

- d. Drugs, medicines, and vaccines should be stored and identified properly; proper disposal of these items should be followed to prevent contamination to the environment.

Explanatory Note:

Image 73.

Vaccine Storage (Source: MM Swine Breeding Farm courtesy of BAI, n.d)



Image 74.

Suppliment Storage (Source: MM Piggery Farm Project [Growing farm courtesy of BAI], n.d)

Explanatory Note:

Image 75.
Carbadox (Source: Toku-e, n.d)



Image 76.
Chloramphenicol (Source: First Veterinary supply, n.d)



Image 77.
Diethylstilbestrol (Source: Indiamart, n.d)

In the Philippines, below are the list of banned veterinary drugs for food producing animals:

- Malachite green and gentian violet
- Clenbuterol, Salbutamol, Terbutalin, Pirbuterol
- Furaladone, Furazolidone, Nitrofurazone
- Carbadox, Olaquinox
- Chloramphenicol
- Chloroform (Trichloromethane)
- Diethylstilbestrol (DES)

- e. The use of needle during injection should be done in such a way that no part of broken needle remains in the pig's body. There should be determining practices for preventing needle remnant in pigs, e.g. measures to control the number of needle used in farm, checking needle number before and after use, and total number of needles used in farm. Farm should have corrective action for embedded needle in the pig's body.

10.3 Disease outbreak or suspicion of epidemic disease

- a. In the case of outbreak of disease or suspicion of epidemic disease, farm should strictly follow the related law or regulation by competent authority.

Explanatory Note:

Swine diseases could be classified based on their impact. They can either be infectious diseases, infectious disease with transboundary implication, endemic production diseases and zoonoses.

Infectious diseases

Commonly encountered infectious diseases of swine are severe viral diseases but cause less significant economic impact when appropriate control measures are applied. However, they are highly contagious and may spread globally. Examples are include porcine reproductive and respiratory syndrome (PRRS) and transmissible gastro-enteritis.

Infectious diseases with transboundary implication

Major infectious diseases are similar to previous classification but may present a major threat to the pig population and in some cases other animal species. These diseases are highly contagious and present severe impact with high mortality rates (in its acute form) in susceptible pig population. Examples are foot-and-mouth disease (FMD), African swine fever (ASF), classical swine fever (CSF) and pseudorabies (Aujeszky's disease).

Endemic production diseases

Endemic disease often involved in production where pathogens can be transferred without any clear economic impact if proper herd management, hygiene and husbandry are observed. The disease pathogen is present in many pig populations globally but the severity of clinical expression has wide variation. Either the disease has a very limited effect or severe impact in the production system. Examples are enzootic pneumonia, pleuritis, pleuropneumonia, swine influenza, enteric disorders in suckling piglets, swine dysentery, arthritis, osteochondrosis, mange and bacterial infections.

Zoonoses

Zoonotic diseases are animal diseases that can be transferred to people either directly (animal-to-person contact) or indirectly through consumption of contaminated food. Examples are classical swine influenza, rabies, leptospirosis, brucellosis, erysipelosis, tuberculosis, Japanese B encephalitis and pig meat infected with the following pathogens: *Trichinella* spp., *Cysticercus* spp., *Salmonella* spp and *Listeria* spp.

Hospital pens or infirmiry pens are often used to facilitate the treatment of sick animals and separate them from healthy ones. It is usually located distantly to the farm. These pens enable pig to recover without competing with healthy animals for water, food, or rest areas.

Table 7. PCSP Biosecurity of swine farms

Location	Description	Level 0		Level 1		Level 2	
		Score	Target	Score	Target	Score	Target
	Distance (kms) from the nearest pig farm	<500m		<500m		<2km	
	Clearly demarcated CDI-Clean Dirty Line, fenced	none		w/ fence		2x fence	4
	Signage of biosecure area/ Actions to follow	no					
	Shower-in, Shower-out (with soap/shampoo)*	no		1x shower		2x shower	3
	Complete change clothing/ footwear	no			4	NO	4
	Pest control program in place	no					4
	Regular cleaning & disinfection	no					4
	Observe downtime **	no		NO	4	NO	4
	Supplies decontamination (personal/farm supplies)***	no					
	Food items (no pork, pork products from outside)	no			3	YES	3
	No food/ drinks in HSA/pig area	no					
	Water, chlorinated & regularly tested between uses	no					4
	Load-in/Load-out (1-way), washed/disinfectd between uses	no					3
	Feeds, feed bags are not allowed to enter HSA ****	swill			4	YES	4
	Dead pig disposal, covered	no			3		3
	Visitors log, mortality, with written biosecurity measures	no					3
	Vertically-integrated (not exposed to viajeros)	no					
	Dedicated feed truck	no					
	Trucks washed/disinfectd/dried upon entry	no		NO	4	NO	4
	Total						
	Minimum Passing score				61		76
					48		54

*1st at the gate entrance, Medium Security Area (MSA)/ 2nd shower to high Security Area (HSA)

** at least 1 night

***Use of UV/Ozone/Disinfection/Fumigation

****Pelleted, no feed bags in HSA

Score	RISK LEVEL
4	very low, Mandatory score- PASS or FAIL only
3	low, orange box is mandatory score
2	medium
1	high
0	A disqualification for the BIOSECURITY LEVEL

- b. The farm operator and/or veterinarian should report immediately or within 24 hours to relevant authorities if morbidity or mortality rate of pigs in the farm is found to be abnormally high or clinical signs or symptoms are indicative of notifiable disease as mandated by the competent authority.

Explanatory Note:

Highly infectious animal diseases must be reported immediately to prevent their spread and minimize their economic impact. Information on animal diseases will help government authorities understand pathogens' pattern, spread, and characteristics, helping them craft necessary risk-mitigating measures such as proper risk communication, border controls, and other measures helpful in controlling the disease spread to both animals and humans, when applicable. Disease reporting locally and internationally is required to ensure control of disease spread leading to possible significant economic impact.

Animal diseases must be reported immediately when:

- (i) unusual increase in the number of sick and dead pigs;
- (ii) sick pigs showing unusual clinical signs; and
- (iii) pigs still showing clinical signs of disease even when they are vaccinated.

Details of a suspected outbreak or disease incidence should be reported to the city, district, provincial agriculture or veterinary office, or to the national animal health offices with the following information: Date when clinical signs and deaths were observed, exact location of affected farms, affected species, clinical signs.

Compliance Requirement:

Animal Welfare

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are considered Explanatory Notes inside a yellow box in red font color.



11 Animal Welfare

Explanatory Note:

As per Republic Act 8485 or commonly known as "The Animal Welfare Act of 1988" as amended by Republic Act 10631, the following are the five (5) basic freedoms of animals for animal welfare:

1. Freedom from hunger or thirst;
2. Freedom from discomfort;
3. Freedom from pain, injury, or disease;
4. Freedom to express normal behavior; and
5. Freedom from fear and distress.

Note: There is an ongoing creation of Animal Welfare for Pigs under the Department of Agriculture Administrative Order 40.

- a. Proper techniques should be applied to handle and restrain animals.
- b. Animals should always be handled and restrained in such a way to protect them from fear, stress, pain and injury.
- c. Appropriate facilities, equipment and tools should be provided and used in handling or restraining the animals.
- d. Appropriate tools, techniques and skills should be used for the purpose of effective animal management. Operators should have appropriate tools, techniques and skills for effective animal management.
- e. Tools should be used in a manner that minimize stress and injury to the animals.
- f. Tools should be functional for efficient application on the animals by the operators.
- g. Sick, injured or disabled should be given the necessary veterinary attention, including humane euthanasia if necessary.

Compliance Requirement:

Animal Transport

The provisions of the standard are written in black font color. Additional information such as notes, images and anecdotal practices are considered Explanatory Notes inside a yellow box in red font color.



12 Animal Transport

- a. Animals should be transported in appropriate vehicles and in a manner that does not cause stress throughout the travel and does not predispose them to injury and disease.

Explanatory Note:



Image 78.

Transport vehicle for live animals (Source: NMIS, n.d)



Image 79.

Transport carrier with decal/ label (Source: Red Dragon farm (Ayala Farm) courtesy of BAI, n.d)

- b. Animals being transported should be in a good state of health. However, stressed, sick and pregnant animals, may be transported but with extra-precautionary measures.
- c. Vehicles used for the transport of animals should be according to the following specifications:
- Allow easy loading and unloading;
 - Has communication equipment and first aid kit;
 - Ensure safety of the animals and personnel during transport;
 - Clean and sanitized;
 - Equipped with floors that provide secure footing;
 - Have proper drainage for collection of urine;
 - Have a decal/label "live animal onboard" at the sides and front/back;
 - Should be registered to BAI as Transport Vehicle Carrier and accompanied by registered livestock handler; and
 - Water should be available during transport.

Explanatory Note:

The Bureau of Animal Industry (BAI) registers transport vehicle carriers and livestock handlers. In addition to the specifications above, pigs are also recommended to be protected from direct sunlight, high humidity, obnoxious gases, and direct rain. In scorching, humid weather with an ambient temperature of 28C, pigs should not be transported.

As stated in the provisions of "Amending the Administrative order No. 03, series of 1997 , regarding the revised guidelines on the registration and licensing of livestock, poultry and by-products handler's and livestock transport carriers", registration and licensing covers any person or business entity who are engaged in the business of inter-provincial or regional handling and distribution of livestock, poultry and its by-products or to any carrier (common or private), who are engaged in handling or transporting livestock, poultry and its by-products.

References



DOCUMENT REFERENCES

Agriculture and Horticulture Development Board (AHDB). (2018). *Environmental Enrichment for Pigs*. Accessible at: projectblue.blob.core.windows.net/media/Default/Pork/Documents/EnrichGuide2101_181102_WEB.pdf

Bolger G.T. (2018). *Routes of Drug Administration*. Retrieved from: [https://www.sciencedirect.com/topics/medicine-and-dentistry/intravenous-drug-administration#:~:text=Intravenous%20\(IV\)%20administration%20avoids%20the,a%20period%20of%20many%20hours.](https://www.sciencedirect.com/topics/medicine-and-dentistry/intravenous-drug-administration#:~:text=Intravenous%20(IV)%20administration%20avoids%20the,a%20period%20of%20many%20hours.)

Bellini, S. et. al. (2016). *Preventive measures aimed at minimizing the risk of African swine fever virus spread in pig farming systems*. *Acta Vet Scand* 58, 82. Retrieved from <https://doi.org/10.1186/s13028-016-0264-x>

Bureau of Agriculture and Fisheries Standards (2019). PNS/BAFS 267:2019 – Good Animal Husbandry Practices for Swine. Quezon City, Philippines

Bureau of Animal Industry (BAI). *Revised Implementing rules and regulations of republic act 8485 otherwise known as "The Animal Welfare Act of 1988, as by Republic act 10631*. Retrieved from <https://www.bai.gov.ph/index.php/>

Cafasso J. Medically reviewed by Varma A. (2022). *What are the Intramuscular Injections?*. Retrieved from: <https://www.healthline.com/health/intramuscular-injection>

Centers for disease control and prevention. (2014). *What people who raise pigs need to know about influenza (Flu)*. Last reviewed August 19, 2014. Retrieved from <https://www.cdc.gov/flu/swineflu/people-raise-pigs-flu.htm#:~:text=This%20is%20to%20lower%20the,reducing%20medications%2C%20whichever%20is%20longer.>

Constable P.D et. al. (2017). *Veterinary Medicine*. ISBN 978-0-7020-5246-0. 11th edition Source: <https://www.sciencedirect.com/book/9780702052460/veterinary-medicine>

Cornell University, College of Veterinary Medicine. (n.d). *Common Disinfectants*. Retrieved from <https://www.vet.cornell.edu/animal-health-diagnostic-center/programs/nyschapg/modules-documents/disinfectants>

Dawson, S. (2021). *Water: The forgotten nutrient for pigs*. Retrieved from <https://www.agric.wa.gov.au/water/water-forgotten-nutrient-pigs>

Department of Agriculture (DA) Administrative Circular No. 03 Series of 2018. *Amendment to DA Administrative order No. 01, Series of 2012 on declaring the list of notifiable animal diseases*. Retrieved from https://www.da.gov.ph/wp-content/uploads/2018/05/ac03_s2018.pdf

DA Administrative order no. 60 & Department of Health Administrative order No. 91 Series of 1990. *Sanitary and Phytosanitary regulations and related Issuances*. Retrieved from; <http://spsissuances.da.gov.ph/index.php/memorandum-orders/10-sps-regulations/administrative-order/329-da-administrative-order-no-60-a-doh-administrative-order-no-91>

DA- Regional Field Office No. 7 DA-DOH Administrative order no. 2 series of 2000. *Sanitary and Phytosanitary regulations and related Issuances*. Retrieved from: <http://rfu07.da.gov.ph/index.php/laws-issuances/administrative-orders/32-ao-2003>

Department of Agriculture Administrative Order 41 Series of 2000. *Code of practice and minimum standards for the welfare of pigs*. Retrieved from https://paws.org.ph/downloads/ao_41_-_code_of_practice_and_minimum_standards_for_pigs.pdf

Department of Human Settlements and Urban Development (DHSUD) *Resolution No. R-674 series of 2000*. Retrieved from: <https://hlurb.gov.ph/wp-content/uploads/laws-and-issuances/policies/R674s2000.pdf>

Department of Primary Industries and Regional Development. (2021). *Water: the forgotten nutrient for pigs*. Retrieved from <https://www.agric.wa.gov.au/water/water-forgotten-nutrient-pigs>

DOH Administrative order No. 4-A & DA Administrative order No. 1 Series of 2000. *Sanitary and Phytosanitary regulations and related Issuances*. Retrieved from: <http://spsissuances.da.gov.ph/index.php/laws/10-sps-regulations/administrative-order/636-doh-administrative-order-no-4-a-a-da-administrative-order-no-1>

Doss H.J and Tilma C. n.d. *Electrical Hazards on the Farm*. National Ag Safety Database, Michigan State University Extension

Epp, M. (2019). *Water quality: The winning formula for pig production*. Retrieved from <https://www.thepigsite.com/articles/water-quality-the-winning-formula-for-pig-production>

Food and Agriculture Organization of the United Nations (2010). *Good practices for biosecurity in the pig sector – Issues and options in developing and transition countries*. FAO Animal Production and Health Paper No. 169. Rome. Retrieved from <https://www.fao.org/3/i1435e/i1435e.pdf>

Food and Agriculture Organization of the United Nations/World Organisation for Animal health/ World Bank. (2010). *Good practices for biosecurity in the pig sector- Issues and options in developing and transition countries*. FAO Animal Production and Health paper No. 169. Rome, FAO. Retrieved from <https://www.fao.org/3/i1435e/i1435e.pdf>

FAO. (2018). *Carcass management for small- and medium- scale livestock farms: Practical considerations*. Retrieved at: <https://www.fao.org/3/CA2073EN/ca2073en.pdf>

FAO and IFIF. 2010. *Good practices for the feed sector – Implementing the Codex Alimentarius Code of Practice on Good Animal Feeding*. FAO Animal Production and Health Manual No. 24. Rome. Retrieved from <http://www.fao.org/3/cb1761en/CB1761EN.pdf> <https://www.feedlatina.org/pdf/i1379e.pdf>

FAO and IFIF. 2020. *Good practices for the feed sector – Implementing the Codex Alimentarius Code of Practice on Good Animal Feeding*. FAO Animal Production and Health Manual No. 24. Rome. Retrieved from <https://doi.org/10.4060/cb1761en>

Gad S.C and Chengelis C. P (1998). *Acute Toxicology Testing (Second Edition)*. ISBN 978-0-12-272250-9. Retrieved from: <https://www.sciencedirect.com/book/9780122722509/acute-toxicology-testing#book-info>

Government of India - Department of Animal Husbandry and Dairying (n.d.). *Biosecurity guidelines for piggery*. Retrieved from <https://dahd.nic.in/sites/default/files/Biosecurity%20guidelines%20for%20piggery.pdf>

Guidelines for establishment of Intensive piggeries in South Australia (1998). Retrieved from https://www.epa.sa.gov.au/files/8312_pigguide.pdf

Housing and Land Use Regulatory Board (HLURB). *RESOLUTION NO, R-674 Series of 2000*. Retrieved from <https://hlurb.gov.ph/wp-content/uploads/laws-and-issuances/policies/R674s2000.pdf>

Levis D. G and Baker R. (2011). *Pork Information gateway: Biosecurity of Pigs and farm Security*. Retrieved from <https://porkgateway.org/resource/biosecurity-of-pigs-and-farm-security/>

New South Wales Department of Education. *Animals in Schools*. Retrieved from: <https://nswschoolanimals.com/pigs-2/pigs-handling/#:~:text=A%20straw%20broom%20or%20flapper,out%20of%20the%20blind%20spot.>

Philippine Animal Welfare Society. (n.d). *Revised Implementing Rules and Regulations of Republic Act 8485 otherwise known as "The Animal Welfare Act of 1998" as amended by republic act 10631*. Retrieved from: <https://paws.org.ph/downloads/3.IRR%20of%20RA%208485%20as%20amended%20by%20RA%2010631.pdf>

Philippine College of Swine Practitioners (PCSP) *Technical Advisory No. 005 Series of 2020 Recovery from African Swine Fever (ASF) swill feeding*. Retrieved from <https://pcsp.org.ph/2020/07/27/pcsp-technical-advisory-no-005-series-of-2020-recovery-from-asf-swill-feeding/>

Pierozan C. R. et.al. (2017). *Environment, facilities, and management of hospital pens in growing and finishing pig farms: a descriptive study*. *Brazilian Journal of Animal Science*. ISSN 1806-9290. Accessible at: <https://www.scielo.br/j/rbz/a/3nLz9JF8JP6T5qfgNDRzGGR/?format=pdf&lang=en>

Piñero C. (2021). *Management of people in swine Production; what data says*. Retrieved from: <https://en.engormix.com/pig-industry/articles/management-people-swine-production-t47641.htm>

Song R. (2012). *How to give injections*. *Pork information gateway*. Reviewed by: Morrow W.E.M and Whitney M. H Date Published: April 17, 2012. Retrieved from: <https://porkgateway.org/resource/how-to-give-injections/>

Soriano M. (2021). *Keys to reduce ammonia levels in the farm and improve animal welfare and performance*. Retrieved from <https://www.veterinariadigital.com/en/articulos/keys-to-reduce-ammonia-levels-in-the-farm-and-improve-animal-welfare-and-performance/>

Stetson L. E. et. al. (2006). *Electrical wiring for swine buildings*. Retrieved from <https://porkgateway.org/resource/electrical-wiring-for-swine-buildings/>

Terrestrial Animal Health Code. (n.d). *Application for official recognition by the OIE of free status for Classical Swine fever*. Chapter 1.9 Article 1.9.1. Retrieved from https://www.woah.org/fileadmin/Home/eng/Health_standards/tahc/2018/en_chapitre_selfdeclaration_CSF.htm

The Pig Site. (2010). *Good Practices for Biosecurity in the Pig Sector*. Accessible at: <https://www.thepigsite.com/articles/good-practices-for-biosecurity-in-the-pig-sector>

The Pig Site. (2011). *Water in Swine Production: a review of its significance and conservation strategies*. Accessible at <https://www.thepigsite.com/articles/water-in-swine-production-a-review-of-its-significance-and-conservation-strategies>

The Pig Site. (2012). *Scheduling of All-in All-out Swine Production*. Accessible at: [https://www.thepigsite.com/articles/scheduling-allin-allout-swineproduction#:~:text=18%20minute%20read-,All%2DIn%E2%80%93All%2DOut%20\(AIAO\)%20swine%20production,weight%2C%20production%20stage%20and%20condition](https://www.thepigsite.com/articles/scheduling-allin-allout-swineproduction#:~:text=18%20minute%20read-,All%2DIn%E2%80%93All%2DOut%20(AIAO)%20swine%20production,weight%2C%20production%20stage%20and%20condition)

United States Department of Health and Human Services Centers for Disease Control and Prevention. (2014). *What people who raise pigs need to know about influenza (Flu)*. Retrieved from <https://www.cdc.gov/flu/swineflu/people-raise-pigs-flu.htm#:~:text=This%20is%20to%20lower%20the,reducing%20medications%2C%20whichever%20is%20longer.>

Verma R. et. al. (2018). *Detrimental impacts of heavy metals on animal reproduction: A review*. *Journal of Entomology and Zoology*. E-ISSN: 2320-7078/ P-ISSN: 2349-6800. Retrieved from https://www.researchgate.net/publication/328686687_Detrimental_impacts_of_heavy_metals_on_animal_reproduction_A_review

Villines Z. medically reviewed by Weatherspoon D. (2018). *Is a subcutaneous injection painful?*. Retrieved from: <https://www.medicalnewstoday.com/articles/322710>

Xu W. et al. (2014). *Atmospheric NH₃ dynamics at a typical pig farm in China and their implications*. <https://doi.org/10.5094/APR.2014.053>Get rights and content. Retrieved from: <https://www.sciencedirect.com/science/article/pii/S1309104215303020>

PHOTO REFERENCES

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Above ground Burial (AGB). 2018. FAO Retrieved from: <https://www.fao.org/3/CA2073EN/ca2073en.pdf>

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United states Department of Agriculture. 2021. Arial view of AGB. Retrieved from: https://www.aphis.usda.gov/animal_health/emergency_management/downloads/agb-emergency-policy.pdf
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 Zones of ear. n.d. Fisher A. Retrieved from:
<https://extension.purdue.edu/4h/Documents/Animal/Reference%20Guide%20-%20Introduction.pdf>
 Zones of ear. n.d. Notches of ears. Retrieved from:
<https://extension.purdue.edu/4h/Documents/Animal/Reference%20Guide%20-%20Introduction.pdf>

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<https://extension.purdue.edu/4h/Documents/Animal/Reference%20Guide%20-%20Introduction.pdf>
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This Explanatory Manual (EM) serves as a supplementary learning material for the Philippine National Standard (PNS) Code of Good Animal Husbandry Practices (GAHP) for Swine (PNS/BAFS 267:2019). The EM aims to aid stakeholders by promoting uniform understanding and interpretation of the PNS to ensure efficient adoption and implementation of the Standard.


PNS/BAFS 267:2019 was developed to support Filipino hog farmers and to promote sustainable farming.

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