



Biosecurity measures in a pig farm

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Introduction

The prevention of infectious diseases in pigs is important for both animal welfare and economic productivity. Moreover, prevention is also important for food safety and public health when zoonotic pathogens are concerned. Biosecurity is defined as the implementation of measures that reduce the risk of disease agents being introduced and spread. Biosecurity embraces all aspects of the prevention of pathogens entering and spreading within a group of animals.

Basic principles of biosecurity at the farm level:

The measures that can be used to improve biosecurity can be categorized in three steps:

- 1) Segregation- The creation and maintenance of barriers to limit the potential opportunities for infected animals and contaminated materials to enter an uninfected site. When properly applied, this step will prevent most contamination and infection.
- 2) Cleaning -Materials (e.g., vehicles, equipment) that have to enter a site must be thoroughly cleaned to remove visible dirt. This will also remove most of the pathogens that contaminate the materials.
- 3) Disinfection- When properly applied, disinfection will inactivate any pathogen that is present on materials that have already been thoroughly cleaned.

Routes of disease transmission and implications for biosecurity

a) Direct pig-to-pig contact

Many pathogens are transmitted through direct contact between an infected shedding pig and a susceptible pig. This is the most potent route of transmission for most pig diseases. Close, prolonged or repeated contact between infectious and susceptible animals, such as in pens or trucks during transport, increases the likelihood of transmission. Some animals that seem to be in good health may also be shedding pathogens at sufficient levels to spread infection; these “silent carriers” can be seen

particularly in endemic diseases. Such animals present a clear risk when moved and commingled with susceptible animals.

b) Semen

Most systemic viruses can be excreted into the semen, which can be a source of transmission of Aujeszky's disease virus, parvovirus, CSF virus and PRRS virus. Some specific bacterial pathogens, including brucellosis and leptospirosis, are shed in semen. Appropriate hygiene during semen collection and distribution is therefore of primary importance, together with routine screening of boars for infections known to be spread by semen.

c) Airborne transmission

The secure distance between farms varies, depending on farm size, pathogen load, pathogen resistance to desiccation in the air, climatic conditions and local geography. Under specific climatic conditions, some strains of FMD virus can be carried by wind for up to 20 km, and pseudorabies virus for up to 9 km. Swine influenza virus is certainly transmissible through aerosol droplets over short distances within premises.

d) Visitors, Vehicles and other fomites

Visitors can transport pathogens on footwear, clothing, hands, nasal mucosae without being infected, and can also be infected by and shed pathogens when they are sick or carriers with no clinical signs. Pig workers must be aware of their own potential role in the spread of disease, as they have physical contact with pigs. Service providers and intermediaries, such as pig transporters, technicians and veterinarians, may be required to visit several farms on the same day, thereby increasing the risk of disease spread; equally problematic is when farm workers or their households keep pigs of their own.

Equipment used by pig farmers must be considered as potentially contaminated fomites. Moreover, vehicles can transmit swine pathogens, when manure containing disease agents adheres to vehicle tyres or bodywork. There is evidence that ASF, *Actinobacillus pleuropneumoniae*, TGE and *Streptococcus suis* can be spread by contaminated vehicles. Lorries, trailers, vans and even motorbikes used for transporting pigs or carcasses to rendering plants represent a high risk for disease transmission.

e) Pig feed, including swill feeding, and drinking-water

Feed and water can become contaminated and play a role in maintaining endemic or toxic diseases. As some pathogens can survive in contaminated meat waste, specific attention must be paid to the use of food wastes in feeding pigs (which can include processed pork products, such as dry cured



meats, that have not been heated). Many countries prohibit the feeding of unrendered meat products to pigs.

f) Pig manure and bedding

Manure from infected pigs contains large quantities of viruses, bacteria and/or parasites. Disposal of pig manure must be considered when designing and implementing biosecurity programmes, as manure may contain pathogenic organisms, leading to faecal-oral-transmitted diseases. Pig manure may contain *Ascaris*, *Taenia*, *Cryptosporidium*, *Yersinia* and *Salmonella* *Campylobacter*, faecal coliforms, faecal *Streptococci* and other pathogens, such as hepatitis E virus. The bedding material provided to pigs can also spread pathogens; for example, sawdust and wood shavings can carry *Mycobacterium avium* bacteria.

g) Birds, bats, rodents, feral and wild pigs and stray animals and Arthropods

Birds (e.g., sparrows, starlings, seagulls and crows) come into close contact with pigs when looking for feed, and may contaminate other herds with droppings and by mechanical transfer. Birds can transmit *Bordetella spp.*, erysipelas and avian tuberculosis, 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. They can carry the agents that cause atrophic rhinitis, *E. coli* diarrhoea, leptospirosis, rotaviral diarrhoea, salmonellosis, swine dysentery, PRRS, *Streptococcus suis* infection and encephalomyocarditis.

Wild animals can harbour brucellosis, leptospirosis, trichinella, pseudorabies and many other pathogens. Among other diseases, feral and wild pigs may transmit CSF, ASF, FMD and pseudorabies. Stray dogs can spread TGE, swine dysentery and brucellosis pathogens, while cats are a potential transmitter of toxoplasmosis to pigs, through their faeces, and can be mechanical vectors as they seek wandering rodents. 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 programmes. Ticks are unable to travel to pigs, but pigs can be in contact with ticks when they graze or sleep in tick-infested areas example ASF.

Biosecurity measures and good practices in the pig farm-

1) Location and fencing of the pig farm

The location of the pig farm is a critical factor in the risk of pig disease introduction. When a new pig farm is being installed, even a small one, its proximity to other pig farms and public roads must be considered. A minimum distance between neighbouring pig farms and between units within a



pig farm is desirable, to limit the risk of aerosol disease spread. Farm units or enclosures should be fenced. The fence must be robust enough to prevent the entry of wild animals, including wild boars and feral pigs, and to prevent the escape of domestic pigs. Contact with birds should also be avoided, by using nets on the roof and open sides. The entrance to the farm must be clearly identified, and have controlled access.

2) Introduction of quality pigs

It is important to avoid the introduction of pigs from outside farms, other than from breeding, multiplier or other farms that are known to be free of diseases of concern. The proper use of AI can help to introduce new genetics without introducing live pigs to farms. Replacement pigs entering the premises should come from known safe sources and should be quarantined, or at least physically separated. Newly purchased pigs should be kept for a minimum of 30 days in a quarantine pen, isolated from the pig farm. During the first phase of quarantine, the farmer can observe the new pigs and determine whether they are sick or not. After quarantine, the new pigs can be introduced into the herd. Replacement gilts must be allowed to adapt to the local environment before being used for breeding. The second phase of quarantine can therefore be dedicated to acclimatization procedures, to allow replacement pigs to adapt to the microbial flora of the herd, and to feed and management procedures. Vaccination and deworming programmes should be applied on arrival.

3) Age segregation

Age-segregated rearing should be encouraged, and buildings should be designed to avoid the commingling of groups of pigs of different health status. Keeping animals in groups according to age and physiological stage is recommended for better productivity, as well as for sanitary reasons. Homogeneous groups of same-age pigs, such as those born in the same week and in the same room, should preferably be kept together until slaughter, without being mixed with other pigs. The method of “streaming” pigs should be linked to an all-in-all-out hygiene policy, where possible. When a group of same-age pigs leaves accommodation for a subsequent step, such as from nursery room to grower, the premises should be thoroughly cleaned and disinfected.

4) Workers and visitors

Visitors to farms should always be asked whether they have recently been to potentially contaminated places, such as pig farms, slaughterhouses, animal renderers or post-mortem rooms; if they have, they should not be admitted to the farm unless all appropriate protection measures are taken. A visitor log book, in which visitors record their last exposure to pigs, is a useful tool for implementation of this measure. Workers working with the herd should have no contact with other



pigs, i.e., they should not keep pigs at their own homes. Visitors, including other farmers and pig workers, should be provided with specific clothing and clean footwear by the farm being visited, and should wash their hands on entry. Where possible, a dedicated building should be located at the entrance, where workers and visitors can change clothing or put on/take off overalls and boots. On smaller farms, farmers usually spend limited time in the pig pens and do not clean or change their work clothing or footwear.

5) Vehicles and equipment

Drivers and their vehicles transporting pigs to the market or slaughterhouse or delivering feed are a major risk for disease transmission. Drivers should strictly adhere to farm protocols and biosecurity principles when handling animals. Feed should be delivered outside the fence. The vehicles, especially those used to transport pigs, should be thoroughly cleaned before returning or visiting other farms. Pig keepers should also take precautions against contamination from vehicles by establishing a safe pig loading location and by not allowing vehicle drivers into pig buildings. Vehicles need to be cleaned and disinfected after each rotation. All instruments or equipment that are likely to come into contact with pigs, such as restraint snares, needles and scalpels, should be assigned to the farm and kept clean. They should not be transported from farm to farm; if they have to be, they should be cleaned and disinfected.

6) Avoiding swill feeding

The use of untreated swill must be avoided, and is often prohibited by national regulations. 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., 100° C for at least one hour).

7) Proper disposal of carcass

When unusual deaths of animals occur, veterinary services should be informed so that they can take immediate actions to control any outbreak of disease. Following disease or deadly injury, dead animals should be buried, composted or burned. Local authorities must prevent and control the illegal trade of dead animals, which could have a serious impact on consumers' health and confidence in pork products.

8) Control of pests



Pig farmers should practise regular pest and rodent control, with rodenticides or by keeping the surroundings of the pig unit clean. Rodenticides must not be used where there are risks of pigs eating the bait or the rodent carcasses. Residues of pig feed have to be regularly cleaned and pig feed must be properly stored to prevent access by rodents and larger wild animals and birds.

9) Cleaning and disinfection

An important routine for reducing the risk of endemic disease outbreaks is the regular and thorough cleaning of the pig unit, including ensuring that manure is removed from the pens every day, cleaning and disinfecting pig pens regularly, and quickly removing manure, urine and straw bedding where sick and dead animals have been present. Where possible, farrowing and nursery pens must be cleaned with detergent. Cleaning is essential for the removal of most organic matter. Disinfection follows proper cleaning. Disinfectants can be toxic to humans or animals and must be used according to instructions on the label.

Conclusion

Biosecurity has become an essential element of livestock production, particularly in intensive systems such as in the pig industry. Biosecurity is important to improve or maintain animal health and reduces the risk of the introduction and spread of endemic and foreign diseases. Animal diseases can spread from farm to farm and result in animal sickness, death and economic losses. The implementation of biosecurity measures all along the production chain minimises the risk of introduction of new pathogens into the farms, as well as their spread within farms. Nevertheless, the implementation of sustainable biosecurity programs and its continuous improvement is still a challenge for many pig farms.

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