BIOSECURITY IN PIG BREEDING HERDS

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Abstract

Aim of this article has been to inform about promotion biosecurity to a livestock industry, the most important sources of disease on pig units and key areas for consideration in terms of farm biosecurity. Diseases exhibit a broad spectrum of infectivity and farms vary widely in their ability to institute preventive measures. Each unit needs to be evaluated individually with particular reference to herd location, preventable risks and financial constraints. Procedures need to be heightened during notifable disease alerts. The Hazard Analysis Critical Control Point (HACCP) system, introduced originally for the food industry, offers some useful principles that can be adapted for use on farm to deal with disease risks. This identifies hazards, establishes critical limits and introduces monitoring and recording systems to deal with the risks. The principal considerations with respect to biosecurity on pig farms are listed and discussed.

Key words: *pig industry, disease risks, welfare, HACCP system.*

INTRODUCTION

Infection present in faeces, saliva, nasal secretions, blood, milk or semen may be mechanically transmitted between animals on a variety of different inanimate objects or formites. These include contaminated clothing, boots, vehicles, equipment, bedding and feed.
The period of time that fomites remain infectious depends on the nature of the agent and environmental factors such as temperature, exposure to ultraviolet light and the efficacy of disinfection procedure, e.g. porcine parvovirus (PPV) and porcine circovirus (PCV-2) are very resistent and survive well for several months under common environental condition in EU countries. Porcine respiratory and reproductive syndrome (PRRS) virus surviving in the environment for several weeks in buildings. Swine dysentery (*Brachyspira hyodysenteriae*) is reported to survive in moist faecaes for up to 40 days.
Disinfection is a targeted procedure aimed at reducting disease transmission via contaminated protective clothing and boots, vehicles or equipment. Disinfectants require the effective removal of organic matter to be fully efficacious. It is essentials to use the correct concentration (Novák et al., 2005).
Irrespective of how reliable the health status of the herd of origin is, it is important that incoming gilts or boars undergo a period of isolation quarantine for at least three to four weeks. The duration will depend on the particular diseases of concern, e.g. eight weeks for enzootic pneumonia (EP) Isolation allows pigs to recover from the stress of journey and adapt to a new environment. Isolation provides an oportunity for clinical inspection, laboratory testing and vaccination, if appropriate (Žižlavský et al., 2003). Laboratory techniques are constantly being upgraded, particularly with the rapid advances in biotechnology and the introduction of new PCR tests and ELISAs.
The Hazard Analysis Critical Control Point (HACCP) system, introduced originally for the food industry, offers some useful principles that can be adapted for use on farm to deal with disease risks. This identifies hazards, establishes critical limits and introduces monitoring and recording systems to deal with the risks (Amass, 2002).

Principal considerations for farm biosecurity

Live pigs - contacts, new stock (including semen and embryo)

Direct contact with other live pigs, including feral wild boars, presents the main specific risk for aquiring new infections.
Pigs may be clinically affected, apparently normal but incubating disease, convalescent carriers or long-term excreters of pathogens. The disease transmission is exacerbated by stress due to loading, mixing and transportation. Semen and embryos also present a risk in relation to viral diseases such as porcine respiratory and reproductive syndrome (PRRS) and classical swine fever (CSF). Most herds buy in breeding replacements for genetic improvement (Wrathall et al., 2004). It is important that these animals are sourced appropriately and health-mached with the recipient herd, and undergo a period of isolation.
Health status is essentially an assessment of herd immunity and current disease activity. Ideally, incoming replacements should be of similar or higher health status than the recipient herd to prevent them from introducing infections not already present in the recipient herd.
Conversely, if they are inappropriately „disease free“ and immunologically naive to common infections, they may need protecting by vaccination or acclimatisation before entering the new herd. This also applies if a new

herd is likely to suffer a disease breakdown because of location (Dee, 2003).
Replacement profiling requires knowledge of the disease status of the herd of origin and the recipient herd.
Disease status information can be obtained from various sources:

- Records of clinical disease history
- Performance records
- Serological monitoring
- Necropsy findings
- Lung/snout scores
- Other abattoir reports

Infectious diseases of pigs
Many of this diseases have been highly contagious viral diseases, including transmissible gastroenteritis (TGE), swine influenza (SI), Aujeszky´s disease (AD) and porcine respiratory and reproductive syndrome (PRRS). Postweaning multisystemic wasting syndrome (PMWS), which is linked to porcine circovirus (PCV-2) infection, has challanged the very survival of the pig industry elswhere (Straw et al., 1999). Even long established endemic diseases, e.g. enzootic pneumonia (EP) and swine dysentery (SD), still cause significant losses if introduced into naive herds (Žižlavský et al., 2000). The recent reappearances of classical swine fever (CSF) and foot-and-mouth disease (FMD) were timely reminders that there is no place for complacency in disease prevention programmes at both national and herd level.

Local spread
The generic term **„local spread“** is often used in areas of high local livestock density where it is impossible to determine precisely how an infectious agent enters a herd. Unexplained disease transmission over short distances is often attributed to aerosol infection, but it is very difficult to exclude the possibility of local spread by others routes, paricularly wildlife.
Aerosol spread appears to occur to a variable extent with a number of diseases including enzootic pneumonia (EP), porcine respiratory and reproductive syndrome (PRRS) and postweaning multisystemic wasting syndrome (PMWS). Long distance airborne spread in viral plumes is well recognised with foot-and-mouth disease (FMD) and Aujeszky´s diseases (AD). Aerosol and airborn spread depend on numerous factors such as:

- type of pathogen
- number and density of animals excreting
- susceptible to infection
- housing
- droplet size
- humidity
- ambient temperature
- ventialtion fans
- wind strength and direction
- sunlight
- topography

Herd location
Geographical location, paricularly proximity to other live pigs, is probably the overriding factor which dictates the risk of a herd acquiring new disease.
The type, number and density of pig units in a 2 km radius are crucial. The position of major roads, prevailing wind direction, drainage, vegetation and biosecurity measures adopted on nearby premises are all significant.
Ideally, new pig units should be sited in areas of low pig density away from obvious risk factors such as other pig herds, slaughterhouses, slurry lagoons, refuse tips and roads used by pig transporters.
A minimum distance of at least 500m between pigs farms may reduce the risk of acquiring common infections. In many commercial herds in high pig density areas, it is very difficult or impractical to maintain disease freedom from common endemic diseases (Žižlavský et al., 2003) such as porcine respiratory and reproductive syndrome (PRRS), enzootic pneumonia (EP), swine influenza (SI) and particularly postweaning multisystemic wasting syndrome (PMWS).
This is no excuse for a poor biosecurity, but an appreciation of what is realistically achievable is essential.
For some diseases, the use of vaccination, if available, may be more appropriate and cost effective than relying on other biosecurity measures which are impractical due to factors beyond the owner´s kontrol (Amass, 2002).

Vehicles for transporting pigs, equipment and consumables
Contaminated vehicles, particularly those used to transport livestock, and their drivers represent an important means of disease transmission. Vehicles, trailers and other equipment should be farm-dedicated, if possible. The degree of risk depends on how recently the vehicle hasbeen used on other pig or livestock farms or for conveying pigs from market to slaughterhouse.
The increasing *trend towards two-site and three-site production systems* has led to more transportation of live pigs. Transporting finishers to slaughter in the morning and weaners in the afternoon leaves insufficient time between journeys for satisfactory cleaning and disinfection. Adopting a three-week batch weaning system reduces theneed tomove pigs as frequently and facilitates the all-in, all-out approach, which promotes good hygienic practice.
External vehicles should not be permitted onto a farm unless essential. These vehicles must be visibly clean, washed and disinfected under supervision on hard standing areas off-site. The effectiveness of this approach was demonstrated during the recent foot-and-mouth disease (FMD) epidemic. Particular attention should be paid to weel arches and the undersite of vehicle.

It is also important to ensure that personnel do not become contaminated during washing. Disposal plastic boots sould be worn, if practicable. Vehicle footwells or floors inside the lorry cab are difficult to clean and disinfect adequately, although the provision of rubber mats and disinfectant sprays may help. Fixed wheel washes are helpful if they are of good design, but disinfectant mats for vehicles are oflimited value and soon become heavily contaminated (Straw et al, 1999).
Feed lorries must be visibly clean and make deliveries from outsite the perimeter fence or at the periphery of the farm usány farm-dedicated blower pipes.
High-health status and nukleus units should try to arrange feed deliveries for the first drop of the day at th beginning of the week.
Contractors´ boxes and equipment that might have been used on other livestock premise should be disinfected.
The anteroom or office delivery point area close to main entrance to a far mis a potential focus for contamination by pathogens on cardboard containers used for items such as pharmaceutical products or semen coolers. Surface disinfection and hygienic disposal of packaging should therefore be instituted, as appropriate.
Loading and unloading of live pigs are procedures which offer opportunities for new infections to be introduced by infected stock or fomites (contaminated vehikle, equipment or clothing). Vehicles delivering pigs should be thoroughly cleaned and dried before transporting pigs onto a unit.
Pig transporters should not be allowed onto the main farm premise, if possible – a pourpose-built loading bay with good washing, disinfecting and drainage facilities, located as far away as practicable from pig acommodation, is ideal (Novák et al., 2005).
Outgoing pigs should be moved into the loading bay, with farm staff observing strict clean and dirty area protocols to avoid contact with the collection vehicle. The loading bay and surrounding area should be kept clean and disinfected.

Humans – visitors, farm staff etc.

The potential for the transmission of infectious aerosols by humans appears to have been greatly exaggerated.
A policy of two or three pig-free days or 'downtime' for visitors and veterinary surgeons is widely imposed, particularly on high-health status and nucleus breeding units. This concept has its origins in work undertaken in the 1970s on the persistence and transfer of foot-and-mouth disease (FMD) virus from the mouth and nose of humans 28 hours (but not 48 hours) after exposure. However, contrary to common perceptions, recent scientific evidence - particularly from the USA - and field observations from experienced research workers suggest that people actually transmitting pathogens from their nose, mouth or pharynx is minimal. Imposing a blanket downtime requirement causes great inconvenience and is expensive to maintain (Straw et al, 1999).
Nucleus herds and others of high-health status will understandably wish to maintain 48 to 72 hours down-time as an insurance policy and a deterrent for unwanted visitors. Where possible, it is prudent for veterinary surgeons and other essential farm visitors to attend herds higher up a breeding pyramid at the beginning of the week. However, it is important that such measures are kept in perspective and do not assume more importance than they merit. Provided a visit to a pig herd is followed by a complete change of clothing, showering, hand (particularly fingernails) and hair washing, and nose blowing, a single overnight pig-free period of at least 12 hours, as now suggested by several authorities, should be more than adequate for most situations assuming other precautions are adopted. Notifiable disease outbreaks are an exception and are covered by national rules. Additional showering-in on arrival may be unnecessary, but it increases awareness and presents a useful physical barier in that street clothes are replaced by dedicated clothing.
In selected circumstances, if there are major concerns, the additional use of a disposable paper dusk mask with the highest dust protection factor may be worth considering.
Formulating basic biosecurity rules for visitors (including vehicle drivers) and farm employees costs little and can greatly reduce the risks of introducing infection by vomites, including dirty boots, contaminated clothing or personal equipment.
Protocols will inevitably vary with the type of unit and circumstances, being higher and more onerous on high-health status nucleus herds at the top of the breeding pyramid and during notifiable disease outbreaks (Wrathall et al., 2004).

Feed, water and bedding

Salmonella species may potentially be introduced by contaminated feed (in addition to the risk of feed delivery vehicles acting as fomites). Feed should be obtained from mills operating in accordance with relevant agricultural industries confederation codes of practice and using ingredients obtained from sources with a consistently satisfactory bacteriological record. There is a small risk of acquiring infection (e.g. *Salmonella spp.*) from contaminated water. Ideally, mains water should be used. Water from boreholes and wells should be tested regularly for bacteriological duality (Novák et al., 2005).
The risks of straw, shavings and other bedding substrates acting as fomites should be reviewed. These materials should not come from sources which might have been exposed to livestock or excrement, and should be stored under cover and protected from contamination by birds or vermin.

Wildlife and vermin

The risk of rodents, fecal cats, birds, insects and other animals acting as vectors of disease is much more difficult to control than disease spread by humans,

equipment and vehicles.
Virus of transmissible gastro-enteritis (TGE) was notorious in countries of European Union for its transmission by starlings and gulls, especially on outdoor units and in uncovered feeding areas. Complete bird proofing was attempted with partial success on some pig farms during the transmissible gastro-enteritis (TGE) epidemics.
Other infections spread by birds inc1ude salmonellosis and avian tuberculosis (via infected peat used as bedding). Even on outdoor units, practical measures such as installing rubber flaps on feeders reduce disease risks and also allow considerable savings in feed costs. Mechanical transmission by insects, particularly flies, has been implicated in the spread of several diseases, e.g. transmissible gastro-enteritis (TGE), *Streptococcus suis* infection and porcine respiratory and reproductive syndrome (PRRS).
The increasing number of feral wild boar in some parts of EU countries, and the potential for their expansion into new areas, pose very specific disease threats to outdoor herds. Commercial wild boar production units must be licensed under the Dangerous Wild Animals Act 1976 and secure escape-proof perimeter fencing is essential. Conventional pig units in the vicinity need to adopt heightened precautions.
Outdoor pigs are inevitably exposed to *Leptospira* serovars, particularly *Leptospira bratislava,* from various wildlife species including hedgehogs, foxes and rats. Rodents can introduce disease such as *Salmonella* infection (which is also spread by feral cats), swine dysentery and *Lawsonia intracellularis* infection.
As with birds, a large rodent population represents a significant amount of food wastage, which is an added incentive for control, even on outdoor units. Independent consultancy advice on pest control is very important. It is advisable not to allow domesticated pets onto the farm premises, but if guard dogs are used they should not be fed marrow bones. The veterinary surgeon should also remain alert to potential disease transmission risks from domestic cats (Novák et al, 2005).

CONCLUSION

Disease imposes considerable constraints on the productivity and profitability of the livestock industry. Pig producers have probably suffered more than other sectors from the devastating effects of a succession of infectious disease outbreaks over the past 30 years. Many of these have been highly contagious viral diseases.
The pig industry has been very proactive in promoting the benefits of biosecurity and implementation of its Strategy for Pig Health and Welfare. The National Pig Associations in EU have developed a personalised self-assessment audit to help producers improve biosecurity on their own farms. Such an approach offers an ideal starting point for veterinary surgeons and producers seeking to identify cost-effective measures appropriate to particular farm circumstances.

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Received for publication on February 28 , 2006
Accepted for publication on May 31 , 2006

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