

Biosecurity in Swine Production: Widespread concerns?

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■ Introduction

Biosecurity can be defined as procedures, efforts and programmes established to reduce the risk of disease introduction into pig populations (Conner, 2001). Moreover, it can slow down the transmission of endemic pathogens (viruses, bacteria, parasites and fungi) thus limiting the spread of disease at the herd, region or country level. Good herd biosecurity is therefore essential to protect herd health status but it is also important when implementing a program for control or eradication of diseases at a regional level. Geographical location of the farm and pig density in the area are two significant factors in the epidemiology of several diseases but, in general, producers do not have much control over them. Fortunately, affordable air filters will soon be available for on-farm use to prevent aerosol transmission of certain pathogens between sites. However, these filters will never compensate for other biosecurity breaches.

Certain biosecurity procedures are simple to apply without any expenses (washing hands), whereas others are more cumbersome and expensive to apply on a daily basis (washing trucks). In general, few biosecurity measures have been scientifically validated with regard to specific pathogens and most of these studies were done on exotic diseases and more recently on Porcine reproductive and respiratory syndrome (PRRS) (Dee et al. 2004; Otake et al. 2002). Even though validation is incomplete for several procedures, since biosecurity cannot be by itself detrimental to health of the herd, measures should be applied to avoid placing our pig population at risk. Thus, everyone should be concerned by biosecurity and should develop expertise reminding the “why”, the “how”, the “when” and the “where” of its application.

■ The “Why”

Most would remember the Foot and Mouth disease outbreak of the United Kingdom in 2001. The day after the detection of the first case, more than 50 herds were already infected. (Anderson, 2002) The disease spread rapidly and had disastrous consequences. A similar experience with Classical Swine Fever occurred in the Netherlands in 1997-1998. A case-control study identified a major risk factor for this latter outbreak: no changing of boots and overalls between farms (Elbers et al., 2001). With the increase in international travelling and climatic changes, numerous exotic diseases could be introduced in our country and spread rapidly. Awareness is also required towards endemic diseases that could be very costly in the long term such as PRRS but also Influenza, Mycoplasma or Salmonella. The risk for each disease should be evaluated according to the probability of occurrence and the consequences at the herd level. A weighting system based on the importance of each biosecurity procedure for a particular disease would be helpful. However, what it is not a risk for one pathogen might be important for another one. For example, for Foot and Mouth disease, animal introduction and visitor entry protocol are critical points compared to rodent management. However, for controlling swine dysentery or leptospirosis, rodent control is essential.

■ The “How”

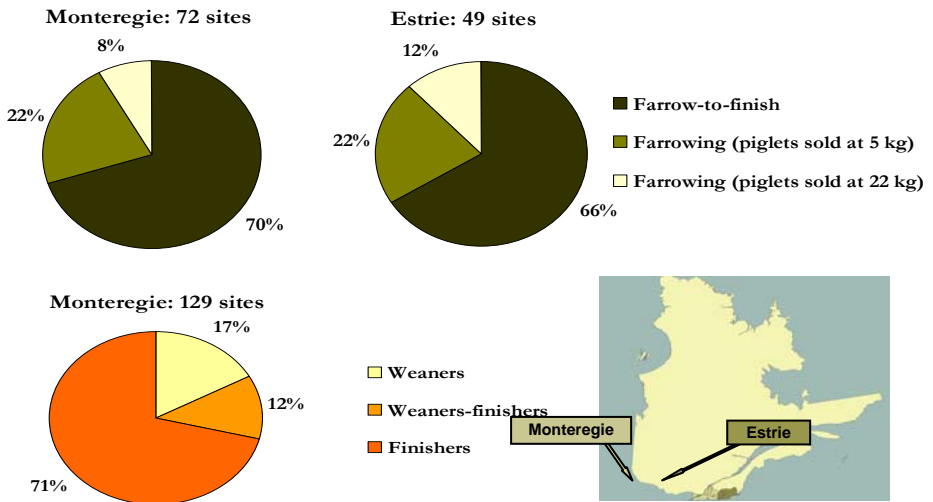
Biosecurity rules are in place to break the infection chain of pathogens (Vaillancourt et al., 2003). Each contagious agent has a mode of transmission that should be understood and targeted to upset the balance of their vital cycle. Introduction of infected animals is well-known as one of the most important risk factors for new disease introduction into a herd. When direct contact between animals occurs, horizontal transmission is effective and the receiver farm is infected. Once inside the pig population, vertical transmission can further increase circulation of microorganisms. Indirect horizontal transmission can maintain pathogens inside a barn but is also responsible for contamination between production sites (area spread). This latter means of transmission can involve humans, animals or other mechanical vectors (fomites) such as articles, equipments, vehicles... They carry infectious agents and allow mechanical transmission of diseases. Survival time outside the host is determined by the persistence of the pathogen in the environment, which varies according to the agent itself, the type of fomites and the environmental characteristics (e.g. temperature, humidity).

A knowledge of the biosecurity procedures used in a region is important to identify factors that need to be corrected to increase the success rate of a control program. As a part of a larger study on the control and transmission of

PRRS, a survey of biosecurity rules currently used in a group of municipalities located in an area of high (Monteregie) and low density (Estrie) of swine production was conducted in Quebec. Information was obtained, through a questionnaire and an on-farm visit, on herd characteristics, pig flow, layout and location of the site, protocol of entry for personnel and visitors, pest control, pig transportation, feed and semen deliveries, manure spreading and dead pig disposal.

Data were gathered for 250 sites, 201 in Monteregie and 49 in Estrie, with a participation rate of 86% and 90%, respectively. **Figure 1** presents the distribution of participating sites according to production type and area selected. Farms were managed by an independent producer on 149 sites and by an integrator for 101 sites. These latter were mostly grow-to-finish operations. Almost half of the finishers operated in all in/ all out by site, whereas 40% of weaners-finishers still had a continuous pig flow. Several biosecurity rules have been evaluated during the study, all aiming at limiting mechanical transmission.

Figure 1. Participating sites according to production type and selected area

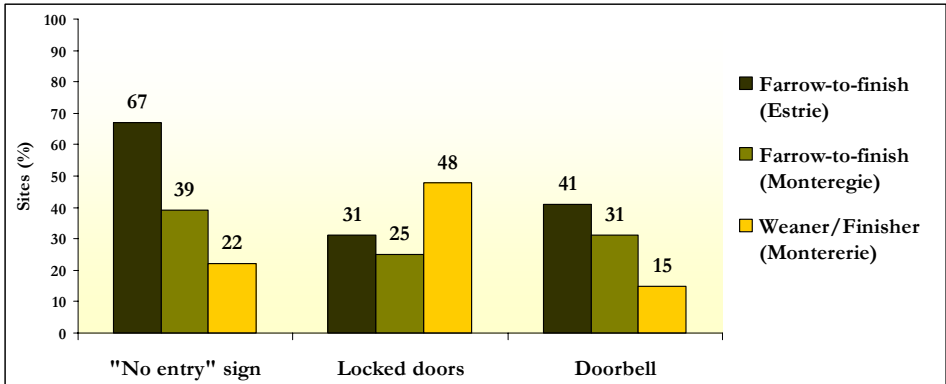


Humans

The priority should be to restrict entrance of people. Only authorized personnel should be allowed inside the unit. **Figure 2** shows what is currently used by producers to limit access. Keeping the doors locked is a simple way to restrict movement. Adding a doorbell increases awareness of an entrance protocol and allows the operator to inform visitors of the rules and to supervise

their application. At the very least, the entrance protocol should include washing hands and changing boots/clothes between facilities.

Figure 2. Limiting access to the facilities

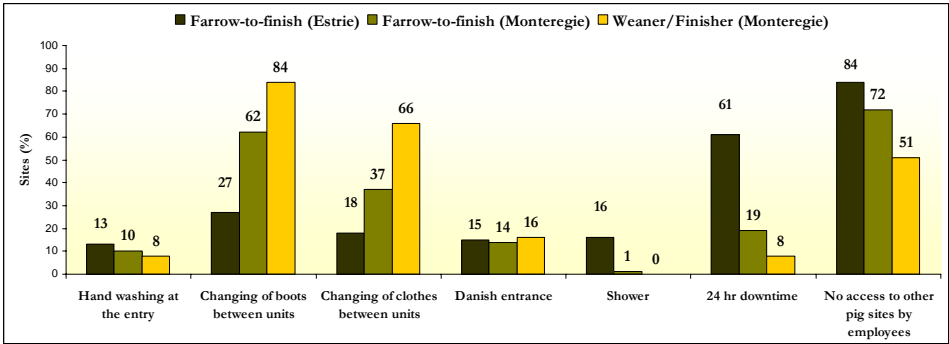


As shown in **Figure 3**, too few producers required washing hands, an inexpensive and simple rule. A “Danish entrance” would be better but was not very frequent. It should consist of 3 different zones:

- a so-called contaminated area where shoes or boots are left,
- an intermediate one and
- a clean zone where farm coveralls and boots are provided.

This type of entry room helps considerably to reduce mechanical transmission of several infectious agents such as PRRS. Alternatively, a shower has significant deterrent effect on people wanting to enter the facilities, but more infrastructures are needed. Requiring a downtime would have a similar effect on the transmission of pathogens but might be difficult to implement. Producers should be aware of the potential risk of employee’s movement between production sites. Ideally, employees should not have access to other pig sites, pig transport vehicles or the slaughterhouse. If impossible, emphasis should be on the entrance protocol for personnel since, even in PRRS positive herds, introduction of a different PRRS virus strain could result in a new outbreak, with considerable economic losses.

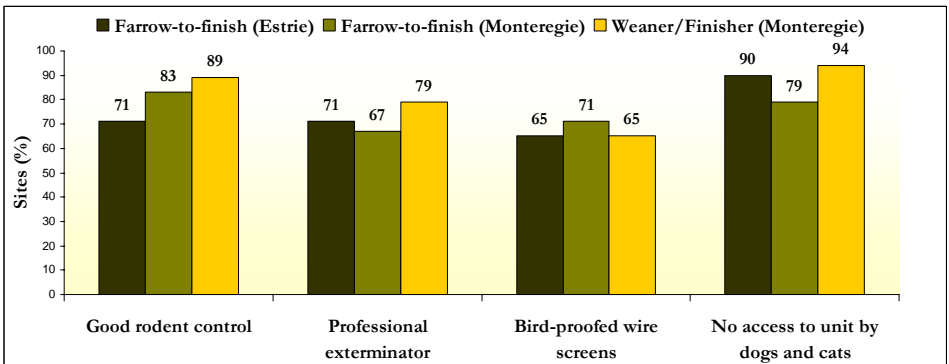
Figure 3. Entrance protocol for personnel and visitors



Animals

Good rodent control is also important to limit area spread especially in high pig density areas. Rodents can reproduce at a phenomenal speed: a mouse has 6-8 litters of 5-6 young per year (Corrigan, 2001). Daily observation of the environment is therefore essential to keep the situation under control. Destruction of their habitat followed by a mechanical and chemical treatment is required. Services from a professional exterminator might be simpler and a time-saver. However, a certain risk is associated with this if a proper downtime and a good entrance protocol are not respected by the exterminator. Surveyed producers thought they had a fairly good rodent control program and many of them hired an exterminator (Figure 4).

Figure 4. Rodent and other animal control



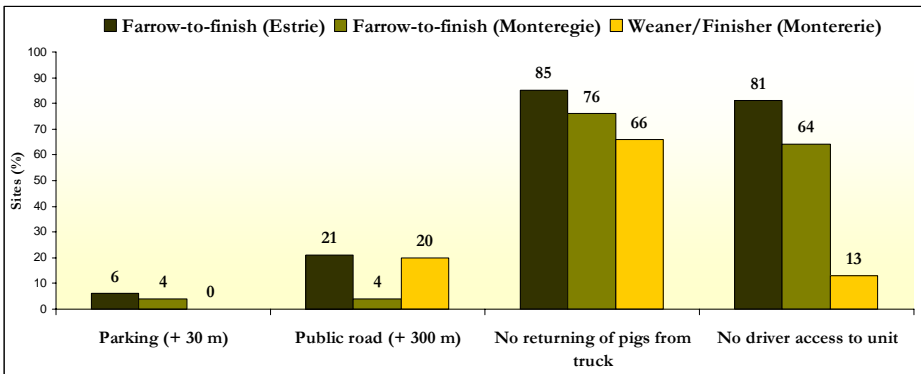
Birds, dogs and cats should be kept outside the units as well. Bird-proofed wire screens should be installed in air inlets whether the ventilation is mechanical or natural. Feed has also to be protected from bird droppings.

Surprisingly, some producers were still allowing domestic animals in the facility, often arguing that cats are good pest exterminator.

Fomites

Vehicles circulating on the site may carry pathogens on their wheels and can also contribute to aerosol transmission if allowed too close to the unit when loaded with pigs (Dee et al., 2002, 2003). They should stay as far as possible from the facilities and should be washed and disinfected before their entrance on the site. This procedure is more easily applied for contract companies that often have installations for washing, disinfecting and drying trucks between runs. Hopefully, in the future, more truck washing stations will be available for producers. Furthermore, the longer the distance between the public road and the facility, the safer is the site. Unfortunately, only 4% of the farrow-to-finish sites in Monteregie were located at more than 300 m from the public road (Figure 5).

Figure 5. Proximity of vehicles and pig transportation



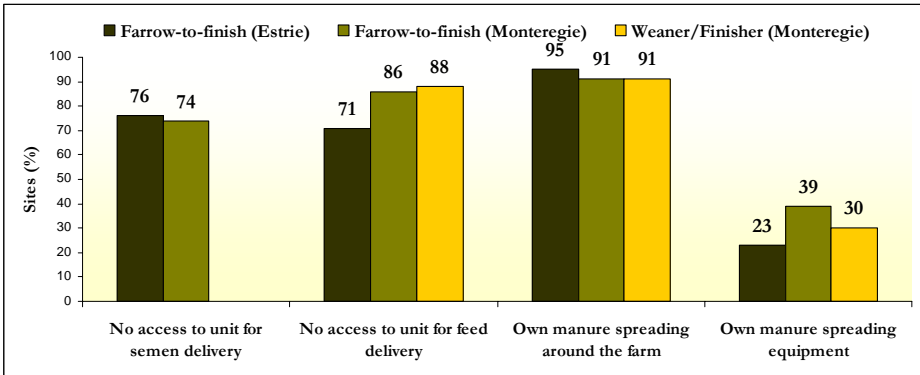
Animal transportation can be a source of several other biosecurity lapses. It is really important to prevent pigs re-entering the unit from the vehicles. Although aware of the risk, some producers do not always control this aspect. Indeed, for a lot of finisher sites, transport is done by a contract company and the producer might not even be on the site when pigs are loaded, allowing drivers free access to the barn. Indeed, in our survey, an association was found between all in/ all out pig flow by facility, absence of a load-in area and free access to the barn by the driver.

Semen and feed delivery is also critical as it involves not only the vehicle but also a driver. Access within the barn should not be authorized and all the materials and supplies should be left outside or delivered off site. From our survey, semen delivery people were entering into the barn on nearly 25% of

the farrowing operations (**Figure 6**). Similarly, bills should be left outside the unit (mailbox) and producers should pay more attention to feed bags.

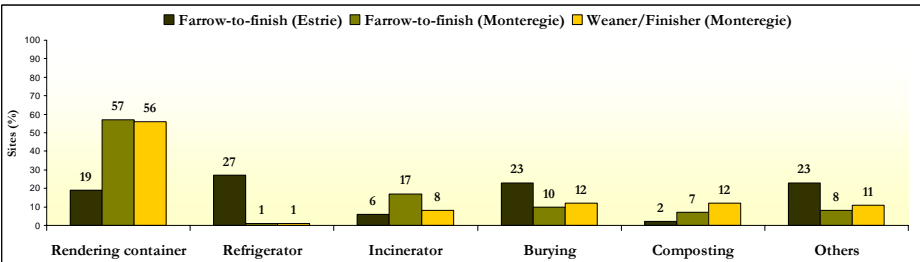
Producers understand that only their own pig manure should be spread on their farm. However, most of them use manure spreading services of a contract company or use farm equipment from neighbouring farms, which is not without a certain risk (**Figure 6**). Further improvement regarding this aspect might be difficult because buying the machinery is quite expensive.

Figure 6. Deliveries and manure spreading



Dead pig disposal is a daily concern for producers. Off-site management involves vehicles such as rendering trucks which can contaminate the herd’s site and convey infectious agents over long distances. Managing dead pigs directly on the site by incinerating, burying or composting lowers the risk of disease introduction by limiting access to the site. As shown in **Figure 7**, a variety of methods was used in Quebec to manage herd mortality: approximately 32% of producers disposed of dead pigs on the site.

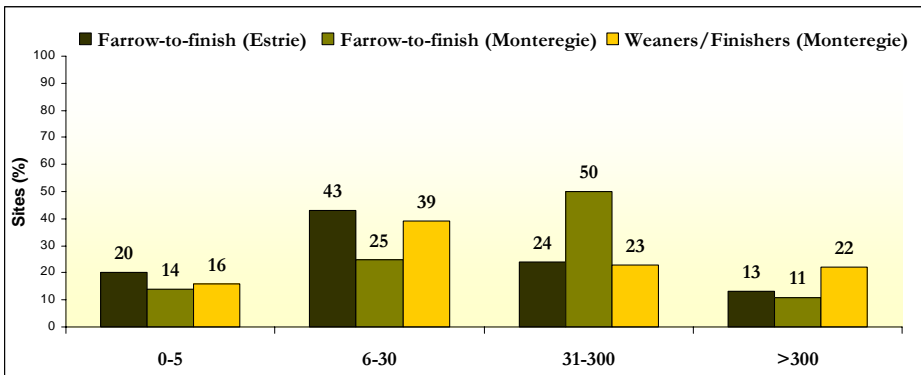
Figure 7. Dead pig disposal



Whatever the method used, wild and domestic animals should never have access to carcasses which are a significant source of pathogens. Broken and

open rendering containers or a pile of pigs near the farm leaves access to animals and therefore contributes to area spread, a situation unfortunately too common (34% of the sites). Although it is well recognized that the rendering truck should never be allowed on the site, the reality is often different, as shown in **Figure 8**. The truck could get as close as 5 meters from the unit on 16% of the sites. On the other hand, approximately the same proportion of producers did not allow the rendering truck on the site (more than 300 meters).

Figure 8. Proximity of the rendering truck to the facilities (meters)



■ The “When” and “Where”

Most producers were concerned by biosecurity, but others, although well aware of the consequences of a lack of biosecurity, did not comply or applied the rules only partially, varying in time or between facilities within a site. These non-compliant producers may increase the risk of contamination of surroundings farms and may represent a real threat, especially in a high pig density area. Therefore, each producer should be encouraged to pay attention to biosecurity and realize that it is a collective responsibility.

Biosecurity must be properly applied on a daily basis and by everyone circulating on the site. However, requirements should be achievable, clear and well understood by employees and visitors. Stay logical in your demands to avoid confusion: it does not make sense to insist on changing clothes without requiring a changing of boots. Moreover, asking for procedures that are impossible to implement is ineffective and may discourage your troops! So, you have to determine the measures you are willing to apply correctly and on a daily basis.

■ Conclusion

With regards to biosecurity, adherence to the rules is essential. A very effective rule "in theory" is useless if not applied properly. A sloppy application or a lack of uniformity leads to ineffective biosecurity and increases employee's frustration. The wide variation of recommended biosecurity rules from the different sources can confuse producers (Moore et al., 2008). Recommendations need to be harmonized and clarified to increase compliance on the farm. Continuing education of producers and employees is also essential to increase awareness of the importance of biosecurity.

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