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FACT SHEET

Hog Slaughterhouse Yard Biosecurity



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CHAIRE DE RECHERCHE EN
SALUBRITÉ DES VIANDES



Université 
de Montréal

INTRODUCTION

Across the various sectors of the pork industry, there are a number of biosecurity programs. The integration and alignment of these measures, however, can sometimes be weak. To increase the effectiveness of contamination control and to improve production biosecurity and safety, the activities and protocols developed by each pork-production sector, from farm to transport to slaughter, must be coordinated, and can only be coordinated if the different approaches to biosecurity are integrated.

The integration of biosecurity protocols across production networks and within the various sectors of the pork industry will be an asset for pathogen control, as much for humans as for the health of livestock. Improving the complementarity of measures between farms and among all other high-risk pork-production activities will require a range of actions; the development of a slaughterhouse yard biosecurity plan has been identified one of the important aspects of off-farm actions.¹

Clearly communicating basic risk-management (prevention) measures is a key part of improving biosecurity and production safety. This fact sheet has been developed in conjunction with the Canadian Swine Health Board national swine farm biosecurity standards² to outline and illustrate the integration of slaughterhouse yard biosecurity protocols—a solid step forward. To help strengthen producer/slaughterhouse relationships, this fact sheet will open and maintain this dialogue from a common and clearly established basis. There is currently no explicit alignment between transporters (and producers) and slaughter facilities. The development of this fact sheet, along with staff training and protocol implementation, will help integrate each sectors knowledge and their reciprocal efforts to achieve everyone's ultimate goal: avoid contaminating breeding and production facilities and suppliers, and improve the safety of pork products.

¹ Off-farm biosecurity report (2010), commissioned by the CSHB and produced by BPR-Infrastructure Inc.

² National Swine Farm-Level Biosecurity Standard. (2010) p. 9, http://www.swinehealth.ca/CSHB_Biosecurity_StandardE.pdf
Consulted on 20/05/11

POTENTIAL BENEFITS:

The long-term benefits of a slaughterhouse yard biosecurity plan will be broad and varied, but a biosecurity plan will first and foremost define the stronger, mutual relationship between slaughter facilities and transporters/producers. The overarching goal is the identification and implementation of biosecurity measures to reduce the risk of spreading diseases in slaughterhouse yards. A better understanding of biosecurity regulations in slaughterhouse yards, along with an appreciation of the importance of such measures for the sanitation status of pig farmers, will encourage some slaughterhouses to update and upgrade.

This fact sheet will foster the consistent application of biosecurity measures in slaughterhouse yards; an increased awareness of the importance of establishing biosecurity protocols by transporters/producers will facilitate the implementation of these sometimes-new expectations.

With observations and records of the widest possible range of situations in slaughter facilities, this fact sheet can be a tool adapted to the particulars of each slaughterhouse. In addition to emphasizing the importance of the sanitation status of herds (by limiting the risk of contamination from vehicles departing from slaughterhouses), it is hoped that this document will result in better control of endemic and exotic disease agents, and in an increased interest in food hygiene (meat safety).

BENEFICIARIES:

Farmers: Reduced risk of farm contamination from inadequately washed, disinfected and dried vehicles departing from slaughter facilities; stabilized sanitation status through reduced pathogens introduction and concomitant reduction of related economic losses.

Transporters: Reduced risk of client contamination through the development of adoption of improved hog transport/unloading practices.

Slaughter facilities/processors: Strengthened relationships with suppliers through increased emphasis on and appreciation of mutual biosecurity efforts, and improved biosecurity assurance vis-à-vis clients and inspection services.

1. BACKGROUND

This fact sheet was identified as a priority of the Quebec pork industry. Although it was developed in the context of the provincial pork sector, however, the process itself as well as several elements are common to the national pork industry as well as to other production sectors, such as cattle or poultry.

For several years, various pork risk-management programs have been designed at many levels in Quebec, in conjunction with federal programs. The *Bonnes pratiques de transport des porcs* (BPTP) program, the *Contrôle des Salmonelles* (PSCS) program and the Quebec Hog Industry Biosecurity and Health Stabilization Program are innovative and complementary national programs, like the food health and safety improvement programs based on Hazard Analysis Critical Control Point (HACCP) and on-farm (CQA) programs. This fact sheet is compliant with Quebec pork industry quality-assurance standards.

This fact sheet has been developed following a literature review identifying generally employed and recommended slaughterhouse yard biosecurity measures. A questionnaire was simultaneously developed and completed by four Quebec slaughterhouses to document existing entrance, exit, staff and unloading biosecurity measures. Slaughterhouses must already comply with various regulatory restrictions, and it is important that this fact sheet be aligned with other quality-assurance programs.

Little data exists on hog slaughterhouse yard biosecurity; the closest information in Canada would be the exotic-disease contingency plans. Each Canadian Food Inspection Agency³-certified slaughter facility operator must develop and maintain an emergency plan in the event of the appearance of an exotic disease. In the United States,⁴ many biosecurity features are included in the Food Defense plans, which are complementary to the Food Safety programs. The Food Defense plans focus on protecting the supply chain from possible contamination, while the Food Safety programs concern accidental contamination, whether biological, chemical or physical, in processing and storage. Unintentional contaminations normally fall under Hazard Analysis Critical Control Point (HACCP).

Slaughter facilities are affected by farm pathogens and can only incrementally affect the sanitary status of the animals it receives. Some slaughterhouses in Quebec, however, in collaboration with pork producers, have implemented an integrated pathogen (*Salmonella*) control program and have managed to reduce the risk of introducing this potentially zoonotic pathogen into the food chain.

It is well known that any improvements in the sanitation status of a farm leads to guaranteed benefit for the slaughterhouse, whether reduced contamination or easier control of zoonotic organisms on processed products. By

³ Contingency Planning, Meat Hygiene Manual of Procedures. (2010)
<http://www.inspection.gc.ca/english/fssa/meavia/man/mane.shtml> Consulted on 20/05/11

⁴ Developing a Food Defence Plan for Meat and Poultry Slaughter and Processing Plants. (2008)
http://www.fsis.usda.gov/PDF/Food_Defense_Plan.pdf Consulted on 20/05/11

improving certain procedures, slaughter facilities can reduce the transmission of pathogens and thus avoid unintentionally contaminating other animal populations—a long-term winning situation.

Provenance is important data in regard to exotic or emerging diseases, and traceability is key in supporting food-safety authorities. There tend to be several point of origin checks in the unloading area.

A biosecurity plan must also take into account the various means of indirect pathogen transmission between infected and non-infected hogs through biological and passive (material) means.⁵

The sometimes-disparate sanitation statuses of the animals received at a slaughter facility means that there are a number of parameters to verify and procedures to implement to avoid transferring pathogens by transport from a slaughterhouse to a farm. Establishing a slaughterhouse yard biosecurity plan would also be useful in the event of an exotic-disease outbreak at a slaughter facility.

There are three recommended steps in the establishment of a slaughterhouse yard biosecurity plan.⁶

STEP 1 – Slaughterhouse yard biosecurity assessment

STEP 2 – Biosecurity plan development

STEP 3 – Biosecurity plan implementation

Each recommended step is detailed further in this fact sheet and in the appended questionnaire, as well as in supporting documents. Prior to the creation of this fact sheet, preliminary assessments suggest that the first step should be particularly detailed.

The development of a slaughterhouse yard biosecurity plan takes into considerations all factors, with emphases on certain higher-risk points, with the objective of identifying preventative risk-management actions with positive cost-benefits.

The recommended measures should be taken in tandem with existing HACCP security and product safety protocols and with the various existing prevention and emergency plans.

This fact sheet has not been reviewed by industry, nor by the federal and provincial bodies under whose jurisdiction slaughterhouse yards fall; it is however based on an observed range of situations in a significant portion of Quebec's pork production sector. Its authors hope that the fact sheet's dissemination and its very existence will improve the overall awareness of the importance of biosecurity in slaughterhouse yards, encourage discussion, and perhaps become the basis for the development of a slaughterhouse yard biosecurity plan, ultimately safeguarding pork producers' sanitation status against endemic pathogens, bolstering food safety assurances, and mitigating any consequences arising from the appearance of an exotic disease.

⁵ National Swine Farm-Level Biosecurity Standard. (2010) p. 14, http://www.swinehealth.ca/CSHB_Biosecurity_StandardE.pdf Consulted on 20/05/11

⁶ Developing a Food Defence Plan for Meat and Poultry Slaughter and Processing Plants. (2008) http://www.fsis.usda.gov/PDF/Food_Defense_Plan.pdf Consulted on 20/05/11

2. OBJECTIVES AND DEFINITIONS

This fact sheet provides a guide for all types of hog slaughter facilities, whether federally or provincially regulated, to identify biosecurity methods and measures for input and output transport, for staff movement, and for stock unloading in the slaughterhouse yard. Presented as guidelines, the biosecurity measures presented here are intended to be a common reference tool for slaughterhouse operators, for transporters and for producers conveying hogs to slaughter facilities, in order to present basic, consistent measures across the entire industry, taking into account the different situations of slaughterhouses or networks, by developing a general biosecurity intervention plan.

There are several definitions of biosecurity. The FAO/BM/OIE⁷ define biosecurity as “the implementation of measures that reduce the risk of the introduction and spread of disease agent,” requiring “the adoption of attitudes and behaviours by people to reduce risk in all activities involving domestic, captive/exotic and wild animals and their products.” Generally speaking, biosecurity refers to the measures and methods required to protect a population from the introduction and propagation of pathogens. This fact sheet applies these definitions to slaughterhouse yards, which is understood to be the area surrounding the slaughterhouse buildings. The yard, a controlled access zone, is usually under the strict control of the slaughter facilities (see figure 1).

The Canadian swine-farm biosecurity standard⁸ lists three strategic objectives for any biosecurity plan; this fact sheet adapts each element to a slaughterhouse situation. External bioexclusion or biosecurity includes policies established to prevent the introduction of new pathogens in hogs housed in slaughterhouses. Internal biomanagement or biosecurity includes the biosecurity strategies developed to reduce the spread of disease among hogs on slaughter premises already contaminated with a pathogen. Bioconfinement, meanwhile, refers to biosecurity strategies to prevent the spread of pathogens already present on slaughter premises to other animal populations.

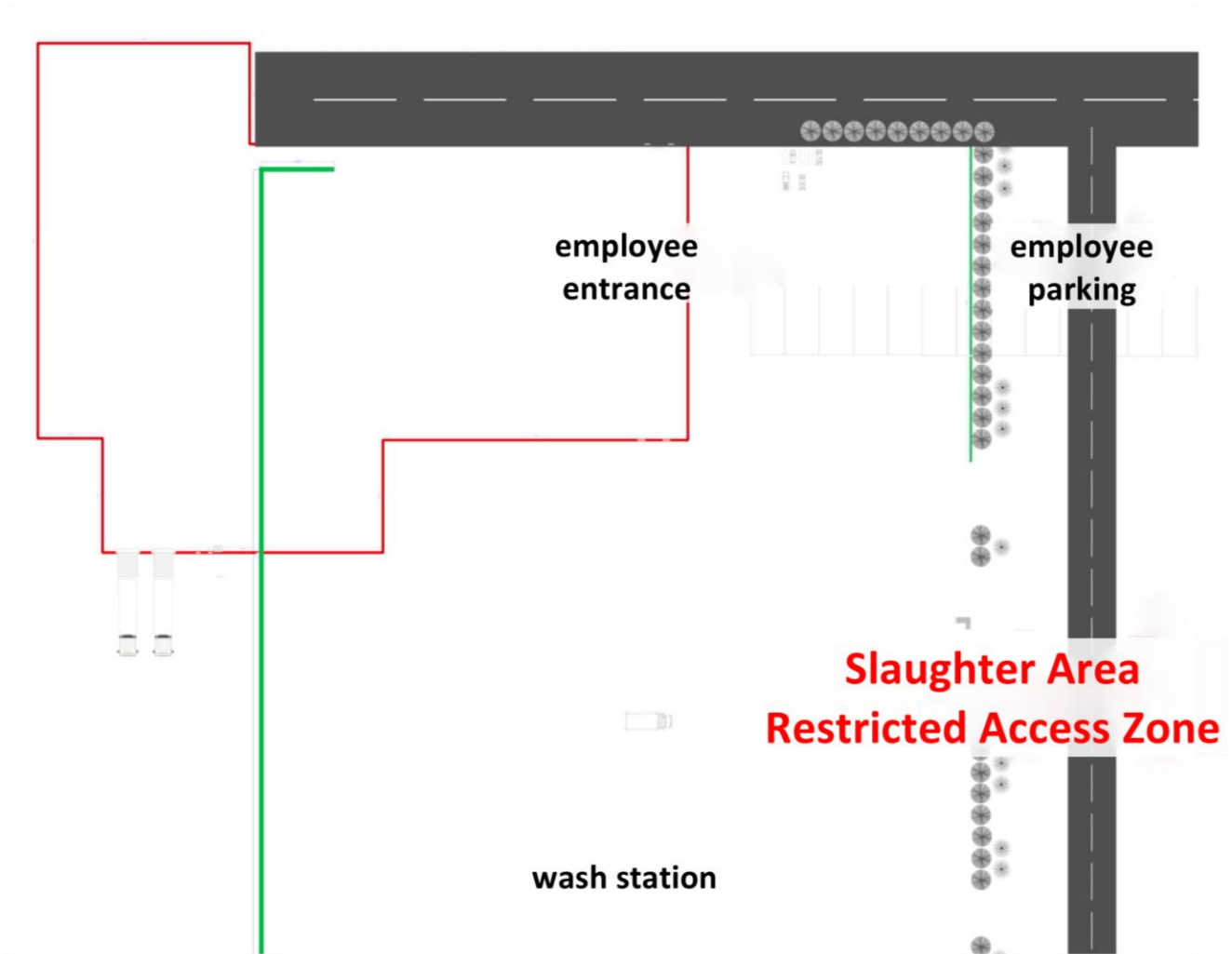
In practice, external safety in slaughterhouse yards primarily aims to avoid the introduction of exotic diseases and knowing contamination of the food chain—well-developed aspects of slaughter facilities’ biosecurity protocols. Internal biosecurity, generally under HACCP, currently exclusively concerns food safety. Bioconfinement is generally covered by exotic disease contingency plans, but does not always apply to endemic diseases. The improvement of certain procedures could reduce the risk of pathogen propagation in slaughterhouse yards and thus avoid the unintentional contamination of other animal populations.

⁷ Good practices for biosecurity in the pig sector. (2010) p. 3, <http://www.fao.org/docrep/012/i1435e/i1435e00.pdf> Consulted on 20/05/11

⁸ National Swine Farm-Level Biosecurity Standard. (2010) p. 9, http://www.swinehealth.ca/CSHB_Biosecurity_StandardE.pdf Consulted on 20/05/11

3. STEP-BY-STEP BIOSECURITY PLAN

Figure 1. Examples of various slaughterhouse factors to consider.



The development of a slaughterhouse yard biosecurity plan must be aligned with federal, provincial and even occasionally municipal regulations. The plan must be integrated with a facility’s HACCP protocols, and is intended as a link with the various existing emergency measures plans (CFIA and provincial). The plan will also cover certain traceability issues.

STEP 1 – SLAUGHTERHOUSE YARD BIOSECURITY ASSESSMENT

One person or one team will be designated to carry out this assessment, which tends to require the participation of the quality-assurance team. The assessment team completes the detailed questionnaire (appended), to list practices that could compromise biosecurity. Some questions may not be applicable to each establishment. A positive response is ideal. While a negative response is not necessarily indicative of a serious problem, it should trigger a biosecurity development process to be developed in the second step. The proposed questionnaire has been synthesized from a detailed document submitted to participating slaughter facilities.

There are two major components in slaughterhouse yard biosecurity assessments: the first is the responsibility of the slaughterhouse, while the second falls to the transporters. Note, however, that the various elements must be inter-related to ensure optimum security. A biosecurity chain is only as strong as its weakest link, and emphasizing one aspect will not necessarily guarantee success in every area.

This preliminary analysis identifies the practices in place, concludes the outline of the transport route (hogs, soiled bedding, inedibles, other), operations and transporter actions, and provides an assessment of slaughterhouse employees’ movements.

STEP 2 – BIOSECURITY PLAN DEVELOPMENT

After having completed an assessment of slaughterhouse yard biosecurity, the team continues to proceed through the risk assessment. The biosecurity plan’s development hinges on the prioritization and management of identified potential risks. This process can be outlined in a table; an example is provided in table 1, below. Subsequently, the team will design a projected risk reduction action plan.

Table 1. Example of identified risks and actions to implement.

Example Section	Example: Risk Negative Response to a Question Deemed Pertinent	Examples: Risk Mitigation Measures
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4. ASSESSMENT PARAMETERS

Unloading area	<i>Transporters do not identify limited access towards the waiting pen</i>	<ul style="list-style-type: none"> <i>* Identify access limits for transporters</i> <i>* Designate controlled access zones</i> <i>* Ensure compliance</i>
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For each, the team will retain the priority or priorities assessed. The plan will therefore be comprised of the identification and ranking of operational priorities, as well as the definition and the planning of the related activities. FSEP⁹ documents may be adapted for those wishing to link their process to HACCP tools. The actual form of the biosecurity plan remains up to the operator.

STEP 3 – BIOSECURITY PLAN IMPLEMENTATION AND CONTINUED IMPROVEMENT

Once the slaughterhouse yard biosecurity plan is completed, questions 1 to 5 in table 3 will help ensure the plan is functional and up to date. Questions 6 and 7 are essential elements of the plan and have thus also been included in the table.

Table 3. Biosecurity plan monitoring.

	Yes	No
1. Is there a designated quality-control person or team for biosecurity plan implementation, for HACCP integration and for updating as necessary?		
2. Have the team members received biosecurity training?		
3. Is the implementation of biosecurity measures regularly verified?		
4. Is the biosecurity plan regularly reassessed, at least once a year?		
5. Is the biosecurity plan integrated with the contingency plan, in the event that an exotic disease is suspected?		
6. Have all slaughterhouse and processing employees received endemic and contingency (exotic disease) biosecurity training?		
7. Are intake employees encouraged to report unusual behaviours or symptoms in hogs?		

⁹ Decision Tree – CCP determination and other Control Measures (PP, PC) Food Safety Enhancement Program Manual, chapter 3. <http://www.inspection.gc.ca/english/fssa/polstrat/haccp/manue/fseppasa3e.shtml#a3> Consulted on 20/05/11

To more easily assess the parameters affecting slaughterhouse biosecurity, the approach has been divided into sections, covering the various possibilities for indirect endemic and exotic disease transmission.

IMPORTANT PARAMETERS FOR SLAUGHTERHOUSES

4.1 Limited and restricted access zones

To guarantee a biosecure site, in this case a slaughterhouse yard, it is important to define it as a controlled activity area. Segregation is the minimum restriction in managing entrances and exits, and requires documents demonstrating compliance with controlled-access restrictions. Facilities that do not already use access documents or records will need to establish them as part of the development of their biosecurity protocol.

Slaughter premises must be secured (with, for instance, fencing and locked gates and doors) to prevent the entrance of non-authorized persons or animals. This perimeter is referred to as the controlled access zone.¹⁰ The grounds and structures within this delineated area, which is accessible through various controlled and secure access points, make up the slaughter site. The zone's controls and monitoring may be carried out by a slaughterhouse employee or by a guard. The premises' exterior lighting must be sufficient to allow monitoring also during the night or in the early morning. Notices must be posted to inform all workers and visitors and the general public that access to the yard is controlled. Employee and authorized-visitor parking locations and routes must also be clearly identified.

The restricted access zone, where hogs are received for slaughter and processing, must be located within the controlled access zone. Within the restricted access zone, the risk of direct contact with hogs, carcasses or pork products increases. Access is thus more significantly limited than in the controlled access zone. In order to limit unauthorized access to the restricted access zone, exterior doors, windows, roof openings, and entrances must be secured with bars, seals or sensors when not monitored (after working hours or on weekends). Emergency exits must close automatically.

4.2 Unloading area

Any lot arriving onsite increases the risk of propagation of pathogens or of possible vehicle contamination during unloading. Contaminated vehicles, meanwhile, present a risk of pathogen transmission for the next site if a strict health and safety program is not established.

To limit the risks of pathogen transmission and cross-contamination, several infrastructural elements must be taken into account, such as the establishment of a one-way route for use exclusively by live-hog transport vehicles, with a separate entrance and exit or a specific route (that is, vehicles may not return the way they entered). A dry-cleaning mechanism, if any (wood-chip cleaning) must be covered, used only for that purpose and conveniently located on the route. Unloading-area and vehicle wash water must be collected and treated before being discharged into the rain sewer.

Transporters' authorized limits must be identified by clear and visible signage. The unloading area must be concrete and/or asphalt and/or allow rapid cleaning without water accumulation. A clearly identified waiting area must be

¹⁰ National Swine Farm-Level Biosecurity Standard. (2010) p. 9, http://www.swinehealth.ca/CSHB_Biosecurity_StandardE.pdf
Consulted on 20/05/11

available, in the yard or outside, removed from the transport route, when several vehicles are waiting to be unloaded. Accumulated snow must be stored in a clearly marked area within the security perimeter. Finally, a boot- and hand-washing station for transporters must be available and in good working order.

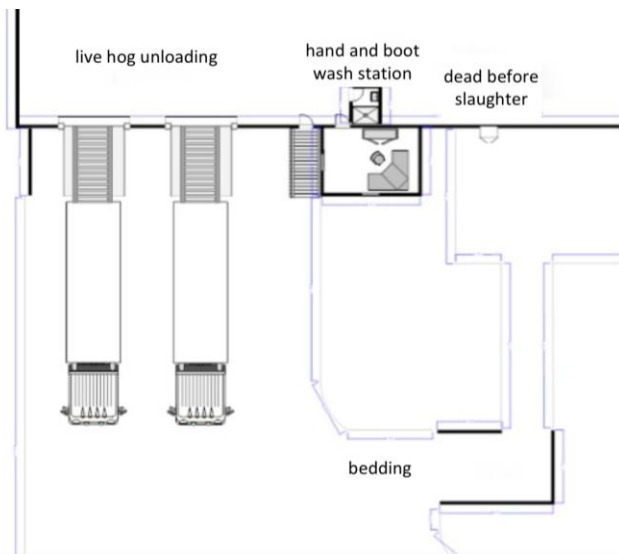
Several health and safety regulations must be enforced to reduce the possibility of infection in the loading dock area: the area must be cleaned regularly to prevent the accumulation of faeces or woodchips on the dock and on the ground; interior and exterior walls and floors must be made of easily washable materials; slaughterhouse cleaning materials must not be used in vehicles to remove sawdust and accumulated faeces from ramps; and a regular sanitation program must be implemented, including washing and disinfection as well as regular scraping and rinsing, and using specialized products.

The unloading dock represents a particularly critical biosecurity lock, which must be observed by transporters in order to prevent the introduction of pathogens into the vehicle, even if the vehicle is then washed.

A vehicle wash and disinfection station must be in place on the vehicles' route to their next loading site, ideally in close proximity to the slaughterhouse. The slaughter facility itself is a poor location for a wash station.

To ensure the traceability of deliveries and to reduce the likelihood of error, advance notice is required for all deliveries. All animal deliveries must be recorded to ensure easy monitoring or follow-up in the event of a health and safety incident. Controlled access to the unloading area prevents unverified or unauthorized deliveries. Unscheduled deliveries must be held beyond the boundaries of the controlled access zone during verification. Provisions exist to accommodate producers wishing to make Sunday-night or Monday-morning deliveries (to minimize the contamination of vehicles, assuming pens and docks are cleaned over the weekend).

Figure 2. Unloading area.



4.3 The human factor

Human transmission risks must be taken into account in developing and submitting a biosecurity plan, notably incorporating the management of staff changes, particularly within the restricted access zone (the actual slaughter facility). Given the considerable impact of introducing or spreading exotic diseases on pork production and on other species, several of these factors are worthy of particular attention. This fourth section outlines guidelines to prevent pathogen transmission through human presence on, movements through and departures from operations sites.

There are a number of infrastructural elements that must be established, such as direct building access for visitors and employees—that is, the building must be part of the controlled and restricted access zones, and entrance into the facility building must not be routed through the slaughterhouse yard.

The development of various protocols and the training of facility employees are important aspects of biosecurity program implementation, to ensure that the issues are understood. Among other regulations, employees are forbidden to bring home any clothing or other protective article provided by the slaughterhouse, a directive that takes on even greater weight for employees residing on pig farms. Employees must be aware of the contamination risks slaughterhouse pathogens poses for pig farms, and vice versa, through active and passive transmission. Depending on the pathogen, human transmission can be both direct and indirect; humans can even transmit certain pathogens, such as influenza,¹¹ salmonellae¹² and foot-and-mouth disease, to other species than swine.

A visitors' log must be maintained. Boots and clothing must be provided to visitors entering the restricted access zone, and visitors must be identified and accompanied by a slaughterhouse employee at all times. A restricted period is required for international visitors or returning nationals from specified countries to reduce the risk of exotic-disease propagation. The Canadian Food Inspection Agency¹³ recommends that farm workers or visitors who have recently been in countries where foot-and-mouth disease has been detected should not be allowed access to livestock for at least 14 days after entering Canada. If visitors or farm workers must have access to livestock, this period can be reduced to five days following thorough personal disinfection.

4.4 Water

The water system (water source, storage, delivery and treatment system) can be a source of pathogens. Sources of water that are susceptible to pathogen contamination include surface water (e.g. puddles, reservoirs, ponds, lakes and rivers), groundwater aquifers, and rainwater collection systems. Surface water sources pose a significantly higher risk for the introduction of infectious organisms and undesirable elements, and are therefore not recommended without a functioning water-treatment system. If not from a municipal source and/ or establish a prevention program in line with HACCP, water should be subject to regular testing. Water reservoirs should be covered to prevent possible contamination from birds or from wildlife. In the event of unsatisfactory water quality, a water-treatment system must be implemented.

To prevent hogs awaiting slaughter from ingesting new pathogens, accumulated water that could be consumed by animals should be drained from the restricted access zone. Some strains of salmonella are known to infect a hog in less than two hours in slaughterhouse wait conditions.^{14,15}

4.5 Dead stock and offal

¹¹ Lowe J, Connor J, Gramer M, Vincent A. (2009) Novel H1N1 Influenza: Implications on human and animals health. Allen D. Leman Swine Conference p.101-102 <http://www.aasv.org/library/swineinfo/Content/LEMAN/2009/101.pdf> Consulted on 20/05/11

¹² Bahnsen P. (2008) *Salmonella*: Potential for pig and human disease. American Association of Swine Veterinarians p.503-506 <http://www.aasv.org/library/swineinfo/Content/AASV/2008/503.pdf> Consulted on 20/05/11

¹³ Animal Health Starts on the Farm, Canadian Food Inspection Agency <http://www.inspection.gc.ca/english/anima/disemala/20100517inde.shtml> Consulted on 20/05/11

¹⁴ Boughton C, Egan J, Kelly G, Markey B, Leonard N. (2007) Rapid infection of pigs following exposure to environments contaminated with different levels of *Salmonella typhimurium*. *Foodborne Pathog. Dis.* Spring 4(1): 33-40.

¹⁵ Hurd HS, Gailey JK, McKean JD, Rostagno MH. (2001) Rapid infection in market-weight swine following exposure to a *Salmonella typhimurium*-contaminated environment. *Am. J. Vet. Res.* Aug. 62(8): 1194-7.

Dead stock and offal are a source of pathogens, the transmission of which through handling, storage and disposal, in accordance with provincial and municipal regulations and with recognized biosecurity protocols, can be reduced and even eliminated.

Unused containers must be located inside the building, or, if placed outside, must be covered; they must be washed after each use; vehicles transporting dead stock and offal must keep to a clearly identified, restricted designated route; and records of mortality and offal-volume (number of containers) must be maintained to facilitate traceability.

4.6 Pests and birds

Numerous pests can live in close contact with hogs, and can be a significant factor in endemic disease transmission in to other operations. Birds, insects and flies, when looking for food, also come into close contact with hogs and can transmit contaminated material, both in their feces and physically. In a slaughter facility with multiple sources of animal intake, effective pest control is crucial to controlling the transmission of pathogens.

To avoid attracting pests to the facilities, do not allow debris to accumulate around the slaughterhouse, remove weeds, and keep grass mown. Ensure the unloading dock area is closed to birds and implement and monitor a pest-management program.

4.7 Aerosols

Airborne transmission is common and well-documented: given the concentration per site of animals of varying origins, it is important to consider and manage airborne transmission, especially as some pathogens, like the Porcine Reproductive and Respiratory Syndrome virus or like the bacteria that cause Porcine Enzootic Pneumonia (*Mycoplasma hyopneumoniae*), can travel up to 9.1 and 9.2 km respectively.¹⁶ The virus that causes foot-and-mouth disease, meanwhile, has been known to reach airborne transmission spans in optimum weather conditions from Brittany in France to the Isle of Wight in England, crossing the Channel.¹⁷

Ideally, there should be no swine operations in close proximity to the slaughter facilities, although this restriction is nearly impossible to control for existing slaughterhouses or farms, in which cases there are a number of possible approaches to limit the transmission of airborne, such as the addition of windbreaks (trees) around the slaughter and production facilities. Facilities out of prevailing winds and hilly topography also help mitigate the risk of transmission. The distance between slaughter facilities and nearby farms (including cattle and poultry farms) should be measured to determine whether geographical factors pose or exacerbate pathogen transmission risks for these farms.

4.8 Meat Products

Dry/cured or fresh (uncooked) meat returns pose risks of introducing pathogens, since the meat products may still contain animal pathogens if not processed adequately. There is also a risk of introducing foreign animal disease into Canada in foreign meat products. Hogs must therefore not be exposed to dry/cured or fresh (uncooked) meat products.

¹⁶ Dee SA, Otake S, Oliviera S, Deen J, (2009). Evidence of long distance airborne spread of porcine reproductive and respiratory syndrome virus and *Mycoplasma hyopneumoniae*. *Vet. Res.* 40,39.

¹⁷ Donaldson AI, Gloster J, Harvey LDJ, Deans DH. (1982) Use of prediction models to forecast and analyze airborne spread during the foot-and mouth disease outbreaks in Brittany, Jersey and the Isle of Wight in 1981. *Vet. Rec.* 110: 53–57.

Meat products returned by clients or other establishments must be inspected in a designated, separate area of the slaughter facilities, and records must be maintained. When meat products are exported, slaughter facilities must comply with the section entitled “Meat products exported and returned” in the Meat Hygiene Manual of Procedures.

IMPORTANT PARAMETERS FOR TRANSPORTERS

4.9 Unloading area – vehicle

These bioexclusion measures for vehicles will help mitigate the level of biological risk (i.e., the introduction of new pathogens into transport vehicles). Compliance with these measures will significantly reduce the risk of transporting new pathogens to breeding and production facilities. It bears repeating that loading docks in particular represent a biosecurity lock that must be observed by transporters in order to prevent the introduction of new pathogens into vehicles, even if the vehicle is subsequently immediately washed.

Transporters must be able to identify and to respect the various posted slaughterhouse limits (restricted-access zone). Dock access routes must be understood and strictly observed. Transporters should not have access to (interior) loading docks and to waiting areas. A boot- and hand-washing station should be available and located close to unloading dock access doors to be used by transporters.

A health and safety improvement protocol for vehicles leaving slaughter facilities have been established in compliance with the health and safety provisions of the *Bonne Pratique de Transport des Porcs du Québec* guide.

4.10 Hog handling – Human and passive handling (tools and equipment)

For vehicle and slaughterhouse bioexclusion and bioconfinement, the biological management of hog handling during unloading must have undergone a documented development process to limit pathogen transmission by human or passive means.

Transporters shall thus put on boots and coveralls immediately upon exiting vehicles; they shall wear disposable or washable gloves to handle animals; they shall not use slaughterhouse tools or materials such as panels, sticks, prods, whips, etc., to handle animals, but provide necessary tools themselves; and finally, slaughterhouse employees shall not enter transport vehicles (for instance, to assist transporters in handling non-mobile animals).

ACKNOWLEDGMENTS AND APPENDIX

ACKNOWLEDGMENTS

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AUTHORS

Philippe FRAVALO, MSc, PHD & Marie-Claude POULIN, DVM, DA

CRSV: *Chaire de Recherche en Salubrité des Viandes*
Faculté de médecine vétérinaire de Saint Hyacinthe
Université de Montréal
3190, Sicotte Street, Saint Hyacinthe QC, Canada J2S 7C6
Tel.: 1 450 773 8521 x. 0064
Email: philippe.fravalo@umontreal.ca

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APPENDIX

Appendix 1: Questionnaire – Slaughterhouse yard biosecurity assessment