

National Swine Farm-Level Biosecurity Standard

Canadian Swine Health Board
Technical Committee on Biosecurity

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Technical Committee on Biosecurity



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Preface

The Canadian government is moving toward an integrated approach to biosecurity that rationalizes policy, legislation, stakeholder roles and responsibilities as a means to better manage relevant risks in food and agriculture.

Funded by Agriculture and Agri-Food Canada, the Canadian Swine Health Board (CSHB) was formed in 2008 as a national organization with the mission 'to provide leadership and coordination in support of the management of the health of the Canadian swine herd'. The Board of the CSHB includes representation from the Canadian Pork Council, the Canadian Association of Swine Veterinarians, the Canadian Centre for Swine Improvement Inc., the Canadian Meat Council, and The Veterinary Colleges of Canada. The Board, with its broad stakeholder representation, is in a unique position to refocus efforts in animal health on a national basis. It provides a framework for effective communication and collaboration on health issues within the sector and with other animal and human health organizations and initiatives.

The four following pillars were identified in consultation with industry and government stakeholders as key components required to support the establishment of a structured disease response plan for the Canadian pork sector:

- Biosecurity,
- Research,
- Long Term Disease Risk Management, and
- Sustainability.

Within the Biosecurity pillar, the development and implementation of the National Swine Farm-Level Biosecurity Standard and related best management practices are an important first step

In January 2010, based on recommendations of the Canadian Swine Health Board Biosecurity Advisory Committee, a Technical Committee was formed and given the mandate to develop a first draft of the National Swine Farm-Level Biosecurity Standard. This voluntary Standard is a tool for producers and industry stakeholders to use to tailor biosecurity measures to individual farm needs and regional considerations. It is a means to improve the economics of the industry.

The Technical Committee will continue to encourage discussion and promote collaboration by engaging experts and stakeholders in order to enhance this document. In addition to this National Swine Farm-Level Biosecurity Standard, a user guide outlining best management practices will be developed.

Abbreviations and Acronyms



ASF	African Swine Fever
ACA	Animal Care Assurance Program © of the Canadian Pork Council
BMP	Best Management Practices
CFIA	Canadian Food Inspection Agency
CSF	Classical Swine Fever
CSHB	Canadian Swine Health Board
CQA	Canadian Quality Assurance © of the Canadian Pork Council
FMD	Foot and Mouth Disease
FAD	Foreign Animal Disease
FAO	Food and Agriculture Organization
GMPs	Good Management Practices
OIE	Office International des Epizooties/World Organization for Animal Health
PRRS	Porcine Reproductive and Respiratory Syndrome
PRRSv	Porcine Reproductive and Respiratory Syndrome virus
WB	World Bank

Glossary

Additional Biosecurity Measures

Biosecurity policies, procedures, and processes to mitigate risk when recommended biosecurity practices **cannot** be implemented (i.e., a recommendation may be an “all-in/all-out” system). Where this is not possible (i.e., as in the case of continuous flow barns) additional biosecurity measures need to be implemented.

Animal Group

A group of animals separated by age, sex, production stage or health status.

Approved

Approved for food or agricultural use by the appropriate regulatory authority for the specific use mentioned on the label and/or manufacturer’s literature (e.g. pharmaceuticals, rodenticides, biologics).

Batches

A group of pigs placed, grown and sold as a group. It refers to the animals that are raised in an “all-in/all-out” manner. A batch of pigs is a cohort that shares common epidemiological risk factors.

Barn

Any structure that encloses animals or animal groups.

Beneficial Practice

A management practice, technique or technology that results in improvement and increased sustainability of the operation.

Biosecurity Program

A disease risk reduction program that conforms to the National Swine Farm-Level Biosecurity Standard.

Buffer Zone

A defined area surrounding a higher level biosecure zone and intended to reduce the risk of pathogen transmission.

Carrier

A pig or animal which carries a pathogen without clinical signs and is able to transmit the pathogen to other animals.

Clean

Free of any visible accumulation of organic matter and debris or other residues.

Compartment

One or more premises which have clearly defined common biosecurity, health status and management systems. While zoning applies to an animal subpopulation defined primarily on a geographical basis (using natural, artificial or legal boundaries), compartmentalization applies to an animal subpopulation defined primarily by management and common husbandry practices related to biosecurity.

Control

The reduction of disease incidence, prevalence, morbidity or mortality to a locally acceptable level as a result of deliberate efforts; continued intervention measures are required to maintain the reduction.

Controlled Access Point

A visually defined entry point through which **all** traffic (people, animals and equipment) will enter a Controlled Access Zone (CAZ) or a Restricted Access Zone (RAZ).

Controlled Access Zone (CAZ)

The area of land and buildings constituting the animal production area of the premises that is accessible through a securable controlled access point.

Danish Entrance

A barn entrance that includes a barrier and requires clothing and footwear change as well as hand sanitizing to enter the RAZ.

Dead Stock

Animals that die on a farm, either naturally or by euthanization that are disposed of either on-farm or taken off-farm for disposal or rendering. A dead-stock service is a provider that removes dead animals from farms.

Debris

Any accumulation of material that may be capable of harbouring disease-causing organisms or pests such as discarded equipment or machinery, manure, dead animals, parts of dead animals or soil.

Disease (infectious)

Clinical and/or pathological manifestation of infection.

Disinfection

The application of a physical or chemical process to a surface for the purpose of destroying or inhibiting the activity of disease-causing microorganisms.

Domestic

Pertaining to Canada as apart from other countries; native, indigenous.

Down Time

1) **For facility:** the time between animal groups, starting with a barn or unit area being emptied of animals and ending with the placement of new animals. It allows for the natural reduction of disease-causing microorganisms within the barn or unit area. The effective period can be reduced by cleaning at the beginning of the period.

2) **For people:** minimum amount of time (often expressed in overnights) required to be away from pig contact before entering other swine premises.

Elimination of Disease

Reduction to zero of the incidence of a specified disease in defined geographical areas or farms as a result of deliberate disease elimination efforts.

Emerging Disease

A new infection resulting from the evolution or change of an existing pathogenic agent, a known infection spreading to a new geographic area or population, or a previously unrecognized pathogenic agent or disease diagnosed for the first time that has a significant impact on an animal or public health.

Endemic Disease

A disease regularly present in an animal population.

Enhanced Biosecurity

A period of heightened biosecurity in response to an increased risk of disease (particularly when a disease outbreak is suspected on the premises or identified in the vicinity). This includes increased emphasis on existing biosecurity measures and the implementation of additional biosecurity policies, procedures and processes.

Eradication

Permanent reduction to zero of the worldwide incidence of infection caused by a specific agent as a result of deliberate efforts; intervention measures are no longer needed.

Essential Visitors

Non farm personnel providing essential services on the premises including veterinarians, service and delivery people, suppliers and regulators.

Exotic Disease

A disease not usually present in Canada but which occurs in other countries. See also Foreign Animal Disease.

Farm or Production Site

A parcel of land including buildings or enclosures used for the production of pigs.

Farm-Level

Pertaining to the farm, people, equipment, supplies and services that come into direct contact with the farm.

Feral Pig

Any wild pig including escaped domestic pigs now living in the wild.

Fomite

Any inanimate object (e.g. shovels) or substance (e.g., soil) on which pathogens may be transferred.

Foreign

Pertaining to diseases or inputs that are not from within Canada. Not domestic.

Foreign Animal Disease

A reportable disease under Schedule 2 of the Canadian Health of Animals Regulation that does not exist in Canada and for which the CFIA has a strategy; or any other disease which after due consideration is designated as such by the Minister.

Health Status

Knowledge about the presence or absence of specific pathogens in a population of pigs. Normally a «high» health status implies the absence of specific pathogens, whereas a «low» health status implies the presence of specific pathogens and risk of disease.

Herd

A number of single species animals kept together under human control, or a congregation of gregarious wild animals.

Immunization Strategy

A strategy that boosts immunity to a pathogen. It can be commercial vaccination or controlled exposure to biological material.

Infected Animal

An animal that has acquired a pathogen.

Infection

Entry and development or multiplication of an infectious agent in the body of humans or animals.

Livestock

Any animal (including birds) intentionally reared in an agricultural setting for the purposes of profit or subsistence, whether for food, fur fibre, dairy, draft, breeding, sport or hobby purposes, or other product or labour.

Lock

A secure fastening device that requires a key, code or key fob to open.

Mutli-site

A group of farms, sites or production units linked by common ownership or management structure and pig flow. It typically includes sow unit, nursery and finisher unit.

Non-Essential Visitors

People and their equipment who do not require access to the CAZ and RAZ. These include but are not limited to guests, friends and family.

Notifiable Disease

A disease that is required by law to be reported to regulatory authorities – federal or provincial agencies. Under international policies, the federal animal health authorities may in turn notify international disease reporting organization such as the OIE or WHO.

On-Farm

Pertaining to activities carried out on the farm itself.

Pathogenic

Microorganisms capable of causing disease.

Pathogens

Biological agents, such as bacteria, viruses or parasites which have the potential to cause diseases.

Pest

Any insect or other animal that may potentially come in contact with farm animals that is undesirable due to risk of disease spread.

Potable

Water suitable for human consumption, as per appropriate legislation.

Premises

A geographically defined location such as a ranch, farm, stable or other establishment on which swine are raised, kept, assembled or disposed of.

Producer Guidance

Examples and beneficial practices to facilitate achievement of the standard.

Production Site or Production Unit

Premises where live pigs are kept.

Production System

A group of farms, sites or production units linked by common ownership or management structure. A production system may have different compartments, for example, PRRS negative pigs are normally kept separate from PRRS positive barns within the production system.

Protocol

A code of conduct or defined procedures.

Range

An open area with fences used to contain an animals.

Reportable Disease

A disease that must be immediately reported to the Canadian Food Inspection Agency (CFIA). Refer to www.inspection.gc.ca/english/anima/disemala/disemalae.shtml.

Restricted Access Zone (RAZ)

An area inside the CAZ that is used, or intended to be used, to house swine, including semi-confined and range production. Within the RAZ there is potential for direct contact with pigs. Personnel and equipment access is more restricted than the CAZ. The RAZ is sometimes referred to as the Production Area or Restricted Area (RA) in other production documents and guides.

Shower-In-Shower-Out Procedure

A farm entry procedure whereby all people entering the RAZ shower and don farm-dedicated clothing and footwear. The process is reversed upon exiting the RAZ.

Site

A facility defined by the stage of production in multi-site pig production. Typically site 1 refers to the breeding herd, site 2 to the nursery and site 3 to the finishing phase.

Standard Operating Procedure (SOP)

Documented procedure based on generally accepted good practices that describes in detail the steps followed to meet an objective (e.g., an SOP that details the barn cleaning and disinfection procedure).

Swine

A member of the porcine family – pig, piglet, gilt, barrow, boar, sow, etc.

Target Outcome

The goal that all keepers of swine should aim for if they are to protect their herds from the introduction and spread of porcine diseases.

Uni-Directional Flow

A biosecurity measure whereby flow of pigs and inputs is arranged within a farm or production system such that movements of animals, humans and material are from areas of higher (or potentially higher) health status to locations of lower (or potentially lower) health status. Commonly referred to as pig flow and people flow and may also be called the “walk forward principle”.

Unit Area

An area or structure housing an animal group. This may be a single barn for each group. Several animal groups can occupy respective unit areas within a single structure if they are physically separated and biosecurity measures are incorporated between them.

Vector

Any living carrier that transports an infectious agent from an infected individual to a susceptible individual, its food or immediate surroundings.

Verification

Refers to the confirmation, through the provision of objective evidence, that specified requirements have been fulfilled.

Zone

A defined geographical area where natural, artificial or legal boundaries and implementation of biosecurity procedures creates a defined health status.

Zoonosis

Any disease or infection which is naturally transmissible from animals to humans.

1. Introduction

1.1 Defining Biosecurity

Biosecurity is the term used to describe the measures and procedures needed to protect a population against the introduction and spread of pathogens. FAO/WB/OIE experts (2009) defined it as “the implementation of measures that reduce the risk of the introduction and spread of disease agents. It requires the adoption of attitudes and behaviours by people to reduce risk in all activities involving domestic, captive/exotic and wild animals and their products”.

A biosecurity plan can be implemented to attain three strategic objectives:

- 1) Bio-exclusion or external biosecurity: policies developed to prevent the introduction of a new pathogen to pigs housed on livestock premises.
- 2) Bio-management or internal biosecurity: a biosecurity strategy developed to reduce the spread of disease among pigs on premises already contaminated with a pathogen.
- 3) Bio-containment: a biosecurity strategy developed to prevent the escape and spread of pathogens already present on pig premises in order to prevent spread to another population of animals.

1.2 Defining the National Swine Farm-Level Biosecurity Standard

1.2.1 Aim of the Standard

The aim of this Standard is to assist the swine industry attain and apply the strategic objectives of bio-exclusion, bio-confinement and bio-management of swine pathogens and zoonoses in Canada.

1.2.2 Biosecurity Best Management Practices (BMPs)

The Standard has been developed in a way that will enable stakeholders, at an appropriate time and at the discretion of the industry, to develop biosecurity best management practices specific to each type of farm and production system.

An accompanying user guide, to be made available through the Canadian Swine Health Board (www.swinehealth.ca), will be developed as an implementation tool for this Standard. It contains a comprehensive description of the best management practices (BMPs) and the actions needed to create a farm-specific biosecurity plan.

1.2.3 Scope of the Standard

The National Swine Farm-Level Biosecurity Standard applies to all types of pig production in Canada including intensive and extensive, and large or small herds.

The scope of this standard covers the breeding and production of pigs from birth to maturity or sale, and acknowledges that many farms are part of a larger integrated multi-site production system with common health status and biosecurity practices.

It was developed to address all pathogens causing disease in swine and those related to food safety and human health.

1.2.4 Targeted Audience

This Standard is a comprehensive voluntary standard designed to provide Biosecurity guidance for veterinarians, producers, owners or managers, and service providers in all swine sectors in Canada.

An accompanying user guidance manual will provide guidance and specific examples of how the standard principles can be applied.

1.2.5 Relationship to Other Initiatives

The National Swine Farm-Level Biosecurity Standard is intended to be complementary to other initiatives needed to maintain the health of the Canadian swine herd. In particular, this Standard will integrate with the following initiatives:

- 1) Canadian pork traceability and identification programs,
- 2) provincial and national Canadian swine disease monitoring and surveillance strategies, and
- 3) relevant federal and provincial animal health legislation.

1.3 Biosecurity Considerations

1.3.1 Principles in the Standard

Measures and procedures applied at the farm or the production system level to reduce the risk of pathogen introduction, and those applied within a production site to reduce the risk of pathogen spread, can be grouped into three general principles:

- **Segregation (Seg):** The application of barriers (physical barriers, temporal separation of activities, and procedures) to limit risk of pathogens from infected animals and from contaminated materials from entering an uninfected site or group of animals.
- **Sanitation (San):** Described as cleaning and washing to remove visible organic material, disinfecting and drying; all to reduce and/or inactivate pathogens.
- **Flow Management (FM):** The actions taken to prevent the cross-contamination of uninfected pigs by organizing the flow of pigs, people and materials within a farm or a production system.
- **Records:** While not a biosecurity principle in itself, documentation is required to support the application of BMPs, training and compliance with biosecurity protocols. A verification process may be performed by internal or external inspection or by an independent third-party audit and is important to confirm that biosecurity best management practices are applied.

1.3.2 Biosecurity Planning and Training

Every farm or production system should have a written plan documenting its biosecurity protocols. Appropriate education, training, and compliance strategies should be utilized so that all people working

on and around the premises are properly informed and trained to apply the required biosecurity measures. Personnel should review, understand and follow the applicable biosecurity protocols for their assigned tasks. The CSHB will develop tools to accomplish these tasks, including a user guide, video and supporting literature accessible at www.swinehealth.ca.

1.3.3 Communication Strategy

A well-defined biosecurity strategy must include good communication and discussion among all stakeholders. Transmission of pathogens can be a regional problem that requires an effective communication network between stakeholders of different production systems.

1.3.4 Health Status Monitoring

Farm and production system monitoring of health status should accompany a biosecurity plan.

1.3.5 Compartmentalization

When multiple sites are epidemiologically linked through a common health status and biosecurity measures, they can be considered an animal health compartment. Compartmentalization is an internationally recognized animal health concept which facilitates the trade in animals and food products, and is a tool for disease management in production systems. The concept is not new; it has been applied in many disease control and elimination programs. Compartmentalization is the management and biosecurity measures needed to create a functional separation of *subpopulations*¹. Compartmentalization is considered, together with zoning, a fundamental principle of biosecurity. In this document, compartmentalization is the animal health principle for multi-site production systems where a common biosecurity plan is needed to accommodate system-wide planning. Veterinary actions need to be coordinated between farms; disease risk from one farm should be understood in context of the whole production flow.

1.4 Key Elements of the Standard

1.4.1 Major Sections

The standard is organized in three specific sections:

- 1) direct route of contamination,
- 2) indirect route of contamination,
- 3) on-farm health management and regional considerations.

Within each section, major target outcomes are identified with a statement, a rationale describing the associated risks, and examples of best management practices (BMPs) that could be implemented at the farm to control the identified risks.

The proposed biosecurity BMPs are divided into four sections: segregation (SEG), sanitation (SAN), flow management (FM), and records (REC). FM is further divided into two sections, one to explain application at the farm level and the other at the production system level.

¹ www.oie.int/eng/normes/mcode/en_chapitre_1.4.4.pdf

All the BMPs in the four sections (SEG, SAN, FM and REC) are examples specific to each risk factor commonly found in swine operations in Canada. However, the specific practices retained for each farm will have to be optimized and adapted to the pig production model of the farm (intensive, organic, etc.), production type (breeding stock, commercial production, single or multi-site production, etc.), location (distance from other production sites), and production system organization. Not all of the principles may be applied to every major target outcome and the BMPs listed are examples for illustration only. The BMPs in this document are not intended to be comprehensive, they are meant to be examples. More documentation and visual training materials are available at www.swinehealth.ca. However, all the principles should be considered when developing best management practices.

A glossary with definitions specific to the text is included in this document.

2. National Swine Farm-Level Biosecurity Standard

2.1 Direct Route of Contamination

Direct route of contamination refers to the transmission of pathogens between infected and non-infected pigs through pig-to-pig contact, semen and embryos. The three major biosecurity risks addressed in this section are those related to the introduction of live animals, semen and embryos from domestic and foreign sources.

2.1.1 Live Pigs from Domestic Source

Live Pigs from Domestic Source	Limit the risk of introducing pathogens through incoming live pigs from a domestic source.
Rationale	Live pigs are an important potential source of pathogens.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Introduce only animals of known and acceptable health status. Limit frequency of new animal introduction Isolate/quarantine new animals and observe daily
Sanitation	Clean the isolation facilities between batches. Maximize downtime between animal batches.
Flow Management	Farm level: Use all-in/all-out placement of pigs within a barn or site to minimize risk. Production system level: Report any unusual disease observations to the veterinarian responsible for the health status of the production system to allow for a timely intervention to prevent spread through contaminated animals.
Records	Record all introductions, placements and removals of animals so that, if an infectious disease is suspected, the animals or group of animals can be quickly traced and isolated.

2.1.2 Semen and Embryos from Domestic Source

Semen and Embryos from Domestic Source	Limit the risk of introducing endemic disease and emerging pathogens into the herd through semen and embryos from a domestic source.
Rationale	Some pathogens, like PRRSv, can be transmitted through semen.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Minimize the number of sources to the minimum needed for genetic progress and commercial needs.
Sanitation	Verify that pig transport companies have defined biosecurity protocols for delivery vehicles and drivers.

Semen and Embryos from Domestic Source

Limit the risk of introducing endemic disease and emerging pathogens into the herd through semen and embryos from a domestic source.

Flow Management:	Farm Level: Use barriers and packaging protocols to avoid cross-contamination on delivery of semen. Production System Level: Put in place a defined health status or biosecurity semen purchasing policy for the farm or the whole production system (as applicable).
Records	Keep a current boar stud health report on the farm.

2.1.3 Live Pigs, Semen and Embryos from a Foreign Country

Live Pigs, Semen and Embryos from a Foreign Country

Limit the risk of introducing endemic disease, emerging pathogens and foreign animal disease into the herd through live pig semen and embryos from a foreign country.

Rationale	In addition to CFIA legal requirements for import, it is important to investigate the endemic disease status of the supply herd and its status regarding potentially new emerging diseases that could be introduced to Canada.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Limit breeding activities with foreign purchased semen to quarantined animals only.
Sanitation	Wash, disinfect and dry the quarantine facility between batches.
Flow Management:	Production System Level: Ensure that the production system veterinarian approves the purchase of animals and/or embryos from outside Canada.
Records	Record the vet-to-vet conversation with the veterinarian in charge of the foreign source supplier.

2.2 Indirect Route of Contamination

In this section, indirect route of contamination refers to the transmission of pathogens between infected and non-infected pigs through vectors and fomites.

2.2.1 Incoming Animal Transport

Incoming Animal Transport

Prevent introduction of pathogens from incoming transportation.

Rationale	Every time animals are moved into the site, there are associated risks of introduction and spread of pathogens from contaminated vehicles.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Plan the traffic flow within and between farms/units to minimize the introduction of pathogens.
Sanitation	Put specific sanitation protocols in place for incoming vehicles.
Flow Management:	Farm Level and Production System Level: Dedicate trucks to specific flows within a production system and between zones (CAZ-RAZ) on a farm.
Records	Ensure trucks have an inspection program and check their records.

2.2.2 Outgoing Animal Transport

Outgoing Animal Transport	Prevent the spread of pathogens during outgoing transportation.
Rationale	Contaminated transport vehicles are a source of pathogens for both the shipping site and the receiving site.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Apply appropriate down time with trucks/vehicles.
Sanitation	Implement a sanitation wash/disinfect/dry program for all vehicles.
Flow Management:	Farm Level and Production System Level: Dedicate trucks to specific flows within one production system or one farm.
Records	Verify for effective wash/disinfect/dry and record it.

2.2.3 Dead Stock

Dead Stock	Prevent contamination and spread of pathogens from dead stock by handling, storing and disposing of mortalities in accordance with current legislation (provincial and municipal) and good biosecurity practices.
Rationale	Dead stock represents a source of pathogens for live animals and other farms.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Implement procedures for handling, temporary/final storage and removal to prevent any contamination of feed and water sources, housing areas and the external environment (e.g., leak-proof containers located outside of the production area).
Sanitation	Sanitize equipment used to remove dead stock from the farm or production system.
Flow Management:	Farm Level: Handle dead stock appropriately to ensure that any potential pathogens are not spread beyond the group and the barn. Production System Level: Dedicate dead stock vehicles to specific flows within a production system and use a pick-up schedule that can maintain a production system flow.
Records	Keep a daily mortality log.

2.2.4 People

People	Prevent the transmission of pathogens by people moving onto, within and from the farm site.
Rationale	All family members, employees, essential service providers, domestic visitors and international visitors can transport pathogens on boots, clothes and bodies and may be carriers of pathogens.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>

People	Prevent the transmission of pathogens by people moving onto, within and from the farm site.
Segregation	Establish a controlled access zone (CAZ) around your building by installing visual indicators at access points of the recognized zones. Utilize a Danish entrance for your restricted access zone (RAZ). Only allow those necessary into the RAZ..
Sanitation	Dedicate separate clothing and footwear for use within the RAZ.
Flow Management:	Farm Level: Respect forward uni-directional flow by moving from youngest to oldest pigs. Production System Level: Report changes in health status of the herd to the system veterinarian and modify people-flow to restrict transfer of disease.
Records	Maintain employee and visitor log books including date and place of last pig and other animal contact.

2.2.5 Aerosols

Aerosols	Minimize the risk of entry or exit of airborne pathogens.
Rationale	Aerosol transmission of some organisms has been documented. It is an important mode transmission that should be considered in densely farmed areas for some key pathogens like PRRSv. The secure distance between farms varies depending on farm size, pathogen load, pathogenic resistance to desiccation in the air, climatic conditions and local geography.²
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Locate new facilities, particularly AI or breeding stock units, in low pig density regions.
Flow Management	Farm Level: Use all-in/all-out flow, as one way to limit impact of area spread of disease.
Records	Verify the distance to your neighbour (e.g., with GPS technology).

2.2.6 Meat Products (for Human Consumption)

Meat Products (for Human Consumption)	Ensure that pigs are not exposed to dry cured and/or fresh (uncooked) meat products.
Rationale	Dry cured and/or fresh (uncooked) meat products pose a risk for the introduction of pathogens because meat may still contain animal pathogens if it not processed adequately. There is a risk of introducing foreign animal disease into Canada in foreign meat products.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	No dry cured and/or fresh (uncooked) meat products may be brought into the RAZ.
Records	Have a verification procedure in place and record compliance.

² OIE 2010. Good practices for biosecurity in the swine sector. p. 7

2.2.7 Pests, Birds and Insects

Pests, Birds and Insects	Prevent pathogen spread by effective control of pests (including birds, rodents and insects).
Rationale	Pests can live in close contact with pigs. They are involved in endemic disease transmission in swine. Birds, insects and flies, when looking for feed, also come in close contact with pigs and may release contaminated material, both in their feces (birds) and by mechanical transfer.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Maintain a secure perimeter around the RAZ.
Sanitation	Remove feed spills and manure accumulation. Ensure weed/grass control. Clean up debris.
Flow Management:	Farm and Production System Level: Understand the risk from rodent/pest transmission to individual sites and units in a production system and take action to prevent it (e.g., maintain buildings and keep entry points secure). Farm and Production System Level: Design site and multi-site pig flow to minimize the spread of disease in the production system should higher risk farms become infected through rodent/pest transmission.
Records	Put in place a pest, bird and insect control program for facility maintenance, following the recommendations of the Canadian Quality Assurance Program (CQA©) (see www.cqa-aqc.ca/resources-materials-e.php).

2.2.8 Other Non-Swine Domestic Animals

Other Non-Swine Domestic Animals	Keep the pig herd segregated from other domestic animals.
Rationale	Dogs and cats can spread pig diseases. Other cloven hoofed animals (e.g., cattle) can be carriers of foreign animal diseases. Other types of animals and domestic birds such as poultry can transmit pathogens causing disease.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Keep non-pig domestic animals out of the barn. Cats and dogs should not be allowed in the RAZ.
Flow Management:	Farm and Production System Level: Understand the risk from pet transmission to herds in a production system and take measures to prevent it.
Records	Routinely inspect facilities to ensure buildings/barns prevent access of animals and keep records to document that these inspections are conducted and risk is minimized.

2.2.9 Wildlife

Wildlife	Prevent contact with wildlife.
Rationale	Feral pigs and wild boars may harbour pathogens affecting domestic pigs. Wildlife (coyotes, etc.) and particularly cloven hoofed animals (artiodactyls) like white-tail deer, mule/black-tailed deer, elk/wapiti, bison, moose and caribou can become infected with foreign diseases (such as FMD).
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Ensure that facilities, fences and equipment are properly maintained to keep wildlife out.
Sanitation	Maintain barn buildings and surroundings appropriately.
Flow Management:	Production System Level: Design multi-site pig flow to minimize the spread of disease should higher risk farms become infected through wildlife transmission.
Records	Keep records of building, fence and equipment maintenance.

2.2.10 Fomites (Tools, Equipment and Supplies)

Fomites (Tools, Equipment and Supplies)	Prevent the introduction and spread of pathogens from all incoming materials.
Rationale	Incoming materials, including equipment and supplies, may act as fomites carrying pathogens onto farms.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Dedicate equipment for use only within a particular barn, farm or system flow.
Sanitation	Include procedures for cleaning and disinfecting fomites in the sanitation program. Have dedicated equipment in quarantine areas.
Flow Management:	Farm and Production System Level: Establish sequential use of equipment within a flow or system, working down the production pyramid. Production System Level: Have a verified cleaning process if sharing equipment outside the production system.
Records	Regularly check and record the use and maintenance of equipment.

2.2.11 Feed and Bedding

Feed and Bedding	Limit the risk of contamination by pathogens through feed and bedding manufacture (on-farm or commercially), delivery and storage.
Rationale	Feed and bedding can easily be contaminated directly or indirectly by insects, rodents or wild animals and other species at any stage of production.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>

Feed and Bedding	Limit the risk of contamination by pathogens through feed and bedding manufacture (on-farm or commercially), delivery and storage.
Segregation	Do not purchase or accept feed or bedding that has been on another swine farm. Purchase from a reliable source.
Sanitation	Feed and bedding areas/storage should be properly maintained.
Flow Management:	Farm and Production System Level: Follow flow or production pyramid sequencing of feed and/or bedding deliveries. Production System Level: Keep the system veterinarians aware of changes in health status and adjust delivery schedules to reflect health status.
Records	Confirm feed suppliers have HACCP protocols/records in place.

2.2.12 Water

Water	Supply drinkable water and prevent contamination of water systems.
Rationale	The water system (water source, storage, delivery and treatment system) can be a source of pathogens. Prevention and control measures can minimize if not eliminate this risk. 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 systems pose a significantly higher risk for the introduction of infectious organisms and undesirable substances and are not recommended for use without a functioning treatment system.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Evaluate and manage any water accumulation that pigs could drink in the RAZ.
Sanitation	Use a water treatment system, if needed, and maintain water system in good repair. Regularly test water if not from a municipal source, following the recommendations of the Canadian Quality Assurance Program (CQA©) (see www.cqa-aqc.ca/resources-materials-e.php).
Flow Management:	Farm and Production System Level: Have appropriate drainage in place to prevent contamination by used water. Production System Level: Understand the risks from water transmission to individual units across the production system and take measures to address problems.
Records	Routinely test and treat water (e.g., by chlorination) and record results.

2.2.13 Pharmaceuticals and Medical Equipment

Pharmaceuticals and Medical Equipment	Ensure that vaccines, pharmaceuticals and the equipment to administer them are selected, used, stored and disposed of, as directed.
Rationale	Human error may lead to misuse of commercial live vaccines. Use of non-commercial processes can be a source of pathogens. Improperly stored medical equipment can be a source of contamination.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>

Pharmaceuticals and Medical Equipment	Ensure that vaccines, pharmaceuticals and the equipment to administer them are selected, used, stored and disposed of, as directed.
Segregation	Consult a veterinarian prior to use of new vaccines or pharmaceuticals.
Sanitation	Ensure proper sanitation in storage of medical supplies and equipment.
Flow Management:	Farm and Production System Level: Establish a veterinary-client-patient (VCP) relationship. Have the production system veterinarian approve the use of vaccines/pharmaceuticals within the production system.
Records	Maintain records of purchase and vaccination/treatment, as required by CQA [©] (see www.cqa-aqc.ca/resources-materials-e.php).

2.2.14 Solid and Liquid Manure

Solid and Liquid Manure	Collect, store, move and dispose of (spread) manure in ways that minimize the risk of spreading any disease organisms.
Rationale	Manure can be a high risk source of pathogens. Pathogens in manure can be spread by direct contact, by air, or on people, equipment and vehicles. Plan and control manure management according to municipal and provincial regulations.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Collect, contain and dispose of manure away from the herd or animal groups and in a manner that prevents access to scavengers and pests.
Sanitation	Implement a sanitation plan that includes staff, equipment and vehicles used to remove manure.
Flow Management:	Farm and Production System Level: Practice sequential use of manure handling equipment within a flow or production system.
Records	Verify and record cleaning process if sharing equipment outside the production system.

2.2.15 Waste Other than Manure

Waste Other Than Manure	Store and dispose of household and farm-related waste in a manner that prevents or controls the risk of contamination by pathogens.
Rationale	If household and farm-related waste is not effectively stored and disposed of it can be a risk to the herd by attracting pests and predators, which can introduce disease either directly or indirectly by moving potentially contaminated garbage around the premises.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Manage storage to prevent access by pests and predators.
Sanitation	Ensure sanitation procedures include daily removal and storage.
Flow Management:	Farm and Production System Level: Minimize contact between pigs and waste and manure vehicles.
Records	Verify that waste removal companies have biosecurity procedures and records.

2.3 On-Farm Animal Health Management and Regional Considerations

On-farm disease management procedures are essential to limit the risk of spread of pathogens within the farm and to other sites.

2.3.1 Diseased Stock Management

Diseased Stock Management	Minimize the spread of pathogens from diseased animals within the site and to other sites within the region.
Rationale	Diseased animals are the major source of pathogens that can infect healthy animals. Biosecurity measures and procedures need to be adapted to the herd health status of the pigs on the site.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Move sick animals to a hospital pen, as recommended in the Canadian Quality Assurance Program (CQA©) (see www.cqa-aqc.ca/resources-materials-e.php). Do not move sick animals to another group.
Sanitation	Define and apply adequate sanitation procedures for hospital pens. Have dedicated equipment for hospital pens.
Flow Management:	Farm and Production System Level: Consult the production system veterinarian on altering pig movements to reduce the risk of pathogen spread. Farm and Production System Level: Consult the production system veterinarian on the use of a pharmaceutical within a system.
Records	Maintain daily mortality logs for each herd, as in the Animal Care Program (ACA©) (see www.cqa-aqc.ca/aca/index-e.php).

2.3.2 Swine Immunization Strategy

Swine Immunization Strategy	Ensure effective immunization of the swine herd.
Rationale	Swine immunization strategies are important in order to reduce the outbreak and spread of disease.
Principles	Examples of Best Management Practices: <i>For more BMP refer to User guide at www.swinehealth.ca</i>
Segregation	Control exposure of new incoming animals to the local resident animals and microflora.
Sanitation	Clean, wash and disinfect animal pens or facilities before pigs are introduced onto the site.
Flow Management:	Farm Level: Include a swine immunization strategy for exposing incoming animals to the local resident animals. Farm and Production System Level: Have an appropriate immunization strategy within each unit.
Records	Record all immunizations of animals, as required in CQA© (see www.cqa-aqc.ca/resources-materials-e.php).

Conclusion



Strengthening of biosecurity is a priority among the solutions required to minimize the risk of disease spread. It does not reduce the necessity for appropriate preparedness plans and adequate resources to control disease outbreaks once they occur; but it is proactive, has a preventive impact and enables producers to protect their assets.³

The National Swine Farm-Level Biosecurity Standard is a first step in a consultative process with stakeholders and experts to improve herd health and biosecurity in the Canadian swine industry. This national Standard will evolve in response to sector developments and needs.

The Canadian Swine Health Board welcomes all comments. Please address them to Dr. Lucie Verdon, CSHB Biosecurity Coordinator, verdon@swinhealth.ca.

³ FAO 2007.

References



- Alno JP. 1. Règles de biosécurité: les grand principes. 2008. Biosécurité des élevages;
http://www.3trois3.com/biosecurite_des_elevages/ficha.php?id=804#
- Australian Pork Limited. Australian pork industry biosecurity program. Version 1, June 2003.
<http://www.pigpass.com.au>
- Canadian Cooperative Wildlife Health Centre. Northern feral pig project. Newsletter, 2001-2002; Vol.8-2, Winter.
<http://www.brianknudsen.ca/pigs.html>
- Canadian Food Inspection Agency, Office of Animal Biosecurity. Draft of the national swine on-farm biosecurity standard. 2009. 140 pages.
- FAO. Biosecurity toolkit. 2007. http://www.fao.org/ag/agn/agns/foodcontrol_biosecurity_en.asp
- FAO/WB/OIE. Good practices for biosecurity in the pig sector: Issues and options in developing and in transition countries. 2009. 82 pages.
- Lambert ME, Dallaire S. Biosecurity in swine production: Widespread concerns? Advances in Pork Production. 2009; Vol. 20, 139-148.
- Madec F. Biosecurity on pig units: A major issue for herd health maintenance. 6 pages.
- New Zealand Pork. Recommended minimum farm biosecurity standard. 2009, September. 1 page.
<http://www.nzpork.co.nz/HealthBiosecurity.aspx>
- OIE. Application of compartmentalization. 2010 © Terrestrial Animal Health Code.
http://www.oie.int/eng/normes/mcode/en_chapitre_1.4.4.pdf
- OIE. Good practices for biosecurity in the pig sector. 2010; p7.
<http://www.fao.org/docrep/012/i1435e/i1435e00.pdf>
- Red Tractor Farm Assurance, Assured Food Standards. Pig standards. 2010. <http://www.redtractor.org.uk>