

The National Sheep On-Farm Biosecurity Standard

Version 2.2 – Stakeholders consultation

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Table of Contents

1 Preface	3
Biosecurity and Why it is Important to the Sheep Industry in Canada	3
1.1 Development of the National Standard	4
1.2 Use of the National Standard	5
1.3 Structure of the National Standard for Sheep	6
2 National Sheep On-farm Biosecurity Standard	8
2.1 Principle 1: Animal Health Management Practices.....	8
2.1.1 Strategy 1: Manage sheep sourcing	11
2.1.2 Strategy 2: Manage returning sheep	12
2.1.3 Strategy 3: Isolate sick sheep, flock additions and returning sheep	12
2.1.4 Strategy 4: Limit contact and commingling with neighboring/other livestock	13
2.1.5 Strategy 5: Plan sheep movement through the production unit	13
2.1.6 Strategy 6: Implement sheep health protocols for specific situations	14
2.1.7 Strategy 7: Limit access by pests, pets and predators	14
2.1.8 Strategy 8: Implement health standards for guardian and working animals	15
2.2 Principle 2: Records Keeping.....	15
2.2.1 Strategy 1: Maintain and review farm records	16
2.2.2 Strategy 2: Record Education and Training Activities	16
2.2.3 Strategy 3: Monitor Health Status	16
2.2.4 Strategy 4: Develop a Response Plan for Change in Health Status	17
2.3 Principle 3: Farm, Facilities and Equipment	18
2.3.1 Strategy 1: Create a diagram of the farm layout and risk areas.....	19
2.3.2 Strategy 2: Clean and Disinfect Facilities, Equipment and Vehicles.....	19
2.3.3 Strategy 3: Reduce risk in barns/pens	20
2.3.4 Strategy 4: Reduce risk from equipment.....	21
2.3.5 Strategy 5: Reduce risk from vehicles	21
2.3.6 Strategy 6: Manage Manure	22
2.3.7 Strategy 7: Manage Feed, Water and Bedding.....	23
2.3.8 Strategy 8: Apply Shearing Protocols.....	23
2.3.9 Strategy 9: Manage Needles and Sharps	24
2.3.10 Strategy 10: Managing Deadstock, Offal and Tissue.....	24
2.4 Principle 4: People	25
2.4.1 Strategy 1: Conduct Risk Assessments for all people visiting the farm.....	25
2.4.2 Strategy 2: Implement protocols for visitors that have recently been in a foreign country.....	27
2.4.3 Strategy 3: Know what people are on the premises	27
2.4.4 Strategy 4: Communicate and train farm workers; inform all visitors and service providers.....	27
2.4.5 Strategy 5: Recognition of Zoonotic Risks.....	28
3 Acknowledgements	29
Appendix A – Definitions.....	30
Appendix B – List of Reference Documents.....	33

1 Preface

Biosecurity and Why it is Important to the Sheep Industry in Canada

Biosecurity is a set of practices used to minimize the transmission of disease causing organisms and pests in animal populations including their introduction, spread within the populations, and release.
Canadian Food Inspection Agency (CFIA)

Biosecurity is often thought to be important only in avoiding catastrophic or foreign animal diseases (FADs). However, in the National On-Farm Biosecurity Standard for Sheep, in addition to having a positive impact on the prevention of FADs, biosecurity is intended to be proactive in helping to reduce the risks of *endemic diseases*. These are diseases that commonly occur at some level on farms in Canada and reduce flock productivity and financial well-being of the industry. Biosecurity *practices* are also designed to reduce the risk of disease transmission when *emerging diseases* are discovered.

Sheep producers need to be aware of the diseases of concern on their farms, and the risks of both endemic and foreign animal diseases occurring in their flock. These risks are inherent in animal management and farm management practices, and in the facilities and the farm environment. These risks can be managed by practical biosecurity measures applied at the farm level.

On a sheep farm, a biosecurity plan focuses on:

1. **Exclusion:** reduce the introduction of pathogens on sheep farms.
2. **Management:** reduce the spread of pathogens within a sheep farm.
3. **Containment:** reduce the spread of pathogens between sheep farms or from sheep farms to other animal populations.

Biosecurity addresses risks that *could* exist, whether they are immediately evident or not. An animal infected with a pathogen may or may not show signs of disease. Nevertheless, the pathogen can be reproduced in the animal's body and shed through excretions, including saliva, nasal and vaginal secretions, feces, urine, milk, or aerosols from the respiratory system. The organisms contained in these excretions may not be visible and can contaminate the surfaces in the surrounding environment, including equipment, tools, and other animals.

Biosecurity addresses disease transmission risks. Pathogens can be transmitted by several means, such as direct contact between animals, including transmission of pathogens shed by one sheep to another, or indirectly, from contact with contaminated tools, equipment and

instruments (such as needles, syringes and hoof trimmers), from people having contact with sheep, and from insects, *vermin* or any other vectors.

Biosecurity addresses risks that impact the viability of farms. Diseases and pests can:

- reduce productivity, by reducing milk production, weight gain and/or successful lambing;
- increase veterinary and labour costs for vaccination and treatment of the flock;
- impact animal welfare, causing suffering and operator/veterinary intervention;
- affect domestic consumption, introducing concern among retailers and reducing consumers' confidence in Canadian sheep products;
- reduce prices that producers receive for their animals and products, driven by over-supply or concern for lower quality and safety;
- close export markets, limiting direct export sales of sheep products and causing oversupply in Canada;
- reduce farm incomes, due to reduced marketing;
- reduce the value of farmland, due to direct contamination (eg Q fever, Scrapie) and reduced attributable revenue; and
- contaminate stored feed, resulting in waste and additional cost.

In addition to adverse effects on the agricultural economy, diseases and pests can have negative effects on the environment and on human health.

The benefits of implementing on-farm biosecurity practices are very significant. They include:

- More secure financial health for producers;
- Improved animal health and welfare;
- Reduced use of therapeutics to reduce costs and antibiotic resistance;
- More secure market access, both local, domestic and export;
- Protection of human health; and
- More secure financial health for farm workers and for farm service industries such as feed suppliers, processors, and veterinarians.

1.1 Development of the National Standard

The Canadian Food Inspection Agency (CFIA) is developing National Biosecurity Standards for livestock and poultry in collaboration with producer organizations, provincial/territorial governments, academia and Agriculture and Agri-Food Canada. Each sector has its own operating requirements and unique practices that need to be reflected in each biosecurity Standards. The CSF and the Canadian government recognize that animal health starts on the farm with an animal health program. Putting measures in place to keep animals healthy and implementing strategies to prevent the introduction and spread of diseases are the goals of an on-farm biosecurity plan.

The Sheep National Standard was developed through a coordinated set of activities over a two-year period:

1. CFIA's Office of Animal Biosecurity (OAB) and the Canadian Sheep Federation (CSF) developed a partnership to create a National Standard for biosecurity in the sheep industry.
2. An Advisory Committee including producer representatives, academics, industry leaders and representatives of the federal and provincial governments was formed to guide the development of the National Sheep On-farm Biosecurity Standard and the National Sheep Producer Biosecurity Planning Guide.
3. A consultant firm was selected through a competitive bidding process and assigned the responsibility to undertake certain activities on behalf of the project sponsors.
4. A review of published research, biosecurity-related documents, and existing programs identified biosecurity-related programs, studies of biosecurity implementation, and best practices in use on sheep farms in Canada and elsewhere in the world. Gaps in practices to address known biosecurity risks and in current biosecurity programs were identified.
5. A benchmark measurement of practices in use on sheep farms across Canada provided¹ a snapshot of the current level of adoption of biosecurity and animal health practices, and recorded gaps and best practices on the participant farms.
6. Draft versions of the National Standard and the Producer Planning Guide were refined through consultations with the Advisory Committee and industry stakeholders and published in final form.
7. A communications package was developed to make the information in the Standard and the Producer Planning Guide more readily available to producers and industry participants in all regions of the country.

1.2 Use of the National Standard

The National Standard provides an explanation of the framework and scope of biosecurity planning in the sheep sector in Canada. It is intended to provide insight to those individuals and groups who need to understand the direction of the industry in order to:

- Establish a minimum set of biosecurity standards applicable for all sheep producers in Canada
- Assist sheep producers in developing a biosecurity plan for their specific farm operations
- Serve as a guide for continuous improvement and to encourage a higher level of care
- Support the efforts of sheep producers by designing programs that interface and coordinate with on-farm biosecurity practices;
- Communicate with Canada's trading partners; and
- Coordinate activities between livestock sectors.

¹ Activities in items 5, 6 and 7 have not been completed at time of preparation of this draft, but appear in past tense as they will when the National Standard document is final.

Therefore, key audiences for the National Standard are:

- Producers, to understand the principles and rationale of the National Standard and to establish a framework for their biosecurity planning;
- Commodity sector organizations, for supporting trade issues and disease management;
- Veterinary practitioners, for input to flock health management programs and as a guide in helping producers prepare their biosecurity plans;
- Academics, to guide plans for new research in sheep health, biosecurity and production practices, and to encourage application of current research to these areas;
- Foreign delegations, as a source of information about what to expect when visiting sheep farms and to support their general understanding of practices in the Canadian industry;
- Buyers and consumers, to understand the principles sheep producers work towards and as a common basis for assessment of domestic supply and suppliers;
- Federal and Provincial governments for international and interprovincial discussions on livestock farm practices and as the basis for policy and funding through public agencies; and
- International Governments for information on biosecurity practices underway on Canadian farms in support of trade discussions.

The National Standard explains its guiding principles, structure and planning approach, and provides detailed descriptions of its goals and associated strategies. It describes what producers will be measured against by the industry in their biosecurity programs. For those requiring a more detailed view of the farm-level plans and practices, a Producer Planning Guide has been developed as a companion volume to the National Standard. The Guide is a resource document for producers as they develop and implement their biosecurity plans.

1.3 Structure of the National Standard for Sheep

Putting biosecurity practices in place to keep animals healthy has been a long-standing and successful practice on many Canadian farms. Therefore, it is important that the National Standard and its companion Producer Planning Guide fit into the normal production practices followed by sheep producers in Canada. In order to reinforce this, and to acknowledge that producers will be using the material at different levels depending on their current involvement with biosecurity practices, the following were considered in developing the Standard:

The Sheep Biosecurity Standard is:

A voluntary outcome-based tool to develop and update on-farm *biosecurity protocols* for sheep producers

Guidance to producers in all sectors of the industry – meat, fibre and milk – and on all types of farms

A set of practices to allow producers to design biosecurity protocols that fit their own operations

Based on the best practices that are currently being used in the sheep industry in Canada and elsewhere and drawn from the available literature pertaining to biosecurity on sheep farms

Developed with the direction and assistance of an Advisory Committee that includes producers, veterinarians and industry experts

Intended to be used as educational materials and to support training and education of farm workers, family members, service providers, and any *visitors* who are invited to the farm

A set of peer-reviewed guidelines that provide a suggested approach to self improvement with respect to biosecurity including the ability to do a self-assessment

The basis for commercial transactions; known and disclosed biosecurity and flock health programs will increase buyer confidence in live-animal purchases

A complete resource of the biosecurity practices for use on the farm, including those that are currently contained in the On-Farm Food Safety (OFFS) program

A way to help increase productivity on Canadian sheep farms

Designed to be used in educational material and training modules for *personnel* and visitors

The National Standard consists of four on-farm Biosecurity Principles, categorized as:

1. Animal Health Management Practices
2. Records Keeping
3. Farm, Facilities and Equipment
4. People

For each Principle, a goal has been identified and a series of Strategies developed to provide the overall direction for reducing disease transmission risks. This goal approach provides the flexibility for producers to design biosecurity plans that will work on their farms. For each Strategy, a set of Best Management Practices has been developed to help producers achieve the goal in each principle. Best practices are presented in the Producer Planning Guide that accompanies the National Standard. These best practices are intended to be selected and adapted to fit the operational focus and physical layout of each producer's farm and facilities. Both documents demonstrate the flexibility that is needed to work with all of the production practices and farm types across Canada.

A glossary of terms is included in an appendix, to provide a guide to the terms that are generally used in farm-level biosecurity.

2 National Sheep On-farm Biosecurity Standard

The National On-farm Biosecurity Standard for Sheep has identified four Principles, each with a specified Goal. Strategies have been developed for each Principle to move producers towards the specified Goal. These components of the National Standard are summarized in the following sections, first in a table and then more fully described.

2.1 Principle 1: Animal Health Management Practices

<i>Goal: Minimize the health risk to the flock from sheep and other animals</i>	
Strategy:	Summary:
1. Manage sheep sourcing	Acquisition is limited and when necessary animals are sourced from suppliers with <i>known health status</i> . As few sources as possible are used. Acquired stock are isolated upon arrival.
2. Manage returning sheep	If sheep are moved off the farm and return, they are treated as newly-sourced animals and subjected to <i>isolation</i> protocols.
3. Isolate sick sheep, flock additions and returning sheep	Sheep showing signs of disease are moved into an isolation facility away from the healthy flock until the disease has been resolved. Animals brought onto the farm are held in an isolation facility until signs of potential diseases are evident and/or resolved or until disease-specific testing <i>protocols</i> reveal the animal's disease status.
4. Limit contact and commingling with neighboring/other livestock	Sheep in the healthy flock are housed, moved and pastured in such a manner that direct contact with neighbouring livestock or other livestock on the farm is avoided and indirect contact with potentially infectious material is limited.
5. Plan sheep movement through the production unit	Sheep are moved through and within the production unit by pathways that limit their exposure to diseased or potentially infectious animals and materials. Movement is undertaken in sequence from younger to older, from healthy to sick, and from more to less susceptible.
6. Implement sheep health protocols for specific situations	Protocols to limit risks of disease transmission are in place for specific production activities, and farm workers understand and employ them.
7. Limit access by pests, pets and predators	A pest control program is in place and its required procedures are followed. Pets are vaccinated and treated for diseases of concern (eg parasitism such as toxoplasmosis from cats and some dog tapeworms) and their access to sheep housing areas and to manure, placentas, deadstock and other potential sources of contaminated material is limited. Access by

predators to the flock is controlled.

8. Implement health standards for guardian and working animals

Guardian and working animals are vaccinated, dewormed (eg tapeworms) or treated for diseases of concern..

Maintaining the health of their sheep is a primary goal for all sheep producers, and achieving that goal requires a flock health program with both proactive and responsive capability. Proactive elements of the plan include providing good quality food and water, and suitable facilities for all aspects of production, as foundation for good health and disease resistance. A flock health program enables producers to assess risk and take appropriate precautions to prevent the introduction and spread of disease.

For common diseases, every farm should have a flock health program that includes the selection of appropriate vaccines and the design of appropriate vaccination and treatment programs. The flock health program is closely linked to the biosecurity plan. Producers and farm workers should be able to recognize abnormal behaviour and diseased animals and to manage them in a way that limits disease transmission. Producers and workers should be aware of *zoonotic* diseases and how to respond to them. The flock health program should also include how to recognize and respond to possible Foreign Animal Diseases (FADs) and new diseases. In most regions, a flock veterinarian can be contracted to assist in establishing the program and in responding to certain problems.

Producers who do not currently have a flock health program are encouraged to develop a program with their flock veterinarian that includes the principles and elements introduced in the Standard. Those who have a program are recommended to review their programs against this information, and to regularly review and adjust program elements in response to their flock health experience, changes in the flock, and/or changes in any aspect of their operations. A flock health program takes into account a producer's individual risk tolerance, and is designed specifically for each operation.

A flock health program will consider:

- **Current flock health status**
- **Historical health problems**
- **The likelihood and frequency of additions to the flock**
- **The source of additions to the flock**
- **The likelihood of animals leaving the farm and returning after commingling at shows, on *community pastures*, and other events**
- **The need for specific health status for genetic sales**
- **The need for specific considerations for organic status**

- **Common diseases and disease frequency on the farm**
- **Drugs and vaccines routinely used**
- **The risk tolerance of the operation for disease outbreaks**

A flock health program will include:

- **Identification of trigger points requiring action by farm personnel and communication with a veterinarian**
- **Vaccination strategy for various age groups on the farm**
- **Disease monitoring, analysis of records and test strategies**
- **Treatment protocols for common diseases on the farm signed off by a flock veterinarian, including assessment of the treatment efficacy**
- **Euthanasia protocol and guidelines for decision-making**
- **Meat and milk withholding times according to label directions and *CgFARAD***
- **Appropriate disposal of empty and out-dated product containers as well as sharps and needles**
- **Proper storage for vaccines and drugs**
- **Proper record keeping for administration of vaccines and veterinary drugs, including appropriate withdrawal periods for meat and milk**
- **Animal management strategies for animals under treatment**
- **Strategy for animal additions**
- **Isolation strategy for sick animals, including required isolation time for diseases of concern**
- **A plan for timely and routine on-farm visits and an annual review of the program with the flock veterinarian**

Such a Program should be written, and should be reviewed and reassessed regularly with farm staff so there is a good understanding of the expectations of the program and the role of each staff member. It should be compliant with the requirements of any relevant public and regulatory programs, including environment, food safety, animal health (eg scrapie program) and animal welfare.

2.1.1 Strategy 1: Manage sheep sourcing

Summary: Acquisition is limited and when necessary animals are sourced from suppliers with known health status. As few sources as possible are used. Acquired stock are isolated upon arrival.

When establishing a new flock, producers are advised to seek information and guidance from other producers, veterinarians and other animal health experts, nutritionists, genetics specialists and other to determine the make-up of the flock. This information will provide direction in acquiring sheep for the flock, and how to reduce disease risks. Producers are also advised to apply as many of the practices described here when starting a new flock:

- purchasing from suppliers whose flock health is known;
- limiting the number of (different) sources used;
- isolating and observing flock members during the first few weeks of their residence; and
- maintaining separation between different species.

Producers are recommended to raise as many of their own replacement stock as possible, and add as few sheep from other sources as possible. When genetic diversity is needed, the use of capable and accredited sources for semen and embryos is recommended so that flock additions can be generated on the farm, rather than being introduced as *lambs* or sheep.

Acquiring sheep from multiple sources, commingling them together, and introducing them into a home flock presents a significant disease risk. The number of diseases that must be accounted for is increased, and treatment protocols required upon entry are expanded. The risk is particularly high when sheep are acquired through an auction market or other commingled sale site, where the sheep are likely to have been exposed to other sheep and to other species.

Knowing the disease status of individual sheep being purchased and the status of the flock from which it came are key to reducing the risk of acquiring one or more diseases along with an animal. Many diseases are chronic/asymptomatic and are therefore difficult to identify at sales or on-site at suppliers' farms. Since several diseases of sheep may not be evident and/or may be asymptomatic, and since sheep may be "carriers" of disease, asking for individual and flock health information is particularly important.

While these risks are particularly significant for *maternal flocks*, they are generally accepted by feedlot operations, in which larger numbers of lambs are needed relatively frequently to meet production commitments that are difficult to satisfy in any other manner.

Feedlot operators can also communicate the practices proposed in this strategy to their suppliers with a goal of reducing the risk of disease transmission to their flock: require sources to provide information on health status, reduce the number of sourcing points, and reduce the extent to which they are commingled. While these goals are developing, feedlot operators can

implement practices in their own feedlots to reduce the impact of the current level of risk – isolating groups of lambs when they arrive; vaccinating and treating them for the feedlot’s diseases of concern; remove from the feedlot when in doubt.

2.1.2 Strategy 2: Manage returning sheep

Summary: If sheep are moved off the farm and return, they are treated as newly-sourced animals and subjected to isolation protocols.

When sheep are taken away from the farm to attend shows and fairs, to feed in community pastures, or to deliver animals for breeding purposes, they are frequently commingled with other sheep and/or with other animals susceptible to sheep diseases. They are at risk of becoming infected by any pathogens that might be present at that *location*.

The risk is both from direct contact with animals that might be infected with/carrying a disease, and from indirect contact, through contaminated equipment, manure, bodily fluids and/or aerosols on site. These secondary sources might be present in feed and water available at the off-farm site, in bedding or on surfaces in facilities in which the sheep are housed or in vehicles in which they are transported.

2.1.3 Strategy 3: Isolate sick sheep, flock additions and returning sheep

Summary: Sheep showing signs of disease are moved into an isolation facility away from the healthy flock until the disease has been resolved. Animals brought onto the farm are held in isolation until signs of potential diseases become evident and/or resolved or until any disease-specific testing protocols reveal the animal’s disease status.

Introduced sheep: When sheep are brought onto the farm or returned from off the farm, they should be isolated from the flock in an area(s) that is located and managed separately from the rest of the farm. The isolation area keeps any risk from the isolated animals away from the rest of the flock, both by direct and indirect means; isolated animals do not commingle with the rest of the flock, and the risk of people, tools and equipment is managed by *cleaning* and disinfection practices. The area will also allow observation of isolated sheep so that uncertain disease status can be clarified, either by development of symptoms or lack of them, and so that vaccination and treatment can be applied on an individual basis.

Sick sheep: When a sheep is diagnosed or suspected of suffering from an infectious disease, or exhibits unusual behaviour that might be associated with disease, it should be isolated from the flock. This can be done by moving the affected sheep to a separate pen that prevents direct and indirect contact with the healthy flock. Alternatively, the healthy animals can be moved away from the sick animal if the environment is considered contaminated. Isolation lowers the risk to other flock members by reducing the possibility of infection from direct, nose-to-nose or aerosol contact. It also allows manure and other potentially-infectious materials to be handled

separately, thereby ensuring that contamination of the healthy flock, its tools and equipment and its facilities is minimized.

It is important to note that there are limits to the effectiveness of isolation for sheep. Some diseases of sheep will not display visible clinical signs during limited isolation and are not reliably diagnosed by testing. These include Johne's disease and several abortion agents. Also, some animals can carry certain diseases without suffering from them, but can still transmit them to other animals; again, the disease may not be revealed during a stay in isolation.

2.1.4 Strategy 4: Limit contact and commingling with neighboring/other livestock

Summary: Sheep in the healthy flock are housed, moved and *pastured* in such a manner that direct contact with neighbouring livestock or other livestock on the farm is avoided and indirect contact with potentially contaminated material is limited.

Sheep in many flocks will be pastured regularly during the course of the production cycle. This means they will be moved from fully- or partially-enclosed areas of the farm to open pasture and back again during these periods. Introduction of pathogens into an enclosed environment is a significant risk due to the concentration of the flock, and the potential for contamination of the flock from contact with other animals on the farm, with *wildlife* or with flocks on adjacent farms needs to be addressed.

There are several issues of concern in dealing with the biosecurity risks of pastured sheep:

- The disease status and biosecurity practices of other livestock on the farm – if other livestock on the farm are not subject to biosecurity, then the biosecurity plan for sheep will be compromised;
- The disease status of sheep and other animals on adjacent farms and the biosecurity practices undertaken on them;
- The method of spread of some diseases of sheep, for example the aerosol/airborne transmission of Q Fever, that cannot be managed or avoided out-of-doors and diseases that can be spread by nose-to-nose contact;
- Potential contact by pastured sheep with contaminated materials in the pasture, in waterways, or along common fences, etc.
- The specific diseases that are likely to be spread or carried by wildlife, such as rabies, Salmonella and Campylobacter;

2.1.5 Strategy 5: Plan sheep movement through the production unit

Summary: Sheep are moved through and within the production unit by pathways that limit their exposure to diseased or potentially-infectious animals and materials. Considerations regarding health status, age and production stage should be taken.

Movement of sheep during any production cycle is quite frequent. Some, such as milking, moving lambs and sheep to the *loading area* for transport, or moving sheep to and from pasture

are quite repetitive. Others, such as moving older animals, moving new introductions to isolation, moving sick animals to the treatment area or moving rams and ewes for breeding, are less frequent and less regular.

Movement of sheep within the production unit is an opportunity for them to spread any disease organisms they may harbour elsewhere in the facilities. Other members of the flock, using the same pathways, are at risk to ingesting or otherwise being infected by them. These risks are possibly higher within the *barn*, given more concentrated space and higher frequency of use.

The design/identification of pathways along which sheep and lambs will travel can be an important part of a biosecurity plan. In most cases, unless new facilities are planned or renovations are needed, producers will opt to use the paths and corridors that currently exist for these movements. In these cases, the risks of *cross-contamination* between members of the flock are higher and intervention to eliminate contaminants between movement events will be needed. These actions will include scheduling and order of animal movements, and cleaning and disinfection between uses.

2.1.6 Strategy 6: Implement sheep health protocols for specific situations

Summary: Protocols to limit risks of disease transmission are in place for specific activities, and farm workers understand and employ them.

Proactive biosecurity, designed to reduce the risk and avoid the occurrence of a disease, will include flock health protocols for specific situations. Specific flock health protocols are more likely to be considered in production activities such as lambing, abortion management, milking, disease testing, vaccination, and parasite control. It is also important to consider that these protocols are likely to be employed in cases of certain diseases of concern on each farm, and that they are specially designed to deal with these situations in the biosecurity plan.

It is important that producers think about these circumstances when biosecurity plans are being developed, and when flock health management is considered. Farm workers should understand the possible approaches to be taken when they encounter these cases, in addition to understanding the more generalized biosecurity practices.

2.1.7 Strategy 7: Limit access by pests, pets and predators

Summary: A pest control program is in place and its required procedures are followed. Pets are vaccinated and treated for diseases of concern and their access to sheep housing areas and to manure, placentas, deadstock and other potential sources of contaminated material is limited. Access by predators to the flock is controlled.

Pests, pets, predators and wildlife represent a pool of unique risks to sheep. They are difficult to fully control, but do require attention in a biosecurity plan, and in many cases very specific actions to avoid direct and indirect transmission of pathogens:

Agent	Nature of Risk
Pests (e.g. rodents, flies, other insects)	Transmission of pathogens by prior contact with other animals, manure, placentas, deadstock, etc.; direct interaction with sheep and contamination of feed, in storage or in feed bunks, and water
Pets, including family pets and cats, and working animals	Infection with diseases of concern on the farm (e.g. rabies); transmission of pathogens by prior contact with other animals, manure, placentas, deadstock, etc.; direct interaction with sheep and contamination of feed and water
Predators	Direct attacks on sheep and lambs
Wildlife	Direct or indirect contact

2.1.8 Strategy 8: Implement health standards for guardian and working animals

Summary: Guardian and working animals are vaccinated, dewormed (eg tapeworms) or treated for diseases of concern.

Guardian and working animals are essential to the operation of the farm and to the well-being of the flock if sheep are pastured during any phases of production. Their health and the management of contaminants that are a natural part of their roles need to be actively managed. Specific risks associated with *guardian animals* and other working animals around the farm include rabies and tapeworms (sheep serve as intermediate hosts for the dog tapeworms.), and *Ascarids* can migrate from dogs and become situated in the livers of sheep.

2.2 Principle 2: Records Keeping

Goal: Have records that validate the health status of the flock.

Strategy:	Summary:
1. Maintain and review farm records	Farm records for production, operations animal health and biosecurity are integrated together. Records include goals and strategies being pursued, and are reviewed regularly to track performance and to identify improvements that might be required.
2. Record education and training activities	Records of education and training of farm workers is important both for internal purposes and to ensure that regulatory requirements are being met.
3. Monitor health status	Health status monitoring is important for producers' ongoing view of the flock's health and to initiate response when observations are made. These records are also important when selling any lambs or sheep to other producers.
4. Develop a Response Plan For Change in Health Status	A response plan is needed to guide farm activity in specific cases of changes in health status. Enhanced biosecurity will be required and a recovery plan needs to be prepared.

2.2.1 Strategy 1: Maintain and review farm records

Summary: Farm records for production, animal health and biosecurity are integrated together. Records include goals and strategies being pursued, and are reviewed regularly to track performance and to identify improvements that might be required.

Biosecurity and animal health records should be maintained together with other flock and production records. This approach will provide a measure of efficiency in recording and accessing/using the information, but it will also make reviews and analysis more effective. Viewing production records together with movement, health and treatment records will provide a more complete understanding of flock performance; this, in turn, will enable valuable analysis of the impact of biosecurity practices to be done. All records should be dated.

It may be useful for producers to set goals and targets for the health and productivity of the flock. Notes and comments in the farm records concerning the results of certain practices and treatments may help to assess performance, and may also be useful when looking ahead to future seasons. A review of the farm and biosecurity records is recommended to be undertaken with the flock veterinarian on a regular basis, so that analysis and conclusions can be compared to the farm's goals, and plans can be altered to achieve the maximum benefit.

Records have low value if they are not reviewed regularly. They are also a valuable resource when an unforeseen situation or event is encountered – these historical records may contain some information that will aid analysis and understanding of the cause, and perhaps of previous successful responses.

2.2.2 Strategy 2: Record Education and Training Activities

Summary: Records of education and training of farm workers is important both for internal purposes and to ensure that information potentially required for labour standards is available.

Farm records should contain information concerning education and training undertaken by all family members and farm employees (see also section 3.4.5). In some provinces and regions, more attention is being paid to the training and education of employees, especially in areas of public health and workplace safety. While it is also recognized as good operating practice, under some regulations, producers as employers, need to maintain records of training given to employees.

In particular, increasing concern for zoonotic diseases, including *Campylobacter*, *Salmonellosis*, *cryptosporidium*, Orf, Q fever, abortion agents and diarrhoea agents, make records of farm worker education on personal protective behaviour, cleaning and disinfection, and other biosecurity practices essential.

Including training and education records together with farm workers' personal and employment records is efficient and convenient.

2.2.3 Strategy 3: Monitor Health Status

Summary: Health status monitoring is important for producers' ongoing view of the flock's health and to initiate response when observations are made. These records are also important when selling any lambs or sheep to other producers.

Producers' flock health programs are integral to planning for biosecurity under the National Standard. Monitoring and maintaining records of the health status of the flock and of individual animals are important components of animal health programs. These elements will be particularly important for newly-sourced animals and sick and at-risk animals.

Flock health programs are important in controlling endemic disease and preventing outbreaks and to ensure that they will be managed when they are identified. A commitment to monitor and cull when required, or to apply preventive treatment when effective, should be incorporated.

2.2.4 Strategy 4: Develop a Response Plan for Change in Health Status

Summary: A response plan is needed to guide farm activity in specific cases of changes in health status. Enhanced biosecurity will be required and a recovery plan needs to be prepared.

The National Standard is focused on proactive biosecurity – those practices that can be adopted to reduce the risks of disease occurrence in many aspects of sheep farming. However, it is important that producers also have a farm-based plan for response to disease outbreak or suspicion of an outbreak on their farm or in their region.

A response plan is a pre-determined set of actions and conditions that are enacted when one or more occurrences, called “trigger points”, are observed. The plan is developed in advance, and will include:

- Identification of potential trigger points;
- Enhanced biosecurity protocols to be initiated on the farm under specific circumstances;
- Preparatory steps to be taken before an outbreak occurs.

In developing such a plan, producers would need to identify the types of disease emergencies that may require a response. These would include:

- an uncontrolled outbreak of any highly infectious disease on the producer's farm, such as an abortion outbreak,
- an uncontrolled outbreak of any highly infectious disease such as a Salmonellosis outbreak in the region of the producer's farm;
- a suspected case of a reportable² or foreign animal disease (“FAD”) on the producer's farm,
- a suspected case of a reportable disease or FAD on an adjacent farm, or on a farm that has a link to the producer's farm; and
- a confirmed case of a reportable disease/FAD/emerging disease anywhere in the region, and especially on a farm with which the producer's farm has exchanged animals, loaned equipment, used shared pasture or other facilities.

² Reportable diseases are defined under regulations enforced by CFIA. In cases of a suspected or confirmed case of a reportable disease outbreak, and in most cases of a FAD or emerging disease, CFIA is responsible for ensuring that required procedures are followed.

Producers must know what they are to do in each of these emergency situations.

It is also important that a recovery plan be in place as the next action following execution of the response plan. While recovery efforts are often disease-specific and therefore difficult to plan in advance, producers need to know what is required to be done in order to return to full production once the disease emergency has been successfully managed.

Development of an on-farm “Response Plan for Change in Health Status” is a large and complex undertaking; more than can be dealt with effectively in this document. However, examples are available from various organizations via the Internet, from federal and provincial government agencies and from industry associations.

2.3 Principle 3: Farm, Facilities and Equipment

<i>Goal: Minimize the effect that farm, facilities and equipment have as a contributor to disease transmission</i>	
Strategy:	Summary:
1. Create a diagram of the farm layout and risk areas	A farm diagram is used to assist in the risk assessment, based on the diseases of concern.
2. Clean and Disinfect facilities, equipment and vehicles	Cleaning and disinfection methods that are effective in reducing the risk of disease transmission are in place and are used for facilities, equipment and vehicles on the farm.
3. Reduce risk in barns/pens	Facility design and management practices can reduce specific risks.
4. Reduce risk from equipment	Equipment can be dedicated for one purpose or dedicated to use in one risk area; equipment can be supplied by the farm for use by contracted service providers.
5. Reduce risk from vehicles	Vehicle use patterns determine the relative risk of vehicles; cleaning and disinfection is the principle biosecurity tool for reducing vehicle-related disease risk. Using farm-based vehicles can improve producers’ control over vehicle use patterns.
6. Manage manure	Manure is removed regularly and moved in a manner that limits exposure to the sheep. Tools and equipment use is limited and they are cleaned and disinfected between uses. Storage is secure and separated from the production area(s). Disposition is controlled.
7. Manage feed, water and bedding	Feed, water and bedding serve to support sheep health and therefore the flock’s resistance to disease. Adequate and quality supplies are required, and storage is secure from contamination.
8. Apply shearing protocols	Order of shearing is important to reduce the risk of disease transmission within the flock; equipment should be kept clean and contract shearers should wear clean outerwear and footwear.
9. Manage needles and sharps	Needles and sharps should not be re-used; if they are re-used, they should be disinfected between uses. Proper injection practices are

10. Manage Deadstock	<p>followed and sharps are disposed appropriately.</p> <p>Deadstock are removed immediately and moved in a manner that limits cross-contamination with the flock. The deadstock holding area is located away from the production area and is secure from pets and scavengers. Disposal respects local regulations and is done in a manner that limits disease exposure to the flock.</p>
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2.3.1 Strategy 1: Create a diagram of the farm layout and risk areas

Summary: A farm diagram is used to assist in the risk assessment, based on the diseases of concern.

Biosecurity plans are based on a risk assessment of the operations, the people and the facilities. An accepted approach to risk assessment is to consider the diseases of concern to the farm, and how those diseases transmit, and then to identify where risk points exist in the operations themselves, in people's activities, and in the facilities and how they are maintained. Risk points in this context are where opportunities exist for the transmission of pathogens, both directly to sheep and also indirectly via other fomites.

The use of a map or diagram of the farm layout is recommended to facilitate the identification of these risks. The diagram can highlight areas of specific activity where sheep of different disease susceptibility might be exposed to one another; where people, their tools and equipment and their vehicles might come in contact with the sheep; and where contaminants might be harboured in any parts of the facilities themselves³.

Areas that would be highlighted on the farm diagram include:

- Access points
- Gates and barriers
- Location of signage
- Visitor parking area(s)
- The barn and other shelters and housing areas
- Pastures
- Receiving and storage areas
- Shipping area(s); the loading chute
- Manure and deadstock management areas

Notes about movement of sheep and other animals around the farm, patterns of access by people and equipment, housing areas for sheep with different disease status, and storage areas for feed, bedding and equipment, can all provide a framework for the practices that might be needed to avoid or reduce the impact of the identified risks.

2.3.2 Strategy 2: Clean and Disinfect Facilities, Equipment and Vehicles

Summary: Cleaning and disinfection methods that are effective in reducing the risk of disease transmission are in place and are used for facilities, equipment and vehicles on the farm.

³ The Producer Planning Guide contain additional information on risk assessment, farm layout and farm zoning,

Cleaning is a constant activity on a livestock farm and disinfection is needed under certain circumstances, especially in dairy facilities and when required to reduce the risk of disease transmission. Cleaning the barn(s), pen areas, feeders and waterers, equipment and vehicles is required to remove organic material that can harbour disease pathogens or other contaminants; disinfection is required to eliminate the disease pathogens themselves. Disinfection is not effective if the surface has not been previously cleaned.

Five basic steps have been developed for cleaning and *disinfecting* on farms. They are:

1. De-bulking – removing visible contamination
2. Washing – washing with soap/detergent and water
3. Rinsing – removing all soap residue
4. Disinfecting – soaking with an approved disinfectant
5. Rinsing (if required by disinfectant product) – removing all disinfection and allowing surfaces to dry

Feedlot operators, and others who might be concerned about the biosecurity risk in pasture areas, can employ a downtime cycle between uses that is long enough to allow disease agents to be reduced by natural causes.

Cleaning and disinfection should be planned to address the farm's identified risks, and a protocol should be designed for the cleaning and disinfection required in each case. This will require a clear understanding of the methods used to properly remove organic material from the various surfaces that need to be cleaned, and when and how to use a disinfectant.

Protocols are required that assure effective cleaning and disinfection of the following facilities and equipment on a sheep farm:

- Barn surfaces, including floors, pens, railings, chutes, walkways, etc. and all areas of the milking parlour;
- Equipment, such as tractor/skid-steer buckets, forks, shovels, tires, etc.;
- Feed storage areas and bins, to eliminate contamination from rodents and other pests, and any manure or faeces that have been deposited in feed bunks or other feeders;
- Water troughs and bowls, to eliminate contamination from any manure or faeces that have been deposited there;
- High risk vehicles, such as those that transport sheep and other animals, especially sheep and animals from other locations; and
- Other vehicles, such as visitors' and service providers' vehicles, especially those that have driven on other farms.

2.3.3 Strategy 3: Reduce risk in barns/pens

Summary: Facility design and alternate management practices can reduce specific risks.

Most practices that are contained in biosecurity plans for sheep farms are designed to reduce the risk of disease transmission between animals and from people and their tools, equipment and vehicles to animals. In addition to these activities that act more directly on the disease risks, there are also important options to consider in developing a plan.

The design and construction of facilities that house sheep can be modified to support other biosecurity practices and/or to address risks directly. For example:

- smooth, non-porous materials or finishes can be considered that both reduce the ability of organic materials and pathogens to adhere to surfaces, and make the surfaces more effectively cleanable.
- the design of the facility can reduce the distance and reduce steps in removing manure from the barn(s) and other facilities,
- floor surfaces can be designed to be more easily cleaned,
- in meat operations, barns can be subdivided to separate groups of animals so that they are less likely to cross-contaminate.

Also, some production practices can be introduced that reduce the disease risk under certain circumstances where biosecurity practices are difficult or impractical to implement. For example, when meat production is being planned, either on a feedlot or full-scope production unit, a form of *all-in/all-out* scheduling can be used to limit potential commingling of current and added stock. If lambs can be managed in groups by purchase sequence or production lot, and the groups kept separate from one another, they are less likely to transmit disease to all of their flock-mates, thereby limiting the potential production losses to smaller groups.

2.3.4 Strategy 4: Reduce risk from equipment

Summary: Equipment can be dedicated for one purpose or dedicated to use in one risk area; equipment can be supplied by the farm for use by contracted service providers.

Cleaning and disinfecting equipment between uses is a mainstay of a biosecurity plan, and can address the risk of disease transmission both within a risk area and when equipment is used in multiple production areas and for multiple tasks around the farm. However, there are additional approaches that can be used to reduce the risks attendant to the use of equipment on the farm. Examples include:

- Equipment dedicated to certain purposes – for example, separate loader/skid-steer buckets for deadstock, manure and feed management; separate forks for bedding and cleanout;
- Equipment dedicated to use in one risk area – for example, forks used for bedding;
- Equipment that is provided by the farm, rather than by service providers – for example, hoof-trimmers, shearing equipment, and handling systems.

2.3.5 Strategy 5: Reduce risk from vehicles

Summary: Vehicle use patterns determine the relative risk of vehicles; cleaning and disinfection is the principle biosecurity tool for reducing vehicle-related disease transmission. Using farm-based vehicles can improve producers' control over vehicle use patterns.

Vehicles used for different purposes and coming from different sources represent different risks to the farm. Risk factors for trucks and trailers include:

- carrying multiple products – for example, sheep, other livestock, feed, manure, and deadstock; and

- travelling to multiple farms and other livestock facilities, including abattoirs, auction markets and shows.

The main concern is that producers often do not know what potential disease risks are presented by trucks arriving on the farm – what they have carried and where they have been.

Vehicles are at lower risk when they are used solely to carry people to and from the farm and do not have direct contact with animals or high risk products such as manure or deadstock. However, these vehicles may require biosecurity practices if they travel from farm to farm or between the farm and other livestock areas – abattoirs, auction markets and shows, for example.

Cleaning and disinfection is the principal means to manage the risk related to vehicles. Inside the box or trailer are critical if sheep are being transported. The exterior of the vehicle is important if it travels across pathways taken by animals or into areas in which contaminated material dropping off the vehicle could infect the farm. The interior of the cab is a concern if the driver or passenger(s) must leave the cab and enter any area of the farm that is accessible by sheep.

One alternate management opportunity is to use vehicles controlled by the farm. This removes the uncertainty of third-party vehicles and allows the producer to manage the biosecurity practices that are applied. Carrying sheep in a farm vehicle also has the advantage of common disease risk between the vehicle and the farm.

2.3.6 Strategy 6: Manage Manure

Summary: Manure is removed regularly and moved in a manner that limits exposure to the sheep. Tools and equipment use is limited and they are cleaned and disinfected between uses. Storage is secure and separated from the production area(s). Disposal is controlled.

Manure management includes addressing risks for removing manure from the production area, movement on the farm, storage on farm, and eventual disposal/distribution on land.

Manure should be removed from the pens or holding areas regularly, determined by the number of sheep housed in each area, and more frequently if there is any concern of disease in the pen (bedding should also be removed and replaced in these cases). Manure storage should be away from the production area and be secured from access by farm animals. Its location should therefore be away from the production area(s) and situated such that runoff will not accumulate and will not contaminate wells, feed storage or other service areas. Most local jurisdictions will have regulations for manure storage and compliance is required.

Movement off-site, if contemplated, requires care in accessing the storage area, respecting farm zoning practices, and avoidance of spillage or other contamination of farm areas upon exit. Disposal on the farm property – composting and/or distribution on fields and pasture – will follow requirements of the environmental farm plans and nutrient management programs in effect in each area.

2.3.7 Strategy 7: Manage Feed, Water and Bedding

Summary: Feed, water and bedding serve to support sheep health and therefore the flock's resistance to disease. Adequate and quality supplies are required, and storage is secure from contamination.

Carefully managing feed and water is important to provide a strong health foundation in the flock. This health foundation improves the ability of sheep to resist disease organisms and to reduce the effect of toxins or pathogens.

Both home-grown and purchased feed needs to be free of toxins that may naturally occur or that may form in storage; copper remains a significant concern for sheep. An assessment of the quality and nutritional value of the feed is useful and will guide decisions about the addition of supplements or minerals to ensure a complete, healthy ration.

Similarly, clean fresh water in adequate volume should be made available to all stock. Water should be tested at least annually and as required by local/regional regulation to ensure its cleanliness and safety, and its source location and facility should be checked to ensure that there is no contamination from surface water or runoff.

Bedding material storage practices are different by regions and by available facilities on farms. Ideally, when weather conditions require it, bedding should be stored in a protected location such that it remains safe, dry and uncontaminated. As much as possible, bedding material should be secure from contamination by pests, pets and rodents. Bedding material in use should be judged by its moisture and cleanliness, cleared regularly, and replaced by dry, clean product.

2.3.8 Strategy 8: Apply Shearing Protocols

Summary: Order of shearing is important to reduce the risk of disease transmission within the flock; equipment should be kept clean and contract shearers should wear clean outerwear and footwear.

On some farms shearing is carried out by producers themselves, or farm workers, using the farm's equipment. On other farms, shearing is done by contract shearers who are expert at their craft, who travel from farm to farm, and who bring with them equipment that is well-suited to the task. Clearly, while there are benefits to both approaches, there are different risks that pertain to each.

Shearing by producers or farm workers presents the risk of disease transmission from one sheep to another from equipment that is not sufficiently cleaned and disinfected between uses. This risk is heightened by the possibility of nicks and the added opportunity of disease transmission by blood or other fluids from the nick or into it. Nicks themselves represent risks of abscess formation, and abscesses are subsequently an effective means of transmission.

As a commingling activity – generally, sheep are pooled/penned in preparation for shearing – there is a possibility of animals coming in contact that generally are in separate areas of the farm, and also a risk of sharing facilities that might be contaminated by one member of the flock.

Shearing by a contracted service from off the farm presents all of the risks of producer/farm-worker shearing. In addition, the shearer's hands, clothing and footwear and shearing equipment, including shears, bags and boards, all carry the additional risk of being contaminated by disease organisms from other farms.

2.3.9 Strategy 9: Manage Needles and Sharps

Summary: Needles and sharps should not be re-used; if they are re-used, they should be disinfected between uses.

Re-use of needles and sharps is a high risk activity. Ideally, single-use needles and sharps will be used on the farm, and not be re-used; this ensures no cross-contamination of tissue or blood from one sheep to another, and avoids the risk of contamination of a drug bottle with a used needle. Subcutaneous injections are inherently less risky in this regard. Reuse of needles increases the risk of injection-site abscesses.

If re-usable needles and sharps are the accepted farm practice, effective disinfection and proper rinsing before reuse is required. Storage practices can also be a risk for reusable needles and sharps if they are exposed to bacteria and bacterial toxins.

2.3.10 Strategy 10: Managing Deadstock, Offal and Tissue

Summary: Deadstock are removed immediately and moved in a manner that limits cross-contamination with the flock. Placentas, aborted material and other tissue are managed as deadstock. The holding area, if used, is located away from the production area and is secure from pets and scavengers. Disposal respects local regulations and is done in a manner that limits disease exposure to the flock.

Deadstock management and management of placentas, aborted material and other tissue address removing deadstock and related materials from the production area, movement on the farm, storage on farm, and eventual disposition. Permitted storage and disposal methods will be regulated under local and regional jurisdiction; each method requires its own biosecurity practices.

Deadstock risks the direct contamination of the areas in which it is found, by body fluids that may contain disease pathogens. These pathogens can find their way into bedding, feed, forage, and onto pasture, and be ingested by others in the flock. Placentas, aborted materials and other tissue may similarly contain disease pathogens that can be transmitted to other animals in the flock, to other animals, or to humans.

The pathogens, or material containing them, may be distributed by insects and pests. In all cases, material containing disease pathogens may be moved about the farm or to other facilities by pets and scavengers, and may also be distributed in their feces, once consumed.

2.4 Principle 4: People

Goal: Conduct a risk assessment and develop protocols for all visitors and farm personnel

Strategy:	Summary:
1. Conduct risk assessment of all people visiting the farm	Attendance by people on the farm is guided by a specific risk assessment.
2. Implement protocols for visitors that have recently been in a foreign country	People who have been in a foreign country follow specific access practices.
3. Know what people are on the premises	Producers know who is on the farm, where they are, and what their purpose is.
4. Communicate and train farm workers; inform all visitors and service providers	All farm workers and family members are trained in the farm's biosecurity practices. The farm biosecurity protocol is communicated to visitors and service providers and they comply with it.
5. Recognize zoonotic risks	Family members, farm workers, visitors and service providers understand zoonotic diseases and take full precautions to protect themselves.

2.4.1 Strategy 1: Conduct Risk Assessments for all people visiting the farm

Summary: Attendance by people on the farm is guided by a specific risk assessment.

Producers are recommended to consider a risk analysis on the attendance of people at the farm – family members, farm workers, service suppliers and visitors. This analysis assumes that their attendance at the farm is legitimate and accepted by the producer, and focuses on the specific level of disease risk they represent, based on their previous exposure to farms and to sheep in particular, and the area(s) of the farm they are intending to enter. In the latter analysis, contact with the sheep is considered.

As illustrated in the Matrix below, risk levels, that can be described as low, moderate and high for simplicity, can be determined by these factors.

Risk Assessment - People

	Where Do They Go?	
	Go To Premise	Go into production area
Where do they come from? Have not been on another farm	No contact with Sheep LOW RISK	Contact with Sheep MODERATE RISK
Have been on another farm – no sheep	No contact with Sheep MODERATE RISK	Contact with Sheep HIGH RISK
Have been on another farm with Sheep	No contact with Sheep HIGH RISK	Contact with Sheep HIGHER RISK

In general, these groups could be described as follows:

- Low risk: travel to a farm but do not come in direct contact with livestock; for example, financial advisors and equipment salespersons
- Moderate risk: travel from farm to farm but do not directly contact the livestock; for example, feed delivery
- High risk: neighboring producers or anyone who travels farm to farm and comes in direct contact with livestock and have been in contact with livestock from other farms; for example, vets, shearers, and hoof trimmers
- A Higher Risk classification can be considered for anyone who has been in contact with sheep on another farm (or elsewhere), in diseased facilities or near diseased animals. If access to another flock was required, specific risk-reduction steps would be taken.

The risk assessment for each individual, based on where he/she is permitted to go on the farm, will determine the biosecurity practices that will be needed upon entry onto the farm and into the production area. A combination of restrictions to access and the requirement for clean hands, clothing and footwear is the basic arsenal for visitors and service providers. A higher level of biosecurity would apply for anyone approaching and/or touching the animals, and higher again for those approaching and/or touching isolated or sick animals.

Pre-determined practices/protocols can be designed that apply for each of these classes of risk, and signs and information can be situated at zone boundaries, on building and pen entries and

on special-risk pens to advise visitors where their limits to access are, and when to apply the higher-level practices.

2.4.2 Strategy 2: Implement protocols for visitors that have recently been in a foreign country

Summary: People who have been in a foreign country follow specific access practices.

A special case exists also, concerning people who have visited a foreign country in the recent past and who have had the potential to contact an infectious agent. While their relative risk can be established from the matrix described in section 2.4.1, knowing the diseases of concern in the area of the world the person has visited would allow producers to establish suitable delays before visits and to establish specific protocols for visits to Canadian farms. Information on known *infectious diseases* by country can be source from the World Organization for Animal Health (www.oie.int).

2.4.3 Strategy 3: Know what people are on the premises

Summary: Producers know who is on the farm, where they are, and what their purpose is.

The presence of people on the farm – farm workers, service providers and visitors – represents a significant set of risks to animal health. In a farm biosecurity plan, practices are recommended to be included that:

- restrict access by people to areas of the farm that require their presence,
- control the conditions of their entry to and exit from those zones and areas,
- require proper management of the tools, equipment and vehicles that accompany them, and
- guide the conditions of their contact with the flock.

In order to ensure that these controls are followed, and therefore that the health and welfare of the flock is maintained, a producer must have full knowledge of who is on the farm at all times. It is also important for producers to know in advance what service providers and visitors wish to visit the farm, so that they can be instructed in the practices that will be required during their visit and so that required materials will be available.

2.4.4 Strategy 4: Communicate and train farm workers; inform all visitors and service providers

Summary: All farm workers and family members are trained in the farm's biosecurity practices. The farm biosecurity protocol is communicated to visitors and service providers and they comply with it.

The success of Biosecurity plans will require the involvement and cooperation of several groups and individuals: suppliers, family members, farm workers, visitors, farm service providers and the flock veterinarian.

They will all need to understand the biosecurity best practices that guide their activities on the farm, and will need to ensure that their own biosecurity plans include safeguards that coordinate with the farm plan.

Producers, their family members, farm workers and visitors will benefit from training in the specific biosecurity practices in the Standard, as they are adapted for each farm. Farm service providers will also need to be trained in the practices established for the farms they service, both to ensure that they can carry them out and so that they can accommodate them within their own operational and biosecurity practices.

Effective training and education requires repeated review and/or instruction sessions with the biosecurity information contained in the farm plan, in other literature (a bibliography is provided in Appendix B) and available from subject specialists, advisors and public sources. Information can be provided in group sessions dedicated to biosecurity, on-the-job demonstrations, and corrective actions following one-on-one observations.

2.4.5 Strategy 5: Recognition of Zoonotic Risks

Summary: Family members, farm workers, visitors and service providers understand zoonotic diseases and take full precautions to protect themselves.

Sheep may be affected by a number of zoonotic diseases – diseases that can be passed to humans. Family members, farm workers, visitors and service providers need to understand the risks to their own health presented by these diseases and their ability to move between sheep and humans. People can be infected by direct and indirect contact and by aerosol means and a number of protective practices need to be followed that help reduce the risk of disease transmission, including hand washing, and full use of *personal protective equipment* specific to the disease risk.

DRAFT

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Sheep Biosecurity Advisory Committee (SBAC)

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Appendix A – Definitions

Adjacent to	This includes situations where sheep are in nose to nose contact with other animals including other sheep. This includes situations where the animals cannot touch each other but share airspace. E.g. sheep are not commingled with livestock (including sheep) but may have direct or indirect contact across a fence line or pen wall. It would not include those farms separated by a road or some other physical space barrier.
All-in-all-out	A production system in which the whole flock (all-in-all-out) or groups of lambs/sheep of similar disease risk (modified all-in-all-out) are housed and moved as a single unit(s) and are removed from the farm as a unit. Each unit's housing area is left empty of animals for a period of time before new animals are introduced.
Anteroom	A physical space within the production area/barn where there is a transition zone that defines a dirty and clean area where boots and clothing can be changed, and hand washing performed.
Ascarid	A parasitic nematode (family Ascaridae) that typically lives in the intestines of vertebrates.
Barn	A farm building used for storing farm products and sheltering livestock
Biosecurity	A health plan or measures designed to protect a population from transmissible infectious agents.
Biosecurity Protocols	Those measures specific to a <i>sheep operation</i> used to prevent the introduction and the spread of disease within an animal population and from that sheep operation.
CgFARAD	The Canadian global Food Animal Residue Avoidance Database provides information to veterinarians on drug/chemical residue avoidance.
Cleaning	Involves washing with detergent in order to remove all organic matter, and includes both a dry (scraping and brushing) and wet clean.
Community pastures	A community pasture is a public grazing area shared by more than one producer and not owned by a single producer.
Controlled Access Zone	A designated area in which biosecurity protocols are in place and monitored and within which livestock are managed (e.g. a location or primary location) and which is accessible to people / equipment / vehicles and livestock only through a securable (e.g. lockable) controlled access point.
Cross-contamination	The distribution of potentially-infectious material from one animal to another, or between facilities, equipment or vehicles by animals, people or things (fomites).
Disinfecting	The use of a disinfection agent, i.e. a chemical that can kill microorganisms, on areas being cleaned.
Domestic animals	Cats, dogs and any other household pet kept by the farm family, their neighbours and/or staff.
Dry ewes	A non-lactating ewe.
Drylots / paddocks / corrals	Fenced areas with no cover and without grass or other grazing often close to buildings used for livestock.
Emerging	An infectious disease that has newly appeared in a population or that has

Disease	been known for some time but is rapidly increasing in incidence or geographic range.
Endemic disease	Continued presence of a disease in a specific population or area.
Ewe	A female sheep that is part of the breeding flock i.e. has been exposed to the ram for breeding purposes
Feeder Sheep	Sheep, usually lambs – purchased for the purpose of feeding for slaughter and not for breeding.
Infectious diseases	Diseases caused by an infectious disease agent e.g. parasite, bacterial, virus, fungus.
Isolation	The action of restricting an animal to a location that is physically separate from other livestock. The purpose of isolating an animal is usually to prevent it from transmitting a disease to another animal, either because it is known to be diseased or because its disease status is currently unknown. The location is known as an isolation facility.
Known health status	The information that should be made available about a flock or an individual animal when offered for sale or intended for commingling, including disease history; flock health management practices; vaccination program detail sufficient to determine compatibility with the home flock; and housing and movement detail sufficient to identify any potential recent disease exposure.
Lamb	A female (ewe) or male (ram or castrated) that is less than 12 months of age.
Lambing Group	A group of ewes or ewe lambs bred for a specific period of time by a specific group of rams and that lamb during a specific period of time and location.
Livestock operation	Includes the buildings / drylots / paddocks / corrals and pastures used at any time of the year to manage any livestock including sheep (see definition below for sheep). The operation may have one or more than one location.
Livestock buildings	Covered structures used at any time of the year to house livestock, or feed used for livestock or equipment used for the management of livestock.
Loading area	An area that is designated for the loading and unloading of animals. This is not just the ramp but it also includes any holding area used for this purpose.
Location	A single location is defined as a property used to manage sheep (or livestock) that is self-contained and not divided by land or public road-way (e.g. concession road, highway – but not private laneway or walking path).
Maternal flocks	Flocks that include breeding ewes that produce added and/or replacement lambs for the flock.
Milking ewes	These are ewes that are currently in production and are actually being milked for human consumption.
Nursing ewe	A ewe that is lactating and currently being nursed by a lamb or lambs.
Other livestock	Animals other than sheep used for food or fibre production. Specifically goats, cattle (dairy, beef, veal), horses, bison, water buffalo, farmed deer / elk, alpacas, llamas, swine, poultry, turkeys, ducks, geese.
Pastures	Fenced areas used for livestock grazing at any time of year. Can include multi-use fields (e.g. graze after haying or aftermath feeding).
Personal Protective Equipment (PPE)	Gloves, clothing, footwear, head and face coverings, breathing apparatus and all cleansing agents, disinfectants and materials that limit, reduce or restrict contact by a pathogen to a human, by physical, airborne or any other means..

Personnel	Includes all full-time and part-time staff plus any family members who work at the operation.
Practice	A repeatable method of carrying out a task or activity for a specific end result, including the use of equipment and products
Primary Location	Would be considered the main or “home” farm where the home or business centre of the sheep operation is located. Usually holds most of the sheep and equipment as well as feed storage.
Protocol	This includes any formal process that a producer used to define how they manage their operations on a day to day basis. The protocol may be formally documented but it may also be non-documented process that is strictly followed. The intent is to focus on the process rather than the documentation.
Ram	A male sheep of any age that is intact and has been or is being used for breeding purposes.
Restricted Access Zone	An area inside the Controlled Access Zone where sheep are housed and where access by people or equipment is further restricted.
Sheep	A ewe, ram, <i>wether</i> (castrated ram), or lamb.
Sheep operation	The buildings, drylots / paddocks / corrals, and pastures used at any time of the year <u>to manage sheep</u> ; includes any structures that are used in managing the sheep operation that don’t have sheep, e.g. equipment shed, handling shed or pen, records room, clothing storage area, manure storage, feed storage. The sheep operation may have one or more than one location. It includes guardian or working animals (e.g. dogs, donkeys, llamas) or equipment (e.g. handling facilities, ATV etc) used to manage the sheep.
Shared facilities and/or equipment and staff	In this case the buildings, equipment and staff are, or may be, used to manage other livestock (e.g. cattle, swine, goats, poultry) or other animals.
Vermin and Wildlife	Includes all non-livestock and non domestic animals and insects that may pose a health risk (disease and/or predatory) to the sheep flock.
Visitors	Any non-personnel that come to the operation.
Wether	A male sheep that has been castrated and is generally 12 months of age or greater although wethers can also be lambs.
Working / guardian animals	Includes dogs (e.g. guardian dogs, herding dogs), llamas, donkeys, horses etc that have contact with and are used to manage the sheep for purposes such as moving the sheep, or guarding the sheep from predators.
Zoonotic disease	An infectious disease that can be transmitted (in some instances, by a vector) from non-human animals, both wild and domestic, to humans or from humans to non-human animals.

Appendix B – List of Reference Documents

Initial References

1. Antonia M. Clavijo, B.M. "Effect of the exploitation system on the appearance of mastitis in goat in two farm in Falcon state, their etiologic agents and antimicrobial resistance." *Zootecnia Tropical* **20**, 383-395 (2002).
2. Bates, T.W., Thurmond, M.C. & Carpenter, T.E. "Direct and indirect contact rates among beef, dairy, goat, sheep, and swine herds in three California counties, with reference to control of potential foot-and-mouth disease transmission." *American Journal of Veterinary Research* **62**, 1121-1129 (2001).
3. Dement, A.I. & Craddock, B.F. "Biosecurity for Sheep and Goat Producers." *Texas A&M University*
4. Ganter, M. "Veterinary consultancy and health schemes in sheep: Experiences and reflections from a local German outlook." *Small Ruminant Research* **76**, 55-67 (2008).
5. Ghanem, Y.M. et al. "Prevalence and risk factors of caprine arthritis encephalitis virus infection (CAEV) in Northern Somalia." *Small Ruminant Research* **85**, 142-148 (2009).
6. Givens, M.D. & Marley, M.S.D. "Infectious causes of embryonic and fetal mortality." *Theriogenology* **70**, 270-85 (2008).
7. Howell, S.B. et al. "Prevalence of anthelmintic resistance on sheep and goat farms in the southeastern United States." *Journal of the American Veterinary Medical Association* **233**, 1913-1919 (2008).
8. Kabagambe, E.K. et al. "Risk factors for Brucella seropositivity in goat herds in eastern and western Uganda." *Preventive Veterinary Medicine* **52**, 91-108 (2001).
9. Menzies, P.I. "Control of important causes of infectious abortion in sheep and goats." *The Veterinary Clinics of North America Food Animal Practice* **27**, 81-93 (2011).
10. Menzies, P. & Simard, C. "ONTARIO MAEDI VISNA FLOCK STATUS PROGRAM: Definitions and protocols governing the program and additional information." *University of Guelph* 1-29 (2007).
11. Merkel, R.C. & Gipson, T.A. "Change in behavior of goat producers after on-line training in herd health practices." *Small Ruminant Research* **98**, 31-34 (2011).
12. Merkel, R. "Introduction to a Meat Goat Quality Assurance Program and HACCP." *Langston University*

13. Mobley, R. & Lyttle-N'guessan, C. "The Herd Health Handbook for Goat Producers: Biosecurity at the Farm Level." *Florida A&M University* (2009).
14. Mobley, R. & Lyttle-N'guessan, C. "The Herd Health Handbook for Goat Producers: Food Safety at the Farm Gate: A Holistic Approach to Food Safety and Herd Health." *Florida A&M University*
15. Mobley, R., Lyttle-N'guessan, C. & Peterson, T. "The Herd Health Handbook for Goat Producers: Control of Parasites in Goats." *Florida A&M University* (2009).
16. Moore, D.A. et al. "Comparison of published recommendations regarding biosecurity practices for various production animal species and classes." *Journal of the American Veterinary Medical Association* **233**, 249-56 (2008).
17. Nöremark, M., Frössling, J. & Lewerin, S.S. "Application of routines that contribute to on-farm biosecurity as reported by Swedish livestock farmers." *Transboundary and Emerging Diseases* **57**, 225-36 (2010).
18. Oliveira, C.J.B. et al. "On farm risk factors associated with goat milk quality in Northeast Brazil." *Small Ruminant Research* **98**, 64-69 (2011).
19. Olson, E.J. et al. "Isolation of an Adenovirus and an Adeno-Associated Virus from Goat Kids with Enteritis." *Journal of Veterinary Diagnostic Investigation* **16**, 461-464 (2004).
20. Thunes, C. & Carpenter, T.E. "Biosecurity practices and travel history of individuals exhibiting livestock at the 2005 California State Fair." *Journal of the American Veterinary Medical Association* **231**, 581-5 (2007).
21. Winter, A.C. "Treatment and control of hoof disorders in sheep and goats." *The Veterinary Clinics of North America Food Animal Practice* **27**, 187-92 (2011).
22. "Sheep and Goat Industries Biosecurity Plan." *Government of Western Australia Department of Agriculture* 1-64 (2002).
23. "Sheep/Goat Industry Biosecurity Plan." *farmbiosecurity.com.au* 1-4 (2003).
24. "Goat MAP: Rules and Guidelines of the Australian Johne's Disease Market Assurance Program for Goats." *Animal Health Australia, Goat Industry Council of Australia Inc., Nation Johne's Program* 1-67 (2009).
25. "Goat 2009 Part II: Reference of Goat Health and Marketing Practices in the United States, 2009." *Animal and Plant Health Inspection Service* (2011).

Additional References

1. Carpenter, T.E. et al. "Potential impact of an introduction of foot-and-mouth disease into the California State Fair." *Journal of the American Veterinary Medical Association* **231**, 1231-1235 (2007).
2. Farquharson, B. "A whole farm approach to planned animal health and production for sheep clients in Australia." *Small Ruminant Research* **86**, 26-29 (2009).
3. Humann-Ziehank, E. & Ganter, M. "Preventive animal health in Small Ruminants - Results of an interdisciplinary workshop Part 2: Infectious diseases." *Tieraerztliche Umschau* **61**, 91-+ (2006).
4. Häusermann, C. et al. "Surveillance and simulation of bovine spongiform encephalopathy and scrapie in small ruminants in Switzerland." *BMC Veterinary Research* **6**, 20 (2010).
5. Kitching, R.P. & Hughes, G.J. "Clinical variation in foot and mouth disease: sheep and goats." *Revue Scientifique et Technique de L'Office International Des Epizooties* **21**, 505-512 (2002).
6. Kumar, S., Vihan, V.S. & Deoghare, P.R. "Economic implication of diseases in goats in India with reference to implementation of a health plan calendar." *Small Ruminant Research* **47**, 159-164 (2003).
7. Reviriego, F.J., Moreno, M.A. & Dominguez, L. "Risk factors for brucellosis seroprevalence of sheep and goat flocks in Spain." *Preventive Veterinary Medicine* **44**, 167-173 (2000).
8. Seuberlich, T., Heim, D. & Zurbriggen, A. "Atypical transmissible spongiform encephalopathies in ruminants: a challenge for disease surveillance and control." *Journal of Veterinary Diagnostic Investigation* **22**, 823-842 (2010).
9. Wrathall, A.E. "Risks of transmitting scrapie and bovine spongiform encephalopathy by semen and embryos." *Revue Scientifique et Technique - Office Internaional des Eprizooties* **16**, 240-264 (1997).
10. Wrathall, A.E. "Risks of transmission of spongiform encephalopathies by reproductive technologies in domesticated ruminants." *Livestock Production Science* **62**, 287-316 (2000).