



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments

Animal Biosecurity

National Farm-Level Biosecurity Standard for the Goat Industry



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Introduction

1.1 What is biosecurity?

Biosecurity is a set of **practices** that are used to minimize the transmission of disease-causing organisms in animal populations, including their introduction, spread within the population, and release. Biosecurity is proactive and focuses on routine, day-to-day on-farm activities to protect the health of the herd.

1.2 Why is biosecurity important to the Canadian goat industry?

Animal health management has undergone significant change in recent years, influenced by

- greater understanding of the risk of new and **emerging pathogens**,
- increased awareness of **zoonoses** and concern for public health,
- changing **epidemiology** of disease, due to the concentration and **commingling** of animals and people in more intensive farming situations,
- new production practices in agriculture, including farm specialization,
- globalization, increasing movement of people and goods,
- opportunities to sell to additional markets, both in Canada and internationally, and
- more attention to **traceability** and the ability to identify product attributes and production conditions along **supply chains**.

As a result, using a proactive approach as the first line of defence in animal health is more important now than ever before. Livestock industries have therefore started to shift their focus to disease prevention and on-farm biosecurity.

The Canadian goat industry understands the need for a proactive approach; in fact, many producers have implemented proactive biosecurity practices on their farms and are working toward a consistent and systematic approach to address the risks in all goat production activities. Significant benefits, both to producers and the industry, can be achieved by increasing attention to on-farm biosecurity and its wide adoption in the goat industry in Canada. These benefits include the following:

a) Enhanced disease risk management:

- lower risk of **infectious disease** transmission to a herd from purchased animals;
- reduced **mortality** and **morbidity** in the herd;
- reduced risk of new diseases entering the national herd and then arriving at the farm;

-
- reduced risk of exposure to zoonotic diseases by producers, and their workers, families, and **visitors**;
 - enhanced awareness, potentially resulting in improved access and availability of timely and effective methods to determine the disease status of a herd; and
 - improved disease testing and herd monitoring.

b) Strengthened animal and herd health management:

- improved animal health and welfare through consistent on-farm management practices;
- reduced need for drug use, contributing to reduced risk of **antimicrobial** or **anthelmintic** resistance;
- increased awareness of vaccines and their use as a tool in a proactive biosecurity program; and
- increased attention to licensing of important animal health products (drugs and **biologics**) for goats, including lactating dairy goats.

c) Operational gains:

- increased profitability from improved productivity and reduced losses;
- more reliable supply of high-quality goat products to Canadian marketers and retailers;
- wider and more confident export markets;
- improved food safety and increased consumer confidence in Canadian **goat products**; and
- enhanced awareness of the importance of genetics, potentially resulting in greater access to and availability of genetics and an improved gene pool and genetic quality of the national herd.

Clearly, biosecurity is important not only for improving animal health on the farm, but also for strengthening the Canadian goat industry as a whole.

1.3 Developing the Standard

The Standard was developed through a partnership of the Canadian National Goat Federation (CNGF) and the Canadian Food Inspection Agency (CFIA), in collaboration with Agriculture and Agri-Food Canada (AAFC). An advisory committee made up of producers, along with representatives from regional and sector-specific goat industry organizations, colleges and universities, and the public sector, provided invaluable guidance throughout the process.

Prior to drafting the Standard, a literature review was completed to highlight the research that is currently available on biosecurity programs and practices in Canada, North America, and the major goat-producing regions of the world. Producer-level consultations were then carried out to identify the current state of implementation of biosecurity measures and best practices on goat farms in all production types across the country.

Section 3 of this document provides a Glossary of Terms. These terms are identified in **bold** on their first use within the document. Readers are advised to refer to the Glossary for any words that are unfamiliar, or for a definition that is unclear in the context in which it is used.

It is recognized that there are a number of challenges currently facing the goat industry, and these may impact a producer's decision to adopt recommended biosecurity measures into their biosecurity plan. These challenges are, for example, availability and access to accredited facilities and suppliers for artificial insemination and embryo transfer, accessibility of veterinary diagnostic laboratories, availability and reliability of certain disease testing protocols and access to drugs and vaccines licensed for use in goats.

The *Biosecurity Planning Guide for Canadian Goat Producers* has been developed, in addition to this National Biosecurity Standard, to assist goat producers in preparing biosecurity plans for their farming operations. The *Planning Guide* provides additional information, best practices, and examples that will enhance producers' understanding of the concepts and outcomes in the Standard and how they can be applied on goat farms across the country.

1.4 Purpose of the Standard

The Standard is a useful tool for goat producers when developing and implementing on-farm biosecurity plans. It contains a set of recommendations that can be adapted to the needs of each farm to raise its current level of biosecurity.

The Standard can also be used by producer organizations, veterinarians, **service providers**, and other stakeholders in the goat industry. Although producers are responsible for the biosecurity on their farms, everyone has a role in biosecurity and can help to achieve consistent industry-wide biosecurity. Appendix A Target Audiences for the Standard provides additional information.

1.5 Developing a Biosecurity Plan

The National Farm-Level Biosecurity Standard for the Goat Industry identifies areas of the farm or farm practices for producers to consider when developing biosecurity plans for their **goat operations**. Identifying the possible risks of the introduction of **infectious agents** to the farm and the practical methods to limiting those risks is key to creating a biosecurity plan. Taking into account the farm facilities, the herd's disease status, an individual goat's **health status** and genetics, and the farm's production objectives and management strategies will also improve its value.

The information in section 2 of the Standard, along with additional resource information in the accompanying *Planning Guide*, will help producers build biosecurity plans to fit their farm operations. The Appendices also provide valuable information. Specifically, Appendix B outlines examples of modes of disease transmission, and Appendix C is a sample step-by-step guide for developing a biosecurity plan.

Consultation with a herd veterinarian¹ will assist with a risk assessment of the **premises**, in particular identifying the farm's **diseases of concern**, and in preparing plans for vaccination and other **prophylactic** treatments. Veterinarians can also offer help in developing and refining practices that fit the health status of each herd and that are effective in dealing with the farm's diseases of concern.

In some areas of Canada, it is recognized that there are a limited number of practising veterinarians who specialize in goat production and health. Additional resources in identifying the farm's risks and developing a farm's biosecurity plan may include, but are not limited to, the following: large animal veterinarian and veterinarians who have an interest in small ruminants, feed formulators, provincial specialists, university faculty, commodity associations, and other producers. Some information is also available from public sources, including libraries and provincial government websites.

¹ In some provinces, annual on-farm visits are required in order to have a valid **veterinary client patient relationship** (VCPR) and this VCPR is needed before prescribing and selling any medications, should the animal health situation change.



Key Areas of Concern

The Standard is designed to provide a systematic approach to proactive biosecurity at the farm level. The Standard is based on six key areas of concern within which potential biosecurity risks are identified and recommended biosecurity practices are highlighted.

Key Areas of Concern for Goat Producers

1. **Sourcing and introducing animals**
2. **Animal health**
3. **Facility management and access controls**
4. **Movement of people, vehicles, and equipment**
5. **Monitoring and record keeping**
6. **Communications and training**

These key areas of concern focus on proactive biosecurity practices that will reduce the risk of animals, people, inputs, equipment, and vehicles introducing infectious agents onto a farm and spreading them within a herd. They will also consider how facilities and operational activities can contribute to improved biosecurity. The results of the producer-level consultation identified that producers are aware of these key areas of concern in their farming operations and respond by implementing biosecurity practices.

Target outcomes have been established for each key area of concern. Each target outcome identifies a goal for the key area of concern. There are many practices that may be implemented to achieve this goal. Producers should review the recommendations and incorporate the most appropriate approach for their operations.

The Standard has been designed in a workbook format. Producers can work step-by-step through the Standard as they develop their biosecurity plans. Before each target outcome, there is a self-evaluation checklist that producers can use to identify their biosecurity activities in each key area of concern. Following the recommendations presented in each key area of concern, producers can write down their biosecurity gaps and then develop goals to assist in determining how the biosecurity concepts could be integrated into their farms' biosecurity plans. As noted earlier, the *Planning Guide* consists of additional reference material and biosecurity best practices. Appendix D summarizes the key areas of concern.

2.1 KEY AREA OF CONCERN 1: Sourcing and introducing animals

Increasing herd numbers and strengthening the herd’s genetic diversity are important in achieving production goals. Semen and embryos can be purchased from **accredited** facilities to broaden the genetic profile of the herd and to reduce the risk of disease transmission that may accompany animal introductions.

When a producer chooses to purchase replacement animals from outside sources, or when goats are taken off the farm to attend fairs and shows and then returned to the home herd, biosecurity measures may minimize potential disease-transmission risks to the farm.

Table 1.1: Self-Evaluation Checklist

Table 1.1 contains a series of activities that may occur on a goat farm to address the risks associated with sourcing and introducing animals into the home herd. Sections 2.1.1 - 2.1.5 provide additional information. Specific subsection reference numbers are provided for each activity.

Biosecurity practices for sourcing and introducing animals	Self-evaluation				Reference
	Always / frequently	Sometimes	Never	N/A	
I raise as many replacement goats as possible and add new goats only when necessary.					2.1.1
I purchase new goats from a limited number of sources.					2.1.1
Artificial insemination is the method used to breed replacement goats.					2.1.1
Embryo transfer is used to replace goats and/or grow the herd.					2.1.1

Biosecurity practices for sourcing and introducing animals	Self-evaluation				Reference
	Always / frequently	Sometimes	Never	N/A	
When my goats participate at a show or a fair, I take preventive measures to reduce the risk of disease transmission from other goats. For example, I ask people to avoid touching the goats. If they are in contact with the goats, I request they wash their hands with soap or apply sanitizer before and after touching a goat.					2.1.2
I avoid commingling of all types of animals from other farms during transportation.					2.1.2
When I purchase new goats, I know the health status of the animals and of the herd of origin and/or source herd . The source is of equal or higher health status to my farm.					2.1.3
My goat purchases are supported by documentation on the health and disease status of animals, such as verified test results for some specific diseases (e.g. Caprine Arthritis Encephalitis (CAE), scrapie, <i>Staphylococcus aureus</i> , infectious abortion, Johne's disease)					2.1.3
All goats introduced or re-introduced (e.g. after going to a show, loaned goats) are isolated for a period of time, as recommended by my veterinarian. The time period required is adjusted specific to the diseases of concern.					2.1.4

Biosecurity practices for sourcing and introducing animals	Self-evaluation				Reference
	Always / frequently	Sometimes	Never	N/A	
Goats in an isolation pen are monitored daily for signs of clinical sickness.					2.1.4
The isolation area does not permit nose-to-nose contact and indirect contact (e.g. feed, water, shared equipment) with my home herd.					2.1.4
The enclosed sheltered isolation pen does not share common airspace (including direction of air movement) with resident animals.					2.1.4
The equipment used for treatment, handling, and other husbandry chores in the isolation area is not used for the main herd; otherwise, the equipment is cleaned and disinfected between uses.					2.1.4
Separate dedicated personal protective clothing (including, but not limited to, gloves, coveralls, and boots) is used to work with goats in the isolation area.					2.1.4
My employees handle goats from the home herd before handling goats in isolation pens.					2.1.4
I have a protocol in effect for releasing goats from isolation, which may include testing, vaccinating, or treating for diseases of concern, as recommended by my herd veterinarian.					2.1.5

Target Outcome:

Animal introductions and re-entry, and the use of semen and embryos do not present a risk to the health status of the herd.

Managing breeding to ensure that replacement animals originate solely on-farm, referred to as operating a closed herd, minimizes the risk of disease introduction. For genetic diversity, artificial insemination (AI) using semen purchased from accredited sources, is a strategy that some producers use to reduce the risk, provided the purchased semen is tested and shown to be free of specific infectious agents. Embryo transfer (ET) is also a method that can help improve the genetic diversity of the herd with minimal risk of disease transmission.

While these low-risk strategies are available to some producers, it is recognized that there are challenges with the availability of AI and ET for every producer. Diversity of genetics, accessibility, availability, and cost of AI and/or ET are considered by a producer when determining a business strategy to increase herd numbers and/or diversify genetics. For producers who purchase and introduce new animals into the herd, there are proactive biosecurity measures that may be implemented to minimize the risk of disease introduction and spread.

Purchases made from sources whose production and biosecurity practices are known present a lower risk of introducing infectious agents, compared with purchases made from sources that are unable to provide that information. Risks in this case could include commingling animals from multiple herds and sales of animals whose health status is unknown. Further, goats are often taken off-farm to attend fairs and shows and are subsequently returned to the herd. Similar to new animal introductions, goats returning from these **locations** pose a high risk of disease transmission to the home herd. Biosecurity measures designed to address these risks should be identified and implemented.

Risks to consider:

- exposing breeding stock to purchased semen or embryos that may contain infectious agents, resulting in infected offspring and/or contamination of areas of the farm in which birth or abortion materials are deposited;
- exposing the home herd or individual herd members, especially those that are more **susceptible** to
 - new goats that may be sick or carrying infectious agents;
 - goats that are returning to the home herd and that have commingled with animals that may be sick or carrying infectious agents, or have been exposed to infected feed, bedding, equipment, vehicles, or facilities when away from the farm; and
 - people, equipment, inputs (such as feed and bedding), and vehicles that transport the goats to the farm, which are contaminated with infectious agents acquired from other herds and animals;

-
- new goats may be susceptible to infectious agents in the home goat herd. Clinical signs may not be seen in the herd if goats have natural **immunity** or have been vaccinated.

2.1.1 Sources and sourcing

SUMMARY: Producers can reduce the risk of introducing diseases onto their farm by controlling the way they source and introduce new animals and/or source artificial insemination and embryo transfer materials. Sourcing semen and embryos from accredited suppliers, limiting the frequency of animal additions, and controlling the number and quality of sources of new animals will reduce the risk.

Bringing new goats onto the farm to use as replacements and to increase herd numbers poses a significant risk of disease introduction. Maintaining a closed herd, in which all replacement animals (male and female) are raised on the farm, eliminates the risk associated with animal introduction. To use semen and embryo materials provided by an external supplier is a relatively low-risk way to increase herd numbers and/or to improve the herd's genetic profile. It is important, however, that suppliers used for this purpose are known to utilize procedures that ensure semen and embryos are free from infectious agents.² All artificial insemination products should be tested prior to sale.

Introducing new genetics is also important to the health and productivity of the herd and cannot always be done through artificial insemination or embryo transfer. Therefore, there may be a need to purchase replacement goats from outside sources.

If additions to the herd are purchased, the risk may be reduced by carefully choosing the suppliers and limiting the number of sources. Suppliers should be reputable and have biosecurity and animal health practices that are compatible with (i.e. equal to or higher than) the practices and health status of the home farm. Further, limiting the number of goats that are purchased and how often they are bought reduces the risk of disease introduction.

2.1.2 Biosecurity practices at fairs, shows, and off-site loan locations

SUMMARY: When fairs, shows, and other off-site locations provide inadequate biosecurity for visiting goats, there are proactive measures that producers may implement to reduce the risks. These include transporting their animals in home-farm vehicles; bringing feed, water, water-delivery systems and other needed equipment from the home farm; applying biosecurity protocols at the off-site location; and treating returning goats as new arrivals. Producers should inquire about whether the fair or show has a biosecurity policy and a set of procedures to minimize the risk of disease transmission. With no policy in place, evaluating risks, and having the capacity to minimize risk, becomes part of the decision-making process when considering whether to attend the off-site event.

Producers should inquire about the biosecurity policies for goats at the off-site locations. Some shows and fairs do have biosecurity policies that apply to all animals to be housed on-site, including

² Health of Animals Regulations, sections 2, 69, 115,116-119, 160 and 161

disease or health declarations, and animal examinations upon arrival. Understanding the organizer's biosecurity policies allows producers to make their own arrangements if they believe that the organizer's policies inadequately reduce the risk of disease transmission.

Regardless of the site's biosecurity policy, off-farm visits may involve contact with animals from other herds, with facilities and equipment that have had contact with many other animals, and with people who will have had contact with goats and other animals that pose a disease risk. Producers should take specific measures to reduce the risk of disease transmission to their goats.

Goats should be isolated from the herd for a period of time when they are returned to the home farm. During this time, if the goat has been infected, clinical signs may be observed, the infected goat can be tested and treated, and **shedding** of any infectious agents it may have acquired while off-farm may cease. All equipment taken off-farm should be cleaned and disinfected before being returned to the production area, and leftover feed and bedding should be discarded.

2.1.3 Disease status at purchase or re-entry

SUMMARY: Knowing the health status of new animals and animals that are re-entering the farm (e.g. animals attending livestock shows, borrowed, or loaned goats) allows producers to implement biosecurity measures to minimize the risk of introduction and spread of disease to their existing herd.

Disclosure of all relevant information between buyers and sellers, including documentation, is necessary for identifying or verifying the disease and immunity status of individual animals and the herd(s) of origin. Producers who obtain replacement or additional stock under these conditions will better understand the risk to which they are exposing their herd, and thus allow for proper preparation for the entry of these animals into their herd. Confidence in the health status may avoid costs of unnecessary prophylactic or disease-management treatments, and reduce the risk of production loss from the acquired animals.

This approach requires that breeders and other suppliers, including agents, brokers, and auction markets, provide animal health records and proof of the programs under which the purchased animals have been raised (e.g. Voluntary National Scrapie Program in Canada). Goat producers will then obtain health and disease records for the animals they acquire and the herd(s) from which they have come.

Producers who purchase additions for their herds should reduce the risks that exist when introducing new stock to their established herd and when commingling goats of unknown health status by

- knowing the disease status of their herd and the herd of origin and/or source herd and whether their health profiles are compatible (equal to or higher than the home herd);
- sourcing animals directly from the herd of origin (i.e. from the birth herd) and limiting commingling during sourcing and transportation; and
- working with their herd veterinarian to assess the compatibility of the herds' health status.

Herd veterinarians for both the buyers and the sellers may also assist with this exchange of information.

2.1.4 Isolation upon arrival or re-entry

SUMMARY: Isolating new or re-introduced animals for a sufficient time helps to identify animals with acute infections that are still in their incubation period, allowing for the shedding of infectious agents to cease, and to carry out testing and treatment. Some infectious agents may be difficult to detect within a normal isolation period.

Producers who isolate new goats on entry provide a buffer between the new animals and the home herd. Goats returning from a commingling activity (e.g. a buck loaned out for breeding or goats visiting shows or fairs) should also be isolated for a period of time on return. This period of isolation provides an opportunity to observe signs of illness and to test for any disease that might be carried by one or more of the additions. Any planned treatments can also be given time to take effect. When necessary, any new animals with a disease that is not present in the home herd can be culled before they have the opportunity to infect others. In all cases, the isolation period for new or returning animals should allow for testing and delivery of laboratory results for all diseases of concern, if available.

It is recognized that certain diseases with long **incubation** periods (such as Johne's disease) and/or diseases that cannot be reliably tested for in a live animal (such as scrapie) may not become evident during isolation. In addition, many infectious agents of animals can be present in animals without signs of illness; these animals are considered **asymptomatic** or **carriers**. Carrier animals may be an undetected source of disease (e.g. chlamydiosis). Additional **biosecurity protocols** will need to be identified, in collaboration with the herd veterinarian, to minimize the potential risks associated with these diseases.

It is important to designate an isolation area(s). It should be separated from housing, pens, or pathways that are used by resident goats and livestock on the farm and have no opportunity for **direct contact**. If multiple groups of goats are in isolation, contact between each group should also be prevented. The airspace should be separately ventilated to prevent transmission of airborne diseases such as caprine arthritis encephalitis (CAE) virus and *Coxiella burnetii* (Q fever). It is preferable that the isolation facility be separated from the main herd by a solid partition and a secure door.

The isolation³ of milking does requires additional biosecurity measures for milk and equipment. Milking does need to be milked, and when larger numbers of animals are involved, manual milking or isolation from the milking parlour may not be possible. Planning the milking order may manage some of this risk, with the lower-risk animals milked first. However, after the higher-risk animals are milked, all equipment, including feeders, walkways, milkers, and water-delivery systems that may contain the infectious agents, should be cleaned and disinfected prior to milking the lower-risk animals again.

³ One reason for isolating milking does would be to prevent the transmission of *Staphylococcus aureus* mastitis. This may entail something as simple as having separate pens for each group so that the group for which *S. aureus* is a concern is milked last.

Goats are social animals and may be stressed by being separated from their herd; isolation facilities should be designed with this in mind. Modifications to the isolation area such as using safety-glass mirrors may offset some of this stress.

2.1.5 Protocols for releasing animals from isolation

SUMMARY: Isolation will only be effective if there are protocols in place for releasing animals at the appropriate time.

Producers should work with their herd veterinarian to develop suitable protocols for releasing animals from isolation. The Herd Health Management Program (example presented in section 2.2) should include disease-testing methods and treatment protocols for common diseases and diseases of concern on the farm for use before goats are introduced or returned to the herd. In situations where testing is recommended and as part of the producer's risk management process, blood, milk, feces, and other samples should be collected from new animals for specific diseases of concern, and submitted to a veterinary diagnostic laboratory. Laboratory tests and analysis of samples should be conducted before they are exposed to the main herd.

Developing the biosecurity plan

Based on the self-evaluation and the information provided in this section on sourcing and introducing animals, consider the following:

1. What are the biosecurity gaps on my farm?

2. What are the biosecurity goals that address these gaps?

3. What steps can I take to achieve these goals?

2.2 KEY AREA OF CONCERN 2: Animal health

Animal health is a top priority for all goat producers. Many activities, both preventive and responsive in nature, contribute to the health of the herd. The health status of the herd and producer’s goals are key considerations when developing a biosecurity plan. They should be complementary to improve goat health management.

Table 2.1: Self-Evaluation Checklist

Table 2.1 contains a series of activities that may occur on a goat farm that relate to managing animal health. Sections 2.2.1 - 2.2.7 provide additional information. Specific subsection reference numbers are provided for each activity.

Biosecurity practices for animal health	Self-evaluation				Reference
	Always / frequently	Sometimes	Never	N/A	
I currently have in place an active herd health management program, developed in partnership with a licensed veterinarian.					2.2.1
My workers and I observe and evaluate the health of animals at least daily.					2.2.2
When a sick animal is identified, I have a protocol in place for isolation.					2.2.2
In my herd health management program, there are specific clearly identified criteria (i.e. trigger points) for contacting my veterinarian regarding animal health issues.					2.2.2
If there is unexpected or unexplained mortality in my herd, I contact my herd veterinarian for further diagnostic workup (e.g. post-mortem, sample submission to a veterinary diagnostic laboratory).					2.2.2

Biosecurity practices for animal health		Self-evaluation				Reference
		Always / frequently	Sometimes	Never	N/A	
I have written treatment protocols, developed by my herd veterinarian, for the management of sick animals.						2.2.3
My herd health management program includes written protocols for disease control measures (e.g. vaccination, parasite control, disease testing, biosecurity) for various production groups.						2.2.3
Milking for human consumption	Udder preparation for milking includes 1) udder/teat cleaning and disinfection (approved or prescribed product), 2) udder/teat drying (using, for example, a single-use towel, paper towel, or multi-use washable microfibre cloth that is disinfected between animals)					2.2.3
	Milk is routinely tested for bacterial counts.					2.2.3
	I use prestripping and/or other methods to routinely test for evidence of mastitis, and I have specific protocols to manage goats with evidence of mastitis.					2.2.3
	After milking, teats are dipped in an approved product.					2.2.3

Biosecurity practices for animal health		Self-evaluation				Reference
		Always / frequently	Sometimes	Never	N/A	
Kidding	I have a protocol in place for kidding that includes cleaning and disinfection of the area after each kidding, and personal protective clothing for workers.					2.2.3
	When abortions occur, I remove the fetus and placenta, and clean and disinfect the area and equipment immediately.					2.2.3
	If I kid on pasture, I ensure that all birth and abortion material and the surrounding environment are promptly cleaned up.					2.2.3
	I investigate the cause of abortions, if the number of abortions increases.					2.2.3
	I use the appropriate heat treatment for colostrum. I pasteurize milk for kids. Only clean milk (i.e. not from a sick animal) is used.					2.2.3
	I have written herd health protocols in place for kids that include navel disinfection at birth, vaccination, parasite control, and identification.					2.2.3

Biosecurity practices for animal health	Self-evaluation				Reference
	Always / frequently	Sometimes	Never	N/A	
Animals are managed so that the youngest and healthiest have no contact with the older and/or diseased animals. This applies to animal movement through the farm, including milking order, and to worker contact with the animals.					2.2.4, 2.2.6
If I have other livestock species (aside from guardian animals) on my farm, I avoid direct and indirect (e.g. common equipment) contacts between them and the goats.					2.2.4
I have a biosecurity protocol for common or community pastures , if applicable.					2.2.4
I have a plan to move my animals within the production area that limits commingling and exposure to animals of higher disease susceptibility.					2.2.6
Water provided to goats is tested for suitability for livestock consumption annually and whenever it is a source of concern.					2.2.7
Feed and bedding are sourced from known and reliable sources, and are stored in a manner that avoids contamination by dogs, cats, pests, and wildlife .					2.2.7

Target Outcome:

Animal health, well-being, and productivity will be optimized through proper implementation of herd health programs.

Risks to consider:

- improper implementation and/or reduced effectiveness of preventive herd health practices;
- limited ability to detect changes in health status in a timely manner;
- increased susceptibility to disease in individual animals and the herd;
- higher risk of spread of infectious agents between goats of different health status and susceptibility;
- reduced effectiveness of response activities;
- increased use of veterinary drugs not licensed for use in goats with the risk of residues in meat and milk, as well as antimicrobial and/or anthelmintic resistance;
- increased risk of spread of infectious agents through feed, water, and bedding;
- increased demands on producers and herd veterinarians for animal health care, consuming time for other productive activities and increasing production costs;
- increased risk of disease becoming established within the herd;
- decreased animal welfare and productivity; and
- increased mortality and involuntary culling, due to disease and low productivity.

2.2.1 Implement a herd health management program

SUMMARY: A herd health management program identifies the key components required for appropriate disease prevention, control, and treatment for each farm. The herd veterinarian is a key partner for determining the specific risks to the herd and then designing and implementing the herd health management program.

Herd health management is intended to improve health and prevent disease in animals. It works within producers' and industry's business structure, and recognizes the issues of animal welfare, human safety, and environmental impact. To be effective, a herd health management program should be targeted toward the needs of each herd. Consideration should be given to the current profile of the herd, including age, production type, and breed. Specific diseases of concern should be identified, including those diseases that are present in the herd, as well as those diseases that are not present, but that pose a risk of introduction. It also includes setting goals for health and productivity, based on an analysis of the current status of the herd, and developing protocols to achieve these goals.

A herd health management program should include a working relationship with a veterinarian.

Table 2.2: The Herd Health Management Program

Table 2.2 is an example of a herd health management program. Specific components are identified that relate to goat health, and additional details are provided in the adjacent column.

Component	Examples
Herd health visits	Schedule visits and communicate with the herd veterinarian, with frequency based on operational type and health status
Monitoring health	Observe all animals routinely for signs of disease or changes over time in behaviour and production parameters
Nutritional health management	Complete an assessment of body condition 2 to 4 times yearly Consult with a nutritional specialist Carry out feed and water testing
Foot checks and trimming	Complete at a minimum of 2 to 3 times yearly (required frequency is farm-specific)
Reproduction program	Set up a breeding schedule Schedule ultrasound examinations for pregnancy Plan lighting and/or hormonal strategies for out-of-season breeding Conduct a buck breeding soundness examination annually, or as needed
Udder health	Perform udder prep and teat dipping Monitor for evidence of mastitis Establish a milking order
The periparturient period	Disinfect navels Heat treat colostrum and pasteurize milk Assure appropriate intake of colostrum Attend to dystocias Investigate newborn mortality
Kid rearing	Be aware of diseases of concern for kids Investigate kid mortality
Disbudding and castration	Perform with suitable timing and technique
Vaccination program	Establish an appropriate regime for each age and/or production group of animals

Component	Examples
Parasite control program	Set up fecal sampling to monitor for internal parasites and anthelmintic resistance Conduct an examination for external parasites
Disease control programs	Carry out herd testing, using a veterinary diagnostic laboratory, for diseases such as caprine arthritis encephalitis, Johne's disease, Q fever, and caseous lymphadenitis Conduct individual testing as needed Use post-mortems to identify reasons for kid mortality, abortions, chronic wasting of adults, and unexpected or unknown mortality
Treatment protocols for sick goats	Establish an isolation procedure for sick animals Have drug and dosage recommendations for common conditions Be aware of meat and milk withdrawal times
Euthanasia	Follow humane destruction and disposal recommendations
Federal and provincial disease-monitoring programs	Participate in the Voluntary National Scrapie Program
Disease/Emergency Response Plan	Practise enhanced biosecurity

If there are multiple species on a farm, a herd health management program should also be prepared for all other species, considering diseases and health risks that are common to all species. Areas of shared risk among the species on the farm should be highlighted, and practices should be coordinated to reduce **cross-contamination**.

A relationship with a herd veterinarian helps to ensure the success of the herd health management program. The herd veterinarian works with the producer to complete the initial risk assessment of the premises, especially identifying the diseases of concern, and provides guidance for the implementation of many parts of the program, including vaccination and other prophylactic treatments.

It is important to continually re-evaluate and adjust the herd health management program to align with the changing needs of the farm business.

2.2.2 Observe and evaluate the health of animals

SUMMARY: Regular observation of the goats for any change in health status is conducted on a daily basis, and the findings are recorded. Trigger points exist to help direct further action and to allow a rapid response to potential disease.

Animals should be observed on a regular basis to detect any change in health status. Monitoring should be based on the diseases of concern that are included in the herd health management program and on other signs of illness. These may include decreased production, abnormal behaviour, and specific signs of disease. All people who are asked to observe the animals should know how to recognize, and subsequently record, these signs in the herd health records. (Refer to section 2.5.)

Regular observation also applies to animals in isolation. Producers should observe the response to treatment to identify adverse reactions and the effectiveness of the treatment over time.

Health records are useful for documenting these daily observations. Regular review can help to detect any changes in herd health, particularly those that are subtle or that occur gradually over time.

Observations and/or threshold data (trigger points) that lead to certain actions can be part of the herd health management program. Examples of trigger points include a percentage of drop in milk production, number of animals affected with a specific clinical sign (e.g. number of abortions or clustering of abortions in a specific period of time), or an observation of a specific clinical sign (e.g. blister around an animal's mouth or hoof). The protocols that outline further action in response to these trigger points should also be documented and may include

- isolation of sick animals in a separate isolation area
- contact with the herd veterinarian to complete a full diagnosis and treatment plan
- sampling for specific diseases of concern with submission to a veterinary diagnostic laboratory
- notification of the federal veterinarian in the case of suspected **reportable disease**

It is important to ensure that personal protective clothing (including, but not limited to, coveralls, gloves, and boots) is worn when handling suspect and sick animals, and that the area where the sick animal was discovered is properly cleaned and disinfected. Ideally, designated protective clothing should be available and worn in the isolation areas.

If an animal dies, aborts unexpectedly, or is culled due to declining health, a **necropsy** performed by the herd veterinarian or by the regional veterinary diagnostic laboratory may be a worthwhile investment. The necropsy could help identify the cause of sickness or death, and therefore provide more information that assists in deciding whether additional action is required to protect the remainder of the herd.

Proper herd monitoring provides important information on the current health status of the herd and, as a result, can help producers take the required action for a rapid response to disease.

2.2.3 Implement herd health management protocols

SUMMARY: To guide the effective implementation of the herd health management program, a plan is in place outlining the schedule of tasks, as well as the assignment of roles and responsibilities for farm workers. Records are maintained to document the progress and completion of each component.

Once the herd health management program has been designed, a plan should be developed to guide its implementation. Under each component of the herd health management program, a series of tasks should be listed that identify all steps required for implementation of the program.

A schedule can then be prepared that outlines the necessary timing and sequence of activities. This allows for the appropriate allocation of the time for the program, which is especially valuable during busy times in the production cycle.

Each task needs to be assigned, detailing roles and responsibilities for each person who is involved in the program. This is more critical in larger operations that have more farm staff. Including all tasks ensures that no steps are overlooked and, more importantly, that all staff receive the required training to facilitate delivery of their assigned task. In addition, some tasks may require outside assistance, and planning allows the necessary arrangements to be made in advance.

As the herd health management program is implemented, the status of all tasks should be recorded. Details that are important include the status of each task, when completion is achieved, who is responsible for each task and when any follow-up is required.

2.2.4 Recognize susceptibility and maintain separation

SUMMARY: To prevent disease spread within the population of goats on a premises, animals are grouped, based on their current health status and level of immunity, and are managed accordingly. To limit the risk of exposure to disease, the sequencing of all activities is considered.

There are a number of complex factors that may contribute to an animal's susceptibility to disease. Some factors are age, health status, and stage of production. These should be assessed and the herd divided into groups, based on these risk factors. These groups could include newborns, weaned kids, doelings, lactating does, sick animals, and new arrivals.

The groups should then be segregated to reduce the risk of disease transmission. Use the farm zoning map to plan the housing arrangement or pasture management for each group of animals. (Refer to section 2.3.1). Segregation will vary from group to group and is typically based on both susceptibility and the farm's diseases of concern. In some cases, for example, physically separating groups by pens may be enough, but in other instances, groups may require a separate airspace, their own feed and water troughs, and dedicated equipment.

Once the housing arrangements and pasture management have been determined, sequence all on-farm activities to minimize the risk of disease transmission. The farm zoning map is a beneficial

tool to help establish a logical sequence of activities around the premises. This order applies not only to day-to-day practices within the production area but also for all visits by service providers and other visitors and to milking. The recommended order is young to old, healthy to sick, most susceptible to least susceptible. Contact with a specific group, especially those of higher susceptibility, only occurs if necessary and additional biosecurity measures may be considered.

If there are multiple livestock species on a premises, biosecurity planning should be designed to address all species.

In some instances, community and/or shared pastures may be used. This practice brings an increased risk of disease transmission between herds, especially if the herd health status and biosecurity practices differ between farms. It is important to communicate with all other producers using the community pastures to determine the health status of their herds and whether they are safe for contact with the home herd. A protocol should be in place that requires all producers to communicate to those who use the pasture about any change in their herd's health status.

2.2.5 Optimize nutrition and the use of vaccines and other biologics

SUMMARY: Nutrition and vaccination plans are in place that address the specific needs of the herd and contribute to enhanced immunity and herd health.

Nutrition plays a key role in the health and production of the herd. Water, pasture, feed (forage, grains, and concentrates), and vitamins and minerals all contribute to good nutrition. Herd veterinarians or animal nutritionists can help producers design appropriate nutritional plans for their herds. Important factors to consider include, but are not limited to, the following: age, stage of production, potential deficiencies based on geographic location, and previously identified nutrition-related herd health issues.

Raw milk – either from the same or another herd – could pose a specific disease risk for kids. Numerous infectious agents can be present in milk (e.g. CAE virus). Appropriate heat treatment of colostrum and pasteurization of raw milk should be considered before feeding.

There are plants in various geographical areas that can be toxic to goats. Regular screening of **pastures** for specific plants of concern should be conducted.

Immunity is acquired both passively and actively. Initially, **antibodies** are transferred from the dam to the newborn through colostrum. This is referred to as “passive immunity,” and thus ensuring that newborns receive sufficient volume of good quality colostrum shortly after birth, either from the dam or another donor, is critical for adequate newborn immunity.

Active or acquired immunity can develop, either as a result of exposure to an organism through contact with an infected or carrier animal, or through vaccination. A vaccination program that is targeted to certain diseases of concern can help prevent their introduction and spread.

It is important to note that no vaccines are currently licensed in Canada for use in goats. Import permits may be required to access vaccines available in other countries. Consultation with the herd veterinarian is therefore critical and will help to determine which vaccines should be considered for each group of animals.

2.2.6 Control movement of animals within the production area

SUMMARY: When animals are moved within the production area, the movement is planned in advance to reduce the risk of disease exposure and spread to susceptible animals.

Movement of animals within a premises is carried out for two reasons: 1) to move animals to a new production area because of a change of status (e.g. dry does to kidding area, or kids on milk replacer that have been weaned and moved to grower pens); or 2) to facilitate a management procedure (e.g. moving milking does to and from the milking parlour, or moving cull or market animals to the **loading area** for trucking off-farm). Movement of animals within and through the premises increases the risk of disease being transmitted among groups. Therefore, movement should be conducted for a reason and only if necessary. A written movement plan that identifies and avoids disease-transmission risks allows this activity to be carried out in a logical and coordinated fashion with biosecurity measures to minimize the risk.

The farm map is a useful tool for producers when planning movement. The goal is to choose a route through the premises that prevents commingling between groups of goats and limits cross-contamination in areas where there are, or recently have been, goats of different health status and disease susceptibility.

Many goat farms have multiple species on the premises, and any animal movement and/or commingling poses a potential risk to all species on the farm, especially those that have shared susceptibility to the farm's diseases of concern.

If multiple groups are being moved throughout the premises, the movement plan should outline the sequence in which the goats are moved. Again, the goal is to prevent commingling and to minimize cross-contamination. Each group should be moved one at a time, with animals of higher susceptibility moved before those of lower susceptibility. When common pathways must be used, manure, debris, and other potential contamination should be cleared before use by other susceptible groups.

Ideally, movement is planned to limit the potential for commingling and cross-contamination between susceptible animals. However, if commingling is the farm's practice, vaccination practices can be planned to provide immunity, and common biosecurity practices can be designed to reduce the disease transmission risk.

2.2.7 Manage feed, water, and bedding

SUMMARY: Management practices are in place to ensure that feed, water, and bedding are of sufficient quantity and quality, and are free from any potential contamination.

Feed, water, and bedding may all pose a risk of introduction of disease and other contamination (includes both on-farm and off-farm sources).

Feed should be purchased from a reliable source that operates under a feed assurance program. The composition of the feed must comply with the *Feeds Act* and the *Health of Animals Act* to ensure the feed does not contain prohibited animal by-products. Records of purchase, transport, storage, and production information, including batch identification and composition, should be kept. Before use, feed should be stored in a secure dry area without access and potential contamination by pests, wildlife, livestock, and other domestic animals. Goats should be fed in feeders (troughs, racks, bunks) to raise the feed off of the ground. Any feed that has been, or may have been, contaminated by manure, urine, or other potentially infectious material, should be disposed of, and the contaminated feeders should be cleaned. All feed, including feed for other animals, should be stored where goats do not have access to it.

The relative risk of introducing infectious agents via drinking water is dependent on its source. Ideally, water should be either from a municipal source or from the drilled farm well. If a well is used, it should be sealed to prevent surface water contamination and tested regularly for bacterial quality and chemical levels (e.g. chlorine). Allowing goats to have access to surface water (e.g. ponds, streams, and ditches) should be avoided. Before any change in the source of drinking water is made, the producer should ensure that the water is safe for livestock consumption, and should identify any other potential impacts. The herd veterinarian may be a valuable resource to assist with the transition.

The use of water-delivery systems, which can be designed to limit contamination with urine and feces, and run-off water, is recommended. The practice of cleaning, disinfection, and flushing of the water-delivery system on a regular basis and after any potential contamination is valuable.

An ample supply of clean, dry bedding is needed for all animals. Bedding should be acquired from a known reliable source, with all relevant information recorded. Storage in a dry, secure area helps to protect the bedding from subsequent contamination on the premises. Protocols can be written to identify the bedding required by each group of animals and to outline the schedule for cleaning and replacement. This is particularly important in areas for isolation and sick animals. If using **dry pack** bedding, contaminated and potentially contaminated material (e.g. abortions, placentas, manure) should be removed immediately.

Developing the biosecurity plan

Based on the self-evaluation and the information provided in this section on animal health, consider the following:

1. *What are the biosecurity gaps on my farm?*

2. *What are the biosecurity goals that address these gaps?*

3. *What steps can I take to achieve these goals?*

2.3 KEY AREA OF CONCERN 3: Facility management and access controls

The farm facilities and all related management activities may have a large impact, either positively or negatively, on both the risk of disease introduction and transmission, and the implementation of biosecurity practices. Farm facilities are the physical environment in which biosecurity measures are applied and therefore should be carefully considered during the design of the biosecurity plan.

Table 3.1: Self-Evaluation Checklist

Table 3.1 contains a series of activities that may occur on a goat farm related to facility management and access controls. Sections 2.3.1 - 2.3.7 provide additional information. Specific subsection reference numbers are provided for each activity.

Biosecurity practices for facility management and access controls	Self-evaluation				Reference
	Always / frequently	Sometimes	Never	N/A	
Biosecurity zones on my farm are identified and biosecurity principles are understood.					2.3.1
I use signs at access control points to identify that biosecurity is in effect on my farm.					2.3.1
Protocols for movement of animals, equipment, and vehicles are written and communicated to farm workers .					2.3.1
I provide a dedicated parking area, which is separate from animal management and housing areas, for farm workers and visitors.					2.3.1
I have perimeter fencing around my goat operation that is inspected and maintained in a timely manner.					2.3.2

Biosecurity practices for facility management and access controls	Self-evaluation				Reference
	Always / frequently	Sometimes	Never	N/A	
The animal facilities and equipment are cleaned and disinfected routinely according to written protocols.					2.3.3
Written protocols for cleaning and disinfection of animal facilities and equipment are available for situations of elevated risk (e.g. abortion outbreak, sick pen, isolation area).					2.3.3
Feed bunks, troughs, and other feeding areas are kept clean of old feed and manure.					2.3.3
Water bowls and water troughs are cleaned regularly.					2.3.3
Feeding bottles, milk, and water pails for kids are washed, disinfected, and dried after each use.					2.3.3
My facilities are routinely inspected and maintained to avoid pest and predator invasion and standing water.					2.3.4, 2.3.7
My deadstock management includes immediate removal and secured storage from the herd, facilities, food, and water, as well as protection from scavengers, dogs, cats, and pests.					2.3.5
My manure management considers removal and storage for composting or spread on cropland.					2.3.6

Biosecurity practices for facility management and access controls	Self-evaluation				Reference
	Always / frequently	Sometimes	Never	N/A	
I have a pest and insect management program in place.					2.3.7
I have a protocol to prevent contact between wildlife and goats.					2.3.7
Dogs on the farm (working, guardian, and pets) have a health program that includes vaccination against rabies and treatment for tapeworms, according to veterinary prescription or label recommendations.					2.3.7
Farm cats have a health program that includes vaccination against rabies and spaying of all queens to mitigate the risk of <i>Toxoplasma</i> exposure to female goats.					2.3.7

Target Outcome:

Management of farm access, facilities, and identified risk areas limits disease introduction and spread on-farm and enables the implementation of biosecurity practices.

Risks to consider:

- uncontrolled access to the farm, and to zones and **identified risk areas**;
- infection acquired by, and shared among goats from facilities, tools, and equipment that are not properly cleaned and disinfected;
- transmission of diseases by contact with wildlife and with other animals when goats are in pasture, and with pests when in their **barns** or other enclosures; and
- exposure to infectious agents in manure, deadstock, or aborted tissue/fluids.

2.3.1 Zoning and facility design

SUMMARY: Farm facilities are zoned, and identified risk areas are determined so that animals, people, and vehicles can move around the farm without unnecessary contact with the herd, and apply the appropriate biosecurity practices.

Zones and identified risk areas are very important to biosecurity. They help to identify where to apply practices for reducing potential contamination of the herd during day-to-day activities, and to allow the separation of areas for special activities, including milking, breeding, vaccination and other proactive health treatments, disease observation and treatment, shearing/combing, and hoof trimming. If the zones are designed correctly, these practices can be followed with minimal disruption to normal production activities.

In many countries, including Canada, the **controlled access zone (CAZ)** and **restricted access zone (RAZ)** have been developed and used. They identify areas of the farm for biosecurity management, based on the risk of activities carried out within.

A CAZ is a buffer area that usually excludes the house and personal space of the farm family. The CAZ contains facilities that are indirectly involved in animal production and many areas in which farm service providers and farm workers circulate (e.g. laneways, parking areas, and equipment sheds). It may also include pastures where animals are not placed. The CAZ has its own specific biosecurity practices and encloses the RAZ.

A RAZ contains or confines production animals and includes the area(s) of the farm in which goats are housed, milked, pastured, worked, bred, treated, and isolated, including the areas through which they move. The layout and management practices of individual farms help to decide whether manure storage, deadstock handling/storage, and other production facilities that are directly involved in animal production should be included within the RAZ.

Therefore, the CAZ and RAZ are used to identify two general areas of relative risk on the farm:

- 1) a buffer zone between the family or public spaces and the zone in which goats are kept, and
- 2) the active production zone that contains the goats.

In addition, within these zones, especially inside the RAZ, there may be identified risk areas in which certain practices are carried out, such as

- working areas in which goats are vaccinated, are held for clinical examination, pregnancy confirmation and/or are bred (e.g. group breeding, artificial insemination);
- milking parlour;
- pens or huts for isolation of kids or for individual breeding;
- maternity/birthing pens/area;
- nursery area; and
- hospital pen and isolation area for newly introduced goats or goats undergoing disease testing.

These are areas with specific disease risks, and thus may require additional biosecurity measures.

There may also be cases in which the whole goat farm might be treated as a single zone. This could occur on a farm on which the goats are housed together and are handled as a single unit; therefore, they share equal risk. This might be a common approach for smaller herds and where facilities are not designed to allow separation. The principles established for the RAZ should apply when the one zone approach is adopted.

Signs should be posted at access points to mark the boundaries of all zones and to identify the controlled access points where biosecurity protocols (e.g. changing clothing and footwear, washing hands, using zone-specific tools and equipment, etc.) should be carried out.

Pathways for the movement of animals and equipment and roadways for vehicles can be located to avoid close contact and/or cross-contamination between animals of different health status or susceptibility, and between the goat herd and the tools, equipment, and vehicles that are moved about the farm.

The identification of a dedicated parking area(s) for vehicles used by farm workers, visitors, and service providers reduces the potential for contamination of the production areas by vehicles that may have been on other farms or may have picked up contaminants from other locations. A controlled access point between the parking area(s) and any adjacent zone reduces multiple uncontrolled access areas and provides an area to implement biosecurity protocols.

When building, repairing, or renovating barns, sheds, and other buildings for housing goats, consider biosecurity requirements. Specifically, the design should allow for segregation and movement practices and provide areas to carry out biosecurity practices (e.g. hand washing stations, clothing and footwear change areas). Materials and finishes should be smooth, sealed, and non-porous, as they are less likely to harbour infectious agents and are more easily cleaned and disinfected. Goats are typically inquisitive, and will often lick and chew their surroundings, and any infected material may be contacted in this way.

2.3.2 Perimeter and interior fencing

SUMMARY: Fencing is used to maintain separation between goats and other animals on the farm, and between the herd and livestock on adjacent farms. Fencing also serves to separate certain goats from the rest of the herd under pre-planned circumstances.

Secure perimeter fencing contains the herd on the farm property and prevents some animals from entering. Fencing reduces some risks of access by animals, whereas other risks may be more difficult to control (e.g. predator attacks, feral or domestic animal movement). It may also reduce accidental or deliberate access by people who could represent a risk to the herd.

Interior fencing can be used to build areas to separate groups of goats from one another, such as isolating new arrivals, weaned kids, or milking does. It may also facilitate the implementation of specific biosecurity measures. Interior fencing is important for separating different species, if present on the farm.

2.3.3 Cleaning and disinfection of facilities and on-farm equipment

SUMMARY: Cleaning and disinfection is conducted prior to and after use, as well as in the routine maintenance of equipment and facilities. It is focused on the facilities that house the herd, and the tools, and equipment that are used in managing the herd and in handling individual goats.

Day-to-day cleaning and disinfection is required to reduce ongoing risk of disease transmission on the farm. For example, there may be unknown risks from diseased or carrier animals to susceptible goats or from a contaminated environment. Cleaning and disinfection as a regular production practice needs to become routine on the farm. Farm workers should know when and how to clean and disinfect equipment and facilities, and have the required materials on hand where they are needed. Infectious agents are invisible to the eye, and therefore proactive cleaning and disinfection is the best way to reduce their spread on-farm and within facilities by equipment and vehicles.

Cleaning and disinfection is necessary when there is an outbreak of disease or a suspected case of disease in the herd. The farm's biosecurity plan should include enhanced biosecurity measures when there is a suspect or confirmed disease situation, and additional cleaning and disinfection is a major part of such a plan.

Cleaning and disinfection is particularly important in areas or during activities in which there is a higher likelihood of contamination. These may include the following:

- any area that goats inhabit or pass through that could be chewed or licked;
- any bedding, water-delivery system, feed bunk, tether, railing, or surface that is accessible to goats in a sick pen, isolation area, or other identified risk area; and
- the milking parlour.

Cleaning and disinfection practices need to be designed to eliminate a range of secretions wherever they are deposited on the farm. Saliva, feces, urine, milk (in the parlour), dander, vaginal discharges,

discharges from wounds or abscesses, and respiratory secretions represent similar or higher risks to the herd.

Equipment and tools that are used to move feed or manure, or to maintain the facility around the herd, particularly those near isolated or diseased goats, require specialized cleaning and disinfection practices. Tools and equipment that come in direct contact with the goats, such as de-horning or de-budding tools, hoof-trimming equipment, and shears should be cleaned and disinfected between uses, and require special attention if a suspected or confirmed disease were to occur in the herd. Milking equipment is generally cleaned and disinfected between uses.

2.3.4 Facility maintenance

SUMMARY: Well-maintained facilities are less likely to harbour potentially infected material, are more easily cleaned, and are less accessible to rodents and other pests.

To facilitate cleaning and disinfection, surfaces throughout the farm, especially those that can come into direct contact with the goats, should be kept in good condition. Damaged surfaces, such as gaps, cracks, and pores, could result in ineffective cleaning and disinfection because of remaining viable infectious material.

Facilities should be kept secure to prevent potential carriers of disease (e.g. pests and rodents) from direct contact with the herd, feed or bedding, and to stop goats from accessing areas they should not enter. Goats are inquisitive animals and thus could potentially gain access to areas they are not intended to enter, and subsequently contaminate these areas with urine, feces, and other excretions.

2.3.5 Management of deadstock, aborted fetuses and placentas

SUMMARY: The herd does not have contact with deadstock, aborted fetuses and placentas. Deadstock, aborted fetuses and placentas are high disease-contamination risks for many common infectious diseases.

Deadstock should be removed from the herd as soon as they are seen, and the area(s) through which the deadstock has passed should be cleaned and disinfected as soon as possible. This also applies to all aborted fetuses and placentas; they should be managed as deadstock and not included with the manure.

It is important that protective clothing (including, but not limited to, coveralls, gloves, and boots) is worn when handling deadstock and that the area where the dead animal was discovered is properly cleaned and disinfected. Even if gloves are worn, it is still important to wash and clean hands with soap and apply sanitizer.

If deadstock are to be disposed of on-site, via composting, burial, or other means, disposal must comply with municipal and/or provincial regulations, including environmental provisions. Deadstock should be moved to a location away from the active production area to avoid the possibility of direct or indirect (e.g. fluids) contamination. **Guardian animals** and any dogs or cats that commingle with the herd should be kept away from deadstock disposed of in this manner.

If deadstock are to be picked up by a disposal service they should be moved directly to a deadstock holding area. The holding area should be secured from scavengers and located away from any contact with the herd. The pick-up location should be in an area that can be accessed by the deadstock service without entering or passing near any of the production areas.

Regardless of storage location, deadstock should be kept completely covered.

2.3.6 Management of manure

SUMMARY: Herd contact with manure is minimized. Manure is a high disease-contamination risk for most common diseases.

Manure contains many infectious agents, some of which can survive for a long time in the appropriate environment. Manure should be cleaned from stalls, holding areas, pens, and pathways regularly, as part of day-to-day production practices. When a disease is suspected or confirmed on the farm, manure should be scraped and removed often from the area where the diseased goat(s) are kept, and stored in an area that is secure from the herd, guardian animals and any dogs or cats on the farm.

It is important to ensure that protective clothing (coveralls and boots) is worn when handling manure and biosecurity protocols are followed to minimize the spread of disease. Ideally, have designated clothing and boots, or clean and disinfect boots before entering into other areas of the farm. Use designated equipment and, if possible, clean and disinfect between uses. Wash hands with soap or apply sanitizer after handling manure and prior to handling feed, bedding, live animals, and products.

Manure should be moved directly from the cleaning site to the manure storage area via planned routes that do not contaminate pathways or are near highly susceptible goats. Storage areas should be located away from the production area(s), and be constructed such that run-off will not reach pathways, goat pens or holding areas, feed storage or feeding equipment, and water sources. Manure should be stored in a manner that limits access by dogs, cats, pests, and scavengers. Enough storage space should be available to allow proper composting practices.

Storage, composting, and application of manure is regulated in many municipalities, and thus these regulations must be followed when handling manure on the farm.

2.3.7 Management of pests, wildlife, dogs and cats

SUMMARY: Pests, wildlife, dogs and cats are excluded from the production area(s) whenever possible. They may be a high-risk source of contamination for certain common diseases.

Producers should have an effective pest management program that includes both practices that limit access by pests and materials (e.g. bait) and procedures (e.g. traps) that control them. The barn should be as secure as possible from entry by birds, rodents, cats (pets and feral), bats, and insects.

For protection purposes, guardian animals that can defend against wildlife may accompany goats at pasture. These guardian animals should be vaccinated against rabies and other infectious diseases and be treated routinely for external and internal parasites, including tapeworms.

Access to the herd by dogs (excluding guardian animals) and cats should be limited. Dogs and cats should also be vaccinated against rabies and other infectious diseases, and routinely treated for external and internal parasites, including tapeworms. If cats are deemed necessary for rodent control, additional risk mitigation practices should be considered to reduce the potential of disease transmission. This includes spaying queens and preventing cat fecal contamination of goat feed and bedding to reduce the risk of toxoplasmosis.

Developing the biosecurity plan

Based on the self-evaluation and information provided in this section on facility management and access controls, consider the following:

1. *What are the biosecurity gaps on my farm?*

2. *What are the biosecurity goals that address these gaps?*

3. *What steps can I take to achieve these goals?*

2.4 KEY AREA OF CONCERN 4: Movement of people, vehicles, and equipment

Movement of people, vehicles, and equipment on and off, and within the premises occurs throughout the day on many goat farms. This movement represents a potential threat to biosecurity, and measures should be in place for movement control.

Table 4.1: Self-Evaluation Checklist

Table 4.1 contains a series of activities that may occur on a goat farm related to the movement of people, vehicles, and equipment. Sections 2.4.1 - 2.4.5 provide additional information. Specific subsection reference numbers are provided for each activity.

Biosecurity practices for the movement of people, vehicles and equipment	Self-evaluation				Reference
	Always / frequently	Sometimes	Never	N/A	
Farm workers, visitors, and service providers are informed of the biosecurity protocols in place. Their actions are monitored for compliance with the protocols.					2.4.1, 2.4.2
Access by visitors and service providers is controlled.					2.4.2
I maintain a logbook for visitors and service providers.					2.4.2
Clothing, footwear, and other protective equipment (e.g. masks) are provided to workers.					2.4.3, 2.4.4
Visitors are provided designated personal protective equipment before entering the facility.					2.4.3, 2.4.4

Biosecurity practices for the movement of people, vehicles and equipment	Self-evaluation				Reference
	Always / frequently	Sometimes	Never	N/A	
I have a protocol for people when they move between biosecurity zones or to an identified risk area (e.g. isolation area).					2.4.1 - 2.4.4
Designated personal clothing and footwear is available for various production areas of the operation.					2.4.3
Equipment, tools, and vehicles used on other livestock operations are cleaned and disinfected prior to returning to the home farm.					2.4.5
Equipment is cleaned and disinfected between dirty (e.g. shovel used for manure) and clean (e.g. shovel used for feed) duties.					2.4.5
Livestock transportation vehicles are cleaned after each use and before returning to the farm.					2.4.5

Target Outcome:

Movement and activities of workers, visitors, and service providers, and their vehicles and equipment do not compromise animal and human health.

Risks to consider:

- Workers can transmit disease-risk materials from one area of the farm to others, thereby infecting goats within non-infected zones, especially those with lower immunity.
- Visitors and service providers bring infectious agents to the farm and risk the health of the goats by not following the biosecurity practices that are in place on the farm.

2.4.1 Access management for farm workers

SUMMARY: Farm workers understand the biosecurity practices that pertain to working on the farm. They are aware of and comply with any changes to the biosecurity plan and practices.

When preparing the farm biosecurity plan, producers should establish practices for farm workers to follow when arriving at the farm, when moving from zone to zone, when working in the production area and identified risk areas, and when leaving the farm. In particular, when moving within the production area, farm workers should know the importance of the order of their actions. That is, the order of activities and movement should be from young to older animals, from healthy to diseased, and from more to less susceptible.

Producers should keep a work schedule and an attendance record for each farm worker. This can be stored with the farm payroll records or in another convenient location for use, if required, during a disease emergency.

During the introduction of the farm biosecurity plan, and when a new farm worker is hired for the farm, producers should carry out education and training so that farm workers know and understand the specifics regarding entry to, and exit from, the farm and all production areas. (Refer to section 2.6.)

2.4.2 Access management for visitors and service providers

SUMMARY: Visitors and service providers access only areas of the farm that are necessary. They are aware in advance of the biosecurity practices that will apply to their visit and come prepared.

Visitors and service providers should have access to the herd and the active production area only for a specific purpose, with arrangements made in advance with the producer. The biosecurity practices that apply to the farm zones and to the identified risk areas, and those that apply to the activities that visitors and service providers are there to perform, should be discussed in advance. Any required preparation will be explained and completed before they arrive.

Visitors and service providers whose disease risk status is unknown, including those who have come from, or who have visited, a foreign country in the recent past should undergo a full risk assessment. That is, information concerning their movements and activities during the two-week period prior to their visit should be documented, with specific concern for the following:

- presence on any farms or on other agriculture or agriculture-related premises;
- access to and/or contact with any livestock;
- access to and/or contact with any livestock-related vehicles, equipment, or other **fomites**; and
- existence or suspicion of any animal diseases on the premises or facilities, or in the areas or regions they have visited.

Analysis of this and other information, including the following, can be used to determine if they should be admitted to the farm and what their biosecurity requirements will be while on the farm:

- purpose of the visit, areas of the farm to visit, and level of contact expected with any of the animals, facilities, and equipment; and
- cleanliness and condition of all clothing, footwear, and equipment worn or carried during a planned visit.

As a general rule, persons who have visited a farm in a foreign country and who are requesting access to the farm should wait a minimum of five days and follow advanced biosecurity protocols set by the producer. For more detailed planning, a list of specific disease risks by country is maintained by the World Organisation for Animal Health (www.oie.int). This list can provide guidance to the specific risk that might be presented by visitors from each country.

A visitor logbook should be placed in a location that is at or near the initial entry point to the farm.⁴ All visitors and service providers should sign the logbook upon arrival and be aware that the record of their visit may be used in the event of a disease emergency.

Any visitors and service providers who require access to the herd should follow best practices for cleanliness and wear barn-specific clothing and footwear.⁵ These controls, as included in the farm's biosecurity program, apply to general access to the herd, movement between the CAZ and RAZ, and access to identified risk areas (e.g. the isolation area, the sick pen). Whenever possible, contact with the herd should be limited, and visitors and service providers should only be permitted to touch the goats if necessary.

⁴ Samples of logbooks and logbook pages are available from several commodity associations; suggested content is included in the accompanying *Planning Guide*.

⁵ Whether the visitors and service providers provide their own (suitable) outerwear and footwear needs to be agreed upon in advance. Producers can maintain a stock of disposable coveralls, boot covers, rubber gloves, and other required materials for use in unexpected circumstances.

Signage should be posted at all controlled access points so visitors and service providers know where they are within the farm's biosecurity zoning, as well as the biosecurity practices they should be following. A hand washing and change area should be situated at the controlled access points for each risk zone, and have suitable supplies available.

2.4.3 Clothing and footwear

SUMMARY: Everyone who enters, and works on or visits, the farm wears farm-specific clothing and footwear. Clothing and footwear is changed when moving between farm zones and when entering identified risk areas of the premises.

Farm workers, visitors, and service providers should agree to wear clean clothing and footwear in the production area(s) and each identified risk area, and to remove and clean and/or dispose of them when leaving.

Clothing and footwear, and facilities where workers can put them on should be available at each controlled access point. Producers and their farm workers should know and be able to tell visitors and service providers the requirements for clothing and footwear for each planned activity. Visitors and service providers should bring suitable clean clothing and footwear for use in the production area(s), put them on just before entering each zone and identified risk area, and remove them when leaving. Producers and their visitors and service providers should agree on what farm clothing and footwear is required before a visit to the farm.

Producers should consider having a supply of clean or disposable coveralls and boot covers for authorized visitors and service providers who do not have enough, or the correct type, of farm-specific clothing.

Storage areas should be available for outerwear and footwear in each farm zone and in the identified risk areas.

2.4.4 Hand washing and personal protective equipment

SUMMARY: All who enter and work on, or visit, the farm wash or sanitize their hands upon entry and exit, when moving between farm zones, and when approaching or leaving certain identified risk areas of the premises.

Hand washing is an effective way to break the cycle of disease transmission and should be done on a regular basis. Specifically, hands should be washed before entering into the RAZ, before contacting any animals or moving between different groups of animals, before conducting higher risk activities such as milking, and whenever hands may be contaminated. Hand washing stations should be located so that it is easy to follow the required practices. If hands are not visibly soiled, an alcohol-based (60%) hand sanitizer is acceptable. However, if hands are visibly contaminated, hand washing with water and soap is needed.

There are many infectious agents, referred to as zoonoses, which can spread from goats to humans and cause disease in humans. Wearing personal protective equipment (PPE) is recommended during times of higher risk, for instance, when handling abortions. In addition to basic PPE, gloves and fitted N95 masks (with the capability to filter 95% of pathogens) should be available for farm staff and they should be trained in their proper use.

2.4.5 Movement control of equipment, and tools, and vehicles

SUMMARY: In identified risk areas or for high-risk activities, the farm's equipment and tools, and vehicles are dedicated to one activity or area. The farm's equipment and tools, and vehicles are cleaned and disinfected between uses. Equipment and tools, and vehicles that are brought onto the farm are moved into a control area only if necessary. Service equipment and tools that are brought onto the farm are cleaned and disinfected before arrival, and between uses.

The biosecurity plan should include a practice to limit the movement of farm-owned tools and equipment between zones and among identified risk areas. Practices should apply to

- mobile equipment (e.g. skid-steers, tractors, and their accessories);
- hand tools, including shovels, rakes, and forks; and
- animal handling equipment such as
 - halters and tie ropes
 - shears for hoof trimming
 - shearing and combing equipment
 - clippers
 - disbudding and dehorning equipment
 - milk feeding equipment
 - equipment used to administer medications
 - milking equipment.

Equipment that is limited to one area or one use is best; however, cleaning and disinfection practices that reduce the risk of contamination from equipment that is moved from area to area and/or between zones may be used.

Cleaning and disinfection procedures for equipment, tools and vehicles should be established for all areas and activities on the farm and be included in the farm's biosecurity plan (refer to 2.3.3). In addition, details for day-to-day cleaning and disinfection as well as cleaning and disinfection practices for use when disease is present can be included. All cleaning and disinfection should be done using industry-approved methods and materials and following the required health and safety considerations.

Important information to outline with the procedures includes:

- schedule of procedures
- roles and responsibilities for each task
- products with instructions for safe use

Any tools and equipment brought by service providers or visitors should be cleaned and disinfected, using an effective protocol prior to arrival at the farm. Producers should provide suitable cleaning and disinfection materials and equipment for visitors' and service providers' use on farm when needed.

Any equipment and tools that are required to be moved from area to area and/or between zones, including service equipment and tools for use on the farm, should be cleaned and disinfected between areas.

All off-farm vehicles should be parked in the designated parking area, and ideally, be replaced with farm-specific vehicles, especially for high-risk activities. Vehicles used for transporting animals should be cleaned and disinfected before use. Operators who exit their vehicles on the farm should be required to put on farm-specific clothing and footwear that are required in the zone(s) in which they will be operating.

Developing the biosecurity plan

Based on the self-evaluation and the information provided in this section on the movement of people, vehicles, and equipment, consider the following:

1. *What are the biosecurity gaps on my farm?*

2. *What are the biosecurity goals that address these gaps?*

3. *What steps can I take to achieve these goals?*

2.5 KEY AREA OF CONCERN 5: Monitoring and record keeping

Gaps in knowledge can translate into gaps in biosecurity activities. An integrated set of information about the herd, including documentation of animal health, routine monitoring and farm management activities should be maintained. In addition to being a valuable management tool, this information may be used to assess disease risk and to implement suitable mitigation practices.

Table 5.1: Self-Evaluation Checklist

Table 5.1 contains a series of activities that may occur on a goat farm related to monitoring and record keeping. Sections 2.5.1 - 2.5.2 provide additional information. Specific subsection reference numbers are provided for each activity.

Biosecurity practices for monitoring and record keeping	Self-evaluation				Reference
	Always / frequently	Sometimes	Never	N/A	
I have records for every animal and for the herd collectively (e.g. ID #s, production, disease experience, test results, movements).					2.5.1
I monitor and record all treatments, vaccinations, mortalities, and necropsy and laboratory results.					2.5.1
All goats are identified. The identification is linked to an individual animal's health and production data.					2.5.1
I have records for all purchases: animals, feed, bedding, etc.					2.5.2
I have written protocols and records for cleaning and disinfection procedures.					2.5.2

Target Outcome:

Information is maintained and used to improve the effectiveness of biosecurity practices. The status of animal health, identification, and inputs may be verified by record review.

Risks to consider:

- Records of practices and treatments are unavailable to assess their effectiveness, to guide response to disease outbreaks, or to help in improving and redesigning biosecurity practices.
- Herd health records and records of health, treatment, and disease for individual goats are unavailable when goats are sold or transferred to another owner.

2.5.1 Herd health records

SUMMARY: Animals are observed on a daily basis, and the findings are documented in the herd health record. Health records are reviewed regularly to detect any changes over time in animal health and production to initiate the necessary response.

General monitoring of all the animals in the herd should be completed on a daily basis. Herd health records are maintained that detail these observations, including any signs of disease, or change in behaviour or production measurements. Be aware that animals in isolation require a higher level of monitoring and record keeping. Additional herd health records for non-routine activities are also helpful. Herd health management programs act as a guide for producers in identifying which information should be measured to track the program's ongoing successful implementation.

2.5.1.1 Individual animal records

SUMMARY: Records are maintained for each animal to document data on health, productivity and movement throughout the individual's lifetime.

In addition to herd health records, individual animal health records provide valuable information to producers. For example, body condition scoring and production records provide a measure of an animal's nutrition and health. If an animal is being purchased from another farm, all the available information on that animal should be acquired and used as baseline data in that individual's record. The record can then be updated on a regular basis throughout the goat's lifetime on the farm.

Maintaining individual animal health records enables producers to provide for the specific health needs of their animals and to implement management changes that will improve productivity. Moreover, producers can provide those records, whenever an animal is to be sold, to increase the buyer's confidence and to improve market access.

2.5.1.2 Identification and traceability

SUMMARY: Each animal is identified, using industry-standard identification, which links each animal with health and production-related data, and tracks movement both on and off the farm throughout an animal's lifetime.

Every animal on the farm is unique. Therefore, each animal requires individual identification that allows it to be differentiated from its herd-mates throughout its life. Goat identification should be carried out according to industry standards.

This identification enables producers to link each animal with health and production data. It also allows producers to easily trace and verify each animal, which is beneficial if any concerns were to arise with respect to exposure to disease and disease transmission, the presence of drug residues, or the impact of its genetics.

Individual animal identification also allows an animal to be tracked as it moves, both within a premises and to a new herd.

2.5.2 Farm management records

SUMMARY: Records for farm management activities are maintained and reviewed regularly with animal health records to assess their effectiveness in the biosecurity plan.

All farm management activities should be recorded. Farm records assist with tracking whether, and when, tasks were completed and who completed them. They include the following:

- cleaning and disinfection
- pest control
- manure and deadstock disposal
- biosecurity training and communication
- any other biosecurity practices on the farm (e.g. sign posting, access restriction)

Ongoing analysis of these records allows producers to determine whether all required biosecurity activities are being followed and whether there are gaps to address. In addition, biosecurity records and animal health records can be reviewed together to understand whether biosecurity practices have contributed to changes in animal health on the farm.

2.5.2.1 Input records

SUMMARY: Information on the source and quality for each purchase of feed, bedding, and any other input is maintained and may be used as a reference if related health issues are suspected.

When feed is purchased, its source, lot number, date and manner of delivery, and storage location should be recorded. Feed may be analyzed for nutritional quality, as well as for contamination, and these results should be included in the feed record. Following distribution of the feed, the groups of animals that received each batch should be documented in the feed record, or conversely, the animals' health records can be updated with the feed information.

Similar records should be maintained for all other input purchases, most notably bedding.

If potential contamination is discovered at the source, a producer may use the recommended records to identify whether the product (feed or bedding) is affected, and if so, take the appropriate response actions. Further, if health issues arise that may relate to the product, the records may be used to trace back to the seller and the purchased batch.

Developing the biosecurity plan

Based on the self-evaluation and the information provided in this section on monitoring and record keeping, consider the following:

1. *What are the biosecurity gaps on my farm?*

2. *What are the biosecurity goals that address these gaps?*

3. *What steps can I take to achieve these goals?*

2.6 KEY AREA OF CONCERN 6: Communications and training

Once the biosecurity plan has been designed and implemented, **family members**, farm workers, visitors, and service providers should be made aware of the plan and their role in carrying it out. All people who come onto the farm have a role to play in on-farm biosecurity.

Table 6.1: Self-Evaluation Checklist

Table 6.1 contains a series of activities that may occur on a goat farm related to communications and training. Sections 2.6.1 - 2.6.4 provide additional information. Specific subsection reference numbers are provided for each activity.

Biosecurity practices for communications and training	Self-evaluation				Reference
	Always / frequently	Sometimes	Never	N/A	
Managers and I lead by example in terms of biosecurity compliance.					2.6.1
My biosecurity protocol is written and communicated to all employees.					2.6.2
My biosecurity protocol is communicated to all visitors and service providers.					2.6.2
My biosecurity protocol is posted.					2.6.2
Visitors, including service providers and family members, are escorted by farm workers or myself to ensure compliance with biosecurity protocols.					2.6.2
I provide biosecurity training to all my farm workers and expect all new employees to review the biosecurity protocol when commencing work.					2.6.3

Biosecurity practices for communications and training	Self-evaluation				Reference
	Always / frequently	Sometimes	Never	N/A	
The biosecurity training sessions are conducted at least annually.					2.6.3
I review my records to assess performance and effectiveness of biosecurity practices.					2.6.4
I review and update my biosecurity plan at least once a year with the participation of my farm workers and herd veterinarian.					2.6.4

Target Outcome:

Everyone who enters the farm is knowledgeable and complies with current farm biosecurity practices.

Risks to consider:

- Farm workers, family members, service providers, and visitors may be unaware of biosecurity practices for entry onto the farm and for movement between zones on the farm, and thus introduce infectious agents from other animal locations.
- Farm workers, family members, service providers, and visitors may be unaware of the potential for transmission of zoonotic diseases to humans; they may not follow the practices included in the biosecurity plan, and as a result, contract a zoonotic disease.
- Farm workers, family members, service providers, and visitors may be unaware of biosecurity practices for identified risk areas and activities, and transmit infectious agents from one area of the farm to another.
- Farm workers, family members, service providers, and visitors may be unaware of biosecurity practices for leaving the farm and transmit infectious agents from the farm to other animal locations.

2.6.1 Producer leadership

SUMMARY: Producers take the responsibility for establishing their farm’s biosecurity plan and educating their family members and farm workers. Service providers and visitors understand the farm’s plan and abide by its requirements.

Successful on-farm biosecurity requires the cooperation of many people – in particular, family members, farm workers, service providers, and visitors. However, producers should take the responsibility for making people aware of their farms’ biosecurity plans, especially those who can support the effort and those who have a role in its success.

For that reason, producers should review their farms’ biosecurity plans with their family members and farm workers, and train their family members and farm workers on the correct implementation.

In addition, although many service providers are developing and adopting biosecurity plans for their own operations, producers should communicate their farms’ biosecurity plans with visitors and service providers, and require that they be followed when on their farms. Ideally, producers and their service providers get together to coordinate their biosecurity plans and to share their individual knowledge and experience, adapting their own plans to suit the practices and equipment of the other.

2.6.2 Communications with farm workers, family members, service providers, and visitors

SUMMARY: Producers communicate the requirements of their biosecurity plans to farm workers, family members, service providers, and visitors.

Communicating with farm workers and family members about the farm's biosecurity practices is important. Each producer should choose a method that is most suited to the farm. It is also important that producers and their farm workers are able to explain biosecurity practices and the farm's risk areas to all persons who enter the farm.

Ideally, visits by service providers and visitors should be planned in advance. During this planning, the purpose of the visit and the areas in which they are allowed to enter should be identified. This information enables the producer to explain the biosecurity practices that relate to each visit and the areas in which they apply in advance, and to complete necessary preparations prior to arrival.

Signs should be posted at the farm gate and on the barn door to tell visitors and service providers that biosecurity practices are in use on the farm. More specific signs can be used at the entry to the CAZ and the RAZ, and in identified risk areas within the production area.

2.6.3 Training and education

SUMMARY: Educating farm workers and family members is undertaken whenever practices are added or changed; they are explained to visitors and service providers in advance of their arrival.

Producers should prepare training materials and hold education sessions with all farm workers and family members. Training materials can include the contents of the biosecurity plan, of course, and may also include detailed "how-to" information on practices that are

- general and apply to day-to-day activities on the farm, such as
 - sequencing
 - cleaning and disinfection procedures and materials
 - record keeping
- specific to certain production activities, such as
 - milking
 - kidding
 - disposal of deadstock
 - manure handling

During the introduction of the farm biosecurity plan, and whenever a new farm worker is hired for the farm, producers should carry out a training session, so farm workers know and understand all parts of the plan and how it is carried out on the farm. The training should ensure that farm workers understand how to apply the recommended practices and why they are important.

Retraining should be carried out at least annually, and when there are changes to the biosecurity plan. It should ensure that existing biosecurity practices are reinforced and should teach workers about changed, updated, and improved practices.

Training materials and education session plans should be updated at least annually, and when there is a change to an operating procedure or to a facility design or layout that affects biosecurity practices. These changes to the training program work together with a review and update of the farm's biosecurity plan.

Producers can ask farm workers and family members for their help in designing the farm's biosecurity plans and training materials, which ensures that the plan and its training materials fit well with the workers. Likewise, their participation in designing the materials increases commitment and understanding.

Providing feedback to farm workers on a regular basis also enhances compliance. Others in the farm workforce, such as farm managers and workers who follow the plan carefully, may also help this effort.

2.6.4 Performance and effectiveness of the biosecurity plan

SUMMARY: The effectiveness of the biosecurity plan is measured by the adoption of its biosecurity practices and their integration into daily routines; improvements to the farm's biosecurity plan are designed and implemented.

When a biosecurity plan is ready for use, producers can set goals for adoption of the biosecurity practices and for compliance with the methods in the plan. With the plan in place, it will be important to understand what works and what can be improved in the plan and in its practices. The farm log provides producers, their farm managers, and farm workers with a method to regularly record their observations of biosecurity practices that are in use by farm workers, family members, service providers, and visitors. These records can be reviewed and analyzed from time to time to determine how well the goals are being met, and to identify changes to the plan.

Developing the biosecurity plan

Based on the self-evaluation and the information provided in this section on communications and training, consider the following:

1. *What are the biosecurity gaps on my farm?*

2. *What are the biosecurity goals that address these gaps?*

3. *What steps can I take to achieve these goals?*



Glossary of Terms

The first occurrence of each term present in the glossary has been identified in the document with **bold** text.

Accredited: Approved or recognized as meeting a prescribed standard.

Acute: Rapid onset or short duration.

Anthelmintic: An agent, usually a drug, which is destructive to worms (internal parasites).

Antibodies: A product of the immune system that helps to recognize and facilitate the destruction of specific infectious agents such as bacteria or viruses within the body.

Antimicrobial: An agent that kills or inhibits the growth of micro-organisms.

Asymptomatic: Not exhibiting clinical signs of a disease or condition.

Barn: A farm building used for storing farm products and sheltering livestock.

Biologics: Medical preparations made from living organisms or their products; examples include vaccines, toxoids, serum, and antigens.

Biosecurity: A health plan or measures that are designed to protect a population from transmissible infectious agents.

Biosecurity protocols: Those measures, specific to a goat operation, that are used to prevent the introduction and the spread of disease within an animal population and from that goat operation.

Carrier: An individual that is infected with an infectious agent, but is not showing any clinical signs of disease at that time; transmission of the infectious agent from a carrier may be possible.

Cleaning: Washing with detergent to remove all organic matter, and includes both a dry (scraping and brushing) and wet clean.

Commingling: Mixing of animals from different farms or production facilities in quarters, resulting in direct or close indirect contact among them.

Community pasture: 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 that is accessible to people, equipment, vehicles, and livestock only through a securable (e.g. lockable) controlled access point.

Cross-contamination: The act of mixing a material, especially a material that is potentially infectious, with another material, thereby introducing the risk that a contaminant could be transferred to an animal. For example, infectious agents shed by sick or carrier animals can be transferred from manure to feed by the use of a common bucket or shovel.

Direct contact: Any form of close contact in which goats can physically touch one another, including all forms of nose-to-nose contact.

Disease(s) of concern: Those diseases that pose a high risk to the health and productivity of a herd; can be farm-specific or applicable to an entire region or country.

Disinfection: Using a disinfection agent (i.e. a chemical that can kill micro-organisms) on areas being cleaned.

Dry pack: A bedding approach that is formed by adding more bedding on top of the existing bedding to reduce the frequency of manure removal. A bedded pack can stay dry and warm, but it is important to clean out periodically.

Emerging pathogen: A bacterium, virus, or other micro-organism that has either been newly discovered or newly introduced to a geographic area or population.

Epidemiology: The study of the determinants and distribution of health-related events (including disease) in a population; can be applied to disease control strategies.

Family members: Any family members who work on the farm, whether they live there or not.

Farm worker: A person who works on the goat operation; may include family members.

Fomites: Any inanimate object that can carry and/or transmit an infectious agent.

Goat operations: All of the activities involved in raising goats and working with goat products, including meat, dairy, and fibre.

Goat products: Any live animals, fresh meat, meat products, milk or milk products, and fibre or fibre products.

Guardian animals: Dogs (e.g. guardian dogs, herding dogs), llamas, donkeys, horses, etc., that have contact with, and are used to manage, the goats for purposes such as moving the goats or guarding the goats from predators.

Health status: Current state of health of the animal or herd, including both its condition and any infectious agents present in the animal or herd.

Heat treatment: Procedure used to prepare colostrum for newborn consumption; involves heating the product for 1 hour at 56°C.

Herd of origin: Herd(s) within which the animal was born.

Identified risk areas: Any area on the premises that has an increased likelihood of disease introduction and/or transmission; this may be due to the nature of the activity that occurs in the area and/or the group of animals that are housed within.

Immunity: Resistance to infection and/or disease.

Incubation: The period of time between exposure to an infectious agent and the onset of clinical signs of disease.

Indirect contact: Any form of contact between goats that involves shared contact with inanimate objects (e.g. surfaces, equipment, feed, water, bedding); does not involve any physical contact.

Infectious agent: A microbial pathogen that can potentially cause disease (i.e. bacteria, viruses, parasites, fungi, and prions); agents may be shed from an infected animal that appears healthy and is either incubating disease, recovering from disease, or is a carrier without symptoms. Routes of shedding include saliva, milk, respiratory secretions, feces, urine, epidermal shedding, and uterine or vaginal discharges. After shedding, infectious agents can persist in the environment, sometimes for extended periods of time, and be transmitted indirectly.

Infectious disease: Disease caused by an infectious agent.

Isolation: 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 or acquiring disease from another animal, either because it is known to be diseased or because its disease status is unknown. The location is known as an isolation facility.

Livestock operation: The buildings, dry lots, paddocks, corrals, and pastures used at any time of year to manage any livestock, including goats. The operation may have one or more locations.

Loading area: An area that is designated for the loading and unloading of animals; not just the ramp, but also any holding area and handling facilities used for this purpose.

Location: A single location is defined as a property used to manage goat (or livestock) that is self-contained and not divided by land or public roadway (e.g. concession road, highway – but not private laneway or walking path).

Morbidity: A measure of the number of individuals who are affected by a disease in a population.

Mortality: A measure of the number of deaths in a population.

Necropsy: A post-mortem examination to determine the cause of death; may involve only gross examination, or additional sampling and laboratory testing for infectious agents and/or toxins.

Newborn: Kid less than 1 day old.

Other livestock: Animals, other than goats, that are used for food or fibre production, work, guardian activity, and recreation; specifically, sheep, cattle (dairy, beef, veal), horses, bison, water buffalo, farmed deer and/or elk, alpacas, llamas, swine, chickens, turkeys, ducks, geese.

Pastures: Fenced areas that are used for livestock grazing at any time of year; may include multi-use fields (e.g. graze after haying or aftermath feeding).

Pests and wildlife: All non-livestock and non-domestic animals, and insects that may pose a health risk (disease and/or predatory) to the goat herd.

Practice: General procedure that is followed by a producer, and not necessarily documented or detailed to the extent of a protocol.

Premises: A defined area of land with all accompanying structures.

Prophylactic: A preventive action or measure.

Protocol: Description of a practice or method, usually written in a standard format that applies to a specific activity and has an intended result or outcome.

Reportable disease: Those diseases that are outlined in the *Health of Animals Act* and *Reportable Diseases Regulations* and are usually of significant importance to human or animal health, or to the Canadian economy. Animal owners, veterinarians, and laboratories are required to immediately report the presence of an animal that is contaminated or suspected of being contaminated with one of these diseases to a CFIA district veterinarian. Control or eradication measures will be applied immediately. Some provinces also have a list of reportable diseases and required response actions.

Restricted access zone: An area inside the controlled access zone where goats are housed and where access by people or equipment is further restricted.

Service provider: A person, company, or organization that provides goods or services to farms on a professional basis, including feed and feed additives suppliers, veterinarians, hoof trimmers, shearing and combing technicians, live animal transporters, deadstock pick-up services, manure management, and many others. The nature of service providers' activities on a farm, especially their closeness to or interaction with the herd, determines the relative risk of disease transmission that they represent.

Shedding: Transmission of an infectious agent from an individual to another individual or to the environment; can occur in the absence of clinical signs.

Source herd: The herd from which goats, sperm, and/or embryos are purchased; may also be the herd of origin.

Supply chain(s): All stages of production, processing, distribution, and sales for a product.

Susceptible: Lacking sufficient resistance or immunity and therefore at higher risk of infection and disease.

Traceability: The ability to follow a product through all stages of the supply chain.

Verified: Proven to be truthful or accurate.

Veterinary client patient relationship (VCPR): An established rapport that exists between a veterinarian and each client and patient, and is required before a veterinarian can prescribe or sell medications; in some provinces a valid VCPR requires on-farm visits at least annually.

Visitor: A non-service provider visiting the herd.

Zoonoses: Infectious diseases that can be transmitted (in some instances, by a vector) from animals, both wild and domestic, to humans or from humans to animals.



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Target audiences for the Standard

TABLE 1 below identifies stakeholders and potential applications of the National Standard. Although the primary audience is producers, many other stakeholders in the goat industry will benefit from the information provided in the document. Each stakeholder is listed as a potential target audience, with an accompanying description, outlining how they may use the National Standard.

Target Audience	Intended Use
Producers	Information and understanding of the National Standard leading to the preparation of a biosecurity plan for each farm
Producer associations – national, provincial, and sectoral	Planning and design of implementation programs and ongoing monitoring
Governments and funding agencies – national and provincial	Support for export development; Program support, and funding decisions
Veterinarians	Framework for support of producers
Processors, retailers, consumers, and the general public	Reference to practices that promote reliability and food safety
Trading partners (Export)	Assurance of scope and purpose of the biosecurity program
Farm service providers and visitors	Understanding the direction and priorities of the industry; coordination of programs, especially farm service suppliers
Academics/researchers	Reference for required areas of research in biosecurity for the industry
Veterinary and Food Science students	Reference and source material for study
Insurance companies	Planning and costing of insurance programs

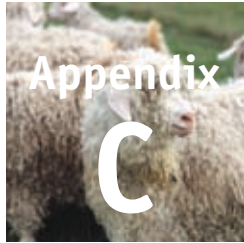


Examples of Modes of Disease Transmission

TABLE 1 provides examples of goat diseases, and illustrates some of the various modes of disease transmission. Biosecurity practices may be implemented in order to minimize the risk of disease introduction and spread. Zoonoses are also identified in order to illustrate the risk of disease transmission to humans.

Disease	Mode(s) of Transmission	Clinical Signs	Zoonoses?
Caprine Arthritis Encephalitis (CAE) (CAE virus)	Colostrum and milk Aerosol Body fluids Equipment contaminated with milk or blood Dam to fetus (rare)	Adults: chronic wasting, enlarged painful joints, mastitis, progressive pneumonia Kids: weakness, paralysis, depression Asymptomatic carriers	No
Caseous lymphadenitis (<i>Corynebacterium pseudotuberculosis</i>)	Direct goat-to-goat contact Contaminated equipment (shears) and environment (feed, water, and bedding); survival in environment can be prolonged Aerosol (if abscesses in lungs) Milk and colostrum (if abscesses in mammary glands)	Abscesses (usually external, but internal possible) Internal abscesses can lead to other clinical signs, depending on location Asymptomatic carriers	Yes
Chlamydiosis/Ovine enzootic abortion (<i>Chlamydophila abortus</i>)	Direct contact with aborted material (placenta, fetus) or vaginal secretions Contaminated environment Semen	Abortion Asymptomatic carriers	Yes

Disease	Mode(s) of Transmission	Clinical Signs	Zoonoses?
Johne's disease/ paratuberculosis <i>(Mycobacterium paratuberculosis subsp. avium)</i>	Ingestion of feces or material contaminated with feces (milk, feed); can survive in environment for months to years Colostrum and milk	Chronic progressive wasting Asymptomatic carriers	No
Q fever <i>(Coxiella burnetii)</i>	Direct contact with birth material (placenta, aborted fetus, fluids), vaginal secretions Aerosol Contaminated environment; can survive in environment for months to years Semen	Abortion	Yes



Developing a Farm-Level Biosecurity Plan

When conducting the initial assessment:

1a. Evaluate the herd disease status by identifying:

- diseases of concern for your farm or herd and their modes of transmission.
- preventive biosecurity measures by which the risk factors for the disease can be managed or minimized.

b. Evaluate the animals by considering:

- genetics of productivity and health.

2a. Evaluate the operational management by considering:

- number of animals the farm loses annually;
- replacements and frequency;
- source of replacements and health status;
- herd size and expansion;
- source, quality, and system for distribution of inputs (feed, bedding, and water); and
- marketing requirements (live and product).

b. Evaluate the management team and strategy with:

- training and compliance to the biosecurity plan.

3. Evaluate the facilities by designing:

- a map of the farm.
- Farm zoning: Areas defined by common or similar disease risk:
 - overall farm zoning approach:
 - restricted access zone is any area that houses or contains goats and/or where access to goats is possible.
 - controlled access zone is the adjacent area within which movement is restricted and any potential fomites are controlled.
 - areas within the barn and other areas of the farm can be defined more specifically, again using the concept of common or similar disease risk. Examples of these more specific zones include the areas where
 - all visitors are allowed;
 - some or all visitors are restricted (e.g. must change clothing and wash hands before being admitted); and
 - animals of differing health status are housed (e.g. new introductions, sick or diseased animals, animals on a health program).

4. Set goals to meet the operational and market objectives.



Summary of Key Areas of Concern

Table 1 provides a summary of the key areas of concern and accompanying target outcomes and strategies presented in the National Standard.

Areas of Concern	Target Outcomes	Strategies
1. Sourcing and introducing animals	Animal introductions, re-entry, and the use of semen and embryos do not present a risk to the health status of the herd.	<ol style="list-style-type: none"> 1. Sources and sourcing 2. Biosecurity practices at fairs, shows, and off-site loan locations 3. Disease status at purchase or re-entry 4. Isolation upon arrival or re-entry 5. Protocols for releasing animals from isolation
2. Animal health	Animal health, well-being, and productivity will be optimized through proper implementation of herd health programs.	<ol style="list-style-type: none"> 1. Implement a herd health management program 2. Observe and evaluate the health of animals 3. Implement herd health protocols 4. Recognize susceptibility and maintain separation 5. Optimize nutrition and the use of veterinary biologics 6. Control movement of animals within the production area 7. Manage feed, water, and bedding

Areas of Concern	Target Outcomes	Strategies
3. Facility management and access controls	Management of farm access, facilities, and identified risk areas limits disease introduction and spread on-farm and enables the implementation of biosecurity practices.	<ol style="list-style-type: none"> 1. Zoning and facility design 2. Perimeter and interior fencing 3. Cleaning and disinfection of facilities and on-farm equipment 4. Facility maintenance 5. Management of deadstock, aborted fetuses and placentas 6. Management of manure 7. Management of wildlife, pests, dogs and cats
4. Movement of people, vehicles, and equipment	Movement and activities of workers, visitors, and service providers and their vehicles and equipment do not compromise animal and human health.	<ol style="list-style-type: none"> 1. Access management for farm employees 2. Access management for visitors and service providers 3. Clothing and footwear 4. Hand washing and personal protective equipment 5. Movement control of equipment and tools, and vehicles
5. Monitoring and record keeping	Information is maintained and used to improve the effectiveness of biosecurity practices. The status of animal health, identification, and inputs may be verified by record review.	<ol style="list-style-type: none"> 1. Herd health records 2. Farm management records
6. Communications and training	Everyone who enters the farm is knowledgeable and complies with current farm biosecurity practices.	<ol style="list-style-type: none"> 1. Producer leadership 2. Communication with farm workers, family members, service providers, and visitors 3. Training and education 4. Performance and effectiveness of the biosecurity plan

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