INFORMATION MANUAL FOR ENHANCED BIOSECURITY FOR FMD PREVENTION: SHEEP ON PASTURE/RANGELAND

April 2024

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Acknowledgments

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Comments

Please send comments or suggested edits for improvement to: sswinfo@iastate.edu

Additional Resources

The Secure Sheep and Wool Supply website has additional resources available at: www.securesheepwool.org

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Target Audience

This Information Manual and corresponding Self-Assessment Checklist apply to:

- Sheep operations of all sizes and management types that raise sheep on **private** pasture or rangeland, including operations that raise sheep from multiple or single sources on grass or other forages (with or without supplemental grain). This includes, but is not limited to, grazing feeders, purebred/seed stock operations, targeted grazing operations, commercial sheep operations, and dairy sheep on pasture.
- Operations with or without other susceptible animals (e.g., sheep in confinement, pigs, cattle, goats) kept on the premises in addition to sheep on pasture.
- All individuals delivering to, servicing, or working on the sheep operation (family members and/or non-family employees working on or visiting the operation).
- Sheep on operations that have **never been infected with or vaccinated for** foot and mouth disease (FMD).

Sheep grazed on public lands have some unique FMD exposure risk challenges. Public land grazers need to be aware of the exposure risks as described in the Management Practices and FMD Exposure Risks for Sheep and Cattle Grazing Federal Public Lands document found on the SSWS Grazing Public Lands web page at: https://securesheepwool.org/producers/public-land-grazing/. Also on that web page is the "*Just-in-Time Biosecurity and Exposure Questionnaire for FMD: Livestock Grazing Public Lands*". State or Federal Animal Health Officials may request completion of that document when producers apply for a movement permit from a Control Area involving public lands. They may also conduct interviews with ranchers or observe practices (in person or virtually) to collect this information. Producers are encouraged to develop an enhanced biosecurity plan that meets the items in the corresponding Self-Assessment Checklist for their base property if livestock reside there at any time.

Introduction

In the event of a foot and mouth disease (FMD) outbreak in the United States (U.S.), maintaining business continuity, as well as animal health and well-being are critical to the U.S. sheep industry. The goal of the voluntary Secure Sheep and Wool Supply (SSWS) Plan is to **provide a workable business continuity plan** for sheep producers that have sheep with no evidence of FMD infection and for associated stakeholders. **The plan must be credible to Responsible Regulatory Officials** (local, state, tribal, and federal officials, as appropriate) and provides guidelines only. In an actual FMD outbreak, decisions will be made by the Responsible Regulatory Officials based on the unique characteristics of each outbreak.

During an FMD outbreak, it is the producer's responsibility to keep their animals from becoming infected, focusing on what they can control on their operation. Biosecurity approaches are both structural and operational. Structural biosecurity is built into the physical construction and maintenance of a facility. Operational biosecurity involves management practices designed to prevent the introduction and spread of disease agents onto or off of the premises. FMD will test the effectiveness of both structural

and operational biosecurity because the FMD virus is highly contagious. Successful implementation of the biosecurity practices greatly depends on the awareness level and behavior of individuals on the operation. **Implementing effective biosecurity measures to protect sheep raised outdoors (on pasture, dry lots, public lands) from FMD can be expensive and inconvenient. However, a failure of biosecurity resulting in FMD infection of the flock can be devastating.**

FMD is highly contagious and has a major impact on animal health and international trade; however, it does not pose a food safety or public health concern. Existing biosecurity plans may offer protection against endemic diseases (diseases regularly found in sheep flocks) but heightened precautions are needed for FMD. The enhanced biosecurity recommendations outlined in this document are based on the known disease exposure routes for FMD. Operations with susceptible species raised outdoors (on pasture, dry lots, and public lands) may have more difficulty preventing FMD exposure depending on their proximity to infected premises and the presence of wildlife in the area.

This document emphasizes three concepts that all operations raising sheep on private pasture and rangeland should be ready to implement prior to an FMD outbreak in the U.S.:

1. A Biosecurity Manager,
2. A written operation-specific enhanced biosecurity plan, and
3. A Line of Separation.

This Manual is organized around the sections in the *Self-Assessment Checklist for Enhanced Biosecurity: Sheep on Pasture/Rangeland* (statements in outlined boxes). This Manual can be used to develop an operation-specific, written, enhanced biosecurity plan prior to an FMD outbreak.

All operations should designate a Biosecurity Manager; this is item number 1 in the checklist. The Biosecurity Manager develops the biosecurity plan PRIOR TO an outbreak; the plan should address items 2-11 on this checklist. The biosecurity plan should describe the scope of the operation, contain forms for documentation of training and signatures, explanations of procedures and signage used on the operation, and protocols written and communicated effectively in languages that are fully understood by the individuals responsible for implementation.

Implementing the biosecurity plan, including training individuals, before an FMD outbreak occurs provides the best chance to prevent animals on the operation from being exposed. Once the biosecurity plan is written, operation owners/managers may use the checklist in one of the following ways:

1. **In the absence of FMD in the United States**, operation owners/managers should decide which items (#2-11) they will implement. The biosecurity plan should describe the strategy for how each item could be implemented (supplies needed, changes in management practice, etc.). These items may supplement or replace measures included in the operation's everyday biosecurity plan.
2. **If FMD is diagnosed anywhere in the U.S.,** operation owners/managers should implement ALL of the items in the checklist to minimize the risk of exposing their animals.
3. **If the operation is located in an FMD Control Area,** Responsible Regulatory Officials may require that all of the items on the checklist, and possibly others, be implemented before animal movement is permitted.

Scope of Biosecurity Plan

Each location (premises) should have its own biosecurity plan. Begin by defining your premises, clearly describing the animals (all species) and animal housing (buildings, pastures, rangeland, and dry lots) associated with the operation. Additionally, other businesses operated from the same premises will need to be accounted for in the biosecurity plan (distribution or sales of feed, mineral, fertilizer, compost, seed, equipment, hosting farm tours, etc.). Biosecurity plans for premises owned/managed similarly may have significant overlap.

A Premises Identification Number (PIN) facilitates requesting movement permits during an outbreak. A PIN is linked to the geospatial location reflecting the actual location of the animals on the premises. This includes a valid 911 address and a set of matching coordinates (latitude and longitude). A PIN is required for both the premises of origin and the premises of destination (https://www.aphis.usda.gov/animal-disease/traceability/pin). When animals on a premises become infected, all locations with the same PIN will be considered infected. Generally, it is best to have separate PINs for premises with animals that are under the same ownership or management but reared/housed off-site and accessed via a public road.

1. Biosecurity Manager and Written Plan

A Biosecurity Manager is identified for the operation. This individual is responsible for developing the biosecurity plan with the assistance of a veterinarian (if they are not a veterinarian) and ensuring biosecurity training of, or communicating biosecurity measures with, all individuals who enter the operation. The Biosecurity Manager has the written authority to ensure compliance with biosecurity protocols and take corrective action as needed.

The designated Biosecurity Manager for the operation should be able to develop and implement biosecurity procedures effective in protecting the animals from FMD virus infection. The Biosecurity Manager should be familiar with the current structural and operational biosecurity of all locations on the operation where animals are housed as well as the health status of the animals. This individual can be an owner, manager, veterinarian, or employee on-site. If the Biosecurity Manager is not a veterinarian, the individual should consult with an experienced veterinarian who is familiar with the operation layout, daily procedures, and health status of the animals when developing the biosecurity plan.

If the operation has animals at more than one location (premises) with movement of animals, people, equipment, or vehicles between them, each location should designate an on-site manager who is responsible for ensuring that the biosecurity practices for that location are followed on a daily basis. It is important that the Biosecurity Manager, and their on-site designees, have the authority to take corrective action if protocols are violated or need to be revised. The Biosecurity Manager should identify an alternate contact person for the premises in the event that the primary Biosecurity Manager is gone or unavailable. The Biosecurity Manager and their designee should have their contact information posted in an area where it can easily be found.

The roles of the Biosecurity Manager include:

- Developing and implementing an effective, operation-specific biosecurity plan,
- Overseeing and documenting that all essential personnel have been trained in biosecurity protocols, and
- Taking corrective action, as needed, when biosecurity protocols are not followed.

An operation-specific, written, enhanced biosecurity plan has been developed by the Biosecurity Manager. The plan is reviewed at least annually and whenever the operation goes through a change that affects biosecurity (expands, adds a new aspect of the business, etc.). The biosecurity plan clearly defines the scope of the operation and includes biosecurity for other susceptible species kept on the premises. The biosecurity plan includes a map of the operation indicating the Line of Separation (LOS), LOS Access Point(s), cleaning and disinfection (C&D) station(s), designated parking area, and carcass disposal/pickup location. The map indicates vehicle movements (animal transport vehicles, deliveries, etc.) and carcass removal pathways. The Biosecurity Manager ensures that all individuals entering the operation frequently (weekly or more often) have access to a copy of the biosecurity plan. The Biosecurity Manager is capable of implementing the written plan if FMD is diagnosed in the U.S.

The biosecurity plan must address how the operation will implement the biosecurity protocols described in this document. The biosecurity plan must also include other susceptible species (cattle, pigs, and goats) on the premises. For biosecurity guidance for beef cattle, dairy cattle, and pigs, see www.securebeef.org, www.securemilk.org, and www.securepork.org.

The operation-specific biosecurity plan must include a premises map (satellite images are preferable) labeled with the following:

- Line of Separation (LOS)
- LOS Access Point(s) which serve as the designated entrance(s),
- Animal load-out and load-in area(s),
- Cleaning and disinfection (C&D) station(s),
- Designated parking area outside the LOS, away from animal areas,
- Carcass disposal/pickup location and carcass removal pathways,
- Vehicle movement pathways (animal transport vehicles, deliveries, etc.), and
- Deliveries (non-essential to the operation).

Additionally, if items will be delivered to the operation, the premises map should indicate the designated area for delivery of these items outside of the LOS if at all possible. If items are to be delivered to an off-site location (e.g., post office, residence), this should be clearly indicated in the biosecurity plan and signs posted at the LOS Access Point(s).

Instructions for creating a premises map for a biosecurity plan using Google Maps can be found in https://securesheepwool.org/Assets/SSWS_CreatingPremisesMap-PastureRangeland.pdf.

The Biosecurity Manager must document that he/she reviews the plan at least annually, whenever the operation goes through a change (expands, adds a new aspect of the business, etc.), or whenever the *Self-Assessment Checklist for Enhanced Biosecurity: Sheep on Pasture/Rangeland* is updated/changed (visit www.securesheepwool.org). The Biosecurity Manager must continuously adapt the plan to address changing risks or recommendations. Due to the inherent variation between operations, biosecurity plans must be created specifically for every premises.

The biosecurity plan should be located where it can be accessed by individuals frequently entering the operation, Responsible Regulatory Officials, or the attending veterinarian upon request.

If all checklist items are not "in place" after completion of the written plan, the Biosecurity Manager must be capable of implementing each item if FMD is diagnosed in the U.S.

2. Training

The Biosecurity Manager and essential personnel are trained at least annually about the biosecurity measures necessary to keep FMD out of the flock; training is documented. The Biosecurity Manager informs individuals entering the operation of biosecurity measures they are to follow in a language they understand. Individuals are aware of the biosecurity concepts and procedures that apply to their specific areas of responsibility. Effective training ensures that individuals are aware of the concepts and procedures that apply to their specific areas of responsibility. The biosecurity plan describes training required before entering this operation.

Encouraging Compliance through Training

Achieving good compliance with biosecurity protocols by individuals working on the operation and visitors is an ongoing challenge for the operation. The biosecurity plan can only be effective if EVERYONE on the operation follows it, all of the time. Ideally, compliance with the biosecurity

protocols should become part of the culture of the operation. Poor compliance is usually due to lack of knowledge or understanding of either the biosecurity protocols or the consequences if they do not comply.

The Biosecurity Manager(s), owners, and essential personnel should be trained at least annually to ensure their awareness of the biosecurity measures necessary to keep FMD out of the flock. There are many resources available on the Secure Sheep and Wool Supply website (www.securesheepwool.org). The Biosecurity Manager(s) needs to inform individuals entering the operation of the biosecurity measures they are to follow in a language they understand. Individuals must be made aware of the biosecurity concepts and procedures that apply to their specific areas of responsibility.

All individuals entering must understand how to:

- Contact the Biosecurity Manager(s)
- Respect the Line of Separation (LOS)
- Cross the LOS, if required, following arrival and biosecure entry requirements
- Perform biosecurity measures for their specific job duties

Essential personnel must ALSO:

- Understand the importance of biosecurity;
- Review the entire biosecurity plan;
- Review the labeled premises map;
- Know who to report to if they see someone not complying or something preventing compliance;
- Recognize the consequences for not complying with biosecurity protocols.

The Biosecurity Manager communicates with all drivers, shearers, delivery and service personnel, veterinarians, livestock transporters, and visitors to promote awareness of biosecurity expectations and operation-specific biosecurity protocols prior to arrival at the operation. Communication of protocols may involve calling, emailing, texting, or faxing information to individuals prior to arrival or communicating with these individuals upon arrival, prior to entry.

Effective training can be done through one-on-one or group sessions, depending on the responsibilities of the individuals and their learning style. Document training sessions for essential personnel and all communication with other individuals arriving on the operation (an example Group Training Form can be found in https://securesheepwool.org/Assets/SSWS_GroupTrainingForm.pdf).

- Example: After a training session, have all attendees sign and date a document after attending a training session and include a copy of the training agenda/content reviewed.
- Example: Keep a copy of the document sent to off-site individuals describing where and how to cross the LOS at an LOS Access Point and their tasks (remain in cab, exit wearing protective boots/gloves, etc.) and have them sign it upon first arrival.

The Biosecurity Manager should continually emphasize the importance of biosecurity protocols for disease prevention. Communication of biosecurity is vital to any operation to protect sheep health. Individuals should be encouraged to communicate with the Biosecurity Manager if they have questions or concerns.

3. Protecting the Flock

Line of Separation (LOS)

The biosecurity plan includes an LOS, which is established as an outer control boundary around, or within, the premises to limit movement of virus into areas where susceptible animals can be exposed. The LOS is clearly defined in the biosecurity plan and is clearly marked on the premises. Animals, vehicles, people, or items only cross the LOS through clearly marked and controlled LOS Access Point(s), following appropriate biosecurity measures. Sheep are prevented from nose-to-nose contact with livestock on adjacent premises. Sheep do not have access to streams, waterways, or run-off water that may have come from other premises with FMD-susceptible species.

The Line of Separation (LOS) concept provides a level of protection from FMD exposure when properly implemented. The Biosecurity Manager should identify a Line of Separation (LOS), which is a clearly identified boundary around, or within, the entire operation to separate off-site from on-site movements of vehicles, items, people, and animals. The purpose of the LOS is to limit movement of virus into areas where susceptible animals can be exposed directly (animal contact) and indirectly (contaminated vehicles, footwear, equipment, run off). Access should only be allowed through a minimum number of clearly marked and controlled LOS Access Point(s) following appropriate biosecurity measures.

The operation can be thought of as a castle and the LOS as the moat around it. The LOS Access Point is the drawbridge which is only lowered once specific biosecurity measures are followed for all vehicles, individuals working on the operation, and equipment to limit entry of FMD virus. Once the LOS is established, it should not move unless areas which were outside of the LOS are cleaned and disinfected before being moved inside the LOS. A modified LOS may be needed during crop harvest when bringing in feedstuffs. This is further explained in Section 4 of this Manual (Vehicles and Equipment). It is important to establish a firm understanding of the LOS concept with all employees, visitors, and service personnel. The boundaries of the LOS need to be included on the premises map.

FMD outbreaks in other countries have been spread by vehicles and people. Biosecurity is not all or nothing; every attempt should be made to minimize as many exposure risks as possible, especially when the flock is located in an FMD Control Area.

The LOS may be located along the property line or another boundary within the operation (for example, near the sheep load-out/load-in area). When determining the best location for the LOS, the following should be considered:

- Animal housing and grazing areas
  - Traffic on roadways outside the LOS could be carrying FMD virus in organic matter (mud, manure, and run-off); ensure the LOS is located some distance from animal housing/grazing (sheep and other susceptible species) so off-site organic matter does not cross the LOS onto the premises.
  - The distance from the LOS to animal housing/grazing will depend on the drive path surface (farther from dirt/gravel than paved), weather extremes (farther if rain/snow will cause vehicle tires to kick up liquid/organic matter into animal housing or grazing areas) and what is known about the FMD virus and its infectivity. There is not a specified distance as it varies with the above conditions.
  - Sheep should be prevented from nose-to-nose contact with livestock on adjacent premises.
    - This can be accomplished by pasture or dry lot rotation, coordinating pasture use with neighbors, or installing an additional temporary electric fence on your premises to create distance between shared fence lines.
- Animal movement patterns

- Water sources
  - Sheep should not have access to water sources (ponds, streams, creeks, waterways, or run-off water) that may be shared or have come from another livestock premises.
    - This can also be accomplished by not using certain lots or pastures, providing temporary or portable water tanks, or installing a temporary electric fence around shared water sources.
- Drive path slope and ground topography (paved, gravel, dirt)
  - Consider volume and direction of runoff
- Weather conditions (rain, snow, mud) effect on drive paths near LOS Access Point(s)
  - This includes natural accumulation as well as plow routes and storage of snow and ice.
- Traffic patterns on and off of the operation
  - Minimize the need for individuals working on the operation and traffic to repeatedly cross the LOS for daily activities
  - Select the fewest number of LOS Access Point(s)
  - For ease of access to residences/living quarters, maintenance shops or other non-animal business entities (school bus, postal deliveries, non-farm employee vehicles, etc.), exclude them from inside the LOS whenever possible
  - Designate an area outside the LOS or at another location for deliveries
- Use of the premises by hunters
  - During an FMD outbreak, hunters must observe the biosecurity requirements for crossing the LOS and should not move between premises without observing biosecurity protocols
- Planned construction projects

Multiple options exist for operations to establish the LOS and they are highly dependent upon the layout of the operation/pasture/rangeland, traffic patterns, inputs and outputs. A table to assist in identification of various inputs/outputs to the operation is available in https://securesheepwool.org/Assets/SSWS_Inputs-Outputs.pdf. This, along with the Biosecurity Manager's operational knowledge of the flock management can create a well-placed LOS. Examples of options for layouts of the LOS are shown in https://securesheepwool.org/Assets/SSWS_LOS-Loading-Example_Pasture.pdf.

The LOS boundaries should be clearly identified (road, posts, fences, flags, spray paint, ropes, etc.) and visible to employees, visitors, and service or delivery personnel so that no one crosses the LOS without following the proper biosecurity measures. Vehicles and individuals remaining within the LOS will avoid areas potentially contaminated with FMD virus.

Maximize Distance between Susceptible Livestock on Adjacent Premises

The distance is maximized between susceptible livestock on adjacent premises, and steps to do so have been coordinated with owners/operators of these premises.

Take steps to maximize the distance between FMD-susceptible livestock on your premises and adjacent premises. To minimize risk of exposure, coordinate plans to increase distance with the owners/operators of these adjacent premises or animal caretakers if using leased ground. Steps may include (but are not limited to): avoiding use of pastures/rangeland with shared fence lines or placing additional temporary fencing within a pasture or pen to increase the distance between premises. All shared fence lines should be carefully inspected to ensure that fencing is in good working order. If the distance cannot be increased, your flock may be considered a contact premises if adjacent to an infected premises and movement may be prohibited until inspection, negative diagnostic tests, and movement tracing can occur.

Grazing Public Lands

Sheep grazed on public lands have some unique FMD exposure risk challenges. Creating an effective Line of Separation (LOS) for livestock grazing vast open rangelands is not realistic. Public land grazers need to be aware of the exposure risks as described in the Management Practices and FMD Exposure Risks for Sheep and Cattle Grazing Federal Public Lands document found on the SSWS Grazing Public Lands web page at: https://securesheepwool.org/producers/public-land-grazing/. Also on that web page is the "*Just-in-Time Biosecurity and Exposure Questionnaire for FMD: Livestock Grazing Public Lands*". State or Federal Animal Health Officials may request completion of that document when producers apply for a movement permit from a Control Area involving public lands. They may also conduct interviews with ranchers or observe practices (in person or virtually to collect this information. Producers are encouraged to develop an enhanced biosecurity plan that meets the items in the *Self-Assessment Checklist for Enhanced Biosecurity for FMD Prevention* for their base property if livestock reside there at any time.

LOS Access Point(s)

Entry to the operation is restricted to a limited number of controlled LOS Access Points. These LOS Access Points are protected with a suitable barrier (e.g., gate, cable, rope) to prevent unauthorized vehicles from entering. Each LOS Access Point is clearly marked with a sign in a language understood by all entering. Vehicles moving through an LOS Access Point are cleaned to remove visible contamination and then disinfected. People and items moving through LOS Access Points follow specific biosecurity steps. The animal load-out/load-in area(s) does not serve as a people entry point. All movements (animals, vehicles, equipment, people) that cross the LOS are recorded and are available for review upon request. Deliveries are made outside the LOS at a designated area indicated on the premises map.

Determine the LOS Access Point(s) based on current traffic patterns and suitability for a cleaning and disinfection (C&D) station. The LOS Access Points should be limited in number; the more LOS Access Points, the harder it is to ensure biosecurity protocols are being followed. If there is a location that is currently used for the majority of vehicle and equipment traffic, or a pathway that individuals working on the operation use to enter the operation from a designated parking area, then that location would be a logical place for an LOS Access Point. The LOS Access Point should **not** be adjacent to animal housing or holding areas.

All other unused driveways that are not LOS Access Points need to be protected with a suitable barrier (locked gate, hay bales, semi-trucks, heavy equipment, etc.) to prevent unauthorized vehicles and people from entering.

Communicating the LOS Access Point

Each LOS Access Point should be clearly marked with signs, in a language understood by all entering, for all traffic entering the operation (vehicles, people, etc.). Signs should include instructions for biosecurity protocols regarding animals, people, vehicles, and items crossing the LOS, or should direct individuals to where they can access these protocols. These protocols should be communicated with visitors, personnel, etc. prior to their arrival. Additional methods to mark the LOS Access Point may include physical and/or visual barriers and signage, including (but not limited to): gates, benches, spray paint, duct tape, etc.

The LOS Access Point(s) must be included in the premises map; communicate the location(s) of the LOS Access Point(s) to all authorized individuals crossing the LOS.

Movement of animals onto the operation could introduce FMD virus if biosecurity protocols are not followed. Incoming animals may require a movement permit if the origin or destination is within a Control Area. Biosecurity protocols for animals crossing the LOS are found in Section 6 of this Manual

(Animal Movement). Movement of livestock transporters and vehicles through the LOS Access Point(s) requires following biosecurity measures as outlined in Section 5 (Personnel) and Section 4 (Vehicles and Equipment) of this Manual, respectively.

Movement of people through the LOS Access Point(s) requires following biosecurity measures as outlined in Section 5 of this Manual (Personnel). At a minimum, ensure individuals have a place to change their clothing, change or disinfect their footwear, etc.

Movement of personal items and food across the LOS is limited to that which is necessary to perform job duties and the items must be clean and not worn/used around susceptible species (hats, glasses, cell phones, lunch bags, shearing singlets, belts, moccasins), or cleaned and disinfected before crossing. Food is consumed in designated areas and never brought into sheep areas. Signage with reminders or instructions should be posted at the LOS Access Points.

Deliveries that do not need to be made to the animal site (e.g., parcel deliveries) should be made to a designated area outside of the LOS. This designated area should be labeled on the premises map, or, if non-essential items are to be delivered to an off-site location (e.g., post office, residence), this should be clearly indicated in the biosecurity plan and signs posted at the premises entrances.

Movement of vehicles, equipment, and supplies across the LOS requires an operational cleaning and disinfection (C&D) station at the LOS Access Point as outlined below. More information on C&D of vehicles and equipment can be found in Section 4 of this Manual (Vehicles and Equipment).

All records of animal, vehicle, and equipment movements by date and time onto the operation should be maintained on site and made available to Responsible Regulatory Officials in the event it is needed for a trace-in or trace-out investigation. See https://securesheepwool.org/Assets/SSWS_VehicleEntryLog.pdf and https://securesheepwool.org/Assets/SSWS_AnimalMovementLog.pdf for sample Vehicle and Equipment Entry and Animal Movement logs.

Cleaning and Disinfection (C&D) Station

There is an operational, clearly marked, and equipped C&D station with the means to remove visible contamination and then disinfect vehicles, equipment, and items needing to cross the LOS. The C&D station is operated by individuals who have received documented training in proper selection and use of personal protective equipment (PPE) and the principles of C&D. Runoff from the C&D station is managed following state and local regulations, ensuring it does not enter waterways, animal housing, or on-farm traffic areas. The biosecurity plan contains contingency plans for vehicle and equipment C&D in inclement weather.

All vehicles, equipment, and items crossing the LOS are free of visible contamination and disinfected prior to entry, which is best accomplished at a Cleaning and Disinfection (C&D) Station on-site. **If C&D is not possible prior to entry to pasture/rangeland during an outbreak, vehicle/equipment entry could introduce FMD virus to the operation**. At least one stationary or mobile C&D Station should be available near an LOS Access Point to clean and disinfect vehicles, equipment, and items prior to crossing. The C&D stations should be equipped with good lighting, adequate water, soap, and a disinfectant effective against FMD virus. Basic steps and supplies needed for the C&D process can be found in https://securesheepwool.org/training-materials/biosecurity/. For a list of Environmental Protection Agency (EPA) registered disinfectants labeled for FMD virus, visit: https://www.aphis.usda.gov/sites/default/files/fmd-virus-disinfectants.pdf.

FMD virus is stable in the environment and in organic material (mud, manure, feed, and bedding). Virus stability increases at lower temperatures and with protection from sunlight. FMD virus is inactivated at pH below 6.0 or above 9.0. To kill the FMD virus, it is important to first clean the surfaces before using

an effective disinfectant appropriate to the surface and allowing for proper wet contact times and adequate drying.

Designated individuals operating the C&D station should be trained in proper selection and use of personal protective equipment (PPE), how to effectively clean and disinfect items so they do not introduce virus to the operation, and how to safely use approved disinfectants. The PPE necessary is dependent on the disinfectant used; consult the label for more information.

When determining the location of the C&D Station, consider the following:

- The wash pad at the C&D Station should be free of dirt/mud (ideally on a hard/solid/paved or well-drained gravel surface).
    - The entry to pasture/rangeland may not allow for a C&D station; other options are shown in https://securesheepwool.org/Assets/SSWS_LOS-Loading-Example_Pasture.pdf: Line of Separation Examples.
- The wash pad and surrounding area should be sloped AWAY from animal housing, waterways, feed receiving or storage areas, and on-farm animal or vehicle traffic areas.
- All applicable state or local regulations regarding the management (capture/diversion) of the run-off/effluent should be followed. This may require building drainage ditches, berms, or other physical barriers to ensure susceptible animals are not exposed.

Contingency Plan for Inclement Weather

Effective C&D can be difficult in the winter in northern climates or during severe weather events unless conducted inside a building. Create a contingency plan for inclement weather and include this in the biosecurity plan. Below are a few suggestions.

- Contingency plans may include:
    - Creating a sheltered C&D station;
    - Using another structure on the premises (but outside of the LOS) as a temporary C&D station during inclement weather,
    - Delaying delivery until the weather improves, or
    - Designating an off-site location, such as a truck wash, for washing all vehicles and equipment arriving on site during inclement weather.
        - Vehicles or equipment cleaned and disinfected off-site must arrive free of visible contamination, and must not have been on any other premises with FMD-susceptible species after cleaning and disinfecting.
    - Determining alternate delivery options or on-site drive paths.
        - See Section 4 of this Manual (Vehicles and Equipment) for options for feed delivery and livestock load out.
    - Using a heated water source for C&D.

The C&D station(s) need to be marked on the premises map.

Designated Parking Area

There is a clearly marked, designated parking area outside of the LOS, away from animal areas, for vehicles that will not enter the LOS and have not been cleaned and disinfected.

Designated parking areas outside of the LOS for employee and visitor vehicles minimizes the need to clean and disinfect them upon arrival and reduces the chance of FMD virus on vehicles crossing to the sheep side of the LOS. Locate the parking area where individuals can conveniently walk to the nearest LOS Access Point to better ensure compliance.

Signs should be posted designating the parking area, to ensure vehicles remain away from the LOS and thus, animal areas, and the LOS Access Point(s). The designated parking area should be labeled on the premises map.

Designated vehicles that remain within the LOS should be available for individuals needing to haul equipment, supplies, or treatment materials to the animals since personal or company vehicles will be prohibited entry without C&D.

4. Vehicles and Equipment

All records of vehicle and equipment movements by date and time onto the operation should be maintained on-site and made available to Responsible Regulatory Officials in the event it is needed for a trace-back or trace-forward investigation. See securesheepwool.org/Assets/SSWS_VehicleEntryLog.pdf for an example Vehicle and Equipment Entry Log.

Vehicles and Equipment (non-animal transport)

All vehicles (including empty livestock trailers) and equipment are cleaned and effectively disinfected prior to crossing the LOS, otherwise entry is prohibited.

Public roadways in the Control Area may be contaminated with FMD virus. Therefore, allowing only vehicles and equipment across the LOS which are free of visible contamination and effectively disinfected at the operation's C&D Station is important to reduce the chance of introducing virus; see Section 3 of this Manual (Protecting the Operation: Cleaning and Disinfection Stations) for more information. Basic steps and supplies needed for the C&D process can be found in https://securesheepwool.org/training-materials/biosecurity/: Setting up and Operating a Cleaning and Disinfection (C&D) Station. See Resources for a link to the Environmental Protection Agency (EPA) list of registered disinfectants labeled for FMD virus. Whenever possible, operation-dedicated equipment should be used and should not be shared unless absolutely necessary.

Entry of commodity feed trucks, service personnel vehicles, and any other vehicles or equipment (e.g., skid loaders, feed wagons) that have exited the operation and are returning, or originate off-site, needs to be done in a biosecure manner. Vehicles and equipment remaining inside the LOS do not need to go through C&D procedures unless it exits and is returning across the LOS. Vehicles and equipment that remain outside of the LOS do not need to be cleaned and disinfected. Entry options are shown in https://securesheepwool.org/Assets/SSWS_LOS-Loading-Example_Pasture.pdf: Line of Separation Examples.

Effective disinfection of vehicles and equipment requires thorough cleaning to first remove visible contamination, application of a disinfectant labeled for FMD virus, then allowing time for the disinfectant to kill the virus. Alternatively, heat may be used to kill viruses after thorough cleaning. The FMD virus is vulnerable to high temperatures and is progressively inactivated by temperatures above 50 °C (122 °F).

In some cases, as in grain delivery by auger truck, the vehicle may remain outside of the LOS and the clean auger swings over the LOS to accomplish feed delivery. In this case, the driver remains outside the LOS and operates the auger from the truck. An individual working inside the LOS may then complete the steps required to receive the delivery.

Harvest vehicles and equipment (auger carts, wagons, semi-trucks) used to haul crops (hay, silage, grain) may enter the operation frequently to deliver feedstuffs over a short period of time, a few times a year. These vehicles and equipment are difficult to effectively clean and disinfect and pose a risk of introducing virus from contaminated roadways. During crop harvest, the LOS may need to be temporarily modified to create a direct path to the feed storage area that does not overlap with vehicles used inside the LOS to feed or contact animals. Access to this area should be restricted to crop delivery vehicles and

equipment ONLY during this time. If the drive path is near animals, consider temporarily moving those animals. During this modification of the LOS, this drive path should NOT be used by vehicles that are used inside the LOS to feed or contact animals. Alternative routes for getting feed out of this area daily need to be made that do not cross paths with the harvest vehicles.

It is still important to minimize the amount of organic material carried into this modified LOS area from roadways. Visible material on tires/undercarriage should still be removed prior to entering the premises, with every effort made to not spray the feedstuffs (hay, silage, grain) carried on the vehicle. Once visible material has been removed, the harvest vehicles/equipment should drive directly to the feed storage area. The vehicle disinfection step can be skipped – rather the drive path should be cleaned and disinfected after harvest/feed delivery is complete, ensuring run-off/effluent does not enter pastures/rangeland, animal housing, waterways, or traffic areas within the LOS. Once the area is decontaminated, the LOS can be re-established as it was prior to harvest.

Further information on contingency plans for vehicle and equipment C&D in inclement weather can be found in Section 3 of this Manual (Protecting the Operation: Cleaning and Disinfection Stations).

Livestock Trucks/Trailers (animal transport vehicles)

All animal transport vehicles delivering animals to the premises are cleaned and effectively disinfected before animals are loaded for delivery to the operation (incoming loads). Vehicles moving through an LOS Access Point should have the tires and undercarriage cleaned to remove visible contamination and then disinfected.

Livestock transporters and their vehicle may introduce FMD virus unless proper biosecurity protocols are followed. Information specific to drivers and other personnel traveling with the truck can be found under Section 5 of this Manual (Biosecure Entry Procedure).

Communicate with the source of incoming animals and with the transporter to ensure that all animal transport vehicles were cleaned and effectively disinfected prior to loading animals for delivery to the operation. Document all communication.

Empty livestock trucks/trailers must be free of all visible contamination (inside and out) and then disinfected before crossing the LOS at an LOS Access Point.

Occupied livestock trucks/trailers cannot be effectively C&D with animals on board and have the potential to introduce FMD virus on their truck tires as well as through spillage of the interior contents (manure, urine, bedding). If the truck was effectively C&D before loading, the interior contents pose no greater risk than the animals themselves. However, the truck/trailer exterior, especially the tires/wheel wells, could become contaminated while driving on road surfaces. To mitigate this risk, the livestock trucks/trailers should unload by backing up to a dedicated load-in facility without crossing the LOS if possible. See Section 6 of this Manual (Animal Load-out and Load-in).

One way to avoid vehicle entry is to use vehicles that stay inside the LOS to transport animals to/from the LOS Access Point. Animals can be transferred using a staged area like a transport chute to move animals from the trailer inside the LOS onto the trailer parked outside of the LOS. Animals could be introduced to the operation in this same manner.

5. Personnel

Prior to Arriving at the Operation

Crossing the LOS is limited to individuals who are essential to the management of the operation. Everyone crossing the LOS on foot or exiting a vehicle inside the LOS arrives at the operation having showered and wearing clean clothing and footwear since last contacting susceptible animals. All individuals crossing the LOS have a signed agreement on file agreeing to follow these instructions.

Individuals arriving at the operation should not cross the LOS unless their job duties require doing so. Individuals that are crossing the LOS in their vehicle should remain in the cab unless their job duties require them to exit the vehicle. Biosecure entry procedures for individuals crossing the LOS but not contacting animals may vary based on their job duties. The Biosecurity Manager is responsible for communicating these requirements to all individuals.

Individuals and their clothing/footwear may become contaminated with FMD virus through a variety of activities and contacts when they are off-site such as:

- Living with people who work at other livestock production sites;
- Caring for livestock at home;
- Working at or visiting other livestock production sites (pigs, cattle, sheep or goats);
- Shearing or handling wool;
- Working at or visiting auction markets, buying stations, slaughter plants, or rendering facilities;
- Hunting or contacting feral swine, deer, etc.; and
- Stopping at a gas station or restaurant which may have been previously visited by rendering truck drivers, or livestock haulers or ranch/farm employees.

It is possible to reduce the potential for people to introduce FMD virus by taking certain precautions prior to arrival at the operation. All individuals entering areas where sheep are located should:

- Ensure that the inside of their vehicle is clean (free of all animal manure/excrement) and has not become contaminated by soiled clothes, footwear, or other items. Do not bring personal pets or animals to the premises.
- Ensure they have showered and changed into clean clothes and footwear prior to arrival on the operation.
    - For individuals that work with the animals and live on-site, showering and changing into clean clothing/footwear before leaving their residence is necessary.
    - For individuals living off-site, after showering and changing into clean clothes and footwear, do NOT contact animals, live or dead, or facilities where they are held prior to arrival at the operation.
- Understand and be able to follow all procedures for crossing the LOS before arrival.
- Sign an agreement verifying they have been informed of these biosecurity protocols and will abide by them (example agreement included in https://securesheepwool.org/Assets/SSWS_EmployeeVisitorAgreement.pdf).

Entry Logbook

Everyone crossing the LOS Access Point(s) completes the entry logbook, unless they are a scheduled worker. The entry logbook is monitored by an individual working on the operation to ensure accurate completion. The contact information and work schedule records for all workers are maintained.

Prior to crossing the LOS, all individuals (other than scheduled workers) granted entrance must sign the Entry Logbook. Information recorded includes (at minimum): name, phone number, reason for entry, and if they had livestock (cattle, pigs, sheep, goats) contact in the last seven days, and describe where (auction, packing plant, exhibition, home, etc. and City/State).

The Biosecurity Manager should ensure the entry logbook is maintained. Operations can use existing entry logbooks if they contain the information described above or use the SBS People Entry Logbook form (see https://securesheepwool.org/Assets/SSWS_PeopleEntryLog.pdf). The entry logbook should be monitored by an individual working on the operation to ensure accurate completion. The entry logbook should be available for review and kept up-to-date.

Employee and family member contact information and work schedule records must be maintained and be accurate.

Biosecure Entry Procedures

All individuals who cross an LOS Access Point on foot or exit their vehicle inside the LOS ensure that visible contamination on their footwear, clothing, or exposed skin does not enter or exit the operation, following the biosecure entry procedure as specified in the biosecurity plan.

All individuals crossing the LOS on foot or exiting their vehicle should arrive having showered, wearing clean clothing and footwear. The inside of their vehicle should be clean and have no visible contamination (soiled clothes, footwear, or other items) that could transfer to their clean clothing, clean footwear, or exposed skin. Additional biosecure entry procedures may vary based on whether or not individuals will have contact with animals or their manure/excretions.

Biosecure entry procedures should be communicated in writing to individuals frequenting the operation and with trucking companies so they can be shared with the truck drivers. One way to accomplish this is through development of Standard Operating Procedures (SOPs).

Animal handlers or those who may be contacting animal areas or their excretions on the operation (employees, family members, livestock transporters, veterinarians, shepherds, processing crews, etc.) should also, at a minimum:

- Wear operation-dedicated clothing and footwear, OR
- Wear clean coveralls/disposable protective outerwear and disposable or disinfectable footwear; AND
- Ensure hands are clean
    - Wash hands and/or
    - Wear disposable or disinfectable gloves over clean hands

These procedures should occur at the designated LOS Access Point for people entry or as the individual exits the cab of their vehicle on the sheep side of the LOS. Individuals exiting their cab are encouraged to carry a change of street clothes/extra coveralls/disposable protective outerwear in the event their street clothes become soiled with animal manure/excretions. The goal is to not transfer manure/excretions on clothing to the vehicle cab or from the operation to another livestock operation.

Non-animal handlers and those remaining away from animal areas on the operation (feed or other product delivery personnel, equipment service personnel, visitors, employees) should also, at a minimum:

- Wear operation-dedicated footwear, OR
- Wear disposable or disinfectable footwear; AND
- Ensure hands are clean
    - Wash hands and/or
    - Wear disposable or disinfectable gloves over clean hands

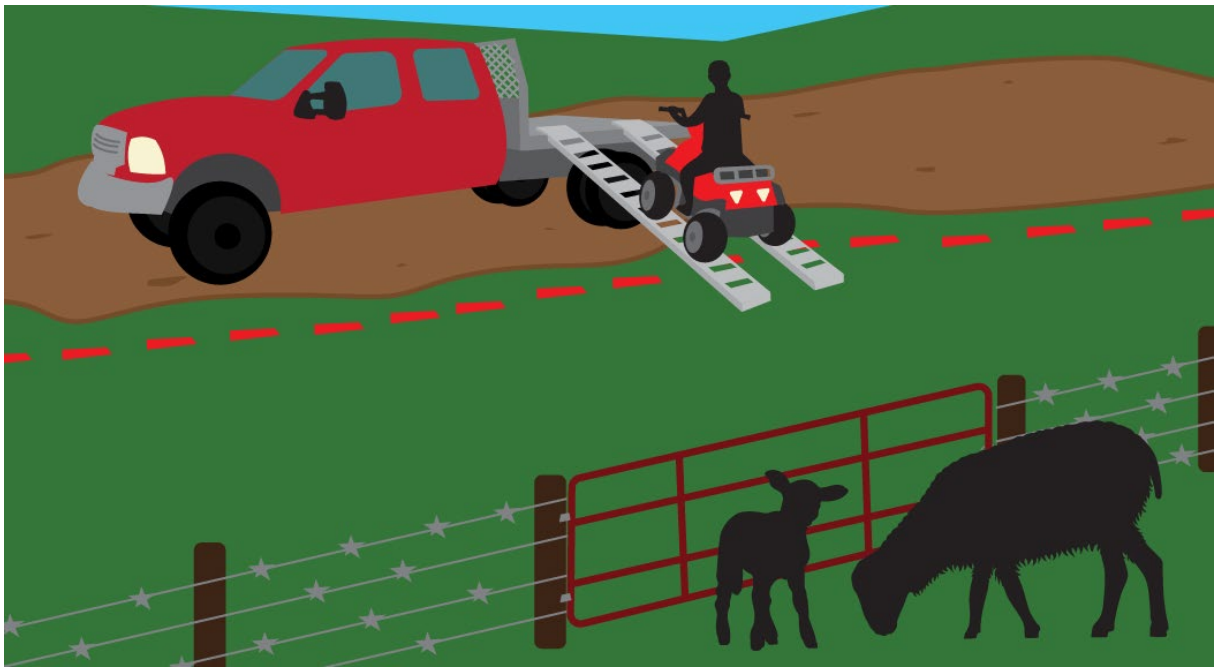
These procedures should occur at the designated LOS Access Point for people entry or as the individual exits the cab of their vehicle on the sheep side of the LOS. If there is a possibility of direct contact with animals or animal manure/excretions, they should also wear operation-dedicated clothing or clean coveralls/disposable protective outerwear.

Specific biosecure entry procedures will vary depending on what is crossing the LOS at the LOS Access Point and on the layout of the operation. The goal is to protect the operation (including individual pastures, rangeland, etc.) from virus that may be present on contaminated surfaces (roadways, equipment, or people). Several examples with visuals are provided below; an explanation precedes the image.

In this example, consider someone who is entering a pasture on their tractor to deliver a round bale to sheep. The operation houses the tractor at the home farm/ranch, and public roads are driven on to access the pasture gate. The driver may use a portable sprayer to clean and then disinfect the tractor tires and their footwear (which have contacted potentially contaminated, off-farm/ranch surfaces) immediately before crossing the LOS Access Point at the pasture gate. Once the tractor and driver have crossed the LOS into the pasture/rangeland, C&D of their footwear when getting in and out of the tractor (to cut bale netting, check sheep, open the gate to exit the pasture, etc.) is not necessary because the inside of the farm-dedicated vehicle and the pasture within the LOS are both considered part of the operation.

Here is an example of a biosecure entry procedure for someone who is checking sheep with a premises-dedicated ATV. Back up the vehicle/trailer transporting the ATV close to the LOS and set up clean ramps that straddle the LOS. The person then C&Ds their footwear that touched the ground outside of the LOS prior to stepping onto the ramps/trailer/premises-dedicated ATV. It is CRITICAL that the ATV only be used on the same premises, otherwise it will require C&D of its tires and wheel wells. Once the person is within the LOS, they do not need to C&D their footwear to open the gate or if they step off the ATV once

they are in the pasture. As long as the ATV does not cross the LOS on the ground, there is no need C&D before loading.



An example of someone entering a small pasture on foot to check on newborn lambs could sit on the tailgate of a pickup or on the front seat of a vehicle parked immediately adjacent to the LOS near a pasture gate to put on coveralls/protective outerwear and change footwear before crossing at an LOS Access Point. For another biosecure entry procedure at an LOS Access Point if an indoor space is available, see the *SSWS Information Manual for Enhanced Biosecurity: Feedlots*.

Record all communications (written, oral, etc.) that occurred between the Biosecurity Manager and livestock transporters, shearers, delivery, or service personnel, including dates and times of said communication. For example, keep a copy of the information sent to the livestock transporter or feed company with a premises map showing where the livestock or feed trucks are to drive and what the drivers are supposed to wear (disposable footwear, disposable gloves, no hats, etc.).

6. Animal Movement

All animal movement into, out of, or within a Control Area requires a movement permit issued by Responsible Regulatory Officials. Permit movement criteria must be met before animal movement may occur in an effort to prevent spread of FMD virus between premises.

All records of animal movements onto the operation should be maintained on site and made available to Responsible Regulatory Officials in the event it is needed for a trace-back or trace-forward investigation. See https://securesheepwool.org/Assets/SSWS_AnimalMovementLog.pdf for an example Animal Movement Log.

The Biosecurity Manager communicates all biosecurity procedures pertaining to animal movement with the source or destination of animals and/or with the transport companies. All communication is documented.

Incoming Animals

Animals come only from sources with documented biosecurity practices that either are not in an FMD Control Area OR are held in quarantine separately from the destination flock and carefully observed for clinical signs of FMD for 30 days before crossing the LOS.

It is not possible to prove that sheep are free of FMD virus; it is only possible to demonstrate lack of evidence of infection. A lack of evidence of infection means that, based on available surveillance tools, the sheep have no abnormal clinical signs and no visible lesions that could be from FMD virus as documented by personnel on the operation; diagnostic test results may or may not be available. However, as of April 2020, there is no accepted sampling protocol to provide a high degree of confidence that a flock of sheep is not infected with FMD virus. Movement of infected but undetected sheep has been a common method of spreading FMD infection in some previous outbreaks. FMD lesions are typically mild or inapparent in adult sheep. It may be difficult to detect FMD infection in a flock of adult sheep. Many infected sheep may not have vesicular lesions. In addition, shedding of FMD virus can occur before clinical signs appear. All incoming animals must come directly from a premises with no current or previous evidence of infection with FMD.

A high degree of confidence that FMD will not be introduced into the operation with incoming sheep can be obtained by quarantining the sheep for 30 days at a biosecure location separate from the operation. Carefully monitor the health of the quarantined sheep and the health of the flock they came from during the 30 day quarantine period before introducing them into the operation. Ensure this separate location has an enhanced biosecurity plan to manage the LOS, vehicles, equipment, personnel, etc.

If animals are raised off-site by other caretakers, ensure that the off-site premises' biosecurity plan aligns with yours and their personnel are trained to look for signs of FMD.

Contingency Plan for Interrupted Animal Movement

A plan exists to manage animals in a biosecure manner on-site in the event animal movement is stopped for several weeks.

Sheep operations should develop plans to manage animals on-site for several weeks that would otherwise be moved to a different premises (pasture, rangeland, feedlot, auction market, packing plant) in the event of a movement restriction. This may include planning to raise weaned lambs or feeder lambs that are ready to move to feedlots to an older age and heavier weight until movement restrictions are lifted or permits can be requested. The plan should include considerations for feeding, handling, treatments, and space restrictions as the animals continue to grow. The plan should include welfare considerations and the possibility of humane euthanasia for any sheep that would normally be sold at a market. Likewise, premises that supply your operation with lambs, replacement ewes, or rams that cannot move animals due to prolonged movement restrictions should be prepared to care for these animals.

Newborn lambs should NOT leave the premises to be cared for by personnel (or others) at their own homes or farms. Available inventory of bottles, milk replacer, buckets, etc. may be limited during an outbreak. Producers are encouraged to have an emergency supply on hand. Introducing items from other livestock operations poses a biosecurity risk unless protocols are followed.

Animal Load-out and Load-in

The biosecurity plan describes whether or not the livestock truck crosses the LOS, the drive path to the animal load-out/load-in area(s), and the capabilities to clean and disinfect between animal load-out and load-in OR there are separate and dedicated animal load-out and load-in areas that prevent cross-contamination. The animal load-out/load-in area(s) is NOT a people entry point. These details are labeled on the premises map. Animals are loaded-out using a staged procedure.

Load-out/load-in areas **inside** the LOS require effective cleaning and disinfection (C&D) of the livestock trailer interior and exterior prior to loading animals at the origin and C&D of the exterior before crossing at an LOS Access Point at the destination. For more information on managing the livestock trailer, see Section 4 of this Manual (Vehicles and Equipment). See Resources for a link to the Environmental Protection Agency (EPA) list of registered disinfectants labeled for FMD virus.

Effective C&D of livestock trucks/trailers to load-out animals from an operation can be challenging if there are not enough commercial truck washes in your area and/or if there are several load-outs needed in a short amount of time. On-farm C&D of livestock trucks/trailers may be difficult due to a lack of water access, inclement weather, and difficulties capturing runoff from the C&D process if required by regulatory agencies. If C&D is not possible, then the livestock truck/trailer **MUST**:

- Not cross the LOS, **AND**
- Not drive close to susceptible animals staying on the operation, **AND**
  - Be destined for a terminal location (slaughter plant),
    - OR -
  - Be used ONLY for animals originating in the same flock (no commingling or sharing trailers).

If it is not possible to C&D the livestock truck/trailer, then the load-out/load-in area **MUST** be:

- Staged for load-out as shown in Figure 1 to ensure sheep, and personnel moving the sheep, cannot carry contamination from the truck/trailer and the load-out facility back across the LOS,
  - AND -

- Made of non-porous materials that can be thoroughly cleaned and disinfected (C&D) under all weather conditions before sheep load-in to prevent potential exposure.
  - **OR** -
- Two separate areas (see Figure 2), each dedicated to one task – either animal load-out or load-in – and located at some distance from each other that prevents cross-contamination of vehicles, personnel, equipment, and animal waste.

The advantage of using the staged load-out procedure (Figure 1) and having separate areas (Figure 2) is that it further decreases the risk of disease transmission from contaminated trucks used for load-out. It also decreases the burden of having to C&D the shared load-out/load-in facility and livestock trucks/trailers used for load-out.

Figure 1: Staged Animal Load-out Area

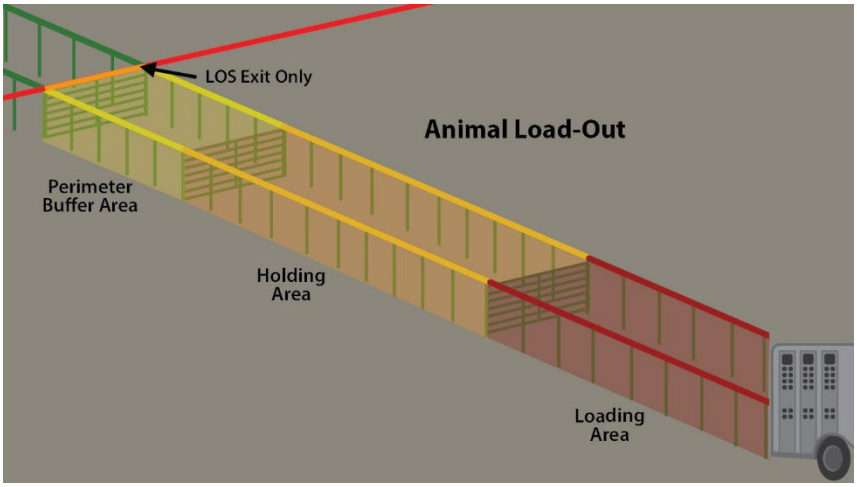
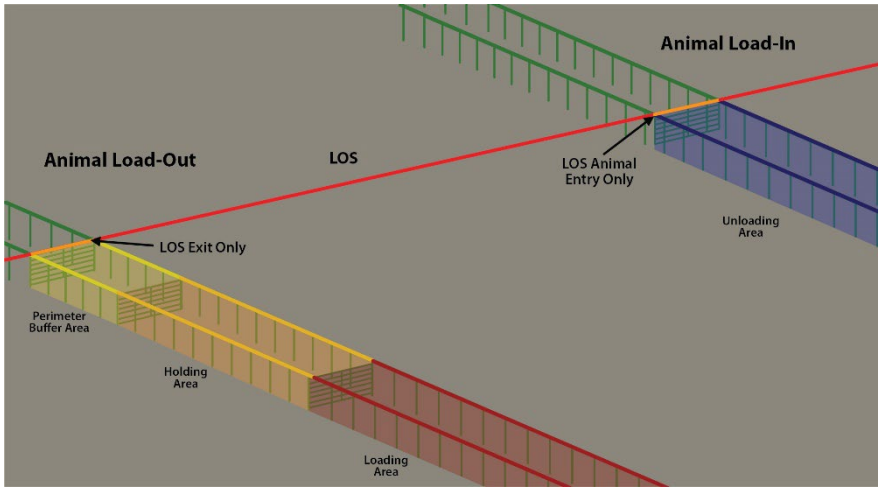


Figure 2: Separate and Dedicated Animal Load-out and Load-in Areas



STAGED ANIMAL LOAD-OUT (SHARED OR DEDICATED): The LOS Access Point in the load-out/load-in area(s) must be marked in a way that is always visible to individuals moving animals, even during load-out (when the floor/ground may be covered with manure and debris). There must be a Perimeter Buffer Area that the sheep move into after exiting the LOS to leave the operation (see Figure 1). The gate at the LOS is then closed. The Perimeter Buffer Area serves only as a pass-thru zone; sheep

should not be held in this area. The sheep move through the Perimeter Buffer Area into a Holding Area; the handler closes a gate behind them. Sheep then move to the Loading Area with a gate closed behind them.

If the handler exits the LOS with the sheep, the handler **should not** cross back to the sheep side of the LOS. Handlers should also move in one direction only; never backwards from the Loading Area to the Holding Area or to the Perimeter Buffer Area to prevent contamination. To re-enter the sheep side of the LOS, handlers must follow the biosecurity entry procedure at a people LOS Access Point. It may be necessary to use two handlers during load-out during an FMD outbreak. The load-out crew must be well trained and a person responsible for load-out biosecurity should observe the loading process to ensure that animals and personnel move in one direction during the loading process and do not carry contamination across the LOS.

ANIMAL LOAD-IN (SAME AREA AS LOAD-OUT): The Perimeter Buffer Area, Holding Area, Loading Area, and loading chute must be made of non-porous materials that can be thoroughly cleaned and disinfected (C&D) under all weather conditions before sheep load-in to prevent potential exposure. These steps are necessary when the livestock truck/trailer being loaded has not been thoroughly C&D, it is likely that the Holding Area and Loading Area may become contaminated while animals are being loaded out. The C&D process of the load-in facilities is essential to prevent incoming animals being exposed. See Resources for a link to the Environmental Protection Agency (EPA) list of registered disinfectants labeled for FMD virus.

ANIMAL LOAD-IN (SEPARATE, DEDICATED AREA): The facility can consist of a simple chute and alleyway designed for safe animal movement. The handler should not cross to the sheep side of the LOS through the animal entry point; only enter through a people LOS Access Point following the biosecurity entry procedure. It is not necessary to C&D the dedicated animal load-in facility. The facility should be located at some distance from the load-out area to prevent cross-contamination of vehicles, personnel, equipment, and animal waste. Personnel who assisted with load-out to trucks that were not C&D may be contaminated and must not help with load-in, unless they have passed through a people LOS access point and followed the biosecure entry procedure.

The LOS Access Point and the load-out/load-in area(s) must be clearly marked on the operation and labeled on the premises map.

7. Animal Product Movement

Semen and Embryos

Semen and embryos collected after FMD has been diagnosed in the United States come from sources with documented, enhanced biosecurity practices and no current or previous evidence of FMD infection. Semen and embryos are transported in containers whose exteriors can be cleaned and effectively disinfected to minimize the risk of virus contamination.

Some operations raising sheep on pasture/rangeland may need to bring in animal products such as semen or embryos. Animal products transported on or off of these operations are potential sources for FMD virus spread.

FMD virus can be transmitted to sheep exposed through direct contact with, or from surfaces coming in contact with, contaminated semen and embryos. If semen and/or embryos arrive onto the operation, they must come from sources with documented biosecurity protocols and a historical and current lack of evidence of FMD infection.

Since semen can contain FMD virus before clinical signs are observed, it should be held, frozen, at the source flock for a minimum of 30 days after collection. If rams do not show clinical signs during the 30

day period, the semen produced 30 days ago is very likely to be free from FMD virus. Though no specific data is available for sheep, the risk of transmission of FMD in cattle via in vivo derived embryos has been shown to be negligible provided that the embryos are properly handled between collection and transfer in accordance with the International Embryo Technology Society Manual. (See WOAH Article 4.8.14, *Collection and Processing of In Vivo Derived Embryos from Livestock and Equids*, available at: https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/index.php?id=169&L=1&htmfile=chapitre_coll_embryo_equid.htm). Embryos collected from ewes without clinical signs of FMD should be held, frozen, for a minimum of 30 days before placing into a recipient animal.

Responsible Regulatory Officials may also require periodic inspection of donor animals by an Accredited Veterinarian and/or laboratory testing a sample from the donor animal(s) to demonstrate a lack of evidence of infection prior to issuing a movement permit for semen or embryos.

Semen and embryos should be transported in containers that can be cleaned and effectively disinfected on the exterior as they cross the LOS to minimize the risk of virus introduction. The collection, storage, and transport of embryos and semen must be closely monitored, and these movements recorded, and biosecurity protocols must be followed to prevent exposure of disease agents to susceptible animals.

Feeding Dairy Products

Bottle lambs are fed milk products that have been treated to World Organization for Animal Health (WOAH) recommendations for inactivation of FMD virus for animal consumption.

Raw milk can be a source of virus transmission to susceptible animals so it is important to use only milk or milk products (colostrum, replacer) that meet World Organization for Animal Health (OIE) recommendations for inactivation of FMD virus for animal consumption. Normal high temperature – short time (HTST) pasteurization (72°C [161°F] for at least 15 seconds) does not completely inactivate all FMD virus in raw milk. FMD is not a public health or a food safety concern; it is an animal health disease. Additional treatment of raw milk or milk products is needed to prevent FMD virus transmission to susceptible animals (cattle, swine, sheep, and goats). This also applies to any waste milk fed to sheep.

The OIE sets the international sanitary standards for trade in animal products and are the guidelines to follow for inactivation of FMD virus in milk for animal consumption. The WOAH Terrestrial Animal Health Code 2023, Article 8.8.36 at https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/?id=169&L=1&htmfile=chapitre_fmd.htm describes:

> **"Procedures for the inactivation of the FMD virus in milk for animal consumption**
>
> For the inactivation of viruses present in milk for animal consumption, one of the following procedures should be used:
>
> - The HTST process applied twice [HTST is high temperature – short time pasteurization with a minimum temperature of 72°C [161°F] for at least 15 seconds]; or
> - HTST combined with another physical treatment, e.g., maintaining a pH 6 for at least one hour or additional heating to at least 72°C [161°F] combined with desiccation; or
> - UHT combined with another physical treatment referred to in point 2 above [UHT is ultra-high temperature with a minimum temperature of 132°C [270°F] for at least one second]."

Wool Shearing and Handling

Shearing Equipment

All shearing equipment such as clippers and shearing machines, slings, combs/cutters, and blades are either new or have been disinfected according to the written biosecurity guidelines prior to crossing the LOS. Blade washes/coolants/cleaners/conditioners either are previously unopened products or have only been used on animals within the LOS. Shearing trailers are cleaned and disinfected according to written biosecurity guidelines.

FMD virus can be transmitted to sheep exposed through direct contact with contaminated shearing equipment. If shearing equipment is used on the operation, they must come from sources with documented biosecurity protocols. Shearing equipment should not have been used on another premises with suspected or documented evidence of exposure to, or recovery from, FMD.

Shearing equipment should be cleaned and disinfected with a disinfectant known to kill FMD prior to crossing the LOS. See Resources for a link to the Environmental Protection Agency (EPA) list of registered disinfectants labeled for FMD virus. Equipment should be transported in containers that can be cleaned and effectively disinfected on the exterior as they cross the LOS to minimize the risk of virus introduction. If trailers are used in the shearing process, they should be properly cleaned and disinfected prior to crossing the LOS.

Shearing Clothing and Footwear

All shearers' clothing and footwear such as moccasins, shearing singlets, and shearing trousers are free of visible contamination and have been cleaned and disinfected according to the written biosecurity guidelines prior to crossing the LOS.

Shearing clothing and footwear are potential sources of virus transmission to susceptible animals so it is important to use only cleaned and disinfected clothing. All visible debris and organic matter should be removed during the cleaning process prior to disinfection. See Resources for a link to the Environmental Protection Agency (EPA) list of registered disinfectants labeled for FMD virus.

Wool Handling Equipment

All wool handling equipment such as cotton or paper twine, burlap or plastic wool bags, nylon bales, brooms, sorting containers and tables, balers, or clips are new (preferable) or have been cleaned and disinfected prior to being brought onto the premises according to the written biosecurity guidelines.

Wool handling equipment can serve as potential sources of virus transmission to susceptible animals so it is important to use only new or cleaned and disinfected equipment. All visible debris/organic matter should be removed during the cleaning process prior to disinfection. See Resources for a link to the Environmental Protection Agency (EPA) list of registered disinfectants labeled for FMD virus.

Wool Handling and Storage

Plans are in place for storing raw wool on site for a prolonged period in a biosecure manner.

It is critical that any wool harvested during, or just before, a U.S. FMD outbreak be handled in a biosecure manner so it does not contribute to disease spread. It is possible that infected sheep could be shorn and their wool stored before the sheep are diagnosed with FMD. Wool may need to be stored for a prolonged period on the premises during an FMD outbreak. Plans should be in place to store the sheared wool on-site in a biosecure manner. Refer to the *SSWS: Wool Handling during a Foot and Mouth Disease*

(FMD) Outbreak document at www.securesheepwool.org for the specific recommendations on wool storage.

Wool Disposal

Written plans are in place for disposing of wool on site in a biosecure manner in the event there is no market.

In cases where storage is not possible/feasible, wool may need to be disposed of on site. Options may include burial, composting small amounts of wool, or burning/incineration. Burial options should be explored with landowners prior to an outbreak. Follow local, state, and federal laws pertaining to wool disposal. Guidance may also be provided by the regulatory officials managing the outbreak response. Refer to the *SSWS: Wool Handling During a Foot and Mouth Disease (FMD) Outbreak* document at www.securesheepwool.org for the specific recommendations on wool disposal.

8. Carcass Disposal

Dead animals are disposed of in a manner that prevents the attraction of wildlife, rodents, and other scavengers. Rendering trucks and other vehicles hauling dead animals to a common disposal site do not cross the LOS.

Develop a plan for carcass disposal of all dead sheep, as well as a contingency plan for a large number of mortalities unrelated to FMD infection (fire, weather, toxicity, etc.). The plan should include the process for removing dead sheep from any pastures, rangeland, pens, lots, and buildings as well as storage and disposal of carcasses using methods compliant with local, state, and federal laws. These regulations may change during an FMD outbreak. Options for disposal may include burial, incineration, composting, or rendering. Landfills may not be a reliable option for disposal of carcasses in an FMD outbreak even if they are not infected. Moving carcasses off of a premises located in a Control Area during an FMD outbreak will likely require a movement permit. Guidance may also be provided by the regulatory officials managing the outbreak response.

- Incineration or composting of carcasses from premises with no evidence of infection may be performed either on-site or off-site, inside the LOS or outside of the LOS (consider available land area and available equipment) as long as it is accomplished in a biosecure manner.
- Burial and composting must be accomplished in such a way that prevents wildlife, pets, and rodents from accessing the carcasses. Burial options should be explored with landowners prior to an outbreak.
- Rendering trucks and other vehicles hauling dead animals to a common disposal site must not cross the LOS. The ideal location for a storage bin/area for rendering pickup is at the edge of the LOS, so that equipment used to move carcasses within the LOS does not need to exit the LOS and rendering trucks have access to the carcasses without the truck or personnel entering the LOS. Any on-site equipment exiting the LOS must go through C&D at an LOS Access Point before crossing the LOS back to the sheep side.

Carcass disposal options should be described in the biosecurity plan, including on-site and off-site possibilities, and carcass movement drawn on the premises map. For example, if rendering is used, the plan should describe how the animals are moved to the pickup location and demonstrate that the rendering truck never crosses the LOS. If the operation disposes of carcasses on-site, then the burial or compost location should be labeled on the premises map. The operation's animal disposal plan needs to be reviewed and updated at least once a year.

9. Manure Management

Manure is stored and removed in a manner that prevents exposure of susceptible animals (either on or off the premises of origin) to disease agents and meets state, local, and Responsible Regulatory Officials' regulations.

Operations that are primarily pasture/rangeland-based may have areas that require manure management (lambing facilities, loafing sheds, dry lots, etc.) Techniques for manure management vary with the type of production system, physical characteristics of the operation, and weather. Infected animals shed FMD virus in their manure. Therefore, the risk of introducing FMD virus increases when manure handling equipment is shared between operations and personnel do not follow effective biosecurity protocols, including cleaning and disinfection. For these reasons, it is very important for the Biosecurity Manager to develop operation-specific standard operating procedures (SOPs) for manure management including storage.

All individuals hauling manure must have showered and changed into clean clothes and footwear prior to arriving at the premises.

Vehicles and equipment contaminated with sheep, cattle, or hog manure from other premises are a potential source of infection. Therefore, require that all manure hauling vehicles and equipment from other sites come onto or return to the premises empty of manure and are cleaned to remove all manure, then disinfected with either heat, or a chemical disinfectant followed by drying, before crossing the LOS. These protocols should be shared in writing with any contract companies, and signed and dated when read. Whenever possible, operation-specific dedicated equipment should be used (for example, site-specific skid loaders) and equipment should not be shared unless absolutely necessary.

If the equipment cannot be effectively C&D, the LOS near the manure storage area could be temporarily modified during manure removal. After manure removal is completed, the LOS should be re-established by cleaning and disinfecting the area accessed during manure removal.

A plan exists for storing manure on-site in the event it cannot be permitted to move off-site during an outbreak.

Contingency planning for long-term manure storage may be necessary for prolonged outbreaks. Spreading or storing manure off-site may not be a permitted movement depending on the risk of FMD virus spread; all local, state and Responsible Regulatory Official regulations will need to be met.

See https://securesheepwool.org/training-materials/biosecurity/ for additional information on cleaning and disinfection.

10. Other Animal Control

Control measures are in place to minimize interaction between sheep and other animals (deer, feral pigs, rodents, non-livestock guardian and herding dogs, cats, etc.).

Free-roaming animals like wildlife, dogs, cats, rodents, and birds can potentially spread FMD virus from infected to susceptible animals via contaminated fur, hooves, foot pads, feet/claws, or feathers. Some operations may be unable to prevent interaction between sheep and wildlife, rodents, or other livestock, such as operations with sheep that graze on significant numbers of acres. It may be impossible to mitigate the risk in this case.

For operations where this is feasible, biosecurity measures that address livestock interacting with wildlife, dogs, cats, rodents and birds fall into three categories: clean, exclude, and control.

Clean: General operation maintenance where animals congregate in/near buildings, weed/grass control around pens, lots, and buildings, sanitation and drainage are important because they reduce attraction of wildlife and rodents. Trash should be regularly removed and feed spills cleaned up immediately. Dead animals should be disposed of/removed promptly.

Exclude: Pasture/rangeland raised animals are at risk of wildlife contact and complete exclusion may not be possible. **In an outbreak, contact with other animals could introduce FMD virus to the operation**.

Control: Access to sheep and feed areas by non-herding/livestock guardian dogs as well as cats should be prevented during an outbreak. Ask neighbors to do the same to prevent dog/cat roaming. Rodent control options (around commodity sheds, barns, feed storage etc.) could include:

- Operation designates a rodent control monitor for the operation who effectively implements a written rodent control plan. The Biosecurity Manager may also serve as the rodent control monitor.
- Operation uses a professional rodent control company.
    - Movement of pest control operators occurs through the LOS Access Point(s) and requires following biosecurity measures as outlined in Section 5 of this Manual (Personnel).
    - Keep records (e.g., invoices or other documentation) provided by a licensed pest control operator describing rodent control measures for the operation. See https://securesheepwool.org/Assets/SSWS_RodentStations.pdf

State and local regulations for controlling wildlife, birds, insects, and rodents must be followed. Use of chemical control methods must follow all label directions and regulations to avoid contamination of sheep. While complete control may not be achieved, it should be attempted.

Livestock Guardians, Herding Dogs, and Ranch Horses

Livestock guardians, herding dogs, and ranch horses are restricted to their own flocks and pastures. If they leave and need to re-enter the pasture, biosecurity measures are taken to ensure visible contamination is removed from their fur and feet/hooves and their fur is decontaminated prior to entry.

During an FMD outbreak, concerted efforts should be made to restrict livestock guardians and herding dogs to their own flocks and pastures. Ranch horses should remain assigned to a single flock/premises whenever possible. This can be challenging, particularly for livestock guardian dogs. If ranch horses or livestock guardians such as dogs, camelids, or donkeys leave their flocks, they must be decontaminated prior to re-entry. This should include removal of all visible debris and manure (using grooming tools suitable for the animal species) prior to their return to the flock. Efforts to decontaminate fur/hair/hide should also take place prior to their return to the flock. Currently, the USDA uses dilute glacial acetic acid (6.5 ounces of concentrate dissolved in one gallon of water) or vinegar to wipe, spray, or sponge down horses imported from FMD positive countries. This is done after grooming the animals to remove any visible dirt, and debris and manure. This protocol may be acceptable for livestock guardian animals and is the suggested protocol to be followed until such time that a more rigorous protocol has been established. As with the use of any chemical, appropriate precautions should be taken when carrying out this procedure. The decontamination plan must also include a plan to disinfect grooming tools and dispose of all waste (including water) in a biosecure manner that complies with applicable state, local, and Responsible Regulatory Officials' requirements.

11. Feed

Feedstuffs are delivered, stored, mixed, and fed in a manner that minimizes contamination, and feed spills are cleaned up promptly to avoid attracting wildlife.

Feed delivery trucks that cross the LOS must be cleaned and disinfected before crossing. Alternatively, certain feedstuffs could be augered across the LOS into an on-site feed wagon or other vehicle/equipment to prevent entry of the feed delivery truck. Feedstuffs can be contaminated if exposed to wildlife carrying FMD virus. Therefore, feed ingredients should be stored in such a way that limits bird, rodent and other wildlife or domestic animal access. If using bagged feed, it should be elevated off the floor and proper rodent control procedures should be implemented in feed ingredient storage areas. All feed spills or feed ingredient spills should be cleaned up as soon as possible to minimize attraction of wildlife and rodents.

- Grain and feed should be stored and handled so that it cannot be contaminated or be treated to eliminate contamination.
- Grain and feed commodity delivery trailers should be covered during transport so that the contents cannot be contaminated.
- If possible, store finished feed and feed ingredients in closed bins or buildings which decrease the potential for contamination with disease agents.

It is important to consider the entry and movement of feed delivery vehicles and the feed they carry when determining the best location for the LOS and Access Points.

List of Resources

Below is a list of internet resources mentioned in this document.

- Animal Movement Log
  https://securesheepwool.org/Assets/SSWS_AnimalMovementLog.pdf
- Cleaning and Disinfection Resources
  https://securesheepwool.org/training-materials/biosecurity/
- Creating a Premises Map
  https://securesheepwool.org/Assets/SSWS_CreatingPremisesMap-PastureRangeland.pdf
- Employee and Visitor Arrival Agreement
  https://securesheepwool.org/Assets/SSWS_EmployeeVisitorAgreement.pdf
- Environmental Protection Agency (EPA) registered disinfectants labeled for FMD virus
  https://www.aphis.usda.gov/sites/default/files/fmd-virus-disinfectants.pdf
- Inputs/Outputs & Contingency Planning
  https://securesheepwool.org/Assets/SSWS_Inputs-Outputs.pdf
- Group Training Form
  https://securesheepwool.org/Assets/SSWS_GroupTrainingForm.pdf
- Line of Separation and Animal Load-out/Load-in Examples: Pasture/Rangeland
  https://securesheepwool.org/Assets/SSWS_LOS-Loading-Example_Pasture.pdf
- People Entry Log
  https://securesheepwool.org/Assets/SSWS_PeopleEntryLog.pdf
- Premises Identification Number (PIN) Information
  https://securesheepwool.org/producers/get-your-pin/
- Public Land Grazing resources
  https://securesheepwool.org/producers/public-land-grazing/

- Record of Checking Rodent Bait Stations
  https://securesheepwool.org/Assets/SSWS_RodentStations.pdf
- Vehicle/Equipment Entry and Delivery Log
  https://securesheepwool.org/Assets/SSWS_VehicleEntryLog.pdf
- Wool Handling
  https://securesheepwool.org/packers-processors/processors/
- World Organization for Animal Health (WOAH) Terrestrial Animal Health Code 2023, Article 4.8.14, Recommendations regarding the risk of disease transmission via in vivo derived embryos
  https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/index.php?id=169&L=1&htmfile=chapitre_coll_embryo_equid.htm
- World Organization for Animal Health (WOAH) Terrestrial Animal Health Code 2023, Article 8.8.36, Inactivation of FMD virus in milk for animal consumption
  https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/?id=169&L=1&htmfile=chapitre_fmd.htm