Biosecurity Fundamentals for Livestock, Dairy and Poultry Farms

Chapter Overview

In this chapter we will cover:

- an introduction to biosecurity
- how to keep diseases away from animals and minimize disease contact
- how to identify the greatest risks for disease introduction
- strategies for managing farm visitors and tours
- winter biosecurity clothing maintenance
- how to address wildlife biosecurity threats
- ways to decontaminate farm equipment

What Is Biosecurity?

In the context of livestock, dairy, and poultry production, biosecurity refers to those measures taken to keep disease agents out of populations, herds, or groups of animals where they do not already exist. If we look at the word *biosecurity*, we can begin to understand its meaning. *Bio* refers to "life" and *security* implies some sort of protection. Hence, *biosecurity* refers to a type of program that is designed to protect life. In its simplest meaning, it means keeping germs away from the animals and keeping the animals away from the germs. There are several different types of germs that are often referred to as disease agents or pathogens. They include viruses, bacteria, and fungi. In addition, parasites, found internally (inside the body) and externally (outside the body), can also cause disease. The control of these parasites is considered an important part of a biosecurity program.

Biosecurity measures are typically implemented on national, state, and herd levels. Federal and state governments take measures to prevent the entry/reintroduction of livestock diseases they have been able to control/eradicate from their herds by setting requirements for arriving animals. Examples of diseases that are of particular concern to states include -- but are not limited to -- brucellosis, tuberculosis, pseudorabie, and foot-and-mouth disease (FMD).

Herd-level biosecurity usually rests with the herd owner or management team; they try exclude any disease that is not already present in the herd or limit the spread of disease within the herd. Examples might include *Streptococcus agalactiae* mastitis, bovine virus diarrhea, Johne's disease, ovine progressive pneumonia, and swine dysentery. To be successful, biosecurity plans must address how the group of animals will be isolated away from other groups; and how traffic (movement of people, animals, and equipment) will be regulated; and how cleaning and disinfection procedures will be used to reduce pathogen levels. Initiating and maintaining a biosecurity program is an important aspect of an animal health maintenance program. It is important to institute some aspect of a biosecurity program in order to ensure a healthy herd or flocks of livestock, dairy, or poultry.

How Do We Keep Diseases Away from the Animals?

Many procedures can be instituted to keep the germs away from animals. If you consider your flock or herd as "clean" (i.e., free of a particular disease), then there are many ways to reduce the chance of that disease from entering your farm. Here are a few steps to consider:

1. Limit visitors on your farm and restrict their direct contact with the flock or herd.
2. Obtain your animals from a source known to be free of the disease your are concerned about. As a buyer, you must learn the history of the flock or herd by asking about past diseases in the parent flock or herd, test results, and also the vaccination history of dams, sires, and progeny.
3. If you are adding new animals to your herd or flock, quarantine them in a separate area for 14-30 days.
4. For poultry, it is extremely important that you keep free-living birds, mammals, and wildlife away from your flock lest they transmit disease agents to your flock of birds.
5. Obtain feed from a clean dependable source. Store feed in a manner that prevents contamination by birds, insects, and rodents.
6. Obtain water from a clean source so it is free from potential contamination. This can be accomplished by testing wells.
7. Ideally, it would be best to keep your pets away from the herd or flock to prevent possible disease transmission.
8. If you use a rendering service to dispose of your livestock mortality, locate pickup areas to prevent rendering trucks from driving through your farm and spreading pathogens to healthy livestock.

How Do We Minimize Animal Contact with Diseases?

1. Prior to arrival of new animals in a confined setting or arrangements, clean and disinfect their housing to ensure that there are no residuals of potential disease pathogens from previous flocks or herds.
2. For poultry, if birds are housed on a dirt floor, turn over the top layer of soil. This can help reduce potential pathogens and parasites that may be present in the soil and protect your new flock.
3. Clean and disinfect all equipment and supplies on a regular basis and definitely between the restocking of animals.
4. For poultry, after disinfection of the housing, it is highly suggested to keep the house empty of birds for at least two weeks.
5. For poultry, it is extremely important that you do not mix different ages or species of birds. Older birds can pass on diseases to younger, more susceptible birds. In addition, some diseases like histomoniasis can be transferred from chickens to turkeys. For swine, it is also extremely important that you do not mix different ages of hogs.
6. Wheels of all vehicles, particularly feed trucks and service vehicles, should be cleaned and disinfected between farms.
7. Feed-truck drivers should not enter animal facilities.
8. Service personnel should change clothing before departing one farm site and upon arriving at another farm site. In some situations, service personnel will need to change clothing before and after entering individual buildings at one site or facility.

9. To keep compost facilities sterile, they should be maintained at 150 degrees Fahrenheit.

By following these biosecurity recommendations, you can reduce the risk of exposure to disease-causing agent and prevent diseases from occurring in your flock or herd.

What Are the Greatest Risks for Disease Introduction?

Although infectious disease can be introduced to a farm in several ways, bringing new animals or animals that have been commingled with, or exposed to, other animals usually presents **the greatest risk**. New herd and flock sires, or replacement females, are often the way that new genetics are added to the herd. This seemingly innocent process is a very common way of introducing new disease-causing organisms. Producers should attempt to purchase animals from sources with known health status whenever possible. In addition, they should plan to:

- isolate for at least two weeks (but preferably a month) all new arrivals or animals returning to the herd from situations where they were possibly exposed to other animals (e.g. fairs and shows). Isolation should be in a facility completely separate from the home animals. Outerwear (boots and coveralls) worn when tending to the quarantined animals should not be worn while caring for other animals. If complete isolation is impossible, use a separate pen or pasture that does not allow nose-to-nose contact, common air space, or sharing of feed and water supplies. While the new animals are isolated, testing should be performed for diseases of particular concern; negative test results should be received before the new animals are mixed with the resident herd.

- work with their veterinarians to develop sound health programs that include parasite control and vaccination for the diseases most likely to be encountered in their operations or management programs.

- isolate animals showing signs of disease to minimize exposure of the apparently healthy ones. Contact your veterinarian so that appropriate diagnostic tests and treatment can be initiated.

Comprehensive biosecurity programs have already been adopted by many poultry and pork producers as they have recognized the need to safeguard the health of their flocks and herds. With the relatively large number of birds or pigs housed in a modern production unit, disease prevention, rather than disease treatment, is easily the better alternative.

As discussed before, basic issues to consider in a biosecurity program include isolating new animals, controlling all traffic and movement on the farm, and sanitation. Efforts should be prioritized to address those factors posing the greatest risk for disease introduction. Regardless of the livestock species, the most common way contagious diseases are introduced is by adding animals to the herd, typically replacement breeding stock. Merely excluding obviously sick animals is not sufficient to prevent disease introduction. New stock

may be incubating diseases to which they were recently exposed, or they may be carriers and shedders of disease organisms. In these cases, it is likely that they will have no apparent signs of disease upon arrival at their new home.

To reduce the risk of introducing diseases with additions to the herd, the following general guidelines should be adopted:

1. The health status of the source herd should be reviewed. Ask about specific diseases. The number of source herds should be minimized, single-source animals are preferred over commingled animals. If there are diseases present in the herd of origin that are not in the recipient group, the acceptability of animals from this source should be questioned. Procuring animals from a source that has a lot of exposure because it participates in many exhibitions or it frequently purchases animals increases the risk compared to using a closed herd as a source. Animals obtained through sales or auctions, where animals from many sources are commingled, generally have a greater risk of disease than those purchased directly from the herd of origin.

2. All new or returning animals should be isolated from the herd for at least two weeks and preferably four weeks. (Many swine herds now require a strict 30-day isolation period followed by a 30-day acclimation period before new animals are introduced to the herd.)

    a. The isolation facility should be at least several hundred yards from the rest of the herd and positioned so that surface drainage and prevailing winds do not carry contamination to the herd. As a rule of thumb, the isolation facility should be far enough away so that it is not readily and easily accessible to personnel as they perform their other regular farm duties.

    b. The isolation facility should be managed all-in/all-out. No animal should be moved from the isolation facility to the recipient herd until the most recent addition has completed the testing protocol and isolation period.

    c. Animals should be carefully observed at least daily during the isolation period. Those showing signs of illness should be penned separately and promptly examined by a veterinarian.

    d. Tests for diseases of specific interest can be performed before the isolation period ends. Acceptable test results should be received before animals are released from isolation.

    e. Preventive treatments such as deworming and vaccination can be started in preparation for moving to the herd.

    f. Outerwear (boots, coveralls, coats, gloves, hats) worn while tending these animals should be restricted to the isolation facility.

g. Routine duties should be sequenced so the person caring for the isolation animals does not come into contact with other animals later that day. If possible, the person taking care of the isolation animals should have no other animal-contact duties.

h. Equipment such as feed containers, hurdles, snares, halters, blankets, shovels, forks, scrapers, etc., used in the isolation facility should not be used in other units.

What About People Who Visit the Farm?

Some operations, such as large poultry and swine farms, have well-developed plans for biosecurity and control of the risk that people present. In an emergency, even these units' plans may need to be tightened with very strict control of human access to the farm. In more normal times, consideration of relative risks allows development of practical approaches to visitors to the farm.

Low-Risk Visitors

Visitors from urban areas, or others who have no livestock contact, present very little risk of introducing disease to the farm. Some precautions might include the following:

- Ask visitors to wear freshly laundered outerwear and clean footwear. You should provide them with disposable plastic boots (or clean rubber boots that can be disinfected) and coveralls as an added precaution. This provides your herd additional protection, but also helps prevent visitors from contaminating their clothing with germs from your farm.

- Do not rely too heavily on disinfectant-filled boot baths. Research has shown them to be unreliable methods of routine disinfection unless boots are thoroughly scrubbed before immersion and adequate contact time in the disinfectant is allowed usually at least five minutes.

- Where possible, do not allow visitors to enter pens, walk through feed alleys, or contact animals.

- Do not allow visitors to bring food articles with them on the farm.

- When visitors leave, provide a plastic bag for disposable boots and ask that they wash their hands (and boots, if worn) before leaving.

Moderate-Risk Visitors

People who routinely visit farms but who have little or no contact with animals, present only a moderate risk of introducing disease. Salesmen, feed and fuel delivery people, and mechanics are examples of this group. They should be expected to observe the same precautions as stated earlier for low-risk visitors. In addition:

- they should wear clean coveralls and boots (disposable plastic or clean, disinfected reusable boots) if there is any contact with feed, animals, soil, or manure

- any equipment they bring should be cleaned and disinfected between uses

- dirty boots should be cleaned and disinfected, and coveralls should be removed and placed in a clean plastic bag or container before re-entering the vehicle

High-Risk Visitors

High-risk visitors to the farm include inseminators, processing crews, veterinarians, livestock haulers, and livestock-owning neighbors. These people typically have close contact with animals and their bodily discharges. In addition to the earlier precautions described in the low- and moderate-risk sections, other recommendations might include the following:

- Vehicles should be clean and free of visible manure on the tires and wheel wells. In an emergency disease situation, restrictions to access to the farm should be in place, and disinfection of vehicles should be considered. Vehicle interiors should be clean and easily cleanable. Livestock trucks and trailers should be clean (preferably disinfected) before arrival on the farm.

- Visitors should arrive with clean clothing, boots, and equipment. Equipment and instruments that have direct animal contact (dehorners, castration equipment, halters, etc.) should be cleaned and disinfected (or sterilized) after use and maintained in such a way that they do not become recontaminated.

- Disposable sleeves and gloves and other disposable or disinfectable clothing should be worn whenever there is direct contact with bodily discharges or animal tissues.

- Before leaving the farm, dirty equipment and footwear must be cleaned and disinfected with an appropriate disinfectant. Soiled coveralls should be removed before reentering the vehicle. Potentially contaminated hands and forearms should be washed with soap and water or a suitable cleanser.

- Farm employees who have livestock at their own home should be required to report to work personally clean and in clean clothes that have not been exposed to their livestock. They could provide their own clean coveralls and disinfected boots, or it may be easier to supply employees with outerwear and boots that are left at the farm when the employee returns home.

What About My Neighbors Who Drop By or Come to Help?

Most of us don't want to offend a neighbor or a friend. Consider having a few extra pairs of coveralls and boots to loan them while they are there. If you explain to them that this is a measure to protect the health of their herd or flock as well as your own, they are not likely to take offense.

Biosecurity Issues to Consider When Planning a Farm Tour Where Livestock Are Present

- Discuss with herd owners/managers their biosecurity expectations. This may vary greatly from farm to farm. In general, breeding herds have more concern about biosecurity than feedlots. All livestock should be considered at risk.

- Designate a person to serve as biosecurity advisor. This person can help formulate policy and answer questions. This likely will be the herd veterinarian.

- Publish the biosecurity standards for the event in the tour announcements and promotional materials. If registration or sign-in takes place at the farm on the day of the tour, the biosecurity standards can be reinforced at that point. Consider including information on:

    a. **dress standards**—clean outerwear not worn on another farm since cleaning.

    b. **boots—**Disposable plastic boots are preferred and will be supplied. Reusable rubber boots will be examined for cleanliness and suitability and approved by the biosecurity advisor or designee. Anyone wearing reusable boots will disinfect them before entering the farm and upon leaving.

    c. **foreign travelers**—Advise persons who have returned from traveling outside North America in the past seven days to notify the herd manager or biosecurity advisor about participating in the tour. The biosecurity advisor can evaluate the risk and render a decision about the person's participation in the tour.

    d. **food products—**Foods of animal origin should not be brought onto the farm unless approved by the herd manager/biosecurity advisor.

- Establish an entry point from the parking area to the animal facilities through which all visitors will pass. A sign may indicate boots are needed beyond this point.

- Disposable boots should be the standard if the tour is to include walking in livestock buildings and in pastures or forages that will be harvested for animal consumption within two weeks. Admittedly, reusable rubber boots are more durable and give better traction in many conditions.

- If disposable plastic boots are deemed unsuitable for the tour and reusable rubber boots are used, a boot washing station should be set up. The station should have provisions for scrubbing and rinsing all visible soil off the boots. The boots are then immersed in a clean disinfectant solution for five minutes before entering the premise.

- Minimize actual contact with animals, animal waste, and discharges. Keep visitors back 10 feet or more where possible.

- Provisions should be made for cleansing hands and exposed skin if actual animal contact is anticipated. Consider providing alcohol-based hand rinses and cleansing gels where soap and water are not readily available. Hand washing is especially important if children, the elderly, or immuno-suppressed individuals will be participating in the tour.

  Following Center for Disease Control (CDC) guidelines for contact with farm animals is recommended. These recommendations can be found by accessing the CDC web-site at www.cdc.gov.

- If food and refreshments are to be available at the tour site, they should be prepared, served, and consumed away from the actual livestock facilities to minimize the possibility of microbial agents of animal origin contaminating the food. While hand washing before eating is always recommended, hand-washing facilities for patrons should be considered essential if they will be consuming finger-foods such as chips, cookies, ice cream cones, sandwiches, etc. as compared to beverages in a bottle/can/cup or food eaten with a spoon/fork. As an alternative to washing hands with running water and soap, provide a cleansing gel or waterless alcohol-based hand rinse and paper towels available near the food concession. These hand rinses are widely available over-the-counter.

- Provide a receptacle for discarded plastic boots convenient to the point where visitors will be departing from the animal area. Ideally, the used boots (and disposable coveralls) can be bagged in plastic trash bags and then placed in a dumpster for removal.

How Do I Maintain Clean Outer Clothing During the Winter?

For some jobs it may be helpful to purchase rubberized over garments that can be easily cleaned and disinfected and which don't allow fluids to soak through. Some types of coveralls, such as nylon, are less permeable than cotton and may be more easily cleaned than cotton or other fabrics. It is difficult frequently to clean many types of coats and jackets. It is possible to purchase outer layer systems that have a detachable outer nylon shell, sometimes waterproof, with inner layers for warmth and comfort. Inexpensive nylon windbreakers can also be purchased for use over top of regular coats. These outer layers can be more frequently changed and laundered, and having several can allow you to keep clean most of the time.

What About Wildlife?

Fortunately, most diseases that livestock producers are concerned about are relatively species-specific. Likewise, the presence of wild animals in the area does not constitute a certain risk to livestock. However, some diseases such as rabies, leptospirosis, tuberculosis, and salmonellosis can be carried and spread by some species of wildlife and vermin such as rats and mice. Although it is impossible to completely prevent the possible contact of wildlife with our livestock, we can make barnyards and surroundings unattractive to many species. Keep grain spills or other potential sources of food cleaned up and unavailable to wildlife. Clean up old board piles or woodpiles and inspect buildings for possible hiding or denning areas. Inspect the haymow for evidence that cats, raccoons, or other animals are using the hay or the straw for denning areas or places to defecate.

Can Farm Equipment Present a Risk for Disease Entry?

Farm equipment that has come into contact with livestock or their bodily discharges can be a source of infections. Manure-hauling equipment should not be shared between farms without thorough cleaning and disinfection. Likewise, on-farm use of such things as front-end buckets and skid-steer loaders for both manure removal and feed delivery can spread diseases such as salmonella, leptospirosis, cryptosporidiosis, and Johne's disease, to name a few. Cleaning and disinfection of this equipment should be routine. Vehicle tires and undercarriages can harbor disease-causing germs, especially if they have come into direct contact with animal discharges. Many germs do not survive long outside the animal, but some do; and sources such as feces, saliva, and urine can be critical for highly transmissible diseases.

Summary

Practical biosecurity for day-to-day situations can be achieved without the total restriction of entry to the farm that might be appropriate in an emergency situation. Biosecurity requires a plan that you adhere to and a regular review of your plan to uncover deficiencies and adapt to new knowledge. It is most successful if a majority of producers adopt a workable plan. Entry of exposed or carrier animals, contaminated feedstuffs, and contaminated equipment represent the greatest threats for disease entry. With planning, these risks can be limited.

REFERENCES:

"Biosecurity for Poultry." OSUE Fact Sheet, Veterinary Preventive Medicine Series (VME-0009-01). Teresa Y. Morishita. Ohio State University.

"Biosecurity Fundamentals for Extension Personnel." OSUE Fact Sheet, Veterinary Preventive Medicine Series (VME-0005-01). Gary L. Bowman and William P. Shulaw.

"Farm Biosecurity…A Common Sense Guide." Canada Food Inspection Agency, Animal Health and Production.

"On-Farm Biosecurity: Traffic Control & Sanitation." OSUE Fact Sheet, Veterinary Preventive Medicine Series (VME-0006-01). Gary L. Bowman and William P. Shulaw. Ohio State University.

Biosecurity Checklist

The following checklist is designed for use by livestock managers in a self-assessment of the biosecurity status of their operation. Hopefully, it will provoke thought and eventually action to improve herd biosecurity. While not all points may be immediately relevant to each operation, they may still help identify issues that increase disease risks, either through accidental disease introduction or intentional acts of terrorism. Understandably, some risks cannot be feasibly eliminated, such as a livestock unit located close to that of a neighbor's. However, strengthening another feature of the operation, such as a perimeter fence, may be warranted to control this risk.

The checklist is divided into sections related to external and internal biosecurity. External biosecurity measures are those that are used to keep out diseases not already in the herd. Internal biosecurity measures are designed to minimize the spread between groups of diseases already in the herd.

While many points are included in the checklist, it should be kept in mind that most diseases are introduced into a herd by the addition of healthy-looking but infected or exposed animals. A good protocol for selecting and adding animals to the herd is essential for an effective biosecurity program.

	Yes	No	Comments for improvements
EXTERNAL BIOSECURITY			
Livestock facilities are at least 1 mile from other livestock facilities.			
Livestock facilities are located at least 100 yards from public highways.			
Livestock buildings are locked when unattended.			
Signs restricting entrance and giving instructions to report to designated point are posted.			
Premise is fenced and driveway is gated to control entry.			
Farm adheres to written policy regarding requirements for employees, service personnel, and visitors.			
Boots and coveralls are supplied to all visitors entering animal areas.			
Equipment brought into facilities is cleaned and disinfected.			
The sources of new animals are kept to a minimum.			
New animals are from a known source, have been tested, and found free of the diseases of concern.			

The isolation facility is located such that direct and indirect contact between the animals in isolation and the rest of the herd is prevented.			
New animals are kept separated from the resident herd and monitored for signs for illness for at least 30 days before being exposed to the herd.			
Animals that have left the herd temporarily for exhibition are handled as new animals upon re-entering the herd.			
Before being exposed to the herd, new animals are immunized against diseases known to be in the herd.			
New animals receive treatments against parasites before moving to the herd.			
The isolation facility is operated all-in/all-out and the number of groups processed through the facility is kept to a minimum.			
Livestock trucks deliver and load-out animals at a site remote from livestock housing units.			
Drivers of feed and livestock trucks are instructed not to enter buildings.			
Feed delivery trucks are clean and do not enter animal areas.			
Livestock trucks are cleaned and disinfected before arrival for loading-out.			
Water and feed are from uncontaminated sources.			
Supplies of water and feed are protected from contamination during storage and distribution.			
Animals are denied access to flowing water such as streams and rivers.			
In confinement facilities, contact with wildlife and birds is prevented by fencing and screening.			
INTERNAL BIOSECURITY			
Health of the herd is monitored by observations, testing, and production records.			
Disease control/prevention programs are designed in consultation with a veterinarian.			
Animals are housed and fed in ways to minimize stress, crowding, and fighting.			
Animals are housed separately by age groups and moved all-in/all-out.			
Pens are cleaned & disinfected between groups.			

Personnel duties are assigned in a manner to minimize the risk of spreading diseases between groups within the herd.			
Sick animals are immediately treated and/or removed from groups to treatment areas to reduce exposure to others.			
Any unusual illness is immediately brought to the attention of the herd veterinarian.			
Professional pest control services are used to prevent rodent and insect infestations.			
Building design and maintenance discourage the entry and harborage of pests.			
Access to feed by rodents is minimized by storage in rodent-proof containers and the prompt clean-up of spills.			
Moribund and dead animals are immediately removed from the animal area.			
Dead animals are disposed of promptly in an approved manner to prevent spread of disease, cannibalism, and the attraction of scavengers			
Access to manure by animals is reduced by timely cleaning and removal.			

SOURCE: Gary L. Bowman, DVM, Extension Veterinarian, Swine, and William P. Shulaw, DVM, Extension Veterinarian, Cattle and Sheep. Department of Preventive Medicine, College of Veterinary Medicine, The Ohio State University.