42 Biosecurity

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Objectives

- **Discuss the importance of biosecurity.**
- **Provide an example of a biosecurity program.**

What is Biosecurity?

Biosecurity is the development and implementation of management procedures to reduce or prevent unwanted diseases from entering the herd population, as well as limit or prevent the spread of disease within the farming operation. These threats can be considered potentially harmful to the health and well-being of the herd. Obvious threats for most, if not all, operations include viral, bacterial, protozoan and rickettsial infectious diseases. Genetic disorders, toxins and parasites also can be hazards.

To develop a biosecurity program or protocol, the producer, along with their veterinarian, must evaluate the risk factors for the entities considered. To understand risks, the specific operation or business goals must be clearly outlined.

Producers must decide the level of risk they are willing to accept in their herd. When estimating the potential impact of a disease or problem on a unit, consider the level of risk and the economic consequences of that potential problem. It is obvious that unit biosecurity levels will differ with marketing strategies. The commercial cow-calf producer who retains ownership through slaughter will not have the same concerns as the seedstock operator or the person marketing in international trade channels. The input from a qualified veterinarian as a component of the development and implementation of a herd health and biosecurity program cannot be overemphasized. Farmers and ranchers can practice many levels of biosecurity on their farms (Table 42.1).

Management and caregivers can easily become overwhelmed with detailed biosecurity protocols; therefore, it is recommended to begin with a simple approach when developing and implementing biosecurity programs. The protocols should be adjusted as needed, as certain threats are eliminated and new ones appear. Biosecurity plans should be reviewed as needed and at a minimum once each year.

Table 42.1. Levels of biosecurity.

1. Closed herd [specific pathogen free (SPF)].
2. No entry or reentry of animals.
3. No entry of new animals, but reentry allowed.
4. Entry of new animals, known medical records and isolation.
5. Entry of new animals, known medical records and no isolation.
6. Entry of new animals, no medical records and no isolation.

Source: Thompson.

Biosecurity considerations developed on the farm by producers and their veterinarians will be discussed in this chapter. Federal and State biosecurity protocols have been developed by USDA-Animal and Plant Health Inspection Service-Veterinary Services (USDA-APHIS-VS) and State Animal Health Officials. Veterinarians at the Federal and State levels support personnel across the nation who provide constant vigilance to protect and improve the health, well-being, quality and marketability of our nation's animals, animal products and veterinary biologics. Biosecurity at the herd level depends on the individual producer and their veterinarian to design strategies to prevent entry of costly diseases.

The Significance of Biosecurity

Farmers and ranchers frequently ask, "Why should I have a biosecurity protocol for my specific operation?" One of the primary reasons to follow a sound protocol is for the overall well-being of the animals under their care. By addressing the well-being of the cattle, the animals have the potential to perform up to their genetic potential and produce the best return to the farmer or rancher.

The effects of the introduction of unwanted disease into a herd can include:

- Reduced reproductive efficiency by affecting pregnancy rates and causing early embryonic deaths, abortions, stillborns, congenital defects and birth of weak calves.

All Web addresses given in this chapter are subject to change. The links to these websites will be updated regularly at the Master Cattleman website at extension.okstate.edu/programs/master-cattleman.html

- Decreased production from reduced weaning weights, daily gain and feed efficiency and days off feed due to illness.
- Animals born persistently infected with a disease that serves as a source of infection to other susceptible animals.
- Increased death rates.
- Reduced marketing options.

With increased scientific information available on the pathogenesis, transmission and diagnosis of diseases such as BVDV, Johne's Disease and others, the liability associated with selling infected animals will likely increase. A slaughter-only option to a seedstock producer can be devastating. Similarly, as other countries embark on programs to control or eliminate specific pathogens, these issues may become the focus of future trade negotiations. With the stakes so high, biosecurity should be a priority in day-to-day management decisions of cattle operations.

The APHIS Area Veterinarian in Charge (AVIC) and State Veterinarian serve as reliable information sources for producers needing advice concerning diseases that limit access to intrastate, interstate and international trade markets.

Threats

Frequently, animal health care professionals initially focus on common infectious diseases caused by viruses, bacteria and protozoa. Farmers and ranchers also must realize biosecurity also involves genetic, toxic and parasitic agents of disease. Before a biosecurity protocol can be appropriately developed, the status of the herd or population must be determined. Review of production records and interpretation of appropriate diagnostic tests must occur to assess the herd status. In many situations, genetic and parasitic problems may be present without presenting obvious clinical signs in the cattle to the farmer or rancher. Toxins or infectious agents can also be present in a subclinical state and go unrecognized.

Veterinarians and producers must develop a program or protocol to address both clinical and subclinical disease. They must decide whether to make efforts to eliminate or contain the disease in their herd. Biocontainment is a plan or program for controlling a problem or problems already present in a herd or population. Typically, biocontainment protocols initially focus on reducing the problem to minimal levels. Elimination or eradication may be the next logical phase of the protocol.

Threats for the health and well-being of the individuals and the herd, addressing issues for consideration and management, and prevention strategies are classified in Table 42.2.

If a problem is diagnosed within the herd, decisions must be made regarding the response. Should the producer and veterinarian be focused on control or containment, reduction of problem to acceptable levels, or elimination or eradication of the problem? Decisions must address the management and movement of animals, people, vehicles, equipment and nutrition sources. Health practices should be reviewed. The focus should be on planning, education and accurate recordkeeping.

Often, only the replacement animal is considered. Special biosecurity issues will differ with the age, sex and reproductive status such as open; pregnant whether through natural pregnancy, artificial insemination or embryo recipient; or nursing. Also, to be considered as herd additions are semen and embryos, which require the same origin scrutiny as a live animal.

In reviewing sources of potential threats to biosecurity, all aspects of the farming operation should be considered.

Commodity feeds – Quality control in commodity feeds includes analysis for incoming ingredients and using select suppliers that have quality control programs in place and who stand behind their products. Some ingredients are naturally more perishable than other feed ingredients. Most incoming feed ingredients should be evaluated for moisture, color, odor, texture, presence of foreign material, heat damage, mold or other spoilage. Presence of any suspected problems requires further testing. Feed concentrates that include corn, barley, cottonseed, canola, soybeans, etc. can be sources of *Salmonella* spp. Keeping a sample of suspected feedstuffs for later testing in a cool but not frozen state is a good practice. Feed fats should be analyzed for moisture, free fatty acid content, rancidity and impurities, or should be purchased from a source that guarantees the analysis of their products. Ruminant-derived animal protein feeds are prohibited for use in cattle feed under current federal law.

Feed storage, processing and handling – Harvesting and storing feeds at the correct moisture level will help prevent contamination by molds, mycotoxins and pathogenic bacteria and improves feed efficiency. Forages, corn silage, alfalfa, hay, etc. can serve as sources of *Salmonella* spp. when irrigated with contaminated water. Improper harvesting and storage can lead to clostridial infections. Equipment used for loading feed should be routinely inspected for leaks in the hydraulics or other fluids. These fluids can be toxic if ingested and pose a residue threat. Clean tractors and equipment routinely. When equipment is used for other nonfeed purposes, such as a front-end loader for manure handling, clean and disinfect it again before using it for feeding purposes. Never store crop chemicals, petroleum products or other potentially hazardous material in areas near where feed is stored, mixed or processed.

Other Sources of Potential Threats

Water sources can be a source of *Salmonella* spp., *E. coli* or *Cryptosporidium* infections. Water also can present exposure to unacceptable levels of pesticides, herbicides and sulfur.

Herd members can be exposed via fence line contact and participation at shows and fairs.

Wildlife can be a source of parasitic and infectious diseases.

Ticks, other blood-sucking insects and contaminated needles and surgical instruments can be significant in the transfer of *Anaplasma marginale*, the anaplasmosis-causing organism, as well as other blood-borne diseases.

Table 42.2. Management and prevention strategies.

Potential threat	*Things to consider*	*Prevention options*
Genetic	calving ease/ dystocia reproductive exams on heifers calving watch nutrition for dam	select sires
	congenital abnormalities recognize abnormalities consult DVM and diagnostic labs for diagnosis prevent exposure to toxins and infectious disease	know genetics
	Heritable conditions identify diseases that are inherited in your breed	know genetics
Toxins	feedstuffs pasture and range plants water sources environment contamination chemicals pesticides herbicides petroleum products fertilizers	observe cattle behavior in drylot and pasture secure storage of feedstuffs identify potential toxic plants follow correct and appropriate application protocols testing of water and feed know run-off patterns know various water sources
External Parasites		
	lice flies ticks grubs	understand life cycles of parasitic agents follow recommended insecticide/parasiticide application rules
Internal Parasites		
	coccidiosis cryptosporidiosis anaplasmosis babesiosis	effective pasture and lot management to control re-infection strategic deworming; test and treat as recommended by your veterinarian consider risk of contamination of re-used needles and non-sterilized surgical equipment (vaccination, dehorning, castration, calving chains and equipment)
	stomach and intestinal(gut) worms liver flukes lungworms	understand life cycles of parasitic agents utilize insect, bird and wild animal control programs as appropriate to disease
Pathogens or Infectious		know origin of herd for herd additions
VIRAL	bovine viral diarrhea (BVDV) blue tongue virus (BTV) infectious bovine rhinotracheitis (IBRV) bovine leukosis virus (BLV) vesicular stomatitis virus (VSV) rabies foreign animal disease (FAD)	utilize laboratory sampling and necropsy to confirm diagnosis increase level of immunity (good nutrition, etc.) and vaccinate as advised isolate new additions sanitation manage disposal of dead stock to prevent reinfection and contamination isolate sick or infected animals monitor animals to diagnose disease early and begin appropriate treatment Identify areas of pathogen build up: calving areas, hospital pens, common chute and processing areas consider risk of contamination of re-used needles and non-sterilized surgical equipment (vaccination, dehorning, castration, calving chains and equipment)
Bacterial		
	brucellosis/bangs *Brucella abortus* Johne's Disease *Mycobacterium avium* sub spp. *Paratuberculosis* TB *Mycobacterium bovis* salmonella pinkeye *Moraxella bovis*	General prevention considerations: Test core herd and new arrivals and make decisions regarding culling or treatment; utilize insect, bird and wild animal control programs as appropriate to disease; consider use of commercial colostrum to reduce spread of certain diseases from cow to calf; follow recommended sanitation procedures to limit spread and cross contamination.

(cont'd)

Table 42.2. Management and prevention strategies. (cont'd)

	E. Coli blackleg leptospirosis vibriosis trichomonas Manheimia hemolytica Pasteurella multocida Histpophilus somnus	
	Protozoal coccidiosis *Eimeria* spp. cryptosporidum toxoplasma	
	Rickettsial *Anaplamsa marginale* Anaplasmosis prions BSE Bovine Spongiform Encephalopathy scrapie (sheep)	
Violative Residues	administration of medications contaminated feedstuffs	Follow label directions or veterinary instructions about prescription feed, water, injectable, oral, topical see notes in the section What are Threats? on commodity feeds and storage and processing

Transport vehicles for livestock, feed, rendering trucks, etc. including buckets and tires can spread diseases.

Human visitors and workers, including employees, family members, feed and delivery personnel, Extension educators, livestock haulers, nutritionists, sales representatives, renderers, veterinarians, processing crews and visitors all can be both a source of threats and a means to spread threats.

Farm pets and stray dogs infected with *Neospora caninum* in feces can serve as a source of this parasitic organism. When cattle consume feedstuffs contaminated with infected dog feces, abortions may occur. In addition, dogs and cats can be a source of rabies.

Communication

- Review clinical signs of animal diseases, Discuss and train all caregivers and managers in disease basics.
- Contact a private veterinarian, Extension educator, state department of agriculture, federal officials or local industry organizations for updates on situations, information or actions needed. Maintain current list of contact information.

Physical Security

- Post signs outlining security procedures in place at the operation.
- Ensure all gates are locked and secured.
- If possible, move animals away from pastures located along major roads and away from areas where they cannot be adequately monitored.
- Do not leave trucks or vehicles loaded with livestock or feed unattended at truck stops.
- Do not allow visitors or unknown persons onto the property.
- Post signs at the entrances to your operation indicating the operation is under increased surveillance and no visitors can enter without permission.

Biosecurity

- Consider canceling participation in shows, fairs and exhibits at times of high risk.
- If visiting farms is a must, wear disposable boots or rubber boots that can be disinfected or disposed.
- Avoid livestock and poultry for at least 10 days to 30 days after visiting premises with sick livestock or poultry or after returning from a foreign country.
- Wash clothing and footwear using an APHIS-approved disinfectant after contact with sick livestock or poultry.
- Clean nostrils and fingernails and wash hair and bathe thoroughly after contact with sick livestock or poultry.
- After visiting foreign farms, dispose of clothing, shoes, equipment, cameras and other items difficult or impossible to disinfect.
- Use shower-in and shower-out facilities following visits to foreign countries, if possible.
- Account for the recent movements and health history of all newly introduced animals at their premises of origin through accurate recordkeeping.
- Account for the recent history of potentially contaminated equipment and animal transport vehicles, including renderers' trucks that may be used to haul carcasses away from the premises.
- Purchase feed only from suppliers who have a quality assurance program for the safe manufacturing, storage and delivery of their products.

- Prevent feed and water from coming into contact with animal waste or other potentially contaminated animal, chemical or physical products.
- If water contamination is suspected, test it and establish its safety before giving it to animals.
- Control all movement of people, vehicles and equipment on and off property to reduce the risk of disease transmission. This may include measures such as locking unguarded entrances, repairing boundary fences and enforcing strict biosecurity measures for people, vehicles and equipment at all times.
- Do not contaminate personal, clothing or equipment at foreign fairs, zoos or other livestock or poultry events.
- Do not wear items such as jewelry, watches or hairpieces when working around animals, since these items cannot be successfully disinfected.
- Do not bring any meat or animal products from foreign countries onto property. Do not bring equipment onto property that has been used around foreign or sick livestock or poultry.
- Do not use feed equipment to handle manure.
- Sanitation procedures to consider are prevention of cross contamination of water, feed, buckets, cleaning brushes, manure, bedding, feeding and mixing equipment, clothing and boots.

Monitor

- Increase the number of times per day that livestock are observed.
- Report sick animals or unexpected death losses to the veterinarian.
- Watch for and report any observations of sick or dead birds, fish or insects.
- Monitor feed and chemical storage areas for tampering or unauthorized entrance.
- Watch for unusual packages or containers, especially those found in unlikely or sensitive areas.
- Verify the source of all incoming animals, feed, supplements, equipment and individuals prior to moving them into the animal area.
- Scrutinize the actions of personnel on the farm, the entry of unnecessary personnel and deviations from normal operations.

Prepare

- Conduct an operation vulnerability assessment by looking at the operation, determining possible areas of vulnerability and correcting them.
- Practice MBWA—management by walking around.
- Review reporting systems and phone numbers in case of a possible foreign animal disease or other emergency. These numbers should include those of the State Veterinarian, Federal Area Veterinarian in Charge, local law enforcement and USDA Veterinary Services.
- Prepare contingency plans in case of attack, quarantines or stop movement requirements.
- Ensure at least one week's worth of feed and water is on hand in the event animals are quarantined.
- Minimize the addition of animals to the operation.

Elements of a Good Biosecurity Plan

For many operations, biosecurity protocols are usual everyday practices that just simply need to be put down on paper and reevaluated as necessary. The first step to developing a biosecurity plan involves identifying a biosecurity manager and consulting with the herd veterinarian. Plans should be in writing and address both the structural components of the farm or ranch along with operational practices. A good biosecurity plan includes:

- designated biosecurity manager,
- description of operation scope,
- map of operation,
- personnel training ,
- personnel and visitor practices,
- physical protective measures such as a line of separation and designated parking areas,
- movement of vehicles and other equipment,
- feed, hay and water,
- movement of animals,
- herd health protocols,
- semen and embryo movement,
- carcass disposal,
- waste management and
- wildlife and pest management.

Conclusion

Biosecurity is an important issue for producers and veterinarians. This chapter provides a resource for what to do initially in the event of a biosecurity hazard.

Biosecurity is a term used to describe programs for preventing the introduction of threats considered potentially harmful to the health and well-being of the herd. Biosecurity goals occur at the national, state and herd level to protect animal and human health and economic well-being of the citizens at an individual and national level.

Biosecurity areas of importance include herd replacements, fence line contact animals, embryos, recipient cows, semen, feedstuffs, water, livestock shows, livestock auctions, wildlife populations, rodents, pets, insects, vehicles and humans. Replacement animal programs include pre-shipment herd of origin information, pre-shipment testing, isolation, post-shipment testing and commingled herd monitoring.

Effects of introduced diseases in a beef cow-calf operation are:

- decreased reproduction efficiency,
- decreased productivity,
- increased morbidity (illness),
- increased mortality (death),
- decreased cash flow and equity and
- loss of marketing options - international, interstate and intrastate - between farms and ranches.

Biosecurity levels range from a closed herd to free entry with no pre-entry testing, no herd of origin medical records or

no quarantine/isolation period. Disease risk level accepted is each individual's decision. Veterinarians are an integral part of any biosecurity program. They are an important source of information concerning diseases, diagnostic testing, vaccination needs and other informational sources.

A biosecurity program is like an insurance policy for the health and productivity of the herd. Producers, with the help of a qualified veterinarian, must make decisions about the risk tolerance level they will accept, based on the chances of a disease occurring and the expected economic losses from the disease. When the risk tolerance level is determined, then appropriate risk management measures can be initiated.

There is no program for all biosecurity measures; there are tools available to control many of the infectious diseases jeopardizing cattle operations. These tools can be adapted to the individual objectives for each herd and can be implemented successfully. However, there must be planning, commitment and education of all personnel throughout the operation to attain the goals set for an effective infectious disease control (biosecurity) program.

Additional Information on Biosecurity can be found at:

Healthy Farms Healthy Agriculture:
healthyagriculture.org/

Secure Beef Supply:
securebeef.org

BQA National Manual:
bqa.org/resources/manuals

References

An Introduction to Infectious Disease Control on Farms (Biosecurity). (2000) A BAMN Publication. For copies contact: AFIA, Dorann Towery, 1501 Wilson Blvd., Suite 1100, Arlington, Virginia, 22209, or phone 703-524-1921.

Thompson, J. U. (1997) Implementing Biosecurity in Beef and Dairy Herds. Proceedings: *American Association of Bovine Practitioners* 30: 8-14.