

A BAMN Publication

AN INTRODUCTION TO INFECTIOUS DISEASE CONTROL ON FARMS (BIOSECURITY)



This guide is published by the Bovine Alliance on Management and Nutrition, which is composed of representatives from AABP (American Association of Bovine Practitioners), ADSA (American Dairy Science Association), AFIA (American Feed Industry Association), and USDA (United States Department of Agriculture). BAMN's charge is to assist the cattle industry with management practices designed to control infectious diseases.

BIOSECURITY AND THE CATTLE OWNER

What is biosecurity?

Biosecurity and biocontainment are words describing programs for infectious disease control that:

1. **reduce/prevent the introduction of new diseases** onto an operation from outside sources
2. **reduce/prevent the movement of infectious diseases** on the operation

What is a pathogen?

For the purpose of this paper a pathogen is defined as **any infectious agent that causes disease in cattle**.

Why is biosecurity important?

Infectious diseases introduced onto an operation can have a devastating effect on cash flow and equity. Tuberculosis, brucellosis, Johne's disease, and Bovine Virus Diarrhea (BVD) are examples of infectious diseases that can severely affect the viability of a cattle enterprise. Adverse effects of infectious diseases can occur at the farm or industry level. Some diseases may severely limit or eliminate animal marketing options (for example: to slaughter only). In the future producers may be responsible for potential pathogen contamination of the food supply or environment. Negative effects may be short or long-term, depending on the nature of the pathogen and level of concern among producers and consumers. Presence of some pathogens can also affect market access for larger portions of the industry. **With the stakes so high, biosecurity should be a very high priority in day-to-day management decisions.**

It is increasingly common for concerns about animal or human health pathogens to play a role in animal export and food policy decisions in international trade. Most agree that opening of international markets for U.S. animal products can have significant benefits for producers. As other countries embark on programs to control or eliminate specific pathogens, these issues may become the focus of future trade negotiations. Since biosecurity programs take time to achieve, it is advisable for U.S. producers to begin thinking about infectious disease control to assure continued access to domestic and foreign markets.

Vaccines and antibiotics have been mainstays of infectious disease control for many years. For several diseases, there are no effective vaccines or antibiotics available. Additionally, antibiotics and vaccines are not always effective, sometimes due to methods of administration. It is critical that written instructions for vaccine and antibiotic storage, reconstitution, usage and withdrawal times are followed precisely. Decisions regarding antibiotic use should be made carefully and with the help of a veterinarian to avoid food product residues and antibiotic resistance. Clearly, antibiotics and vaccines cannot replace biosecurity programs, though for some diseases (IBR, BVD) they are necessary and reduce disease when used properly.

What are the components of a biosecurity program?

The components of a biosecurity program are **all good management practices that can increase the profitability of your operation**. Some of the key areas of consideration are included in Table 1.

Table 1. Components for consideration in a biosecurity program

When considering the risk to the health of your herd, there are several means by which these risks can be introduced to your herd or spread within the herd. Below are control points for several of these pathways ranked in order from highest to lowest risk. See how you stack up in practicing these control measures.

Exposure Area	Examples	Control Points
New Additions	Cattle, Semen, Embryos Many infectious disease agents can be introduced to the herd by new additions. Organisms like Neospora, a cause of abortion, and Bovine Virus Diarrhea Virus, a cause of abortions, congenital malformations, respiratory disease, and diarrhea, can be introduced with apparently healthy animals. In addition, diseases with prolonged incubation times (the time from first infection to the appearance of clinical signs) such as Johne's disease, can be introduced to the herd with apparently healthy animals. Semen and embryos are often overlooked as a source of infectious disease agents for the herd. The artificial insemination industry does extensive work to assure that semen brought into the herd is free of infectious disease agents. However, diseases like trichomoniasis, BVD and bovine leukosis can be introduced with semen from sources with less stringent testing requirements.	<ul style="list-style-type: none">• Physically inspect all animals• Test for diseases of concern• Culture milk from individuals for contagious organisms• Vaccinate twice, well before the stress of transport• Quarantine for 3 weeks before mixing with herd.• Buy semen, embryos or bulls from suppliers with control programs for infectious disease
Feeds, Water	Concentrates (corn, barley, cottonseed, canola, soybeans, etc.) Salmonella, a cause of diarrhea, has been shown to occur in some feed sources. Forages (corn silage, alfalfa, oat hay, etc.) Salmonella has been shown to occur on forages that have been irrigated with contaminated water sources, such as lagoon water. Improper harvest or storage of forages can lead to clostridial infections. Water (wells, ground water, lakes, streams, etc.) Contaminated water sources could result in the introduction of E. coli, Salmonella, Cryptosporidium etc. to the herd.	<ul style="list-style-type: none">• Test water for bacterial, chemical or nutrient contamination• Ask feed suppliers about quality assurance program, storage, and delivery of their products• Prevent fecal and urine contamination of feed and water
Animal Contacts	Fence Line Shows/Fairs Stray Animals Shared Maternity/Hospital Pens Contact Between Different Age Groups Within The Dairy	<ul style="list-style-type: none">• Minimize animal contact between groups• Treat returning animals as new additions• Minimize contact with non-resident animals (fence-line contact with neighboring cattle)
Wildlife Contacts and Vectors (organisms that transfer infectious organisms from one individual to another)	Rodents, Birds, Deer, Coyotes, etc. Birds and Wildlife - Salmonella. Deer – Brucellosis. Coyotes – Salmonella and Leptospirosis. Insects: Insects transfer infectious disease agents such as Bluetongue or Anaplasmosis. Rodents: Feces from rodents can be a source of Salmonella or <u>E. coli</u> .	<ul style="list-style-type: none">• Where possible, exclude wildlife from the premises• Control pest (rodent and bird) populations and access to feedstuffs• Control populations of insects, birds and rodents in contact with cattle

Exposure Area	Examples	Control Points
Health Management Practices	<p>Animal Management Procedures</p> <p>Some infectious disease agents can be transmitted with small amounts of blood that might be transferred from animal to animal during routine procedures. Infections with Bovine Leukemia Virus and Anaplasmosis are examples of diseases where this method of transmission is important.</p> <p>Procedures like dehorning, implanting, or repeated use of the same needle while vaccinating can result in small amounts of blood being transferred from one animal to the next. Though these organisms are unlikely to survive for prolonged periods on equipment, if cattle were processed within a short period with the same equipment, transmission could occur.</p>	<ul style="list-style-type: none"> • Use disposable equipment (AI sleeves and needles) once and discard • Disinfect reusable equipment (tattooers, gouges, hoof tools, implant guns) between every animal • Use appropriate vaccine handling and administration techniques
Fomites (objects that mechanically transfer infectious organisms from one individual to another)	<p>Transport vehicles</p> <p>Diseases transmitted by feces are a common problem in transport vehicles. In most cases, agents associated with respiratory disease (primarily viruses) would be too fragile to withstand prolonged periods in transport vehicles in the absence of the original infected and shedding animal. If the transport vehicle contains animals from another source, then this would be similar to other animal-to-animal spread such as can occur via fence line contact or at sales or fairs.</p> <p>Rendering vehicles</p> <p>Rendering vehicles are a concern because the animals may have died from a transmissible disease. Organisms can be transmitted to livestock or other feedstuffs coming in contact with leakage from contaminated vehicles.</p> <p>Human visitors/workers</p> <p>In some cases, poor hygiene habits of workers can result in infections of livestock with organisms such as <i>Taenia saginata</i>, a tapeworm that causes cysticercosis in beef cattle. Manure on boots of visitors is also a potential source of infections. Unwashed clothing of employees that own livestock is another potential source of infectious agents.</p>	<ul style="list-style-type: none"> • Cattle trucks - wash between uses • Renderers' trucks - haul dead animals away from facilities for removal • People - restrict access to animal facilities, order work routines from younger to older animals, provide boot and hand washing facilities, remove heavy manure deposits from clothing before moving between groups. • Equipment (calf carts, feed equipment) – remove manure contamination between uses, do not use feed equipment for manure handling

How do I design a biosecurity program?

1. **Develop a written risk assessment** of your operation, facility and management practices. With the help of your veterinarian, identify the level of any infectious diseases already existing on your operation.
2. **Identify and prioritize** in writing those diseases targeted for control through your biosecurity program.
3. **Assess the diseases not present** on your operation and prioritize those you wish to continue to exclude. Walk through your facilities with your veterinarian to determine the risk level for disease transmission or movement and write down a prioritized list of biosecurity objectives.
4. **Work with your veterinarian to develop a written biosecurity plan** that meets your needs. Work with all personnel and advisors for your operation to implement the plan. Review and update this written plan on an annual basis.

What options do I have to limit entry, movement or effects of infectious diseases onto my operation?

Limiting animal movement and contact is an obvious way to reduce the introduction of new agents or their spread on the farm. In fact, many if not most, biosecurity risks are from animals purchased off the farm or ranch. The best approach to disease control is to maintain a completely closed herd. However, this is rarely practical, with most herds requiring periodic introduction of new genetics. Each decision to introduce cattle should be made knowing this is an opportunity for pathogens to gain entry. Risk management techniques include:

- 1. Buying semen and embryos from reputable sources** that can clearly document that their infectious disease control protocols limit the introduction of new disease.
- 2. Before introduction to the herd test all animals** for diseases you are trying to keep off your operation or, **buy replacements certified to be free from those diseases**. Your approach to testing depends on the nature of the disease, the accuracy of the diagnostic tests and the cooperation of the seller. For most diseases, it is of little benefit to control spread of the disease on the operation if the risk of introducing new cases from outside the operation is not controlled.

Movement of pathogens among groups of animals is similar to the introduction of pathogens from outside the farm. Ideally, **each production class** (calves, growing heifers, bred heifers, lactating cows, dry cows, etc.) should be thought of as **individual management units**. **Direct or indirect contact among groups should be minimized or timed to have the least risk of clinical disease.**

Summary

A biosecurity program is like an insurance policy for the health and productivity of the herd. It will not be free. Producers must make decisions about their “risk tolerance level” based on the chances of a disease occurring and the expected economic losses from the disease. Based on this, producers and their consultants can implement the appropriate level of risk management.

Though there is no “one size fits all” programs for biosecurity, 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.

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