

# Biosecurity: What Does it Mean?

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## ■ Introduction

Biosecurity can apply to many different levels, for example a single premise, a geographical region, an entire country, or parts of several neighboring countries. This presentation will focus on the need for biosecurity in the broadest sense and will not be restricted to a specific farm or business.

## ■ What Does Biosecurity Mean?

Biology is defined as 'knowledge dealing with living organisms and vital processes' (Webster, 1991). Webster defines security as 'measures taken to guard against espionage or sabotage, crime, attack or escape' (Webster, 1991). This definition of security is particularly meaningful because it includes the opposing concepts of guarding against attack as well as escape. Biosecurity must look at guarding the biological security of the operation, as well as preventing the spread of biological hazards within the operation, or their escape from the operation. Security issues are threats to the dairy industry as a whole, as well as the individual parts of the supply chain within the industry. These threats can be infectious or chemical.

## ■ Why Should All Of Us Be Concerned About Biosecurity?

Traditionally, biosecurity has been referred to in terms of protecting the health of the individual livestock herd. Biosecurity for the individual herd is still a legitimate concern. The introduction of a new disease into a naïve herd can negatively impact the productivity of the herd, as well as the economic well being of the owner. Many infectious disease agents, including *Mycobacterium paratuberculosis* (Johne's Disease), Bovine Virus Diarrhea virus, Infectious Bovine Rhinotracheitis virus, *Salmonella* spp and Bovine Leukosis virus, although endemic in the provincial dairy herd, are not present on many

individual farms. Inadequate biosecurity involving herd additions puts the health of the resident herd at risk. The consolidation of the dairy industry over the past 15 to 20 years has often resulted by combining several smaller herds into a single large one. Many dairymen can think of situations where a newly formed herd experienced problems with contagious mastitis caused by *Streptococcus agalactiae* or *Staphylococcus aureus*, enzootic pneumonia or scours in replacements, or abortions and infertility.

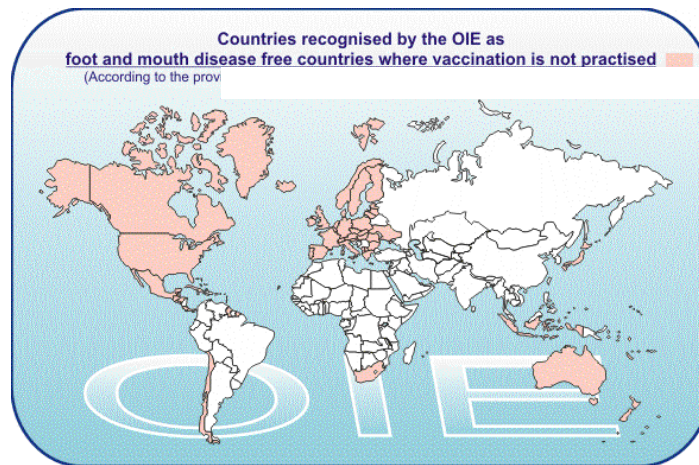
But biosecurity is important far beyond the individual herd. Some diseases of livestock are a zoonosis, meaning they can cause disease in humans. Salmonellosis is the classic example and there are numerous examples in Alberta of family members or farm employees becoming ill after animals infected with *Salmonella* spp were introduced into the herd. Public health may be put at risk by the contamination of livestock or food products with chemicals, such as dioxins or drugs.

National, regional or individual farm disease outbreaks have the potential to impact access to the market place. Over the past five or 10 years, animal disease has formed an increasingly important part of international trade agreements, both for the movement of live animals, as well as animal products. Japan has expressed increasing concern about imports of Canadian cattle subsequently testing positive for Johne's Disease. Bovine Spongiform Encephalopathy (BSE) devastated the beef industry in the United Kingdom because of the concerns of consumers, both domestic and international, over the safety of British beef. The contamination of livestock feeds with dioxins in 1999 cost the Belgium livestock industry over US\$510 million in less than six months.

Canada has always lived with the risk of an incursion of a foreign animal disease. Foot and Mouth Disease (FMD), which resulted in approximately 10 million head of livestock being destroyed in the United Kingdom in 2001, last occurred in Canada in 1952. Fortunately, that outbreak was in the middle of a Saskatchewan winter. It involved 3,980 animals on 42 premises. At least 10 municipalities were quarantined and two abattoirs closed. Consider the potential impact that same FMD virus would have on Canada today. An estimated 40,000 head of cattle are on wheels at any one time in Alberta (Miles Belsheim, Alberta Beef Producers, personal communication). It is quite likely that an incursion of FMD will have spread to other premises before it is detected in Canada. This is exactly the scenario that occurred in the UK outbreak. The Tripartite FMD simulation lead by the Canadian Food Inspection Agency (CFIA) in 2000 estimated that nearly 800,000 head of livestock in Alberta would have been directly affected by FMD within 6 weeks. An economic impact assessment commissioned by the Canadian Animal Health Coalition in 2002 estimated that an incursion of FMD into Canada would cost the Canadian economy between \$14 billion and \$45 billion. An estimated 10 million head of livestock would have to be destroyed, and it would take the

Canadian industry 4-6 years to regain our export markets (Schlacter and Associates, 2002).

The world distribution of FMD illustrates that North America can be viewed as an island of livestock health. As of February 15, 2003, the Organization International des Epizooties (OIE) recognized only 54 of its 162 member countries as free of FMD without vaccination (OIE, 2003a).



**Figure 1.** World Distribution of Foot and Mouth Disease (OIE, 2003b)

A multitude of products now enter Canada by plane, truck and ship from around the world on a daily basis. Travelers arrive at our international airports within 12 to 24 hours of leaving any place on the globe, well within the survival time of many animal pathogens, including FMD virus. Increasing globalization and international travel have increased the difficulty of protecting our borders from disease incursions, both human and animal.

Bioterrorism can be defined as the intentional use of microorganisms or toxins derived from living organisms to cause death or disease in humans, animals, or plants in civilian settings (Wells, 2000). The use of biological agents, such as bacteria, viruses, fungi and toxins as weapons, has been recorded throughout history. Previous attempts to halt offensive biological warfare programs included the ratification of the Biological and Toxin Weapons Convention in 1975. This ratification did not end the threats of attack (Wells, 2000) and the events of 9/11, and subsequent to it, have raised the fear of biological weapons being used for terrorism. What is really disconcerting is the ease with which such weapons can be produced and deployed in the absence of advanced research facilities. Commercially available technologies are now affordable and available for large-scale production of biological agents (Ashford et al, 2000).

Attacks could be covert, creating a challenge to differentiate between an unintentional disease outbreak and a terrorist attack. Because the livestock industry in Canada is a major contributor to the national economy, the agriculture industry could be an attractive target. Many diseases, including FMD, are endemic in other parts of the world but do not occur in North America. As a result, the North American livestock population is naive and vulnerable to infection with a number of disease agents.

### ■ **What Does Biosecurity Include?**

A biosecurity plan needs to be decision based and flexible in order to adapt to unique and unexpected events (Wells, 2000). Biosecurity plans are joint efforts requiring the support of all involved and should take into consideration the following points.

- ▶ Determine critical goals and products of your operation,
- ▶ Assess the risks to the production unit. Identify and prioritize key diseases and hazards,
- ▶ Evaluate the risks for transmission of disease, including the intentional introduction of disease agents of chemicals,
- ▶ Identify the changes required to implement a biosecurity program, and
- ▶ Weigh costs versus benefits of implementing a plan.

Questions that should be answered when assessing risks include the following.

- ▶ What exposure is there to my operation from inputs, such as herd additions, feed and water sources,
- ▶ Do wild animals, birds or insects pose a risk,
- ▶ Will rodents, pets (cats, dogs) be a source of infection or means of spread,
- ▶ Who visits my operation and do I keep a record of when they visit and where on the operation they went? Do I know where they have been in the past two weeks, what sanitary precautions did they take before visiting my premises,
- ▶ Can I prevent unauthorized individuals from entering the premises or having access to parts of the premises, for example the calf barn or milk house,

- How do I prevent disease transmission from one part of the operation to another? For example, one of the primary goals in controlling Johnes Disease is to prevent the spread of *M. paratuberculosis* from adult carrier animals to replacement calves. Identifying how *M. paratuberculosis* may spread on an individual farm is an essential step in the development of that farm's biosecurity farm, and
- Do I keep up to date records that will facilitate a retrospective investigation or recall should it be needed?

An On-Farm-Food-Safety program is in reality part of a biosecurity plan. It prevents hazards, such as antibiotic residues and infectious agents, from moving off the farm.

Biosecurity plans must be developed individually and tailored to the type of business conducted. Although the principles are the same, a resulting biosecurity plan for one dairy farm may be different than a neighboring farm. And the biosecurity measures instituted by a feed mill or the local veterinary clinic could be expected to be unique, substantially different than that of their clients.

In addition to prevention, biosecurity also includes the timely recognition, treatment, and possibly, reporting of disease occurrences. The farmer carries an especially heavy burden because he/she will most likely be the first individual to observe a sick animal. One reason the recent FMD outbreak in the UK was so severe was the failure of a farmer to seek veterinary assistance when his animals became sick. The consequences of this failure are obvious. Any unexplained death, sudden unexplained decrease in herd milk production or sick animals should be reported to the herd veterinarian. A correct diagnosis and instituting treatment and control measures as soon as possible will minimize the impact of a disease on the herd, and potentially, other industry stakeholders as well.

It is important to recognize that it is not possible to completely prevent the introduction of disease into a herd or country. Complete isolation of a country or an agricultural business would preclude trade or the movement of products into or out of the business. Consequently, any biosecurity plan must include a contingency plan to deal with the incursion of a disease or toxin should it happen. How would you dispose of your herd should it become contaminated with a chemical or disease like FMD? What measures do you have in place to minimize the impact on your neighbors or the consumers of your product? Do you have records that would contribute to an effective recall system? The formation of the Canadian Livestock Identification Agency is an example of the livestock industry developing a practical system for tracing an animal to the farm of origin in the event of a food safety or disease problem.

## **National Level**

Federal legislation lists 32 reportable diseases in Canada and the CFIA has a strategy to deal with each of them. Many of these diseases are foreign to Canada. Should the occurrence of a reportable disease be suspected, it must be immediately reported to the CFIA so the control/eradication strategy can be instituted in a timely manner. At the national level, the Canada Customs and Revenue Agency (CCRA) and the CFIA are responsible for protecting Canada's borders from the incursion of foreign animal diseases and food contaminants. Foods and livestock products are allowed into Canada following an assessment of the risk to Canada associated with their production. For example, beef is not allowed into Canada from countries that cannot demonstrate their freedom from BSE. You will recall the precautions taken at Canada's ports of entry in 2001 when FMD broke out in the UK and the Netherlands. The importation of food products from countries experiencing FMD is not allowed and CCRA or CFIA agents will inspect the possessions of those travelers suspected of bringing these materials into the country. Cattle exported from the United States must be tested negative for bluetongue and anaplasmosis before entering Canada.

## **Provincial Level**

Alberta Agriculture, Food and Rural Development (AAFRD) is concerned about Johne's Disease and in 2002 implemented a Voluntary Johne's Disease Herd Certification program in partnership with the beef and dairy industry. The goal of this program is to increase industry awareness of Johne's Disease and minimize its spread in the Alberta cattle herd.

As part of Alberta's Foreign Animal Disease Eradication Support (FADES) plan, Alberta is committed to assisting the CFIA should an outbreak of a foreign animal disease occur in the province. Biosecurity is an important part of AAFRD's FMD Contingency plan. Details of what actions will be required and who will complete them will be an integral part of the contingency plan when it is completed.

## **Individual Level**

Every part of the dairy industry has a responsibility to develop and implement effective biosecurity measures and contingency plans should the biosecurity plan fail. Milk producers should sit down with their veterinarian and incorporate biosecurity and emergency management planning as part of their herd's preventive health program. All farm visitors have a responsibility to enquire about the farm's biosecurity program. In the event there isn't one, visitors must take precautions of their own not to breach the biosecurity of the farm.

Feed companies must ensure the safe procurement, manufacture and distribution of feedstuffs, particularly those feeds that are comprised of animal by-products. A feed company has an obligation to ensure the ingredients used are free from chemical and microbial contamination and stored and handled properly. When making deliveries, a feed company must take precautions to ensure its vehicle or driver are not a mechanical vector responsible for spreading disease from farm to farm and must respect the on-farm biosecurity programs of its customers.

Veterinarians and have a professional obligation to prevent disease. They and consultants must take special precautions to avoid being responsible for spreading disease from farm to farm. Veterinarians are responsible for developing sanitary treatment protocols and informing the producer about the potential risks of disease transmission. Veterinarians are often involved in disease surveillance, monitoring programs and carcass inspection where it is their direct responsibility to identify and report specific diseases they discover. The federal and provincial reportable diseases are examples of diseases that, if suspected, must be reported by the veterinarian and the livestock owner to the appropriate authorities.

### ■ **Suggestions to Consider in a Biosecurity Program**

Some suggestions to decrease the risk of contamination and disease spread are listed.

#### **Visitors**

- ▶ secure the facilities, lock the barn and milk house
- ▶ post signs to direct visitors to report to a main office. Find out where they have been in the past two weeks. Ensure foreign visitors have taken the appropriate precautions not to carry disease agents, especially those from countries with FMD. Keep accurate and current records of these visits
- ▶ provide boots and clean or disposable coveralls for visitors, record where they go in the operation
- ▶ educate all vendors (veterinarians, visitors etc.) about your biosecurity plan. Enforce your biosecurity plan
- ▶ provide foot baths with disinfectant and a clean up area for all visitors
- ▶ control rodents. Prevent access by wild birds to the buildings and feed area

- ▶ remain current regarding contamination threats and know how to identify them

### **Vehicles**

- ▶ establish a traffic pattern to prevent random access to your operation
- ▶ provide facilities for washing and disinfecting tires, mud flaps etc.
- ▶ ensure truckers have cleaned and disinfected their truck or trailer before transporting your animals
- ▶ clean and disinfect your own vehicle after visiting other livestock properties

### **Animals**

- ▶ prevent contact with neighboring livestock, consider double fencing
- ▶ investigate the health status of a herd before you purchase animals from it
- ▶ quarantine new additions for at least 2-3 weeks, including resident animals that have been off farm
- ▶ change clothes, wash and disinfect boots before and after handling quarantined animals
- ▶ monitor the herd's health closely
- ▶ routinely vaccinate against diseases prevalent in the area. Vaccinate herd additions before adding them to your herd
- ▶ isolate sick animals and disinfect any equipment they have been in contact with
- ▶ maintain a sick pen completely separate from young stock and replacements
- ▶ handle young stock before older ones
- ▶ remove dead stock immediately and dispose of them subject to the Destruction and Disposal of Dead Animals regulation ([www.qp.gov.ab.ca/documents/Regs/2000\\_229.cfm?frm\\_isbn=0773289585](http://www.qp.gov.ab.ca/documents/Regs/2000_229.cfm?frm_isbn=0773289585))

### **Feed and Water**

- ▶ buy feed from reliable vendors to minimize the risk of contamination with chemicals or bacteria, such as *Salmonella* spp
- ▶ feed and water sources should not be accessible to strangers



- store feed in pest/vermin resistant containers
- use dedicated equipment to handle feed and water
- clean and sanitize feeding and watering equipment regularly
- have a separate feeding/watering area for sick animals

### **Manure**

- clean and disinfect manure-contaminated equipment before using it
- change bedding and disinfect common areas regularly
- do not spread manure on frozen ground as run off will occur and may contaminate a neighbor's property
- avoid run off from adult cattle passing through pens with replacements
- prevent run off from other facilities from entering your facility

### **Employees**

- investigate where new employees were previously employed
- employees must follow and enforce the biosecurity plan. Know if they visited other livestock operations on days off
- develop an employee training plan
- wear boots and coveralls and leave them in the barn or work area. Don't wear them into the house or office area

## **■ Conclusions**

Biosecurity is the responsibility of the entire dairy industry, from the individual farm, through the various parts of the industry to the provincial and federal governments. There can be no single biosecurity plan that will meet the needs of all farms or agricultural businesses. Each business must assess the potential risks and develop a flexible and practical biosecurity plan tailored to its operation. Because it is unlikely that all risks can be mitigated, a biosecurity plan must include a contingency or emergency plan for the operation in the event a microbial or chemical contamination should occur.

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