

Practical and Sensible Dairy Farm Biosecurity

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Take Home Messages

Farm biosecurity strategy is very similar to financial investment strategy:

- Determine your risk level – What is your tolerance or intolerance to loss from disease?
- Develop your portfolio – Create a farm specific biosecurity program.
- Safeguard your assets – Protect the resident herd!

Introduction

A disease outbreak in any herd could be financially devastating to the operation but it could be particularly devastating during an expansion program when debt load has increased substantially. A program designed to prevent disease is more than just a vaccination program. A tight biosecurity program is designed to maximize disease resistance and minimize herd exposure to infectious agents. By identifying some of the diseases that are likely to be of greatest risk, prevention and control measures can be developed and implemented to focus on ones that are most likely to create problems.

Here is a partial list of infectious diseases commonly found on U.S. dairy farms.

Bovine Leukemia Virus/Leukosis -- BLV
Bovine Respiratory Syncytial Virus -- BRSV
ovine Viral Diarrhea Virus -- BVDV
hlamydiosis
Costridial Diseases – Hemorrhagic Bowel, Black Leg, Enterotoxemia, etc.
Contagious Mastitis -- *Staphy aureus*, *Strep agalactiae* and *Mycoplasma bovis*
Haemophilus somnus
Infectious Bovine Rhinotracheitis -- IBR
Papillomatous Digital Dermatitis -- "Hairy heel warts"
Leptospirosis
Listeriosis
Mycobacterium paratuberculosis -- Johne's Disease
Mycoplasmosis – Respiratory form
Neosporosis
Parainfluenza-3 Virus -- PI3
Pasteurellosis
Rota/Corona Virus -- calf diarrheal agents
Salmonellosis
Winter Dysentery -- bovine corona virus?

All of these diseases can limit productivity--from lower milk production to reduced milk quality, from impaired reproduction to reduced calf survivability, from chronic debilitating infection to death. Any one of these diseases can become established in a naïve, resident herd when new cattle are introduced. Preventing the introduction of disease is often overlooked during an expansion due to the need for increased milk sales to maintain cash flow. Waiting until after the fact and attempting to control the spread of disease is a reactionary approach and doomed to fall short of expectations. If herd protocols are established, losses can be contained.

Establishing a practical and sensible farm biosecurity program involves rational risk assessment and careful planning to manage that risk. No two farms are identical. Certainly, there are external challenges (vermin, birds, wildlife, etc.) that make any biosecurity program difficult, if not impossible, to follow completely. The level of biosecurity implemented on your operation will depend on the goals and activities of your dairy operation (commercial herd versus show herd, death/disease risk averse versus death/disease tolerant).

Levels of Biosecurity (1=low risk, 6=high risk)

1. Closed herd (specific pathogen-free herd) and all bio-traffic strictly monitored.
2. No entry or reentry of cattle.
3. No entry of new cattle but reentry of existing cattle allowed (show cattle).
4. Entry of new cattle (known medical records) and isolation/quarantine.
5. Entry of new cattle (known medical records) and no/incomplete isolation/quarantine.
6. Entry of new cattle (no medical records) and no isolation.

Steps to Develop a Farm Biosecurity Plan

1. Determine your risk level for specific diseases and/or infectious diseases in general.
 - Your herd veterinarian can help provide this information.
2. Assess the risk that the diseases of concern will be introduced or spread within your herd.
 - Determine the method of infection and evaluate your operation for potential contaminations.
3. Target your program to address the highest risk activities or “loop holes” in your system.
 - Manure management with Johne’s disease/salmonella, persistently infected calves with BVDV, infected quarters with contagious mastitis, or all of the above!

Strategies to Reduce the Risk of Impaired Productivity from Infectious Disease

Raise the Level of Resistance in the Herd to Infectious Disease

- Develop a strategic vaccination program with your herd veterinarian.
- Reduce environmental stress by:
 - providing clean, dry, comfortable housing for all animals on the farm,
 - using heat abatement strategies in summer, windbreaks in winter.
- Reduce nutritional stress by:
 - providing a transition between the dry period and early lactation,
 - supplying high quality forage to all lactating cows,
 - maintaining a balanced ration with adequate levels on trace minerals and vitamins.
- Maximizing colostrum intake of newborn calves.

Prevent the Introduction of Infected Cattle

- Consider the potential production losses from Johne’s, BVD, and contagious mastitis.
- Only purchase cattle from uninfected herds or herds with known health status.
- Only purchase animals from herds with a known effective vaccination program.
- Avoid purchasing cattle from unknown sources or from commingled sources.
- Transport purchased animals in farm-owned trucks or require that hired transporters start with sanitized truck.
- Isolate and monitor purchased cattle for 30 days before allowing contact with the herd.
- Test new herd additions for infectious diseases before introduction to the herd.
- Embryo transfer recipients can be a source on infectious disease, test appropriately.
- Test all calves from purchased cattle for persistent infection with BVDV.

Decrease the Herd Exposure to Infectious Disease

- Isolate sick and diseased cattle with unusual clinical signs or cattle that do not respond to customary treatments.
- Have a veterinarian necropsy (autopsy) any animal that dies from undetermined causes and dispose of dead animals promptly.
- Control cattle and human movement patterns. Keep in mind that the maternity cows and young calves are most susceptible to disease.
- Utilize individual calf hutches for newborn calves. Thoroughly disinfect between uses.
- When selling cull cows and bull calves, identify a location outside of the barn for cattle buyers to pick up these animals without entering the barn.
- Reduce manure contamination of water sources, bunks, feeds and feeding equipment.
- Require hoof trimmers to sanitize their chutes, tables, knives, and other equipment before coming on the farm.
- Limit access to the dairy facilities from outside visitors.
 - Lock the doors to the barn.
 - Post a warning sign asking visitors to keep out. Leave a telephone number to call.
 - Provide clean coveralls and boots for all visitors.
 - Maintain a log book of all visitors -- date, time and origin.
 - Employ rodent and other pest control measures.

Management of Isolation and Quarantine Facilities and Processes

- Length of time - 30 days for cattle coming from commingled or unknown sources.
- The incubation period for most cattle diseases is two weeks or less.
- If cattle are reentering or coming from known sources, 14 days should be adequate.
- Exhibiting cattle at fairs presents a risk of disease transmission (a lower risk than others).
- If bringing in lactating animals, plan appropriately for milking these cattle.
 - Clearly identify all new arrivals to distinguish them from the resident herd.
 - Strictly control contact with these cattle (human and animal traffic, feeding, manure, etc.)
 - Obtain serum on arrival and test for risk averse diseases.
 - Maintain banked serum from new arrivals.
 - Vaccinate on arrival with standard herd protocol.
 - Re-vaccinate (booster) in 3-4 weeks prior to leaving quarantine facilities.

Disease Prevention Practices for Specific Diseases

Diseases of the particular importance for which specific prevention protocols should be considered include: Bovine Virus Diarrhea Virus (BVDV), Johne's Disease, Leptospirosis, and contagious mastitis (*Staphylococcus aureus*, *Streptococcus agalactiae*, and *Mycoplasma bovis*).

Bovine Virus Diarrhea

Bovine virus diarrhea virus (BVDV) is a systemic disease of cattle which has several clinical manifestations in cattle. Acute BVD is the most prevalent form of the disease in normal cattle. In healthy, unstressed, immunologically naive cattle, BVD usually varies from a clinically inapparent to mild disease. Infection with BVD can create a carrier state. When pregnant cows are infected with BVD while the developing fetus is between 40 and 125 days in gestation, the fetus can become persistently infected. The calves that survive to term are the Trojan Horse for introducing BVD virus into the herd. These calves will shed BVD virus from every pore of their bodies. If other pregnant cows or heifers are exposed to these carrier animals, more persistently infected calves will be born. Acute fatal BVD results when persistently infected cattle are exposed to another form of the virus. It appears that a sound

vaccination program for BVD can prevent the acute form of BVD in herd mates exposed to the persistently infected animals. However, vaccination doesn't appear to prevent reproductive losses in the form of early embryonic death or abortion. If killed vaccines are used for primary immunization, two doses within 30 days are required. Frequent boosters every 4 to 6 months may also be necessary throughout the animals' lives. Modified-live vaccines may provide longer duration of immunity. Initial immunization with modified-live vaccines should occur between 4 and 12 months of age. Your veterinarian can help design a complete vaccination program tailored to your farm.

This raises the question of the value of implementing screening programs to identify carrier animals. Work with your veterinarian to determine which diagnostic laboratories have the proper tests to identify persistently infected animals. Obtaining blood from calves of purchased additions prior to receiving colostrum can be beneficial in identifying persistently infected neonates. Blood from persistently infected calves contains large quantities of virus. Passive transfer of antibodies from colostrum may bind much of the virus in the serum making detection difficult. Identification of carrier calves may not be possible again for up to two months.

Johne's Disease

Recent surveys in Wisconsin have indicated that a third of the herds have one or more cows infected with Johne's disease. Johne's disease is chronic intestinal disorder of adult cattle caused by a *Mycobacterium avium subsp. paratuberculosis*. Chronic diarrhea and progressive wasting which leads to culling or death characterize clinical disease. The disease frequently becomes clinical at or near the time of calving and often at the time of third calving. Calves are either born with the infection if their dam is infected or acquire the infection early in life. The infection usually remains latent until the calves become adults. There is not currently a test that effectively identifies latent infections. Therefore, assume that herds undergoing major expansion and purchasing cattle also may be acquiring Johne's infected animals (even though the herd may already have latent carriers or clinical disease). Manage the herd as if Johne's disease is present.

Primary means of spread is through ingestion of manure containing *M. paratuberculosis*. Young calves are most susceptible to infection and heifers infected beyond a year of age are less likely to become infected. Some calves born to infected cows are born infected through intrauterine infections. The following list of management practices should be followed.

- ! Calve cows in clean environment
- ! Remove calves from cows **as soon as possible** after birth
- ! Don't feed pooled colostrum unless pasteurized
- ! Feed colostrum from negative dams
- ! Use milk replacer after colostrum
- ! Raise calves separate for adult cows
- ! Don't allow calves contact with manure from adult cows (buckets of skid loaders)
- ! Avoid contact with drainage from cow yard
- ! Avoid grazing lots or pastures where adult cows have grazed
- ! Cull offspring of any cow developing clinical disease
- ! Cull any adult cow with clinical signs
- ! Consider testing program if adult cows develop clinical signs

Leptospirosis

Several types (serovars) of leptospiras infect cattle. These serovars can be divided into two categories. Host-adapted leptospirosis in cattle results from infection with *L. hardjo*. All other serovars that infect cattle are non-host adapted. Non-host-adapted leptospirosis is more likely to result in acute infection resulting in an epidemic of abortions and/or stillbirths. Non-infected herd mates become infected by contact with urine from infected herd mates. They transiently shed organisms in the urine and expose other animals in the herd. Host-adapted infections with *L. hardjo* are more likely to occur as subclinical infections resulting in abortions (10 percent of herd), stillbirths, and weak calves. *Leptospira hardjo* can be harbored in the kidneys of infected hosts for extended periods of time and shed in the urine. Urine from infected cattle is a source of infection for non-infected herd mates. Non-infected cattle can become infected by exposure through mucous membranes (urine splashing in the eye or cattle drinking pools of urine contaminated water) or breaks in the skin. Since there is no practical means of identifying chronically infected animals, it is safest to assume that one of the new animals which was added to the herd is shedding leptospira in the urine. Herd mates can be protected through an effective vaccination program that means vaccination at least twice, once prior to breeding and once during gestation.

Contagious Mastitis

If mature cows are purchased, a bulk tank milk sample from the herd of origin can be cultured to determine if *Staphylococcus aureus*, *Streptococcus agalactiae*, or *Mycoplasma bovis* mastitis exist in the herd. Either individual cow DHI somatic cell count records or if they are not available, the udder health of individual cows should be evaluated using the CMT test. Cows with SCC greater than 200,000 cells/ml for the previous two months should be examined by the CMT to determine which of the quarter(s) contributed to the elevated SCC. Quarters with a positive CMT score should be sampled for bacteriological culture. A decision on the acceptability of cows should be made on the basis of number of months of elevated SCC, number of quarters involved, and pathogens isolated from the quarters. As herd sizes increase, there is an increase association with mycoplasma mastitis. Monthly bulk tank cultures can be incorporated in a herd disease prevention program to monitor the herd for the presence of contagious mastitis pathogens.

Good hygienic practices during milking will help reduce the potential for these contagious mastitis pathogens to spread. Isolating known infected cows and those that are suspicious, then milking them last is a proactive step in controlling contagious mastitis. Milking personnel should wear latex gloves while milking. Contaminated milk can be rinsed from latex gloves much easier than rough calloused hands. Post-milking teat dipping with an effective germicide will kill residual bacteria that may remain on the teat surfaces once the milking units have been removed. It is essential that the entire teat surface be coated with the germicide. Inadequate coverage generally occurs when the product is sprayed on the teats. Dry treating every quarter of every cow will help eliminate *S. aureus* and *Strep. agalactiae* infections that have developed during lactation.

Conclusion

Dairy farms considering expansion will have to respect sound biosecurity measures in order to maintain disease free herds and sustain maximum production. Most farm expansion requires an infusion of capital, which implies an increase in the debt load carried by the dairy enterprise. The variability in production (and subsequently cash flow) induced by disease cannot be tolerated. A five percent drop in production can be the difference between realizing a profit or enduring a loss. As dairy farm units become larger, the scope of the economic impact from disease magnifies. Infectious diseases can enter a herd through purchased additions or carried onto a farm by other animal species including humans. Strategies exist for increasing herd resistance against and decreasing herd exposure to infectious diseases.

