BIOSECURITY – HOW TO PROTECT YOUR HERD

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INTRODUCTION

A disease outbreak in an established dairy herd could be financially devastating. If the operation is undergoing an expansion, with added investment risk, impaired productivity from disease could be particularly devastating. Thus, a **biosecurity program** is especially important in any herd considering herd expansion. A biosecurity program is more than just a vaccination schedule. It is a program to designed to maximize disease resistance and minimize herd exposure to infectious agents. By identifying certain diseases that are likely to be of greatest risk, prevention and control measures can be developed and implemented to minimize the potential for disaster.

A multitude of cattle diseases exist in the Midwest waiting to infect susceptible hosts (Table 1). All of these diseases can induce economic losses--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 be introduced into a naive herd during the expansion process. Preventing the introduction of disease is paramount. Controlling the spread of disease once it is on the farm is reactionary at best, but **protocols** must be established to reduce losses.

First and foremost, the resident herd must be protected. This begins with an effective vaccination program targeting specific pathogens. In order for cattle mount an immune response, nutritional and environmental stress must be minimized. Excellent nutritional management is essential for a fully functioning immune system. Cattle experiencing heat stress, cold stress or other drains on the immune system will not adequately respond to vaccination.

Next, the herd management team must establish protocols to prevent the introduction of new diseases. Purchasing strategies that include diagnostic testing will help. Purchasing cattle from known sources is usually prudent. Many farms have no method to quarantine incoming cattle. If an infectious disease is introduced and the incoming cattle are in an isolated facility from other cattle, the disease can be contained and losses minimized.

Lastly, dairy operations must become more like modern swine and poultry operations with regard to farm access. Diseases can be transmitted on the boots or tires of other people visiting the farm. Birds, rodents and other wildlife can carry infectious organisms. Some thought must go into reducing or eliminating these potential breaks in biosecurity.

STRATEGIES TO REDUCE THE RISK OF IMPAIRED PRODUCTIVITY FROM INFECTIOUS DISEASE

Raise the level of resistance in the resident 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.
- Maximize colostrum intake of newborn calves.

Prevent the introduction of infected cattle

- Only purchase cattle from uninfected herds or herds with known health status.
- Only purchase animals from herds with a known **effective** vaccination program.
- Test new herd additions for infectious diseases before introduction to the herd.
- Avoid commingling cattle from multiple sources.
- Transport purchased animals in farm-owned trucks or require that hired transporters start with a cleaned and sanitized truck.
- Isolate and monitor purchased cattle for 30 days before allowing contact with 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.
- Test new herd additions for contagious mastitis once lactating.

Decrease the herd exposure to potential infectious diseases

- 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. Haul dead cattle to a specific location for rendering truck.
- Utilize individual calf hutches for newborn calves. Thoroughly disinfect between uses.
- When selling cull cows and bull calves, identify a location away from the main 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 visitors (veterinarian, nutritionist, lenders, neighbors, etc.) to wear boots.
- Require hoof trimmers to sanitize their chutes, tables, knives, and other equipment before coming on the farm and before leaving 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.

DISEASE PREVENTION PRACTICES FOR SPECIFIC DISEASES

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

Bovine Virus Diarrhea

Bovine virus diarrhea (BVD) is a viral 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 can vary from a clinically in apparent condition 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. 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.

A sound vaccination program for BVD can help 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. No vaccination program is 100% effective at eliminating disease. Proper handling and usage is essential to success. Immunizing the existing herd may help reduce the economic risk from introduction of BVD virus. 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 identity carrier animals. A cost-effective, immunoperoxidase ELISA blood test has been developed specifically for this purpose. 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 until the calves reach two months of age. Obtaining blood from calves of purchased additions prior to receiving colostrum can be beneficial in identifying persistently infected neonates. The typical serum neutralization blood test for serum antibodies (titers), while less expensive, may not offer as much information. This test confirms exposure to BVD from naturally occurring virus **or** vaccination. The fact that an animal can mount an immune response to BVD (has a positive titer) **may** indicate that it is **not** persistently infected with the virus. Work with your veterinarian to determine which diagnostic laboratories have the proper tests to identify persistently infected animals.

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 paratuberculosis*. Clinical disease is characterized by chronic diarrhea and progressive wasting which leads to culling or death. 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. The 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.

Fecal or tissue culture has been the "gold standard" for identification of Johne's-infected cattle. The primary advantage of this method is that it detects cattle actively shedding *M. paratuberculosis* and thus those more likely to transmit the disease. Unfortunately, the culturing process requires much technical expertise and depending on the laboratory, results may not be available for 4 to 12 weeks. Also, asymptomatic cattle and those shedding very few organisms may yield false-negative results. The genetic (DNA) probe test also detects cattle actively shedding *M. paratuberculosis*. This technique identifies a specific section of DNA common only to *M. paratuberculosis*. Genetic probes require more organisms for detection than fecal culture. This test takes only three days to perform but is more expensive and highly technical.

Currently, there is not 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. A cost-effective ELISA blood test has been licensed and approved by the USDA for detecting Johne's cows. The test is very specific with regard to positive results (ie. positive reaction truly indicates infection). Unfortunately, the test is not very sensitive. Only half of the truly infected cows will be detected. Typically, once serum antibodies are detected, the cow will become clinical within 6-8 months depending on the degree of stress. 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
- Feed colostrum from known negative dams
- Use milk replacer after colostrum feeding period
- 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

Salmonella

Salmonellosis has recently become a greater concern due to the potential for human disease from very virulent sero-types. Salmonellosis usually affects calves between 10 days and 3 months of age. Adult animals can be affected as well, particularly when experiencing periods of stress. Disease severity will be determined by the virulence of the sero-type(s) involved, the concentration of *Salmonella* in the environment and the immune status of the cows and calves. *Salmonella* can be transmitted by fecal-oral contamination or aerosolized.

Three disease conditions occur; septicemic, enteric, and/or carrier. Calves and cows with the septicemic form can die with no clinical signs (slight depression and in appetence) or diarrhea and colic with convulsions. The course of disease is a few hours, but rarely more than 1-2 days. The enteric form is most common. Calves and cows will have slightly watery diarrhea, changing to voluminous feces with mucosal shreds, casts and/or blood. Initially, animals will have a fever but their temperature falls rapidly as dehydration progresses. Chronic salmonellosis is responsible for the carrier state. Carrier calves are typically 6-8 weeks old, while carrier cows can be in any stage of lactation. These animals will have loose stool but not diarrhea. Body temperature will be normal to slightly elevated. Typically, calves fail to thrive as evidenced by a rough hair coat and undersized body.

Salmonellosis control is best achieved by good management practices including individual calf hutches with adequate spacing. Vaccinations have minimal effect. Establishing a complete Johne's disease control program will work to control Salmonellosis. Keep in mind that Johne's has a long incubation period before clinical signs develop and *Salmonell*a can be spread in as little as 6 hours. Serologic blood tests are available to identify chronic carriers of the disease.

Leptospirosis

Several types (serovars) of leptospiras infect cattle. Theses 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 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 which means vaccination at least twice, once prior to breeding and once during gestation.

Contagious Mastitis

If mature cows are purchased, several serial bulk tank milk samples from the herd of origin should be cultured to determine if *Staphylococcus aureus*, *Streptococcus agalactiae,* or *Mycoplasma bovis* mastitis exists in the herd. Either individual cow DHI somatic cell count (SCC) 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 a cows should be made on the basis of number of months of elevated SCC, number of quarters involved, and pathogens isolated from the quarters. When purchasing springing heifers, a milk sample should be obtained and cultured as soon as possible after calving. As herd sizes increase, there is an increased 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 cows known to be infected and those which are suspicious, then milking them last is a pro-active step in controlling contagious mastitis. Many herds have chosen to put all high SCC cows in a separate milking string, regardless of culture status. 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 *Staphylococcus aureus* and *Streptococcus 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 expansions require infusions of capital, which implies increased 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 milk 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 infectious diseases and decreasing herd exposure to those same pathogens. Protection of the resident herd is an essential first step in a biosecurity program. Think of a dairy herd biosecurity plan just like a comprehensive farm insurance policy. The policy may never be needed, but when it is, the protection provided can help reduce the economic hardship that might otherwise ensue.

Table 1. Partial list of infectious diseases commonly found on Midwest dairy farms.

Disease	Risk of Intro	Duration of Disease	Risk of $ Loss	Vaccine Value
Anaplasmosis	Regional	Carrier	High	None
Bovine Leukemia Virus/Leukosis – BLV	High	Carrier	Low	None
Bovine Respiratory Syncytial Virus – BRSV	High	Acute	Mod	High
Bovine Viral Diarrhea Virus – BVDV	High	Acute/ Carrier	High	High
Clostridial Diseases – Black Leg, Malignant Edema, Enterotoxemia, etc	Ubiquitous	Acute	Mod	High
Haemophilus somnus	Mod	Acute	Mod	Mod
Infectious Bovine Rhinotracheitis – IBR	Ubiquitous	Acute	Mod	High
Papillomatous Digital Dermatitis – "Hairy heel warts"	High	Chronic	Mod	Unknown
Leptospirosis	Ubiquitous	Acute	Mod	Mod
Listeriosis	Ubiquitous	Acute	Low	None
Johne's Disease – *Mycobacterium paratuberculosis*	High	Chronic Carrier	High	Low
Mycoplasmosis	Mod	Acute/ Carrier	Mod	None
Neosporosis	Low	Carrier	Mod	None
Parainfluenza-3 Virus – PI3	Ubiquitous	Acute	Mod	High
Pasteurellosis	Ubiquitous	Acute	Mod	Mod
Rota/Corona Virus – calf diarrheal agents	Ubiquitous	Acute	Mod	Mod
Salmonellosis	High	Acute/ Chronic	High	Low
Staphylococcus aureus mastitis	High	Chronic	High	Low
Streptococcus agalactiae mastitis	Low	Chronic	Mod	None
Winter Dysentery – bovine corona virus?	Ubiquitous	Acute	Low	None