

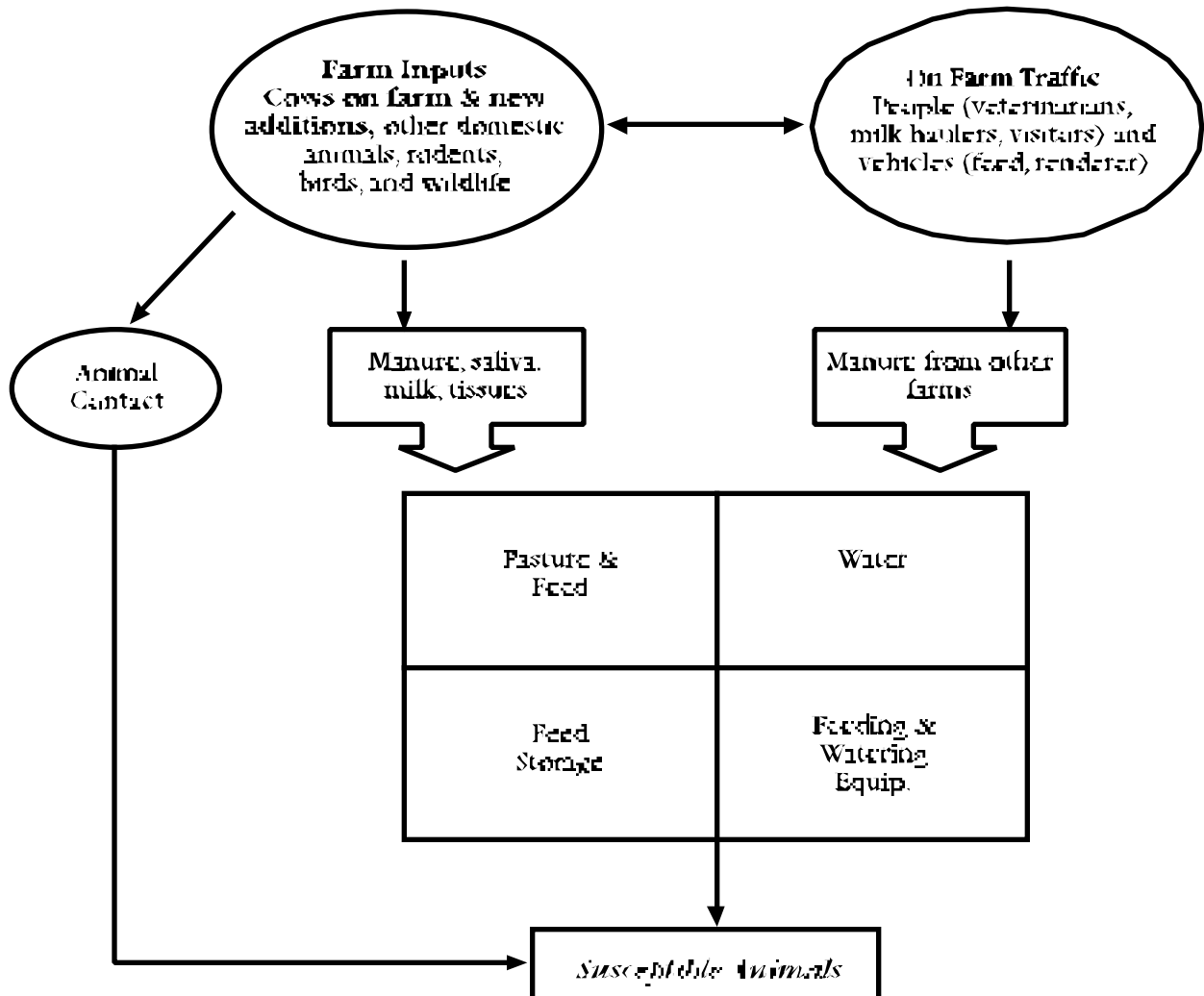


This guide is published by the Bovine Alliance on Management and Nutrition (BAMN), which is composed of representatives from AABP (American Association of Bovine Practitioners), ADSA (American Dairy Science Association), AFIA (American Feed Industry Association), and USDA (United States Department of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

INTRODUCTION TO BIOSECURITY

Management is a key factor in the prevention and control of disease. Animal contact (within and between species), animal products, manure, water, feed and environmental sources are among the several risk factors related to disease **prevention and control**. **Feeds, feeding systems and nutrition** should be a part of **BIOSECURITY planning**. Knowing the way each disease is transmitted on the farm is critical to disease prevention.

HOW CONTAMINATED WATER AND FEED CAN AFFECT BIOSECURITY ON FARMS



I. What Are The Missing Links In Your Feed Biosecurity Program?

This paper will help you find the missing links in your biosecurity program, and will offer suggested biosecurity guidelines and training resources.

Control Points for Diseases Transmitted by the Oral Route

To determine the risk of disease transmission from water and feed, check for the potential sources of contamination in the table below.

Disease/Pathogen	Manure	Water	Waste Milk*	Pasture	Forage	Grain/Concentrate**
BVD	M	C	S			
Coccidiosis	M			C	C	
Cryptosporidiosis	M	C		C	C	
Giardia	M	C		C	C	
E.coli	M	C	M	C	C	C
Salmonella spp.	M	C	M	C	C	C
Campylobacter	M	C	C	C	C	C
Listeria	M		S		M	
Johne's Disease	M	C	S	C	C	

Letters in the table denote the following:

C – Source when contaminated by rodents, fecal material, animal tissue/fluids or other unknown sources.

S – Secondary source of organism.

M – Major source of organism.

***Waste milk includes unpasteurized whole milk, hospital milk or colostrum. Calf milk replacer is a good alternative, as it has not been shown to transmit disease when properly stored and handled.**

****FDA has imposed a ban on feeding ruminant derived protein to ruminant animals as a precautionary measure to ensure that BSE is not transmitted to this country. Make sure your supplier is complying with the law. All animal protein should be properly labeled.**

II. Feed Processing and System Influences

There are several feed manufacturing/processes that help minimize the risk of introducing disease by feedstuffs. Even feeds that have been properly processed can be recontaminated at a later time.

A. Feed Handling, Equipment and Storage

- Ask your supplier about their quality assurance and monitoring programs such as how pests are limited, testing procedure for mycotoxins, facility contamination control (personnel and ingredients) and their retained sample program.
- Practices such as pelleting, steam flaking and roasting can reduce bacterial numbers when exposed to adequate temperature and time. Heat processing can kill salmonella bacteria at temperatures of 55° C (131° F) for one hour or 60° C (140° F) for 15 to 20 minutes.
- It is critical that all chemicals and pesticides are properly labeled and stored separately.
- Ensure all storage areas (silos, bins and commodity sheds) are cleaned out between batches of feed.
- Ensure all feed delivery equipment is cleaned out between deliveries and farms.
- Feed mixing and delivery equipment can spread pathogens from a small quantity of contaminated feed to all animals on the farm.

- **Do not use manure-handling equipment to handle feed.**
- High pressure washers with or without steam should be used on feed bunks, storage areas, silos, mixing and delivery equipment and feeding areas along with proper disinfectants.
- Examine all feedstuffs closely for manure, mold, foreign materials and uniformity.
- Waste milk should be pasteurized if fed to calves. Unpasteurized waste milk from one cow could infect many calves.
- Milk replacer mixing and handling equipment should be cleaned and sanitized after each feeding.
- Feed and ration preservatives (example: acids) may limit pathogen growth and/or spread.
- Fermentation acids, produced by proper ensiling can reduce pathogen load. Wrong moisture, poor packing, no cover, etc. can increase pathogens in silage.
- When feeding from silos and commodity storage facilities inspect for mold and other spoiled material. Do not feed this material.
- When mold growth and spoilage are a problem, reevaluate design and feedout procedures.
- Rotate inventory to minimize pathogens in stored feeds.
- Feed bunks should be cleaned out daily. Feed refusals should not be stored more than 24 hours to prevent spoilage. If feed refusals are fed, they should be fed to the oldest heifers, to minimize disease transmission.
- Porous feeding surfaces can harbor pathogenic organisms. Rough feed bunks should be resurfaced to make them smooth.

B. Feeding Plans, Records and Labeling

- A feed label with guarantees and ingredient composition must accompany all feeds. In addition to the nutritional information and instructions for use there are feeding requirements and warnings noted on labels for medications. Consult the label prior to using any feed.
- Medicated feeds should be properly stored and used. Mixing equipment should be cleaned after medicated feeds are prepared.
- Feeds manufactured from animal proteins containing ruminant material must be so labeled. In such cases the label and/or invoices must state "Do not feed to cattle or other ruminants". This ensures that ruminant derived protein is not used in cattle rations. Feed suppliers and individuals responsible for feeding cattle should maintain copies of purchase invoices and labels for animal protein products.
- Have a feed plan for each production class (calves, heifers and milk cows), establish goals for performance and disease control.
- Record feed intake as a tool to help monitor animal health and feed quality.
- Routinely test all feeds and record analyses. Rebalance diets as necessary. Work with your consultant to determine appropriate feed tests.

C. Grain, Proteins, Forage and Moisture

- An often-overlooked source of bacterial and fungal (mold and yeast) disease is silage and hay. Proper growth, harvest and feedout can reduce the risk of disease.
- Protect feeds and feeding areas including baling and ensiling of feed or storing feed from exposure to animal carcasses and manure. Clostridiosis, Botulism, Salmonellosis, and *E coli* infections often develop out of poor forage management in this area.
- Prevent access to feeds and feed bunks by dogs, cats, wild life, birds, rodents and other animals. These animals also should not have access to dead cattle and other tissues such as placenta.

- Application of manure and lagoon water to growing forages (green chop, corn and alfalfa) can cause contamination of cattle feed. Limit application to a time period well before harvest, this will help reduce transmission of *Johnes*, *E coli*, *Salmonella spp.*, and other pathogens. In some cases composting of manure can decrease pathogens.
- Bird-netting and bird deterrents should be used to minimize risk of *Salmonella spp.* transmission from wild birds.
- Ensure that optimal conditions for harvesting, handling and storage are followed for every crop.
- The following are some suggestions for baling hay or ensiling feed:
 - Dry matter should be 28-32% for corn silage and 35-40% for alfalfa haylage when ensiling.
 - Follow feed consultant guidelines for proper crop maturity and length of cut.
 - Have the proper equipment for packing and covering silos (tractors, pit walls, etc.).
 - Monitor silage pH (*Clostridia* and *Listeria* grow above 4.5).
 - Guidelines for organic acid levels in ensiled feeds are: Greater than 3% lactate for corn silage, 7% lactate for alfalfa silage, less than 2-3% acetate, less than 1% propionate, less than 0.1% butyrate. Low lactate levels indicate low sugar levels and incomplete fermentation.
 - Feedout rate: Ensure that silo size matches the herd size. Feeding out ensiled feed too slowly allows mold and undesirable bacterial growth.
 - Baled hay should be 85-90% dry matter and properly protected to prevent mold growth and contamination.

D. Water Quality and Water System

- The sanitary quality of water is determined by microbiologic testing for coliform and other microorganisms. Water supplies (well area, ponds and streams) should be protected from fecal contamination where possible.
- Watering cups, tanks and troughs should be designed and located for ease of cleaning and reducing contamination of feed and water. Prevent excessive water on ground and floor around water systems.
- Water odor, taste, excessive mineral or compounds necessitate the need for testing of water sources.

III. Nutritional Balance

- A number of infectious agents are opportunists and infection occurs in weakened animals. Proper nutritional balance and adequate feed intake will help promote immune function and resistance.
- Some vitamins and minerals and overall nutritional balance have been identified as influencing immune function.
- Nutrition can also influence physical barriers to infection (e.g. skin, mouth and tissue).

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PUTTING BIOSECURITY GUIDELINES IN PLACE

I. Written Control Programs

It is essential to have a written biosecurity program. These programs must constantly be followed:

- Emphasize your biosecurity program with every person who enters your farm. Make sure they understand your concerns for biosecurity. Your milker, herdsman, feed consultant, veterinarian, A.I. technician, hoof trimmer, milk sanitarian and truck drivers should all adopt, if they don't already, good sanitation/biosecurity practices.
- Plan the order of work routine on the farm. Work from younger to older animals.
- **Traffic** onto/and on the farm should be controlled.
- Service vehicle tires carry manure; thus vehicles should not be driven through runoff, manure or feed areas.
- On farm boots should be cleaned and disinfected regularly. Disposable boots should be made available to visitors. Visitors should have limited access to critical areas where animals are housed and feed is stored and handled.
- Clothing should be clean and equipment disinfected before coming on the farm.
- Identify runoff and control rain and storm water damage.
- Prevent standing water which can be a breeding ground for mosquitoes.
- **Animal movement onto farm and within farm** must be carefully controlled, especially vehicles hauling live and dead animals.
- **Rodent/bird/fly/animal control programs** are important in areas of feed storage, handling and feeding systems/feeders and animal housing.
- **Cleaning and maintenance schedules** are important in keeping manure and body fluids from contaminating feed and water.

II. People and Resources For Training On Farm Workers

- Veterinarians
- Feed consultants
- Pest control specialists
- University extension and other faculty
- Industry contacts: feed, pharmaceutical, agricultural chemical, and machine industries.
- Milk processors and dairy fieldmen
- Internet resources may also be helpful, especially the National Animal Health Monitoring System web site at www.aphis.usda.gov/vs/ceah/cahm/cahm-act.htm
- Other BAMN publications that are available for your use relative to biosecurity are:
 - An Introduction to Infectious Disease Control on Farms (Biosecurity)
 - Biosecurity on Dairies
- Other BAMN publications are:
 - A Guide to Modern Calf Milk Replacers. Type, Use and Quality.
 - A Guide to Colostrum and Colostrum Management for Dairy Calves.
 - A Guide to Dairy Calf Feeding and Management. Optimizing Rumen Development and Effective Weaning.