

DeLaval biosecurity guide

Health protection and sanitation strategies for dairy farms



Dear reader,

Livestock owners and industry personnel who support the farms are genuinely concerned with health, well-being, and productivity of the dairy cattle. However, everyday livestock owners face several potential disease threats that could jeopardize the health of their animals and represent a threat to the economic viability of the farm and welfare of the entire herd. One, if not the, major health challenge in dairy production is to keep control over infectious diseases in order to ensure long term profitability.

As defined by the Ontario Livestock and Poultry Council (OLPC) Biosecurity Committee, [Biosecurity](#) is the protection of people, animals, and ecological systems against disease and other biological threats. Biosecurity is achieved through systems that aim to protect public health, animal and plant industries, and the environment from the entry, establishment and spread of pests, diseases, and contaminants. This means that biosecurity refers to management practices that reduce the risk of infectious diseases entering the farm, as well as reducing the impact of diseases that are already present with the herd. It is therefore of utmost importance to implement a Biosecurity Program on the farm.

This DeLaval Biosecurity Guide has been developed by experts within the company and describes actions for the development and implementation of an effective biosecurity program. The purpose is to help you as a dairyman to prevent the introduction of and control the spread of disease within the herd. To ensure quality and alignment with latest scientific knowledge the guide has been reviewed by international experts in contagious diseases and biosecurity.

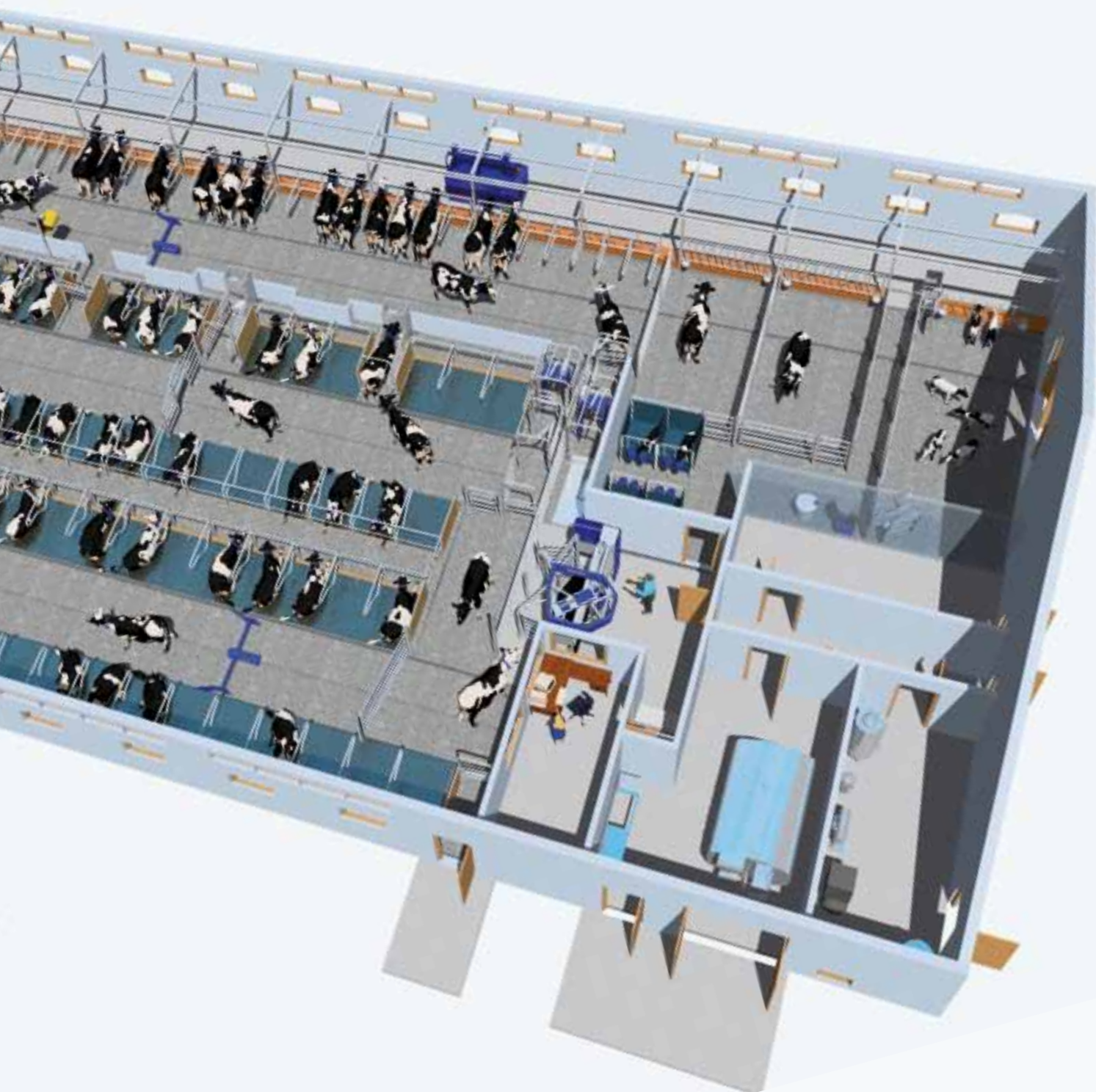
Enjoy!



Contents

1. Introduction.....	1
2. Preventing the introduction of disease.....	2
2.1. Livestock.....	3
I. Maintain a closed herd	
II. If purchasing cattle - know the source of purchases and use laboratory testing	
III. Quarantine new arrivals	
2.2. Humans.....	4
I. Control people	
II. Control vehicles and traffic patterns on the farm	
2.3. Birds, pests and pets.....	6
I. Control of birds	
II. Control of rats and mice	
III. Control flies	
IV. Control pets	
3. Preventing the spread of diseases.....	12
3.1. Animal separation.....	13
I. Management of groups and housing	
II. Manage maternity, sick and calf pens	
3.2. Sanitation and disinfection management.....	14
I. Manage manure	
II. Disposal of dead animals	
III. Control feed and feeding equipment	
IV. Clean mechanically and use disinfectants	
V. Clean equipment	
VI. Milking parlour	
VII. Personal hygiene	
4. Increase animals' resistance to diseases.....	24
I. Use vaccines	
II. Ensure good nutrition	
III. Reduce stress	
5. Conclusion.....	26
6. Checklist for Biosecurity.....	27

1



Introduction

A part of the sustainable dairy farming concept includes management practices that ensure farm profitability through the health and well-being of dairy cows, as well as constant attention to public and environmental health concerns.

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Infectious diseases are caused by a large number of agents and can be spread through numerous ways. Some are mostly spread by direct contact with infected animals, such as bovine viral diarrhea, and the bovine leucosis' virus. Others can be spread via air, insect bites such as Blue tongue, contaminated clothing/footwear such as BRSV virus, feed or water such as E. coli, contact with wildlife, etc. The foot-and-mouth disease virus can be transmitted in a number of ways. It can be spread by close contact animal-to-animal and long-distance aerosol spread as well as inanimate objects, typically fodder and motor vehicles. Many important infections are also related to hygiene measures such as several of the agents related to calf diarrhea and claw eczema/digital dermatitis.

To reduce the likelihood of infectious diseases being brought onto the farm and minimize the spread of diseases already present, it is imperative to establish and adhere to strict management practices – a Biosecurity

program. Disease outbreaks can be tremendously devastating, especially when culling of animals is required, such as with foot-and-mouth disease, or when animal production is reduced due to Bovine Viral Diarrhea (BVD), Infectious Bovine Rhinotracheitis (IBR), Tuberculosis (TBC), Brucellosis etc. They can also cause disease in humans, making it also an important reason to control them.

In a Biosecurity Program, there are no “universal” biosecurity recommendations appropriate for all farms, which mean that there is no such thing as a “one size fits all” program. Because risks can vary by farm and region, a rational and careful on-farm risk assessment is the starting point for a tight, practical, and sensible biosecurity program. A successful biosecurity program is based on three pillars: **Sanitation, Isolation and Traffic Control**. Most of the measures incorporated in a biosecurity program are fairly basic. They will be effective only if the biosecurity measures are practiced as a regular part of farm management and only if everyone on the farm complies with the program.



Preventing the introduction of disease

Common sources of disease introduction on to the farm are: livestock, humans, wildlife and vehicles. Even if agents can be spread in numerous ways it is often fairly simple to protect the herd with simple routines.



2.1. Livestock

Contagious diseases are transmitted directly from an infected animal to an uninfected animal. This is the most common route for disease transmission among animals. The main strategies for managing the potential introduction of disease are:

I. Maintain a closed herd

The first and most important method to prevent the introduction of disease in the herd is to avoid purchasing of cattle. However, there are few truly closed herds having no contact with external cattle, in which owners would have to strictly adhere to the following requirements:

- Use home-grown replacements for maintaining and increasing herd size.
- Prevent fence-line contact of their stock with other cattle.
- Use only artificial insemination for breeding and not bring in bulls.
- Not exhibit at shows.
- Restrict visitors, and demand the use of protective clothing.

II. If purchasing cattle - know the source of purchases and use laboratory testing

Many owners take precautions when purchasing animals. They also use laboratory-testing programs to maintain minimal-disease or disease-free herd status. To know the health status of herd additions:

- Purchase pregnant (with more than 6 weeks of pregnancy) or, preferably, virgin heifers to minimize the risk of introducing mastitis.
- Determine the vaccination and health

status of individuals and the herd of origin.

- Purchase from as few herds as possible of known health status, such as those from certified programs.
- Whenever planning to introduce new cattle, make certain existing cattle are vaccinated according to the recommendation from a veterinarian before bringing new cattle into the herd.
- Only cattle with known medical history should be purchased. Historical data should be collected, during quarantine and upon arrival. Information collected should include:
 - Original source of the animals.
 - History of vaccination and treatments.
 - Somatic cell count in current and previous lactation.
 - Results of bacterial culture of their milk.
 - Dates of previous freshening and any history of abortion and infertility.

At least four weeks of isolation is ideal and it gives enough time to:

- Test for common diseases (BVD, IBR, Johne's disease) through blood tests prior to introduction to the main herd. However, it is recommended to purchase animals from a herd that has been declared free of Johne's disease as the blood test on an individual animal is less conclusive.
- Test milk samples for somatic cell count and combine it with individual and bulk milk culture. This can

detect contagious mastitis such as *Staph aureus*, *Strep. agalactiae*, and *Mycoplasma bovis*.

III. Quarantine new arrivals

Newly acquired animals should be isolated upon arrival and tested for specific diseases in order to prevent its introduction. Quarantining incoming animals is ideal. Avoiding all contact with the rest of the herd may be the only practical method of isolation.

- Newly purchased animals should be isolated for at least 30 days.
- Separate housing, feeding and calving areas should be used. They should be housed away from the resident herd. Do not permit any contact with resident cattle.
- Animals in isolations should be always handled last. Clothes / footwear should be changed after handling newly arrived cattle, and hands should be thoroughly washed.
- New animals should be observed and examined for early disease detection. Extend the period of isolation if an animal becomes ill.
- If cows or heifers are pregnant at arrival, isolate and test the calf at birth.
- Vaccinate new purchases during the isolation period, even if they have been vaccinated previously.
- Isolated cows should be milked last until their culture results are complete and quarantine period is finished.



2.2. Humans

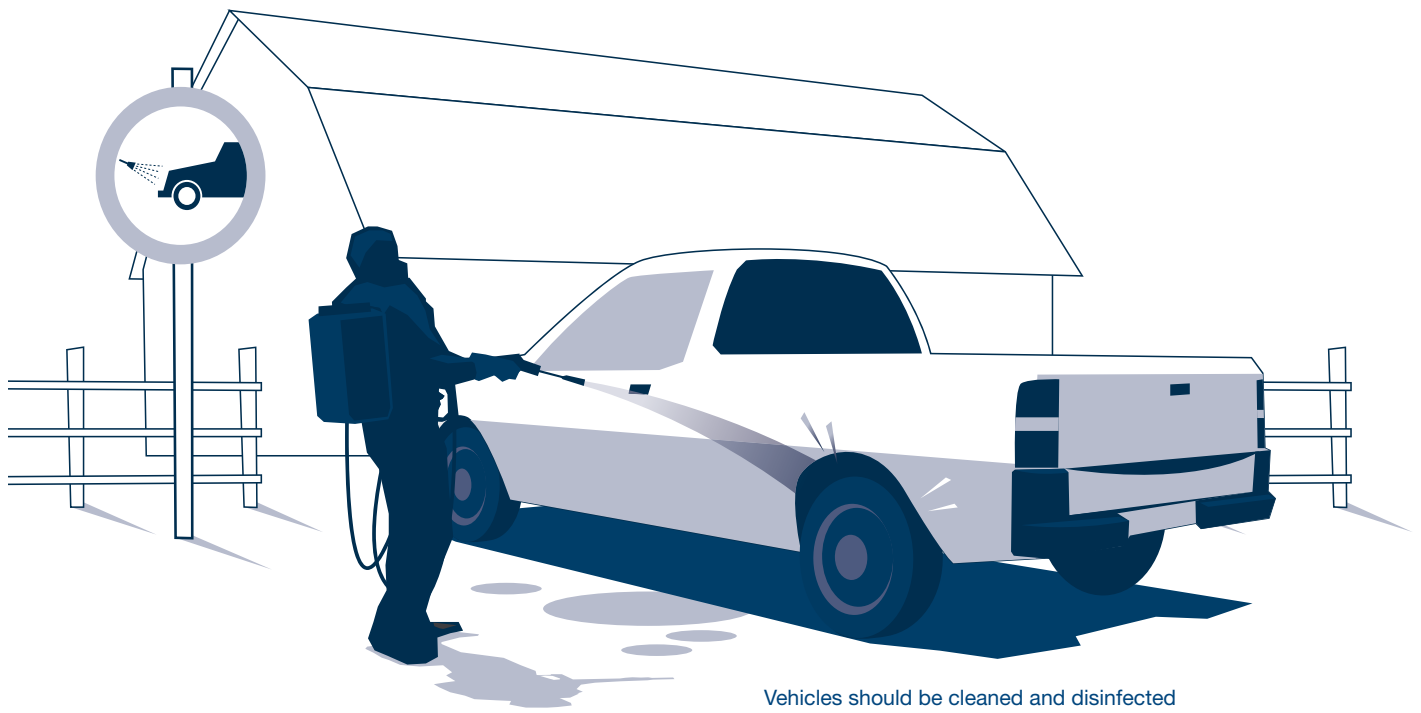
I. Control people

People spread contaminated material directly on footwear, hands, and clothing. To decrease the spread of contaminants, develop a biosecurity protocol for farm visitors as follows:

- Post “Do Not Enter” signs (with telephone number(s) to contact you) on livestock buildings and farm entrance gates.
- Inform herd workers, visitors, and truck drivers of your farm protection methods and mandate the compliance of these procedures.
- Establish one area on the farm where visitors can enter. This area should not be an animal housing area and should be clearly marked so visitors go directly to this entry point once on the farm.
- Park all vehicles away from livestock areas, preferably on concrete.
- Keep a visitor log (with dates) to have a record of all visitors. This could be useful for tracking purposes if a disease outbreak occurs.
- Determine if the individuals have been on farms in another country in the last two days prior to visiting your facility. If there is an outbreak of foot-and-mouth this restriction should be extended to five days and the restriction given by local authorities should be followed.
- Visitors entering the animal housing units should wear clean clothing and clean rubber boots on your farm. Ensure they wash their boots before entering and when leaving.
- Providing disposable coveralls and plastic boots for your visitors would be most ideal.
- Determine if there is a real need for the individual to enter any animal housing and feeding areas on your farm. If there is, designate a specific visitor area to minimize contact.
- Prohibit visitors from touching cattle and calves.
- Provide fresh footbaths or disinfectant containers at the entrance to each animal housing area on your farm. The individual should clean and disinfect their boots when moving between animal housing units.
- Provide accessible and functioning hand wash stations with fresh and clean disinfectants, which should be used before and after animal contact.

II. Control vehicles and traffic patterns on the farm

- Do not let “off-farm” vehicles drive through the animal housing units.
- Ideally, vehicles should be cleaned and disinfected before entering your animal housing areas.
- Establish a separate area far-removed from the animal housing facility for loading and unloading of animals on to trucks
- Any equipment coming on to the farm (hoof trimming tables, etc.) should be cleaned and disinfected before it enters your property. If it is not properly cleaned and disinfected, do not permit it in to the animal housing unit. Have it cleaned and disinfected in an area away from the barn.
- Provide “clean” routes for feed delivery vehicles – routes that are not contaminated by manure.
- Provide cattle laneways that do not cross lanes used by milk trucks and feed delivery vehicles.
- Avoid sharing manure handling equipment with neighbors.
- Wash and disinfect equipment to be shared with neighbors and insist on only clean equipment coming onto your farm.



Vehicles should be cleaned and disinfected before entering your animal housing areas.





2.3. Birds, pests and pets

I. Control birds

Pigeons, sparrows, starlings and swallows are the most common birds found in and outside barns. They may carry infectious agents on their feet and within their digestive system. To control bird populations:

- Protect food and water supplies.
- Plug small and large nesting holes and perches in your barn that are suitable for sparrows and starlings.
- Screen-in all openings in natural ventilation dairy barns.
- Seal off openings into silo roofs.
- Screen-in ledges used as nesting sites by pigeons.

II. Control of rats and mice

Rats and mice deposit thousands of droppings a year. Even a small population of these rodents can severely contaminate feed supplies. In addition, rodents carry disease agents on their feet and fur, and they destroy millions of dollars worth of feed, supplies and buildings each year. It is important to remove unnecessary sources of food that attract rodents.

To control rats and mice:

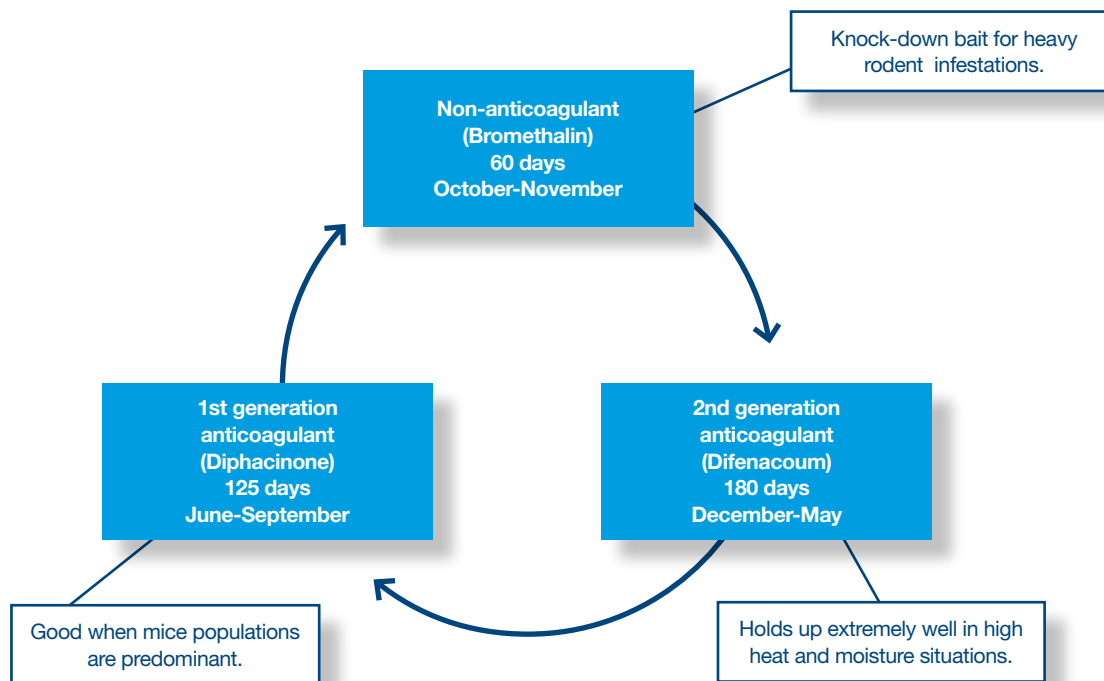
- Protect food and water supplies.
- Construct buildings which provide certain protection against rodents.

- Eliminate safe hiding places and nesting sites.
- Clear vegetation around the buildings.
- Destroy existing populations by poisoning, fumigating or trapping.
- Place bait where rodents will repeatedly encounter them:
 - Close to or directly in burrows.
 - Near known rodent feeding sites
 - Along paths from nests to food sources.
 - In shelter areas, such as under equipment.
 - Along wall ledges and pen dividers.

Products for baits:

Products for baits		Mechanism of action
First generation anticoagulants	Warfarin, Coumatetralyl, Chlorophacinone, Diphacinone.	Rats and mice may need to feed more than once to ingest a lethal dose. Death occurs within 3-7 days after consumption.
Second generation anticoagulants	Difenacoum, Bromadiolone, Flocoumafen.	Rodents may consume a lethal dose in a single feeding. Death occurs within 3-7 days after consumption.
Non-anticoagulants	Alphachloralose, Aluminium phosphide, Powdered corn cob, Bromethalin.	Usually neurotoxin products. Rodents may consume a lethal dose in a single feeding. Death generally occurs within 2-5 days after consumption of a lethal dose.

Anticoagulant rodenticide resistance is a worldwide phenomenon that occurs after sustained use of anticoagulant toxicants for rodent control. Resistance will become prevalent in populations that are strongly selected by application of the toxicant, killing most non-resistant individuals and allowing resistant animals a greater influence in the genetic pool for future generations. The most obvious strategy to avoid and mitigate resistance is to integrate anticoagulant and non-anticoagulant rodenticides, i.e., use a rotation baiting system as follows:



You can find a list of recommended products at www.delaval.com/biosecurity

III. Control flies

Flies are among the most difficult pests to control. Several kinds of flies live in and around dairy buildings or in the pasture. Whether feeding upon the animals or just annoying them, flies can reduce weight gain and milk production. In addition, flies are unsanitary and may contaminate milk. The dairy industry is facing the need to increase measures for disease control and food safety.

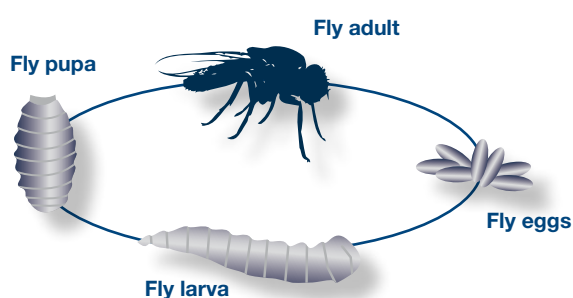
In addition to weight-gain reduction, reduced milk production and feed

efficiency in cattle (due to both feeding and annoying behavior), the adult stage fly is capable of spreading diseases through biting (flies fed on blood), contact to animals' secretions, manure, etc... Flies can carry disease organisms on their legs and mouthparts.

Among the pathogens commonly transmitted by houseflies are *Salmonella*, *Shigella*, *Campylobacter*, *Escherichia*, *Enterococcus*, and *Chlamydia*.

– Lifecycle

For a fly egg to become an adult fly a lot of moisture is needed to prevent the fly eggs, larvae and pupa from drying out. This is the reason why adult flies prefer to lay their eggs in wet, organic matter, such as fresh manure and spilled feed.



Flies progress through four stages of life



– Integrated Pest Management

Integrated pest management means using a two-pronged attack on flies: prevent larvae from developing into adult flies and control adult flies already present. This is the best approach for fly control. As resistance to pesticides has occurred over the years, incorporating multi-management strategies has been the most successful control program. This involves monitoring, environmental control (consisting of cultural, biological and chemical methods) and animal treatment.

Fly suppression using insecticides is best realized when the fly population level is already controlled by proper manure management to minimize fly breeding. Larvicides have the best impact when used while the adult fly population is still low. Reliance on the use of only insecticides seldom provides a satisfactory outcome. There is no insecticide on the market that

can compensate for poor sanitation practices.

All insect pests, including flies, have fluctuating populations under natural conditions. Their numbers will rise and fall above and below a mean level. The concept of management encompasses using a combination of insect control methods to reduce the mean level to an acceptable degree.

It is acknowledged that pests cannot be eradicated, but it is a reasonable goal to keep the numbers at a tolerable level.

Monitoring

Systematic monitoring provides a measure of the success or failure of control methods and serves as an early warning system so that changes can be initiated before a crisis develops.

Houseflies can be monitored using spot cards (7.5x13 cm white cards), sticky fly traps, or baited traps placed in key fly-resting areas. These monitoring devices are left for 7 days, then the number of flies collected, vomit spots and faecal matter are counted to determine the number of flies present. In general, spot card counts of over 100 spots per card per week, or baited or sticky fly trap catches in excess of 250 flies per week are considered high levels of fly activity.

Areas to monitor include: calf housing, accumulated wet bedding in pens, manure around feeders, lagoons, feed storage areas (bins, troughs, bunkers and silos), wet areas in the environment, and carcasses.

It is best to monitor these areas before the fly season begins (usually during the warm summer months), then every 2 weeks throughout the season.

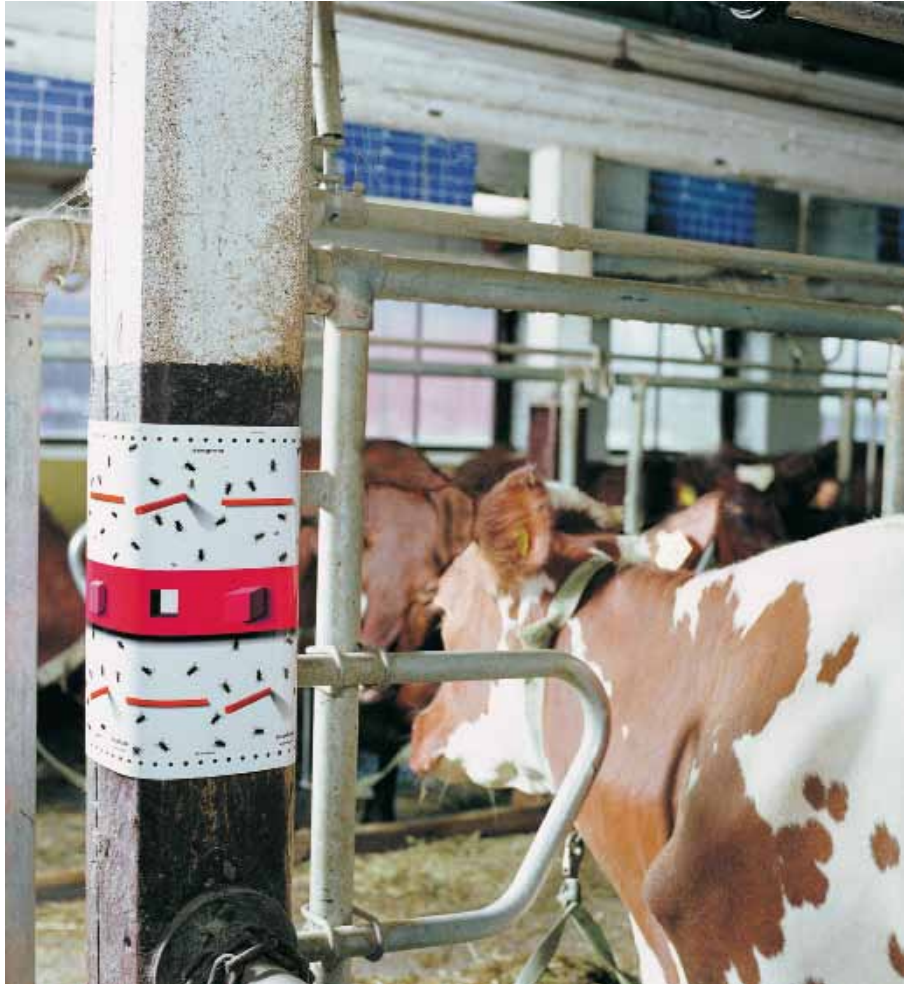
Environment

The environment must be managed to decrease the areas where flies can lay their eggs.

– Cultural methods

The cultural control of flies is the manipulation of non-biological factors such as environmental conditions, temperature and humidity of breeding habitat, which will help to decrease flies' population.

- Removing or thinly spreading fly breeding materials (manure and bedding) weekly. This helps break the cycle since this prevent fly eggs from hatching. Spreading manure and bedding as thinly as possible will help ensure that it dries out quickly.
- Preventing feed spoilage and keeping feed dry to reduce ideal areas for fly breeding.
- The primary fly source in confinement areas are animal pens, especially those housing calves. The pack of manure and bedding under livestock should be cleaned out at least once per week.
- In free-stall barns, the next most significant fly-breeding areas are the stalls, which should be properly drained and designed to encourage complete manure removal. In stanchion barns, drops should be cleaned out daily.
- Having closed screen doors and windows and keeping traffic to and from the milk room to a minimum can greatly reduce fly numbers in this sensitive area.
- Flies do not like air movement. Therefore, installing fans in the milk room, the collecting yard and housing is a good idea. In addition to keeping flies away, the fans will help combat heat stress.
- The occasional flies that still get in can be controlled with sticky fly paper traps, electrical fly catchers, or baits. With respect to baits, these should not be placed in areas where animals will have access to them or where they can fall and contaminate feed.



– Biological methods

Many beneficial arthropods are naturally found in the same manure and organic materials where fly larvae develop. These beneficial insects help control fly populations through predation or direct competition with the flies.

- Wasps are parasitic on dung-inhabiting fly pupae. The female wasp inserts its ovipositor into the pupal case of the fly and deposits one or more eggs. The wasp egg then develops into a larva which kills the fly pupa by feeding on it.
- Some beetles and mites can help with fly control. One major predator of flies in confined-animal operations is the small black beetle, *Carcinops punmilio*. The adult and larvae of this beetle feed on the eggs and larvae of flies.
- When using a biological method, the manure cannot be excessively wet, as this prevents parasite movement and larva/pupa destruction.

Remember that certain fly-eating parasites can only be used in specific geographic areas because they may feed on other beneficial insects, so check with your local extension specialist for recommendations.

– Chemical methods

After maximum effort to suppress fly numbers by proper cultural and biological methods, insecticides are often necessary to achieve adequate fly control.

The effectiveness of chemical insecticides will be enhanced if fly suppression by cultural and biological methods is maximized. In addition, the development rate of insecticide-resistance will be reduced.

Chemical control options include knock-down and residual insecticides, baits and larvicides. As with any insecticide, it is important and legally necessary to follow label directions regarding site of application, dilution and application frequency.

- Knock-down adulticides: These are generally applied as a fine mist of insecticide that relies on contact with the adult fly to kill it. They do not last long in the environment (1-2 hours). Treatments may need to be repeated frequently to achieve the desired effect.
- Residual adulticides: Application of residual insecticides can be either sprayed on or painted on to structures that flies tend to rest, such as building walls, fence lines, shade structures, surrounding vegetation, etc.
- Baits: Fly baits are usually formulated granules and are meant to be used as scatter baits or in bait stations. The use of fly baits should be limited to periods when adult housefly numbers exceed the actions threshold. Baits should NOT be placed in areas where animals will have access to them or where they could fall and contaminate feed, water, or milk.

- You can find a list of recommended products at www.delaval.com/biosecurity

Animal

It refers to management practices applied to the animals in order to reduce the population of flies. This includes application of products containing insecticides or fly repellents, such as pour-ons, sprays, and dusters, impregnated ear tags, feed additives and boluses. It should be used with carefully assistance of your veterinarian in order to avoid meat and milk residues hazards, environmental damage and animal or human injury. Your veterinarian is the only person capable of finding the best option for animal's participation in a fly control program.

IV. Control pets

Remember that dogs and cats can also carry diseases to livestock, particularly parasitic diseases such as neospora and echinococcus infections. To minimize the possibilities:

- Control the movement of dogs and cats between farms.
- Minimize the contact of dogs and cats with animals and feeding areas.

Vaccinate farm dogs and cats for rabies and diseases common in your area.



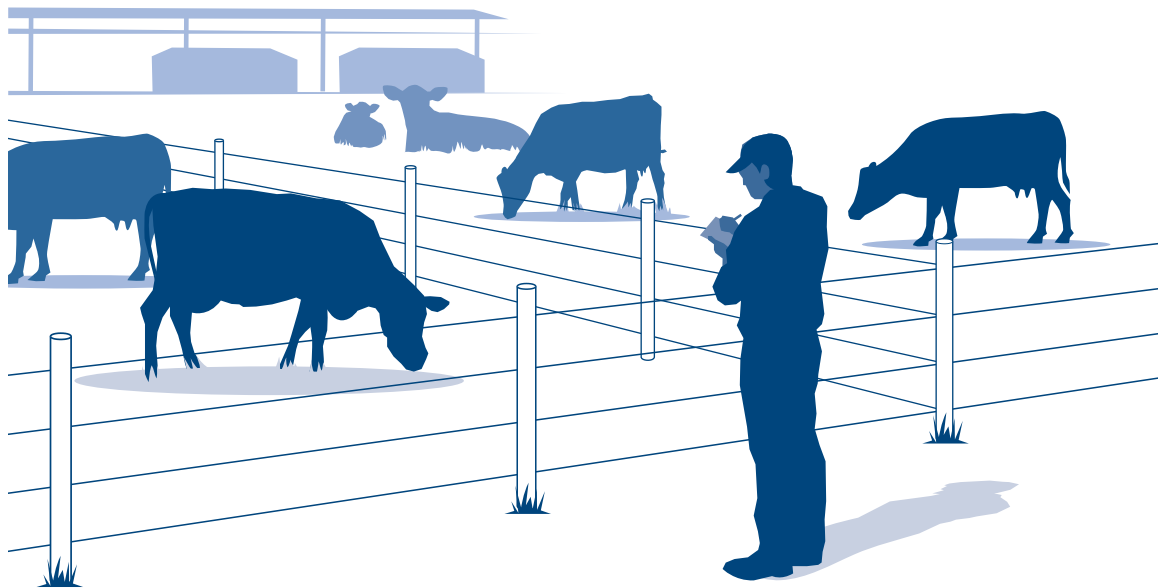


3

Preventing the spread of diseases



3.1. Animal separation



I. Management of groups and housing

Particularly young, but all healthy animals can acquire infectious diseases through exposure with infected or carrier animals (often older). Housing and management systems, especially for dairy cattle, should be constructed to minimize contact between the young animals with the older animals, as well as between the healthy and infected animals. All calves should be given good quality colostrum in the first hours of life helping in the development of a good immunity. In effect, the young are given time to develop immunity to diseases before joining the adults. Also, it is extremely important to separate sick calves from healthy ones.

Proper facility design, feeding and management practices guarantee maximum growth, health, and comfort for animals.

- Ensure maternity area is clean and dry. Single calving pens are recommended.
- Implement maternity-pen and newborn-calf management practices that prevent calves from ingesting manure.
- **Ensure the calf receives 4 liters of good quality colostrum milk within the first 6 hours of life.**
- Separate pre-weaned dairy calves from all other age groups.
- Clean the udder, before harvesting colostrum as if for milking. Store colostrums under hygienic conditions protected from flies and contamination

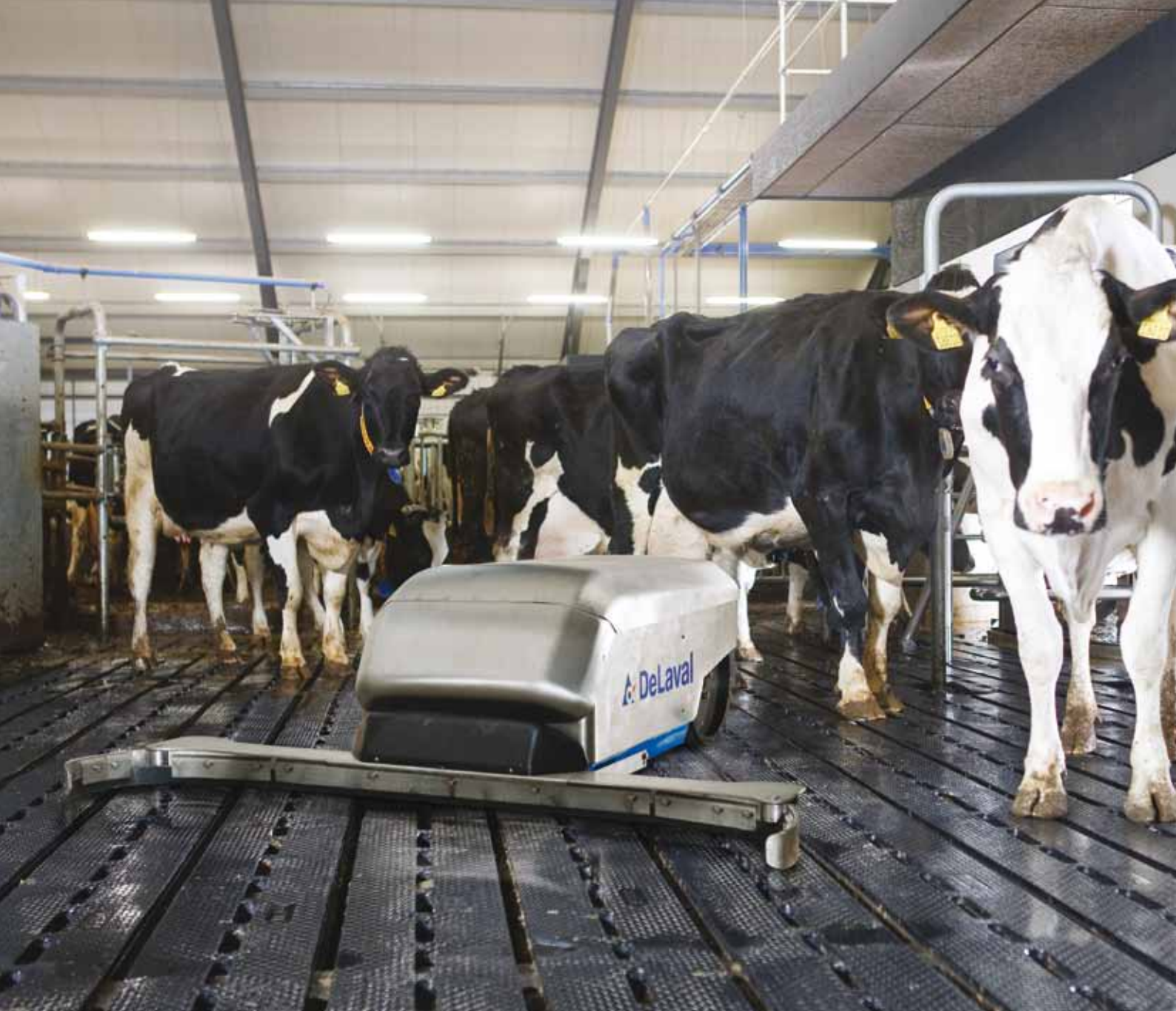
- House each milk-fed dairy calf in an individual pen or hutch following your country's local directive
- Clean bedding of calf-housing facilities regularly and not less than once a week to reduce the number of microbes in the calves' environment.
- If possible, use individual bucket, nipples and other feeding equipment. Make sure they are cleaned and sanitized before every use.
- Place hutches away from dairy barn exhaust fans.
- Design stall areas for cattle safety, cleanliness, maximum comfort and movement space.
- Avoid overstocking and make sure to offer enough area to allow all animal to lie down and rest
- Maintain clean, dry, and drainable stalls. Construct and maintain proper lanes and traffic areas to prevent environmental mastitis, maintain clean udders and to avoid infectious claw diseases.
- Place water troughs in areas that have minimal traffic and mud problems.
- Separate dry dairy cows from milking cows and pregnant heifers from dry cows.
- Implement practices that prevent the spread of contagious mastitis (e.g. segregate cows with mastitis to the end of the milking order or put them in their own separate group. See Section VI for recommended routines
- Organize a routine to feed and milk newly purchased isolated cattle after the main herd.

II. Manage maternity, sick, and calf pens

Exposure of freshening cattle and calves to infectious agents is reduced by carefully managing maternity and sick pens. For disease control:

- Use maternity pens only for freshening cattle.
- Use sick pens only for sick cattle.
- Prevent animal-to-animal contact between sick pens and maternity pens.
- Clean all manure from the pens after use.
- Disinfect the walls and floors after use.
- Allow the pens to dry after disinfection.
- Bed the pens well before the next animal enters.
- If applicable, move cows and heifers to clean, dry pastures or paddocks for calving.





3.2. Sanitation and disinfection management

I. Manage manure

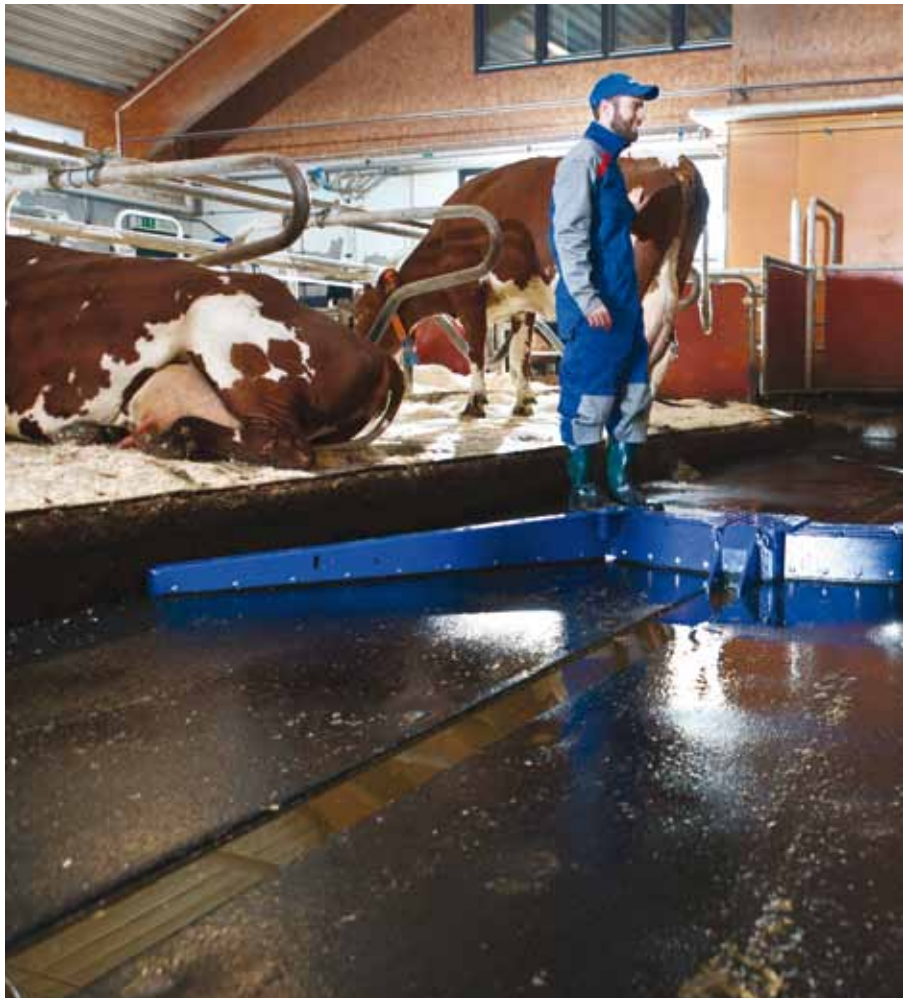
Infected animals can shed infectious agents such as salmonella, E coli, Leptospirosis or Johne's disease in their faeces, urine and other bodily fluids. These agents can contaminate feed, water and housing. To reduce the risk of spreading disease by manure:

- Develop and install manure systems to prevent environmental contamination. This system must have two main components: equipment to collect and transfer manure; and a storage facility where manure is held when it cannot be spread.
- Ensure adequate size for dairy manure storage. Storage facilities should be large enough to store manure, bedding, wasted feed and all liquids, including precipitation.
- Ban cattle and young stock access to manure storage, and make sure that the risk of contaminating feed is minimized, which means: no manure contaminated vehicles on the feeding table.
- Compost or store manure under conditions that destroy most disease-producing bacteria, such as covered pads for solid and semi-solids, concrete structures, steel tanks, lined earthen storages, and composted.
- Remove manure frequently from barns, yards and holding areas to prevent completion of life cycles by parasites and flies and to keep infection load at an overall acceptable level.
- Control the fly population by removing manure, using traps, baits or flypaper, using insecticides or larvicides, using biological predators (wasps) or combinations of control measures.
- Assure clean teats and udders for nursing calves by using clean calving areas and bedding packs with clean and dry straw or shavings.
- Prevent manure and other organic matter from entering the animal facilities from sources such as vehicles, equipment, and runoffs from other farms.

II. Disposal of dead animals

Carcasses can be a hazard to people and other animals. They can contaminate soil, air and water and require special handling. To minimize property contamination and risk of spreading disease, owners should:

- Dispose of dead animals within 48 hours of their death.
- Cover the dead body until disposal
- Dispose of all contaminated bedding, milk, manure or feed.
- Keep a single specifically selected area for dead animals prior to collection.
- Prevent scavenging by other animals such as dogs, cats, foxes, etc.
- Wear protective clothing when handling dead animals.
- Clean and disinfect the area that was occupied by the dead cattle.
- Producers may choose on-farm disposal methods which ensure the destruction of disease-producing bacteria or have the dead animal picked up by a licensed collector.

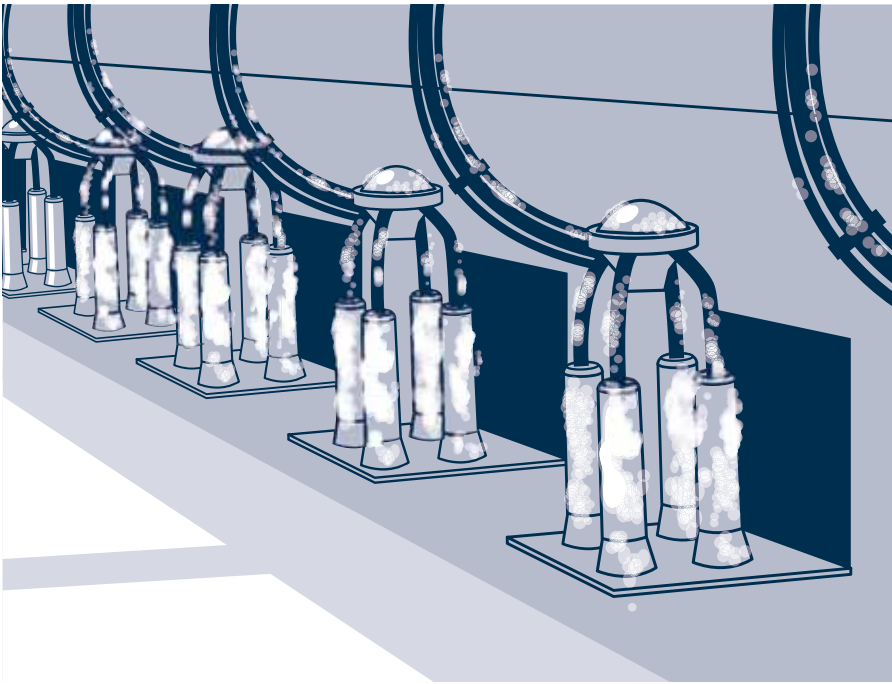


III. Control feed and feeding equipment

Consider the risk of contaminated feed (forages, pasture, grains and concentrates, water and waste milk), feeding equipment and systems when developing an on-farm biosecurity plan. The biosecurity procedures for feeding should include plans to:

- Protect feed from manure contamination.
- Inspect clean and disinfect feeding equipment for all animals on a regular basis.
- Keep the feeding places clean and free from waste
- Purchase from suppliers with quality assurance and monitoring programs.
- Protect feeds from contamination through proper storage of chemicals, pesticides and medications.
- Harvest feeds at proper moisture contents and ensile them in suitable storage systems. Use silage inoculants to maintain silage quality
- Monitor water quality and assure clean delivery systems.
- Have a good program of pest control.





IV. Clean mechanically and use disinfectants

Cleaning

Cleaning and disinfecting is a vital link in a biosecurity plan, since it is imperative to maintain the well-being and health of high producing animals, such as dairy cows. In intensive modern housing where high density and high productivity increases the infection pressure, it is important to properly clean and disinfect in order to decrease pathogen levels and prevent or halt the disease cycle.

The first step of cleaning is removing all gross organic soil because it contains high levels of contamination and is a major source of infection. Also, high levels of soil will reduce the efficacy of the cleaning and disinfection process.

Cleaning and disinfection of individual buildings or boxes is possible, and this reduction of bacteria in the immediate surroundings helps to reduce the opportunity for bacteria to gain access to the animal and cause diseases. Animal housing should be cleaned, faeces must be removed daily, and disinfection should take place regularly, such as before new animals are introduced and after an outbreak of infectious disease. Do not forget to remove all bedding and equipment before cleaning.

Clean cow housing when the building is empty.

- Housing for cows, calf and young stock should be thoroughly cleaned of all organic waste.
- Surfaces should be pressure washed using a detergent sanitizer.
- All cleaned surfaces should be sprayed with a suitable disinfectant solution. Use the proper concentration of the chosen disinfectant (always mix according to the product label).
- Remove manure and bedding from cubicles daily.
- Scrape / remove manure from channels at least once per day.
- Spray the concrete base with a suitable disinfectant and renew bedding as necessary.
- Clean and disinfect all equipment, utensils, feed racks, and water bowls/troughs every day.



Disinfection

Before selecting a disinfectant to use, there are several factors that must be considered. Some products are effective for routine disinfection protocols at the farm level, while others are necessary for outbreak situations. For an effective disinfection protocol, consideration should be given to the microorganism being targeted (Figure 1), the characteristics of a specific disinfectant (Figure 2) and environmental issues. Additionally, the health and safety of personnel and animals are always an important consideration. Figure 1 and 2 give general guidelines of efficacy for different type of disinfectants. Refer to actual product labels for specific approved efficacy claims for specific products.

The use of a broad-spectrum disinfectant active against viruses, bacteria, yeasts, molds and other pathogenic organisms is essential to complete an effective disease control program. It is of prime importance to ensure all surfaces are thoroughly wetted with disinfectant to break the chain of infection.

Thoroughly clean all objects to remove any visible debris (manure, dirt, and bedding) before applying a disinfectant. Most disinfectants are ineffective when dirt, manure and/or other debris are present. These materials prevent the chemicals in the disinfectant from contacting the surface being cleaned and killing the disease-causing agents.

Figure 1. Antimicrobial spectrum of disinfectants

Chemical Disinfectants
Note: Removal of organic material must always precede the use of any disinfectant.

	Acids (hydrochloric acid, acetic acid, citric acid)	Alcohols (ethyl alcohol, isopropyl alcohol)	Aldehydes (formaldehyde, paraformaldehyde, glutaraldehyde)	Alkalis (sodium or ammonium hydroxide, sodium carbonate)	Biguanides (chlorhexidine, Nolvasan, Chlorhex, Virosan, Hibistat ^a)	Halogens hypochlorite iodine	Oxidizing Agents (hydrogen peroxide, peroxyacetic acid, Trifectant ^a , Virkon-S ^a , Oxy-Sept 333 ^a)	Phenolic Compounds (Lysol ^a , Oxy ^a , Amphyl ^a , TekTrol ^a , Pheno-Tek II ^a)	Quaternary Ammonium Compounds (Roccal ^a , Zephiran ^a , DiQuat ^a , Parvosol ^a , D-256 ^a)
most susceptible									
mycoplasmas	+	++	++	++	++	++	++	++	+
gram-positive bacteria	+	++	++	+	++	+	+	++	++
gram-negative bacteria	+	++	++	+	++	+	+	++	+
pseudomonads	+	++	++	+	+	+	+	++	-
rickettsiae	+	+	+	+	+	+	+	+	+
enveloped viruses	+	+	++	+	+	+	+	+	+
chlamydiae	+	+	+	+	+	+	+	+	-
non-enveloped viruses	-	-	+	+	-	+	+	-	-
fungal spores	+	+	+	+	+	+	+	+	+
picornaviruses (i.e. FMD)	+	N	+	+	N	N	+	N	N
parvoviruses	N	N	+	N	N	+	N	N	-
acid-fast bacteria	-	+	+	+	-	+	+	+	-
bacterial spores	+	-	+	+	-	+	+	+	-
coccidia	-	-	-	+	-	-	-	+	-
prions	-	-	-	-	-	-	-	-	-
most resistant									

LEGEND
 ++ highly effective
 + effective
 + limited activity
 - no activity
 N information not available

a-varies with composition
 b-peracetic acid is sporicidal
 c-ammonium hydroxide
 d-some have activity against coccidia

DISCLAIMER: The use of trade names does not in any way signify endorsement of a particular product. For additional product names, please consult the most recent Compendium of Veterinary Products. ADAPTED FROM: Linton AH, Hugo WB, Russel AD. Disinfection in Veterinary and Farm Practice. 1987. Blackwell Scientific Publications; Oxford, England; Quinn PJ, Markey BK. Disinfection and Disease Prevention in Veterinary Medicine. In: Block SS, ed., Disinfection, Sterilization and Preservation. 5th edition. 2001. Lippincott, Williams and Wilkins: Philadelphia.

Figure 2. Characteristics of selected disinfectants

Disinfectant Category	Alcohols	Aldehydes	Biguanides	Halogens: Hypochlorites	Halogens: Iodine Compounds	Oxidizing Agents	Phenols	Quaternary Ammonium Compounds (QAC)
Sample Trade Names	Ethyl alcohol Isopropyl alcohol	Formaldehyde Glutaraldehyde	Chlorhexidine Nolvasan [®] Virosan [®]	Bleach	Betadyne [®] Providone [®]	Hydrogen peroxide Peracetic acid Virkon S [®] Oxy-Sept 333 [®]	One-Stroke Environ [®] Pheno-Tek II [®] Tek-Trol [®]	Roccal [®] DiQuat [®] D-256 [®]
Mechanism of Action	•Precipitates proteins •Denatures lipids	•Denatures proteins •Alkylates nucleic acids	•Alters membrane permeability	•Denatures proteins	•Denatures proteins	•Denature proteins and lipids	• Denatures proteins • Alters cell wall permeability	• Denatures proteins • Binds phospholipids of cell membrane
Advantages	•Fast acting •Leaves no residue	•Broad spectrum	•Broad spectrum	•Broad spectrum •Short contact time •Inexpensive	•Stable in storage •Relatively safe	•Broad spectrum	• Good efficacy with organic material • Non-corrosive • Stable in storage	• Stable in storage • Non-irritating to skin • Effective at high temperatures and high pH (9-10)
Disadvantages	•Rapid evaporation •Flammable	•Carcinogenic •Mucous membranes and tissue irritation •Only use in well ventilated areas	•Only functions in limited pH range (5-7) •Toxic to fish (environmental concern)	•Inactivated by sunlight •Requires frequent application •Corrodes metals •Mucous membrane and tissue irritation	•Inactivated by QACs •Requires frequent application •Corrosive •Stains clothes and treated surfaces	•Damaging to some metals	• Can cause skin and eye irritation	
Precautions	Flammable	Carcinogenic		Never mix with acids; toxic chlorine gas will be released			May be toxic to animals, especially cats and pigs	
Vegetative Bacteria	Effective	Effective	Effective	Effective	Effective	Effective	Effective	YES—Gram Positive Limited—Gram Negative
Mycobacteria	Effective	Effective	Variable	Effective	Limited	Effective	Variable	Variable
Enveloped Viruses	Effective	Effective	Limited	Effective	Effective	Effective	Effective	Variable
Non-enveloped Viruses	Variable	Effective	Limited	Effective	Limited	Effective	Variable	Not Effective
Spores	Not Effective	Effective	Not Effective	Variable	Limited	Variable	Not Effective	Not Effective
Fungi	Effective	Effective	Limited	Effective	Effective	Variable	Variable	Variable
Efficacy with Organic Matter	Reduced	Reduced	?	Rapidly reduced	Rapidly reduced	Variable	Effective	Inactivated
Efficacy with Hard Water	?	Reduced	?	Effective	?	?	Effective	Inactivated
Efficacy with Soap/Detergents	?	Reduced	Inactivated	Inactivated	Effective	?	Effective	Inactivated

? Information not found

DISCLAIMER: The use of trade names does not in any way signify endorsement of a particular product. For additional product names, please consult the most recent Compendium of Veterinary Products.

REFERENCES: Linton AH, Hugo WB, Russel AD. Disinfection in Veterinary and Farm Practice. 1987. Blackwell Scientific Publications; Oxford, England; Quinn PJ, Markey BK. Disinfection and Disease Prevention in Veterinary Medicine, In: Block SS, ed., Disinfection, Sterilization and Preservation. 5th edition. 2001. Lippincott, Williams and Wilkins: Philadelphia.

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Disinfectant considerations

An ideal disinfectant is one that is broad-spectrum, works in any environment, is non-toxic, non-irritating, and non-corrosive. Unfortunately, no disinfectant is ideal. Therefore careful consideration of the characteristics of a disinfectant are essential to select the most useful, effective and cost-efficient product.

Before selecting a disinfectant to use, there are several factors that must be considered:

– Concentration

Use of the proper concentration of a disinfectant is important to achieve the best results for each situation; some products will have different dilutions. Although some disinfectants may be more efficacious at higher concentrations, these levels may be limited by the degree of risk to personnel, surfaces or equipment, as well as the cost of the chemical. However, over-dilution of a product may render the disinfectant ineffective to the targeted microorganism. Always refer to the product label for the recommended concentration and mixing instructions for each situation.

– Application method:

There are a variety of ways to apply disinfectants. Object surfaces or walls of a building may be treated with a disinfectant solution by wiping, brushing, spraying, foaming or misting. Portable items should be soaked in a container of disinfectant. Fumigation may be used in some situations, but is inefficient in buildings with ill-fitting doors and/or windows or damaged roofs.

- Apply at the recommended dilution rate.
- Pay particular attention to corners, cracks, seams and porous surfaces (e.g. wood and concrete which can retain infective material).
- Spray in the apex of the roof and work down the walls to the floors.
- Allow surfaces to dry before restocking.

– Contact time:

Appropriate contact times are essential. Disinfectants may vary in the contact time needed to kill versus inactive microorganisms. The minimum contact time needed is normally stated on the product label. Please check.

– Stability and storage:

Some disinfectants (i.e. sodium hypochlorite) lose stability quickly after being prepared for use or when stored over long periods, especially in the presence of heat or light. Disinfectant product labels will indicate the shelf life of the concentrated product. To maximize stability and shelf life, products should be stored in a dark, cool location and preferably in stock concentrations.

– General recommendations

For general recommendations, such as instructions for use, safety precautions, storage and disposal, check the label of the selected disinfectant. Prior to use check to make sure the disinfectant is compatible with the material to be treated.

Information about disinfectants is available from your DeLaval dealer or veterinarian. You can also find a list of recommended products at www.delaval.com/biosecurity

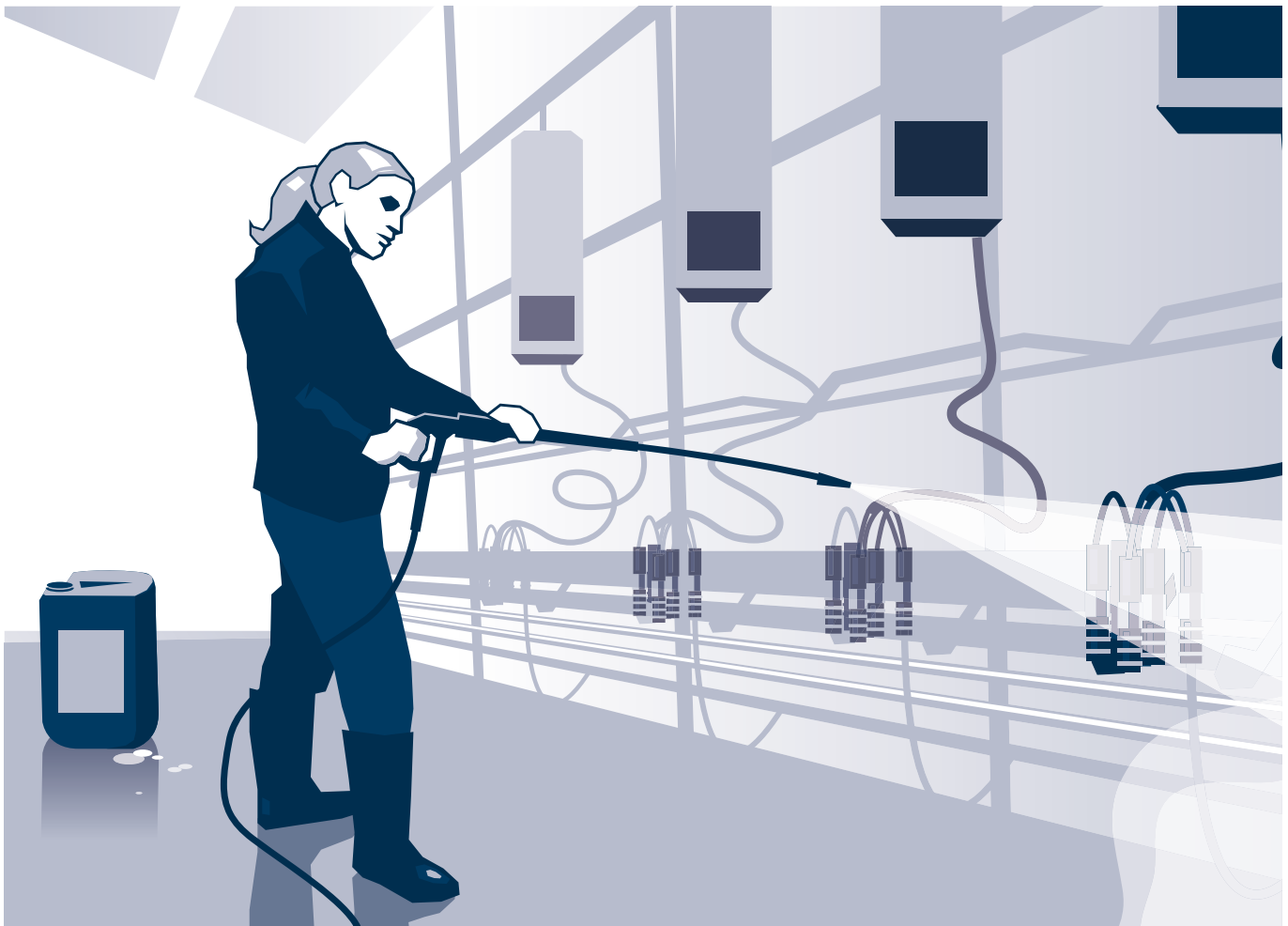


V. Clean equipment

Cleaning and disinfecting equipment and the facility is a primary measure for keeping animals healthy. Remember that all manure and organic material must be removed before the disinfectants can work. Do not lend or borrow equipment. If equipment must be loaned it must be cleaned and disinfected before it is returned.

Diseases can spread from animal to animal and farm to farm indirectly by small and large equipment. To reduce these means of contamination:

- Keep visiting vehicles out of areas accessible to livestock.
- Thoroughly wash and disinfect the inside, outside and tires of equipment shared with neighbors. Use the appropriate vehicle cleaner.
- It is ideal to use separate equipment for sick and healthy animal, however if you have to use the same one, clean and disinfect any equipment used on sick animals before use on healthy animals. Use the appropriate detergents and brushes.
- All the equipment that handles feed or is introduced into the mouth of cattle should be cleaned and disinfected before use.
- All equipment used for treatment of animals should be cleaned and disinfected. Anything contaminated with blood, saliva, nasal secretions, urine, feces, or that has come into direct contact with infected skin or tissue should be, preferably, disposed of rather than re-used. Store clean, dry items in drawers or plastic bags, or keep covered. Always work with sick animals after all healthy animals have been treated.
 - Use a new disposable needle for each animal when administering treatments.
 - Sanitize nursing bottles and buckets after each calf feeding.
 - Disinfect dehorner, hoof knives, and trimmers after using on each animal.
- Use separate shovels and forks for feeding and manure handling.
- Maintain clean water troughs, water bowls and feed mangers. Organic debris can build up over time in water and drinking cups and harbor disease-causing organisms. The cups should be monitored daily for functionality and cleaned weekly.
- Clean and sanitize equipment and materials used for handling dead stock.
- Either soak and scrub equipment in a tank or pressure-wash with a detergent sanitizer.
- Store equipment where it will not be re-contaminated.



VI. Milking parlour

This is the area that dairy farmers typically practice high standards of cleanliness and sanitation, with milk hygiene and mastitis prevention being the primary focus. However, farmers frequently fail to use effective broad-spectrum disinfectants for cleaning. This should be considered part of the routine.

The milking facilities and milk storage room must:

- Be clean and kept uncluttered by removing stocks of chemicals not being used, feeding stuffs, debris, garbage, etc.
- Have floors with good drainage, undamaged, free from accumulated manure and well-maintained.
- Have lamps with protective coverings to minimize the risk of contamination.
- Have well-fitted, fully-intact, weatherproofed windows.
- Have ceilings, roof linings and beams designed and maintained to minimize the accumulation of dirt and dust and any risk of creating space for pests to harbour.
- Have the bulk tank and ancillary

equipment thoroughly clean, both internally and externally, with lid kept closed at all times.

- Have the milk collection area cleaned before each collection to ensure that the tanker hose is not externally soiled when in use. Also, the tanker access should always be unobstructed.
- Have a sufficient supply of potable water available for milking operations and for cleaning equipment that comes in contact with milk.

The milking parlour is a high through put location resulting in the risk of spreading disease so it should be disinfected twice daily. Surfaces should be cleaned regularly to avoid multiplication of pathogens in this frequented area.

As the milking machine is cleaned every day, it should be the same for the milking parlour itself.

After each milking, rinse the milking parlour with water.

Once a week, clean the area with a detergent, then disinfect with a broad-spectrum disinfectant.

Continuous production of safe milk is possible if all people involved in milking consistently follow an effective biosecurity plan and good management practices. Consistency in a repetitive task such as milking is necessary, not only to produce safe milk, but also to produce it efficiently.

Standard operating procedures help you and your staff:

- Know which animals produce milk that cannot go into the bulk tank to prevent contamination of milk in the tank;
- Practice the same routine every milking, which is essential to obtain a beneficial operation.

Here we will provide a basic guideline to ensure a healthy udder, which is essential to the production of high quality milk and prevents the introduction and spread of mastitis, a serious and costly disease that directly affects the yield, safety and quality of milk produced.





Prevent and control contagious mastitis

Contagious mastitis is an infection of the udder caused by bacteria such as *Staphylococcus aureus*, *Streptococcus agalactiae* and *Mycoplasma*. It is spread from an infected quarter to an uninfected one usually during milking. These bacteria are extremely adapted to live in the udder and, as a result, they can survive for a long period of time in an infected quarter. In some cases, there are no obvious changes in the milk or signs of clinical mastitis, but it can cause subclinical infection and decrease in milk quality and production.

In order to prevent and control this kind of mastitis there are some key points that must be observed:

- Before purchasing new cattle, check the herd's and animal's udder health and milk quality records. Do not forget to segregate new animals and milk them separately.
- Use proper pre-milking sanitation practices to prevent the spread of bacteria from water and contaminated towels.
- Milkers should wear gloves during milking in order to prevent the spread of bacteria from infected cows to uninfected ones.
- Ensure that milking equipment is properly sized, maintained and attached.
- Use proper post-milking teat sanitation practices with an approved teat sanitizer to prevent the spread of bacteria.
- Milk infected and treated cows last or separately into a bucket. If possible, separate infected cows from healthy cows also between milking.
- Implement plans for investigating the cause and proper treatment of clinical mastitis – in consultation with your veterinarian. This will ensure that the microbes causing the mastitis are properly identified and treated.
- Early detection of mastitis. The enzyme Lactate dehydrogenase (LDH) is highly correlated to common contagious infection. Since levels of LDH rise rapidly when an infection starts, by measuring this enzyme it is possible to detect an infection several days before it becomes clearly visible.
- Treat quarters with dry cow treatment at drying off to assist in curing of existing infections and for prevention of new ones following your veterinarian's advice and/or use a dry cow sealant to prevent new dry period infections.
- Cull cows that are chronically infected with contagious mastitis to decrease the risk of new infections in the herd.
- Implement a biosecurity plan to prevent the introduction of animals with contagious mastitis, utilizing milk culture and SCC tests.

Prevent and control of environmental mastitis

Environmental mastitis results from infection of the udder by pathogens such as *Escherichia coli*, *Klebsiella* sp., *Streptococcus uberis*, *Streptococcus dysgalactiae*, *Prototheca* sp, and others. These pathogens are originated from cattle's environment especially manure. It often leads to clinical mastitis with high severity, but they can also cause subclinical infections. Most of new environmental infections occur during the dry period and after calving. In order to prevent and control this kind of mastitis, some key points must be observed:

- **The most important management practice is to keep the milking cows' and dry cows' environments as clean and dry as possible. This will greatly reduce the incidence of environmental bacteria.**
- Ensure that teats are thoroughly cleaned and dried before milking.
- Use proper pre-milking sanitation practices to prevent the exposure of the teat ends to bacteria.
- Prior to milking, use an approved pre-milking teat sanitizer to reduce new cases of environmental mastitis. The product must be in contact with teats for at least 30 seconds and must be completely removed before attaching the unit. This will reduce the number of environmental bacteria on the teat.
- Implement practices that encourage cows to stand for at least 30 minutes after milking.
- Ensure that milking equipment is properly sized, maintained, and attached. This will assist in reducing the incidence of bacteria entering the teat end.
- Follow recommended milking procedures to reduce the spread of bacteria.
- Use dry cow treatment on all quarters at drying off to treat existing infections and help prevent new ones following the advice of your veterinarian. and/or use a dry cow sealant to prevent new dry period infections
- Vaccinate against coliform mastitis to reduce the severity of the impact of clinical mastitis due coliform bacteria following the advice of your veterinarian.
- Ensure ration provides adequate vitamins E and A, beta-carotene, selenium, copper and zinc to help maintain the animals' resistance to mastitis.



VII. Personal hygiene

Access to animals should be limited to essential people.

- Workers must never wear the same clothes for milking as were used for other farm duties. Provide good, clean and comfortable clothes for the workers.
- Insist workers thoroughly wash their hands before milking cows and after working with sick animals.
- Insist workers wear protective plastic or rubber gloves for handling calving and milking cows.
- Wash farm clothing with detergents and bleach or washing soda. Provide on-farm laundry facilities for employees.
- Provide accessible and functioning hand wash stations.



4



4. Increase animals' resistance to diseases

I. Use vaccines

Vaccination is an essential component of a Biosecurity plan in many countries. It primes an animal's immune system to respond quickly to a subsequent infection by specific microbes, usually viruses and bacteria. The quicker immune response of vaccinated cattle will often prevent diseases from developing and if they are exposed to disease, they may not get as sick.

Vaccination can also reduce the spread of disease-causing microbes. Reducing the impact of infection on an animal's health helps maintain its productivity and reduce the need for treatment.

Vaccination relies on the response of animal's immune system to provide protection. Its effectiveness depends on the vaccine being properly stored, handled and administered to a healthy

and well-nourished animal whose immune system is able to respond to the vaccine.

For herd additions, these vaccines may be given during the 4-week isolation period.

Consult your veterinarian for specific recommendations and prepare a vaccination calendar for your herd.

II. Ensure good nutrition

Nutrition plays a major role in the barrier between health and disease. It is the animal's nutritional status that decides whether it will stay healthy or will succumb to disease when exposed to a disease-causing agent.

This is because the development of infectious diseases can be affected by the animal's diet, as the proper functioning of the animal's immune system (the system that fights

off infectious disease) needs an adequate supply of protein, vitamins and minerals.

An animal being provided good nutrition is more resistant to disease, which means that a healthy animal is more likely to remain healthy if exposed to infection-causing agents, while animals with improper nutrition are much more susceptible to disease.

When an animal is exposed to an infectious agent, its organism try to fight the infection by mounting a response composed of white blood cells and other "killer" factors. However, in order to do that, the organism needs energy and other "building" factors that are only found in the diet. Specific nutrients required for the fighting process are: proteins, minerals such as zinc, copper, selenium and iron, and vitamins such as vitamin A and E.



Also, it is important to recognize that a good nutrition involves the need of a perfect balance between:

- The quality or types of foods supplied (forage, grain, salts and supplements).
- The quantity of food.
- Balance between its ingredients (fiber, energy, protein, minerals and vitamins).

Remember that: dairy cattle should be fed diets that have been formulated to meet their needs for maintenance; growth, production and reproduction. Feed ingredients and finished feeds should be wholesome, carefully mixed and stored and delivered fresh to the cattle.

III. Reduce stress

The successful producer will create a cow environment that minimizes stress, excessive competition for resting, feed and water, and potential

for injury and disease. Common herd health problems associated with poor cow environment and comfort include: mastitis, lameness, hock injuries, metabolic and infectious disorders.

A stressed environment can lead to the liberation of some substances in cows' body that directly affect the immune system. In order to enhance animals' resistance to disease, it is important to pay attention, among other things, in some key factors:

- **Floors** - All walking surfaces should be non slippery to reduce injuries, increase mobility to feed, water and resting areas, and to encourage estrous activity.
- **Design and Dimensions** - Properly maintained free stalls or tiestalls are the key to cow comfort on most dairies. Stalls should provide a clean, dry, and comfortable location to lie down. Properly designed free stalls include consideration of stall

bed, stall partition, and bedding material. Dimensions and design of the stall should allow the cow to stand up and lie down naturally.

- **Bedding** - Straw, sawdust, sand and shredded newspaper can all work well as bedding material. Unfortunately, in too many dairies the choice is often determined more by the manure handling system and less by consideration of the cows' comfort. Any bedding used must keep the cows clean and dry. Keeping stalls well-bedded maximizes moisture absorption, adds resilience, makes stalls more comfortable, increases usage and reduces potential for injury.
- **Ventilation**- A ventilation system for a dairy facility should prevent high humidity in winter and heat build-up in summer. Free stall fronts and partitions should be open enough to allow air movement across the cow.

Conclusion

Disease prevention methods must remain ongoing to protect the herd from exposure.

Owners have the primary responsibility to protect their herd. Savvy livestock owners not only implement biosecurity protocols but insist they are adhered to at all times by workers, visitors, drivers, neighbors, etc. These strategies can successfully prevent the introduction of disease to herds, as well as prevent the spread of diseases already present.

To protect their herds, owners commonly:

- Manage new arrivals
- Manage and control farm traffic
- Manage groups of animals and their housing
- Sanitize and disinfect
- Increase animal's resistance to diseases

There are a number of ways in which infectious disease agents can enter a farm. The goal of preventing entry utilizing a strict biosecurity plan may be overwhelming or seem impractical. For this reason it is recommended that the initial primary focus of the biosecurity plan be the main route of entry onto the farm. A determination of where the risks / routes of disease-introduction are at on a particular farm allows for the prioritization of intervention of exposure and will also serve to establish practices that can be easily implemented.

In other words, an individual, farm-specific approach to biosecurity is more desirable than relying on general recommendations. Review strategies for health protection and sanitation management of your herd using this guide. Consult a veterinarian or your DeLaval representative regarding which biosecurity strategies to use in your herd health program. Establish goals for disease prevention and provide the training necessary to reach these goals.



Implement the appropriate strategies to insure the health and comfort of your cattle. Make sure all workers and visitors are aware of their role in safeguarding the health of the herd. Although the specifics of a biosecurity program will differ from farm to farm, the primary goal is to keep everything as free of germs as possible and to limit contact between and with animals.

6. Checklist for Biosecurity

6

Standard Operation Procedures

Preventing the introduction of diseases

Livestock

Maintain a closed herd

- ✓ Use home-grown replacements for maintaining and increasing herd size.
- ✓ Use only artificial insemination for breeding and not bring in bulls.

New introductions and returning

- ✓ Limit the frequency and number of new introductions.
- ✓ Limit purchases to a few sources with known and trusted herd health programs.
- ✓ Obtain a complete herd health history prior to purchasing and introducing new animals.
- ✓ Request copies of vaccination and treatment records for all purchased animals.
- ✓ Vaccinate newly acquired animals prior to receiving them.
- ✓ Have a separate area far-removed from the animal housing facility for loading and unloading of animals on to trucks.
- ✓ Handle all animals that temporarily leave your operation as new introductions when they return.
- ✓ Limit the contact of your animals with others during their time off your farm.
- ✓ When animals are off your farm, prevent the sharing of stalls, tack, feed or water with animals from other operations.
- ✓ When animals are off your farm, prevent the sharing of trailers, grooming supplies, reproductive equipment, needles or syringes with other farms.
- ✓ When animals are off your farm, prevent reproductive contact with animals from other herds.

Isolation and quarantine

- ✓ Isolate and monitor purchased cattle for 30 days before allowing contact with the herd (quarantine).
- ✓ Your isolation and quarantine facilities should be distant from all other animal areas and separate from one another.
- ✓ Prevent the sharing of equipment (feed, treatment, milking) between isolation and quarantine animals.
- ✓ If equipment must be shared, wash it in warm water and soap to remove visible contamination, rinse, disinfect and rinse it again before removing it from one location and moving it to another.
- ✓ Immediately isolate sick animals from the herd to minimize disease spread.
- ✓ Prevent direct contact between isolated animals and others.
- ✓ Prevent the sharing of ventilation, feed/water and equipment between isolated or quarantined animals and others.
- ✓ Use separate facilities, equipment, and staff to handle isolated livestock.
- ✓ If it is not possible to use separate facilities, equipment and staff, handle or visit the isolated animals LAST.
- ✓ Clean and disinfect all equipment, clothing, boots, etc. that have come into contact with ill and isolated animals.
- ✓ Prevent new additions and animals returning from sharing water, feed, facilities or bedding with your other animals.
- ✓ Test for key diseases (BVD, IBR, Johne's disease) before taking animals out of isolation or quarantine.

6. Checklist for Biosecurity

Standard Operation Procedures

Preventing the introduction of diseases

Humans

- ✓ Limit access to your farm.
- ✓ Have only one gated entrance to the animal areas on your farm to better control and monitor visitors and vehicles. Keep it locked when not in use.
- ✓ Minimize visitors and traffic on your farm.
- ✓ Have posted signs at the farm entrance to inform visitors to stay off your farm unless absolutely necessary, and to only enter with permission. Provide a phone number at your farm entrance for visitors to call and make an appointment.
- ✓ Have posted a visitor biosecurity sign that clearly lists specific measures to follow when on your farm.
- ✓ Require visitors to follow your farm's biosecurity procedures.
- ✓ Require visitors and vehicles to park in designated areas at the entrance to your farm and away from all animal areas.
- ✓ Use only on-farm vehicles for transporting visitors within your operation.
- ✓ All visitors should be accompanied by someone from the farm at all times.
- ✓ Provide clean coveralls and disposable or disinfected rubber boots and require that these items be worn by all visitors at all times while in animal areas.
- ✓ Require visitors to avoid livestock areas and restrict them from contacting or handling your animals (unless absolutely necessary).
- ✓ Require delivery vehicles and personnel to follow your farm's biosecurity guidelines regarding parking, driving, and animal contact.
- ✓ Require that all deliveries be left at the perimeter of your farm.
- ✓ Animals should be loaded out and delivery facilities should be located at the perimeter of your farm.
- ✓ Take measures to prevent runoff from other operations from entering your operation.
- ✓ Require that employees that have contact with livestock at other locations (including their own home) use strict biosecurity measures while on your farm (e.g. provide them with clean boots and coveralls to wear).
- ✓ Educate yourself and train your employees to recognize and report diseases.
- ✓ Maintain a written Biosecurity Plan and have regularly scheduled meetings to educate and update those involved.

Birds, pests and pets

- ✓ Prevent your animals from having contact with free-roaming animals (e.g. wildlife, cats, dogs, etc.).
- ✓ Keep farm access routes, parking areas, yards and storage areas clean and tidy to avoid attraction of birds or rodents.
- ✓ Minimize bird contact and nesting in your operation.
- ✓ Maintain a rodent control program.
- ✓ Secure all feed storage areas, and clean up spilled feed to minimize access by pests.
- ✓ Prevent the contamination of cattle feeds with feces from animals, including farm cats and dogs.
- ✓ Develop routine surveillance of buildings and perimeters for conditions that encourage pests.
- ✓ Apply appropriate measures of insect control. Use integrated pest management.
- ✓ Store grain in bird-proof containers.
- ✓ Use waters that are too deep for birds to stand in, and keep the water below a level that can be reached by birds perched on the edge.
- ✓ Remove nests.

Standard Operation Procedures

Preventing the spread of diseases

Animal separation

- ✓ Ensure maternity area is clean and dry.
- ✓ Separate new-born calves from cows/heifers within a few hours of birth.
- ✓ Ensure that all calves ingest adequate amounts of disease-free colostrum within the first 6 hours of life.
- ✓ Rear calves in individual pens, such as calf hutches, to reduce the risk of transmitting infections from older calves and adult cattle.
- ✓ Calves should have a separate source of water.
- ✓ Clean bedding of calf housing facilities regularly to reduce the number of microorganisms in the calves' environment.
- ✓ Clean and sanitize buckets, bottles, nipples and other feeding equipment before every use.
- ✓ Store and handle equipment so it does not become re-contaminated.
- ✓ Replacement cattle should be kept off pastures where manure has been spread for six months, and separate from other cattle.

Sanitation and disinfection management

Manage manure

- ✓ Restrict cattle access to manure storage.
- ✓ Select an appropriate manure management system.
- ✓ Ensure adequate size for dairy manure storage.
- ✓ Clean alleyways and main congregation areas at least daily.
- ✓ Pay particular attention to calf bedding in pens and hutches.
- ✓ Keep bedding dry and under cover.
- ✓ Store manure and feed away from the barn.
- ✓ Frequently removal waste, once to several times per day
- ✓ Transport to designated storage or disposal area, out of contact with animals with designated equipment.

Control feed and feed equipment

- ✓ Prevent access of animals to stored feed and feeding areas.
- ✓ All feeds should be evaluated for their risk of introducing and/or transmitting disease.
- ✓ Feeds from outside sources must have acceptable, documented quality assurance program.
- ✓ A feed sample should be collected and frozen for diagnostics if contaminated or suspected.
- ✓ Prevent access to and contamination from any animals that may urinate or defecate.
- ✓ Protect feed from weather to prevent spoilage and mycotoxin development.
- ✓ Ensure feed and/or process properly to ensure appropriate conditions are achieved.
- ✓ Spilled feeds should be frequently cleaned up and disposed of before attracting rodents and other wildlife, fostering spoilage and serving as breeding ground for pests.
- ✓ New feed should not be added to or poured on top of older feed.
- ✓ Maintain the face of silage stored in bunkers by removing enough each day.

6. Checklist for Biosecurity

Standard Operation Procedures

Preventing the spread of diseases

Sanitation and disinfection management

Cleaning and disinfection

- ✓ Thoroughly clean all objects to remove any visible debris (manure, dirt, bedding) before applying a disinfectant.
- ✓ Always use the proper concentration of any disinfectant and mix according to the product label.
- ✓ Always allow a disinfection solution contact time to “sit” and work.
- ✓ Refer to the disinfectant label to determine the amount of contact time that is recommended.
- ✓ Use different equipment to feed and to clean pens, or completely clean between use.
- ✓ Never step in the feed bunk.
- ✓ Never leave manure-hauling equipment in pens with different groups of animals.
- ✓ Clean contaminated vehicles and equipment before use around healthy cattle.
- ✓ Routinely clean and disinfect feeding equipment and cattle handling equipment.
- ✓ Routinely clean and disinfect equipment used to medicate cattle.
- ✓ Facilities should provide a clean area for restraint, treatment, and isolation of sick cattle.
- ✓ Facilities should prevent cross-contamination of water, manure, feed, or equipment between groups.
- ✓ Have a plan to manage group size, age distribution, and animal flow to reduce risk of disease.
- ✓ Handle healthiest animals first (young calves, healthy older cattle) and sick animals last.

Milking equipment

- ✓ This equipment must be rinsed, washed, sanitized and disinfected between every milking, or, at a minimum, once every 24 hours.
- ✓ Any known diseased animals (mastitis) should be milked last in the sequence

Sanitize Between Animals

- ✓ Some facilities have back flush systems directly installed.
- ✓ Rinse bucket- removes milk residue and pathogens in the milking claw; not milk hoses

Teat Dip Cups

- ✓ Organic buildup in the cups (feces, milk, urine, and bedding) deactivates the chemicals.
- ✓ Must be monitored for contamination. Solution dumped down the drain, cup promptly rinsed, washed with detergent and warm water, and then refilled with fresh dip before using on another animal.
- ✓ Never dump remaining dip back into the original container.
- ✓ After each milking, teat dip cups should all undergo a cleaning/washing procedure.

Standard Operation Procedures

Preventing the spread of diseases

Sanitation and disinfection management

Calf Equipment

- ✓ Esophageal feeders- should be cleaned and disinfected between animals and stored in an area that does not allow contamination from flies or feces.
- ✓ Milk bottles should be removed after eating .
- ✓ Nipples and bottle rinsed with water, washed with detergent, rinsed again, inverted and allowed to dry completely before the next feeding.
- ✓ Clean bottles and nipples should be kept free from environmental contamination.
- ✓ Buckets should be rinsed after all milk is consumed to remove the residue.
- ✓ Proper personal hygiene needs to occur before preparing milk and feeding the calves.
- ✓ Hands should be thoroughly washed and disposable gloves worn if possible.
- ✓ Coveralls or clothing and footwear should be clean; free of organic matter.

Treatment Equipment

- ✓ All equipment used for treatment should be cleaned and disinfected.
- ✓ Anything contaminated with blood, saliva, nasal secretions, urine, feces, or that comes in direct contact with infected skin or tissues must be thoroughly cleaned. Some items may need to be disposed of rather than cleaned and re-used
- ✓ Store clean, dry items in drawers, plastic bags, or kept covered.
- ✓ Always work with sick animals after all healthy animals have been treated.

Increase animal's resistance to diseases

Vaccines

- ✓ Have a strategic vaccination and parasite control plan in place for all cows.
- ✓ Consult a veterinarian for specific recommendations regarding the use of vaccines.
- ✓ Prepare a vaccination calendar for the herd.

Good nutrition

- ✓ An animal being provided good nutrition is more resistant to diseases.
- ✓ Good nutrition relies upon three factors: quality and quantity of food supplied and balance between ingredients (fiber, energy, protein, vitamins and minerals).

Reduce stress

- ✓ Walking surfaces should be non-slippery to guarantee good mobility.
- ✓ Stalls should provide a clean, dry and comfortable environment for animals.
- ✓ Facilities should have a good ventilation system to prevent high humidity in winter and heat build-up in summer

Notes

Notes



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