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# Preventing disease spread within your farm - biocontainment

## Information leaflet farmers, advisors and vets in Northern Ireland



THIS GUIDE IS PART OF A SERIES OF LEAFLETS ON VARIOUS ASPECTS OF BIOSECURITY

1. Understanding infectious diseases
2. Bioexclusion: keeping infectious diseases out of your herd
3. Purchasing stock: reducing disease risks
4. Biocontainment: preventing disease spread within your farm

The health of your stock is as important as their milk yield, growth rate or fertility and biocontainment has an important influence on all of these. The information in this leaflet can be used to assist in formulating a Biocontainment Plan for your farm to manage infectious disease threats. In this document the terms farm and herd are used interchangeably. But it is important to recognise that the term “farm” includes the home farm and other parcels of land which are occupied by the herd.

## THREATS OF INFECTIOUS DISEASE TO HEALTHY STOCK

Threats to the health of your stock come from outside your farm and from within your farm.

### Threats from outside the farm

The greatest risk of introducing disease into a herd is by the addition of new animals. The ‘Bioexclusion: keeping infectious diseases out of your herd’ and the ‘Purchasing Stock: reducing disease risks’ leaflets deal with limiting the risk of introduction of disease to a farm.

### Threats from inside the farm

These threats arise from infections that have either been recently introduced into a herd or that are endemic. An infection is said to be endemic when it is maintained in the herd over time, although disease caused by it may only be apparent at certain times or under certain conditions e.g. during herd expansion or periods of production or management stress.

## WHAT IS BIOCONTAINMENT?

Biocontainment describes the practices needed to reduce or prevent the spread of infectious diseases within a farm, typically between different management groups.

Biocontainment should be the main focus when dealing with an on-going disease outbreak but it is preferable to build it into good farming practice to prevent disease problems occurring in the first place.

In some cases you may have to live with the presence of the infectious agent, but seek to prevent the disease it causes, e.g. Leptospirosis. For others, you may choose to eradicate the infectious agent e.g. *Neospora caninum* (the cause of Neosporosis), while for others eradication programmes are in place (e.g. BVD virus).

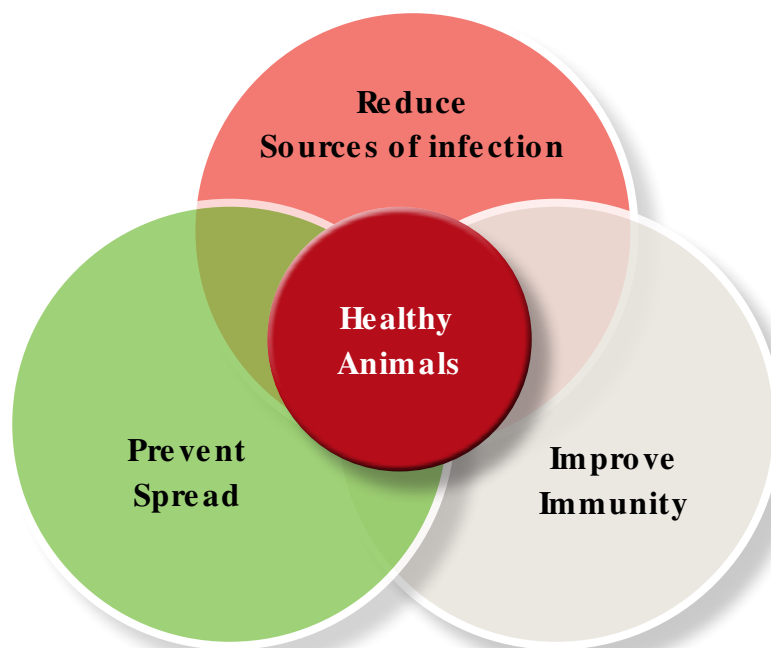


Figure 1: A Biocontainment Plan protects animal health by reducing the sources of infection, preventing the spread of infection and improving animal immunity.

## KNOW YOUR HERD HEALTH STATUS

Do you know which infectious diseases are in your herd, and how many animals have been infected? This information defines your herd health status. Awareness of herd health status becomes even more important when embarking on management changes - regrouping of animals from different management groups or expansion.

You can assess the health status of your herd by:

1. Using your farm records.
2. Working with your vet.
3. Testing your cattle.

### 1. Use your records

Keeping good records is essential to track changes in herd health over time. A production drop (e.g. in milk yield) can be the first sign of a disease outbreak. Records are particularly important with subclinical infections as you may see poor performance (e.g. high cell counts) before seeing clinical signs of disease.

Mastitis Recording Chart					
Cow ID	Date	Quarter Affected	Drug Treatment	Num of Tubes	Comments
E.G. 93	19/05/15	LB	Drug xyz	///	Clots - Cow sick & back in milk

**Know your Herd Health status**

Records of herd production (e.g. calves reared, weanlings sold, milk yield, slaughter weights), health (e.g. number of antibiotic treatments, deaths, involuntary culls) and fertility (e.g. six-week in calf rate) can be used to assess your herd's general health status. Analyse records for trends over time.

- have you spent more on treatments for infectious diseases in calves and adult stock than last year?
- are cell counts higher than last year?
- are the cattle taking longer to finish this year?
- have more cows aborted (>5% is a problem) than last year?

### 2. Talk to your veterinary practitioner

Building a relationship with your veterinary practitioner is important to ensure that they are involved in preventing disease on farm as well as treating disease outbreaks. Your veterinary practitioner is best placed to devise a herd health plan for your farm.

Work with them to prevent, investigate and respond to disease outbreaks by:

- discussing and assessing infections present in your herd.
- developing an overall herd health plan for your farm.
- examining sick cattle.
- sampling affected and unaffected animals.
- having post-mortem examinations performed on dead animals on the farm or at the laboratory.

This will allow you to work together to plan disease control measures specific to your farm.

As well as investigating individual sick cattle and disease outbreaks, your own veterinary practitioner can assess the strengths and weaknesses of your farm and advise on changes required to improve herd health practices and prevent disease outbreaks. Animal health management should take a structured approach. Monitor the herd over time even when no clinical disease is present. Disease impact is much easier to identify when there is baseline data available.



*Make time to discuss a herd health approach with your own veterinary practitioner.*



*Individual blood screening can provide a large amount of information on which infections animals have been exposed to.*

### 3. Test your cattle

Tests on the whole milking herd e.g. bulk milk tank (BMT) samples or individual live animals e.g. blood or tissue (ear) samples or dead animals (e.g. post-mortem examination) can tell you about the the specific infections circulating within your herd. Knowing the types of infections present allows you and your veterinary practitioner to plan specific disease control measures. This is particularly important in cases of abortion, see page 9.

*Bulk milk tank testing:* Screening tests can be used to establish the exposure of your herd to a range of infectious diseases but there are some limitations to tests and how they are interpreted. Some tests detect the infectious agent (e.g. the virus) while others detect the animals' responses to these infectious agents (e.g. antibodies to the virus) – these two results are interpreted differently. It is particularly important to discuss BMT results with your own veterinary practitioner in conjunction with guidance from the testing laboratory. For example, BMT testing is not useful in investigating for Johne's Disease.



*BMT testing can provide information on which infectious diseases the herd has been exposed to, but the results need careful interpretation.*

Having established the disease status of your herd, you now need to know what you can do about maintaining or improving it by implementing a Biocontainment Plan.



## BIOCONTAINMENT PLAN

A specific biocontainment plan needs to be developed for each step in conjunction with your veterinary practitioner. The plan should have 3 steps (figure 1):

**Step 1** Reduce the sources of infection by ensuring all animals are healthy.

**Step 2** Prevent the spread of infection to susceptible animals.

**Step 3** Improve immunity of susceptible animals.

### STEP 1 REDUCE SOURCES OF INFECTION

#### SOURCES OF INFECTION

There are two main sources of infection on your farm:

1. Infected animals.
2. Contaminated environment, equipment and visitors.

#### Infected animals

- **Clinically sick animals:** A clinically sick animal is one that is showing visible signs of illness. Identifying these animals is often the first sign of a disease problem in the herd. These clinically sick animals often produce large amounts of the infectious agent, potentially spreading it to other animals and shedding the agent into the immediate environment; e.g. in manure, urine, nasal secretions, abortion and calving fluids.
- **Sub-clinically affected animals:** Animals can be infected without appearing ill (their performance may be reduced). Sub-clinically affected animals can only be identified by using diagnostic tests and closely monitoring performance. An example of this is a cow with a high somatic cell count. She may have an infection in her udder even though there are no obvious signs of mastitis. Sub-clinically affected animals can often also act as carrier animals (see below) shedding infectious agents into the farm environment and directly to nearby animals. (Figure 2). Thus, once you detect any sick animal in a group you should look further for any sub-clinical cases. Figure 2 shows the typical distribution of infected animals for an endemic disease such as IBR.
- **Carrier animals:** These animals appear healthy but may shed infectious agents particularly when stressed, thus placing exposed animals at risk. Identification of carrier animals requires sampling and testing for potentially infectious diseases. For example, older healthy carrier animals can be the ultimate source of respiratory disease in susceptible young animals who share the same air space. Often the number of carrier and subclinical cases may be far greater than the number of clinically sick animals (Figure 2).

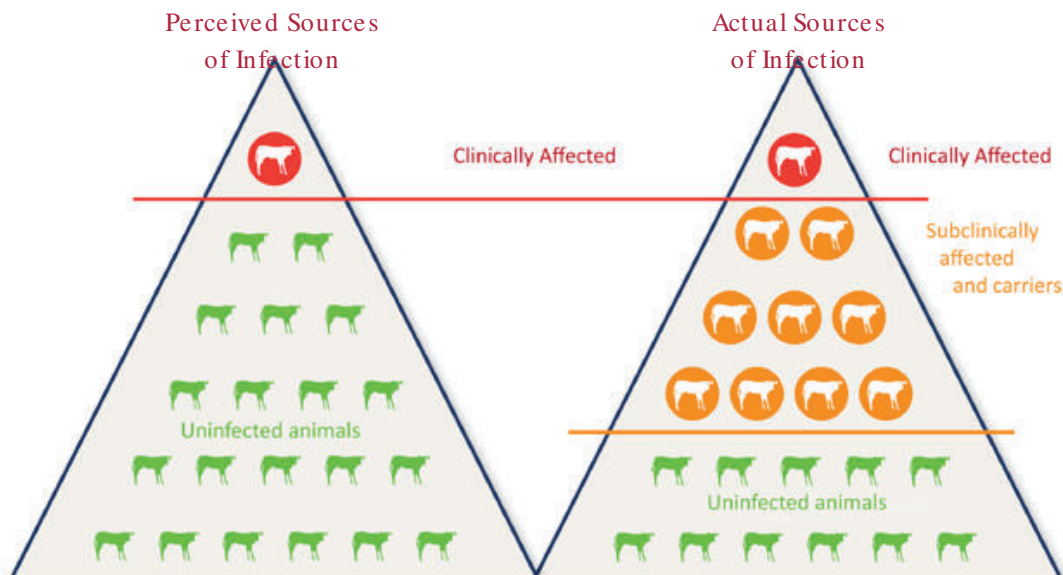


Figure 2: The typical pattern of infection for an endemic disease where there can be a high number of subclinically affected or carrier animals.

## Case example

Latent carriers of IBR in dairy herds may shed virus when stressed e.g. at calving or at peak milk. This presents a risk to incoming heifers who have not been exposed to the virus before (Figure 3). The information leaflets on IBR give more details on reducing the spread of IBR from carrier animals [www.animalhealthni.com](http://www.animalhealthni.com).

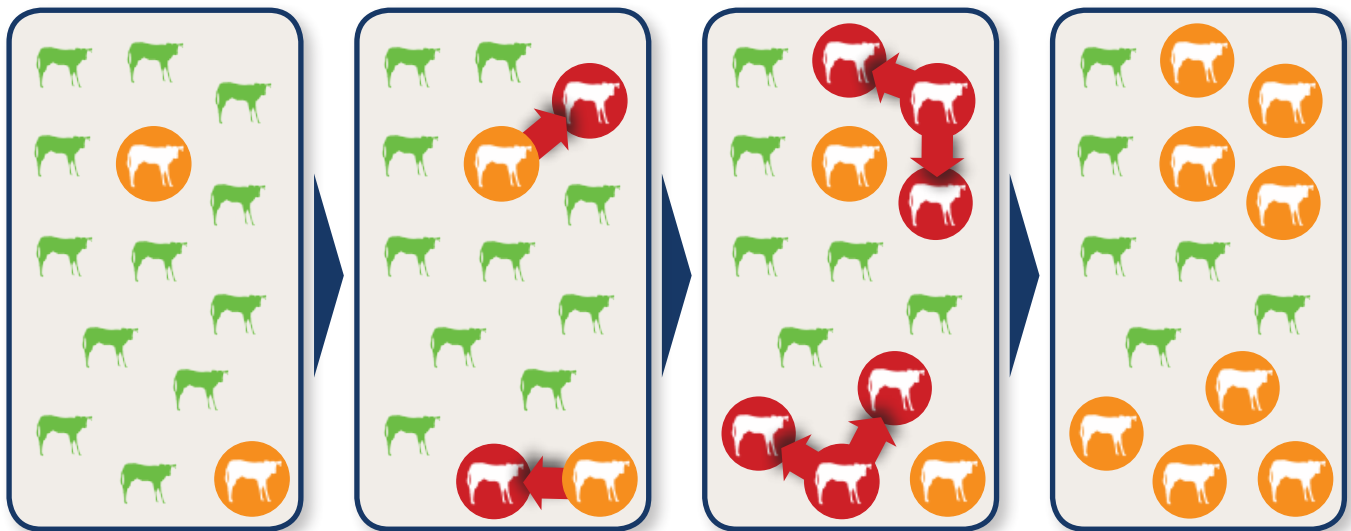
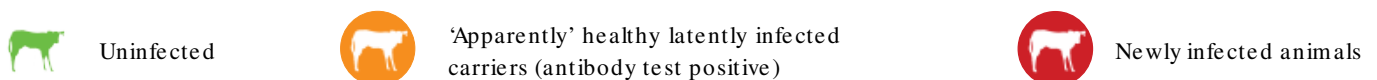


Figure 3: Spread of IBR following shedding of virus from carrier animals.



Mixing of older animals with younger animals presents a risk of transmitting infectious agents from older animals, who are often immune but may be carriers, to the more susceptible younger animals.

There is also the risk of infection, which may be endemic in the home herd, becoming a clinical outbreak at times of stress or during herd expansion due to spread to susceptible purchased stock. Mixing or regrouping is also stressful to cattle in itself.

### Contaminated environment, equipment and visitors

Manure or contaminated bedding or the airspace can act as sources of infection. For example, a calving area contaminated with *Salmonella* or Johne's disease or pasture contaminated with parasites pose infectious disease risks challenges to younger animals.

Contaminated equipment (e.g. trailers, crushes, calving ropes, used needles, tongs, stomach tubes), clothing (boots, soiled gloves) or unwashed hands can also act as sources of infection. Further information can be found in the AHWNI Leaflet 'Bioexclusion: keeping infectious diseases out of your herd. <http://www.animalhealthni.com/Biosecurity/20170609%20AHWNI%20Bioexclusion%20leaflet.pdf>

## WHAT TO DO ABOUT SOURCES OF INFECTION?

### Reduce infection from ANIMALS

#### Avoid bringing in new diseases

Having stringent bioexclusion practices will help prevent new diseases coming into your herd from outside – see the leaflet 'Bioexclusion: keeping infectious diseases out of your herd'. <http://www.animalhealthni.com/Biosecurity/20170609%20AHWNI%20Bioexclusion%20leaflet.pdf>

#### Diagnose and treat sick animals promptly

Treatment reduces the number of sick animals on the farm and potentially reduces the amount of infectious agent being produced by the animal. Identifying sick animals quickly is very important to get the best response to treatment so good stockmanship is needed. Your veterinary practitioner may recommend treating all animals in a group, not just the sick animals, e.g. in cases of respiratory disease outbreaks.

#### Isolate or remove animals from the group/ herd

Individual sick animals should be isolated from the rest of the herd during treatment. For some diseases, treatment is not appropriate because the animal will not respond e.g. those persistently infected (PI) with BVD virus. Once identified, the best option is to move PIs promptly to an isolation area and cull as soon as possible.

### Reduce infection from the ENVIRONMENT

You can reduce the source of infectious challenge from the farm environment by:

#### Reducing stocking density

Reducing stocking density in critical areas such as calving pens and calf houses will reduce infection challenge. Ensure that housing and handling facilities remain adequate for the size of your herd.

#### Cleaning and disinfecting contaminated housing

Calving pens, isolation boxes and calf pens must be cleaned and disinfected with approved disinfectants after use. There is a full list available on the DAERA website: <https://www.daera-ni.gov.uk/publications/approved-disinfectants>.

#### Composting manure and storing slurry

The longer that manure is allowed to compost or slurry is stored the lower the risk of disease transmission.

#### Regularly emptying and cleaning feed and water troughs

Keep troughs at a height that they can only be accessed by your cattle. Water troughs should be regularly checked to ensure they are clean. Any persistent source of dampness or water leakage can promote survival of parasites and bacterial. Ensure pipes, taps, drinkers, gutters and roofs are adequately maintained.

#### Reducing equipment and machinery contamination

- Clean and disinfect equipment after each use: e.g. slurry spreading equipment, trailers, calving aids.
- Use disposable equipment where possible: e.g. needles, syringes, gloves and dispose of appropriately.
- Clean and disinfect animal handling equipment after each use: e.g. tongs, stomach tube used to feed scouring calves.

Overall reducing the number and scale of infectious sources on the farm makes reducing the spread of disease easier.

**STEP 2 PREVENT THE SPREAD OF INFECTION**

The second goal of a Biocontainment Plan is to prevent the spread of infection on your farm.

Examples of these different routes of infection spread or transmission are outlined below.

**Transmission**

**Transmission** is the spread of an infectious agent (e.g. bacteria, viruses, parasites or fungi) from an infected animal or group to another animal or group. Transmission routes may be considered as direct or indirect, depending on the degree of animal contact. They may also be described as vertical or horizontal depending on whether or not the agent can pass from the dam to her calf.

**Direct transmission** of diseases occurs when disease-causing agents spread between animals that are in close contact e.g. respiratory viruses through the air or by nose-to-nose contact, *Leptospira* through urine, *Salmonella* through fresh manure.

**Indirect transmission** of diseases occurs when disease-causing agents pass between animals which are not in direct contact, e.g. through contaminated environment, equipment, feedstuffs or water.

**Vertical transmission** occurs when a disease-causing agent is transmitted from dam to calf prior to or around the time of birth. This can be during pregnancy (e.g. BVD virus, *Neospora*, Johne's disease) or during/after calving (e.g. *Salmonella*). It occurs less commonly via colostrum (e.g. Johne's disease)

**Horizontal transmission** is the animal-to-animal spread of disease-causing agents that are not transmitted from the dam to the calf during pregnancy or around calving.



*Never allow new animals to mix with the home herd immediately as both groups can pass on infections.*



*Always unload new animals away from the home herd.*



## How to prevent the spread of infection

### Quarantine incoming animals

Bought-in stock may have infections new to your herd and if they come in close contact with animals immediately on arrival on-farm this will increase the infectious challenge to your home-bred cattle. See the leaflets 'Bioexclusion: keeping infectious diseases out of your herd' <http://www.animalhealthni.com/Biosecurity/20170609%20AHWNI%20Bioexclusion%20leaflet.pdf> and 'Purchasing Stock:reducing disease risks' for further information on quarantine plans.

### Isolate sick animals

Healthy animals need to be separated from sick animals, animals in other age groups, and animals of unknown disease status, e.g. an aborted cow. Isolate sick animals immediately, in an area away from other stock. An isolation area for sick animals should be easily disinfected and have a separate airspace and operate an independent method of waste disposal to that of healthy animals. This could simply be an isolated or stand-alone calf hutch or a stable.

Prevent manure runoff from isolation areas to the rest of the herd and if possible do not spread manure from isolation or young stock rearing areas.

### Dealing with abortions

Isolate the aborting cow from other cattle, especially from other pregnant cows until vaginal discharge has ceased.

- Submit samples to the laboratory – blood from the cow for brucellosis, salmonellosis, leptospirosis, BVD and neosporosis, and the foetus and afterbirth for post-mortem examination and culture. Tag the foetus and submit the tissue sample to a designated laboratory for BVD testing.
- Take hygienic precautions, especially when handling the products of abortion and any discharge from aborting cows, as some infectious agents which cause abortion in cattle can cause severe illnesses in exposed persons.
- Dispose of contaminated material hygienically, with thorough cleaning and disinfection of the isolation area and equipment.
- Closely monitor other pregnant cows to ensure that this is not an emerging abortion storm.



*An isolation area is essential on every farm.*



## Protect susceptible animals

### At handling

- Handle susceptible animal groups before other groups.
- Clean away gross contamination each time between groups.
- Change gloves between groups.

### At calving

- Remove newborn dairy calves from the calving pen box, immediately (within 15 minutes) after birth. This will limit the exposure of the newborn calf to a potentially contaminated calving environment.
- Use calving boxes for calving only, not as isolation boxes.
- Always feed healthy calves first, sick calves last.

### Housing or grazing animals

- Avoid mixing age groups in the same airspace to prevent aerosol spread of infections, e.g. respiratory diseases, or in yards especially where residence is prolonged.
- Avoid large group sizes; if an outbreak does occur, having smaller group sizes will help minimise the number of animals affected.
- Rear animals in batches - use an all-in-all-out system of matched groups so that older animals do not transmit infection to more susceptible younger animals.
- Ensure adequate ventilation in all housing and avoid overcrowding.

For specific diseases particular control measures may be necessary e.g. with Johne's disease it is critical to break the cycle of transmission in the calving pen. Ask your veterinary practitioner to carry out a Veterinary Risk Assessment Management Plan (V-RAMP) for Johne's Disease control.

## Reduce environmental and equipment contamination

- Always use clean disinfected equipment.
- Use separate equipment for different groups.
- Change needles and syringes regularly and always change between groups.
- Disinfect boots and change gloves when moving between animal groups.
- Ensure disinfection of visitor's clothing, boots, hands and equipment (bio-exclusion) on arrival.
- Provide boots and clothing for veterinary practitioners and other essential visitors to animals.
- Raise and shield feed and water troughs and mineral blocks to reduce contamination with manure and urine.

### STEP 3 IMPROVE IMMUNITY

The third action of the Biocontainment Plan is to improve the immunity of the most susceptible animals on your farm.

Biosecurity (both bioexclusion and biocontainment) and animal management (the treatment/removal of infected animals and vaccination for some diseases) are the major factors affecting disease control that can be influenced by a farmer. All of these factors ultimately determine the balance between disease and immunity. When the animal's immunity is overcome it will succumb to disease.

The most susceptible animals in the herd require particular attention to prevent the spread of infectious diseases. These are usually younger animals, particularly calves, which must rely initially on immunity received from their dams via colostrum. The level of colostral immunity of young calves can be assessed on blood samples using the ZST test.

Older cattle act as reservoirs of infection for younger animals – e.g. IBR latent carrier cows can infect calves, and animals returning from rearing farms or an out-farm can bring infection back to the home herd, and also can pick up infection from the home herd upon re-entry.

On the farm the animals which are most susceptible to diseases are:

- **The pregnant dam** - e.g. susceptible to BVD infection.
- **Colostrum-deprived calves** - calves that have not received sufficient protection via colostrum.
- **Naive animals** - have not been exposed to the infectious agent previously and not developed an immunity.
- **Young animals** - that do not have a fully developed immune system.
- **Late born calves** - in seasonal calving systems, these calves often succumb to infection as a result of build-up of disease-causing agents in housing during the calving season.
- **Stressed animals** - that have reduced resistance against infection.
- **Bought-in animals** - animals that have recently moved to the farm and may not be immune to diseases endemic on the farm.
- **Immunosuppressed animals** - cows around calving.

#### WHAT CAN YOU DO ABOUT THE SUSCEPTIBLE ANIMALS IN YOUR HERD?

There are a number of actions you can take in consultation with your veterinary practitioner to improve the immunity of susceptible animals.

- **Protect animals with immature immune systems**- provide adequate colostrum to all newborn calves. Separate newborn dairy calves from their dam and the calving environment immediately after calving. See AHWNI Johne's Bulletin 1:Key Risks at Calving <http://www.animalhealthni.com/Compulsory%20Phase/bulletins/20170322%20Johne's%20Bulletin%20v1.pdf>
- **Prevent immuno-compromising conditions** - e.g. a poor plane of nutrition, nutritional deficiencies, lameness, BVD or liver fluke infections.
- **Reduce stresses** which lower immunity particularly at high risk times- e.g. around calving, change of housing or weaning.
- **Use preventive medicines where appropriate** - e.g., vaccines, dry cow mastitis therapy, dosing for fluke and worms, treating for lice and ticks.
- Operate and maintain a **hospital area** and a **quarantine area** on your farm.
- **Optimise management activities** - ensure vaccines are given at the appropriate time, disbud calves rather than dehorning older animals.

## VACCINATION

Notwithstanding the importance of other biosecurity practices, vaccination has a central role in a Biocontainment Plan. When a group of animals is exposed to a disease, many, but not all, will become immune and recover (if they do not succumb to the disease). However not all disease outbreaks / exposures result in uniform immunity across the whole group of animals. In order to ensure that the majority of animals are immune to a given pathogen, and avoid the necessity for animals becoming infected to achieve this, vaccines have an important role to play in biocontainment.

Prevention of disease is usually best achieved by using vaccines well in advance of disease exposure. Many vaccines (particularly those containing a killed agent) require a primary course of two doses before protection is complete e.g. clostridial vaccines. However, some vaccines may be used as emergency interventions, in the face of an outbreak to decrease the severity of clinical signs e.g. live IBR marker vaccines.

Handling and administering vaccines according to the manufacturer's labelling or instructions is important in maintaining the integrity of vaccine and optimizing the protection achieved.

It is not advisable to perform several stressful procedures (e.g. moving pens, transport, dehorning, hoof trimming, etc.) at the same time as vaccination.

Datasheet claims for vaccines may differ from user's expectations e.g. reduction in clinical signs rather than complete prevention of infection or the need for adequate colostrum intake following use of a scour vaccine in the dam.

### Limitations of vaccination

Vaccination is rarely 100% effective in preventing disease, and individual protection from vaccination is variable. Vaccines are only as effective as the animal's immune response; injecting cattle with vaccine does not guarantee the herd's immunity. Factors such as insufficient time before exposure, poor nutrition, transport, social and weather-related stress can decrease the level of immune response.

In some instances, vaccination does not prevent disease but merely decreases the severity of clinical disease and/or decreases shedding of infectious agents e.g. *Salmonella*.

Although uncommon, vaccination carries the risk of adverse reactions ranging from mild injection site reactions to severe anaphylactic reactions. Regulatory authorities and vaccine companies ensure that rigorous standards are applied to ensure vaccines are of consistent quality, safety and efficacy.



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