Section 8

Herd Health and **Infectious Diseases**

by **Donal Sammin, Michael Casey, John Fagan, Kevin Kenny, John Moriarty, Ronan O'Neill, (all DAFM), David Graham (AHI), John Mee (Teagasc)**

Introduction

In this chapter we deal with those infectious diseases, and parasitic infestations, that occur relatively frequently in Irish dairy cattle. We focus on general principles for the prevention and control of these diseases, rather than providing detailed information on each disease as this information is readily available elsewhere.

1. **What are infectious diseases and why should they be controlled?**
2. **How do I keep infectious disease off my farm?**
3. **How do I recognise when animals are ill?**
4. **How do I treat animals who are ill?**
5. **How do I prevent the spread of infectious disease between animals on the farm?**
6. **How do I boost disease resistance in my animals?**
7. **How do I control parasites on the farm?**
8. **How do I prevent and manage abortion in cows?**
9. **How do I prevent and manage some of the specific infectious diseases of cattle (Johne's disease, BVD, IBR)?**

chapter 46

Herd Health and **Infectious Diseases**

1 What are infectious diseases and why should they be controlled?

Disease may be caused by a variety of factors. Infectious diseases are those diseases that are primarily attributable to infection of an animal or person by a viral, bacterial or fungal pathogen (a disease-causing agent). In some instances, infectious disease arises because of a combination of risk factors, for example housed cattle are predisposed to respiratory infection and disease by poorly-ventilated or overcrowded housing and/or by stresses associated with weaning, transport and mixing.

Infectious diseases have a negative impact on production and profitability – some animals may become ill and die or require veterinary treatment (clinical disease) but many animals in the herd may be affected to a lesser extent without showing noticeable signs of illness (subclinical disease). They might have a reduced milk yield or weight loss and this hidden aspect is quite often the most significant impact of disease on the profitability of farming enterprises. Some infectious diseases have an impact on the export trade as they are subject to regulation by countries that import dairy produce from Ireland and also by international animal health agencies (EU, OIE, etc.).

Some of these regulated diseases are known to occur in Ireland (endemic) in which case the Department of Agriculture, Food and the Marine (DAFM) is likely to have a control or eradication scheme in place to ensure continued market access, e.g. bovine tuberculosis (TB), brucellosis and BSE.

Other regulated diseases do not normally occur in Ireland (exotic) in which case the DAFM will have made provision to ensure that they cannot be readily introduced, or that if introduced they can be rapidly detected and eliminated e.g. foot-and-mouth disease (FMD) and Blue-tongue. Exotic viral diseases such as FMD have a tendency to spread very rapidly and have serious implications for the export trade, justifying extreme measures such as "stamping out" (killing all animals that may potentially have had any contact with the virus) to ensure that they are quickly brought under control.

Key message

Keep infectious disease out of your herd!

2 How do I keep infectious disease off my farm?

Checklist

Reducing the risk of new disease entering your farm

- Develop a biosecurity plan* with your veterinary surgeon.
- Control animal movement onto and within the farm.
- Control movement of people onto and within the farm.
- Control equipment and vehicle movement onto and within the farm.

* *Biosecurity refers to practices that help to prevent introduction of disease into farms and spread within the farm. Simple, practical, biosecurity measures tailored to your farm reduce the risks of introducing infectious disease into your herd.*

How to

Prevent introduction of infectious disease/cattle

- Ideally operate a fully closed herd with no animals brought in (purchased, borrowed (bull) or returned from show or mart).
- If an animal must be bought in, investigate the animal health history of the herd you are buying from.
- Quarantine all purchased animals and animals returned unsold from the mart for 2–4 weeks (ideally 4 weeks) before allowing them to join the herd.
- Identify infected animals (carriers) by testing new additions before introduction to the herd.
- Transport animals in farm-owned trailers or in trucks that have been washed down and disinfected.
- Prevent nose to nose contact with neighbouring cattle across field boundaries, by double fencing or you could agree with neighbours that cattle will not be grazed in adjacent fields at the same time.
- Ensure boots and hands are disinfected on entry to the farm, especially by those who have handled cattle on another farm. Ideally, provide workers with boots and clean overalls.

Any quarantine area should:

- be totally separate from any areas occupied by the main herd
- have equipment (e.g. buckets, tools) used exclusively in that area
- include animal handling facilities
- be clean. People should disinfect their hands and boots and remove their overalls before leaving this area and entering other areas of the farm
- be thoroughly cleaned and disinfected as cattle leave this area.

Checklist

Bought-in animals

Consider vaccination
Ask for records of vaccination; consult with your vet regarding the need for booster vaccination or further vaccination.

- Investigate the herd health status of source herd, particularly in respect to Johne's disease.
- Clinical history (ask your vet to contact the source herd vet).
- Check their treatment records.
- Check laboratory reports including test results for specific diseases - has the herd been tested for evidence of BVD, IBR and/or Johne's disease?
- Check parasite control (recent treatments for worm/fluke infestation).

Consider individual animal health status

- Ensure you have negative laboratory test results for BVD virus and for antibodies to IBR before purchasing animals.
- Monitor the health of bought-in animals while in quarantine.
- Check somatic cell count (SCC) of milking cows before they join the milking herd.
- Check faecal egg counts before and after dosing for signs of anthelmintic resistance.

Key risks

- Adding new animals to the farm without an adequate quarantine period.
- Allowing animals to return from marts, shows, or exhibitions without quarantine.
- Not knowing the disease status of the farm of origin and failing to test for specific diseases prior to addition to own herd.
- Allowing other animals (domestic or wild) to contact your livestock, feedstuffs, or water sources.
- Failing to prevent disease transfer via human contact, vehicles, or equipment (including needles and rectal sleeves) used on more than one animal.
- Spreading manure from other farms onto your land.

3 How do I recognise when animals are ill?

How to

Recognise when an animal is ill

The farmer, not the vet, is responsible for the early detection of a health problem. This can be difficult as the early signs of animal ill-health are not always obvious. Your aim is to detect ill-health early, when treatment is most likely to be effective.

Key fact

Freshly calved cows are the highest risk group for ill-health and so should be monitored most frequently.

How to

Monitor cattle for signs of ill health

Observe the group of animals from a distance before proceeding with a close-up examination of individual animals. Look for signs of abnormal behaviour, e.g. separation from the main group. Changes in feed intake, milk yield or body condition may also indicate an underlying health problem in a group of cattle.

Tip

Especially if new to cattle farming, familiarise yourself with the normal behaviour of your cows at grass - this will allow you to recognise unusual behaviour patterns in animals that are ill.

Herd Health and **Infectious Diseases**

Checklist

A poor body condition score is associated with:

- unusual behaviour: separation, not responsive or hyperexcitable, bellowing, etc.
- abnormal posture or difficulty in movement.
- abnormal appetite - reduced feed intake
- poorly filled gut or hollow flanks
- not chewing the cud
- coughing, grunting, straining
- rapid breathing (more than 30 breaths per minute)
- discharges (from the eyes, nostrils, mouth, vulva)
- abnormalities in faeces (excessively fluid) or urine (discolouration)
- abnormal coat
- abnormal swellings (e.g. abdomen, legs, udder)

Tip

Especially if you are new to cattle farming, become familiar with normal gut fill and flanks of cattle. The upper left flank behind the ribcage is the area overlying the rumen – a hollow flank suggests the rumen is not full and that the animal may have reduced its feed intake for some time (possibly due to illness) whereas a distended flank (if tense and drum-like) indicates bloat and may require urgent veterinary attention.

How to

Examine animals for ill health

If you suspect an animal is unwell, you may need to perform a closer examination. Before handling the animal, ensure you have restrained it securely and safely in a crush or self-locking head gate.

First check the animal's temperature and then inspect more closely whatever aspect of ill-health you had observed.

How to

Take an animal's temperature:

- Lubricate the digital thermometer.
- Insert the tip of the thermometer approximately 5cm into the rectum.
- Press the tip of the thermometer against the wall of the rectum.
- Remove the thermometer when the temperature reading has stabilised (approx. 30 seconds).
- Clean the thermometer after each use.

Key fact

The normal rectal temperature range in a cow or a bull is 38.0 to 39.0^{0}C. Temperatures of 39.5^{0}C and above indicate a fever usually resulting from infection, toxaemia or pain; temperatures below 38^{0}C may indicate shock or terminal illness.

Checklist

Important physical inspections to carry out on the restrained animal

1. Examine the udder (for heat, pain and swelling), the teats and the milk.
2. Inspect the head (eyes, mouth, throat, breath, ears).
3. Note the 'gut fill' of the animal.
4. If lame, lift the leg in question and examine the hoof.
5. If you need to examine a lame leg, use lifting equipment or a hoof-trimming crush to do the job safely.

Having completed both observations and examinations, you are then in a position to decide if and when veterinary care is required.

Key risks

- If animals are not observed regularly (at least daily) diseases may become quite advanced before signs are detected.
- Delayed disease diagnosis will reduce the response to treatment.

Laboratory Testing

- A wide range of laboratory tests are available to assess animal health status.
- The question is no longer can you test for a particular disease - but rather should you test? and how best to test?
- Laboratory testing for animal health always costs money- used wisely it can pay dividends, but used poorly it will yield no real benefit and may be misleading

Which animals to collect from, which samples to collect and which tests to request, are all specific to the disease in question and the objectives in mind. Detailed guidelines on the best approach to investigate each disease have been tailored for Irish farms and are available on http://www.animalhealthireland.ie
A few general principles on sample types and test types are outlined below.

Testing can be performed on individual animal samples or on combined samples (from two or more animals), e.g. a bulk milk tank or pooled faecal sample. Tests to determine infection status may be direct where they detect the presence of the infectious agent (e.g. PCR test for BVD virus) or indirect where they detect a hallmark of infection such as the presence of antibody (e.g. ELISA test for BVD antibody). No laboratory test is perfect. They all have limitations due to the type of technology they use, the type of sample they require, and the organism they are looking for. Modern professional laboratories are able to minimise these limitations. Incorrect test results remain a possibility but are very rare.

Test performance
Test sensitivity - The percentage of infected animals that actually have positive test results when that test is used. Ideally 100% - no false negatives.

Test specificity - The percentage of non-infected animals that actually have negative results when that test is used. Again ideally 100% - no false positives.

Pooled Testing
The extreme sensitivity of modern techniques such as PCR (Polymerase Chain Reaction) and ELISA (Enzyme-Linked Immunosorbant Assay) have meant that it is now possible to use a single laboratory test to evaluate several samples which have been carefully pooled together - primarily because of the cost benefits.

Herd Health and **Infectious Diseases**

Usually this does not affect how samples are collected on the farm as the pooling is done within the laboratory itself. Check with the laboratory in question for more details.

Bulk Milk

1. The bulk milk test can only test those animals which are contributing to the bulk tank on the day of sampling.
2. Remember cows which abort or are infertile don't always go into milk and therefore may not be contributing to the bulk milk tank on any given day.
3. Remember cows which are very recently calved, off-form or have been treated for antibiotics for any reason may not be contributing to the bulk milk tank on any given day.
4. A negative result when testing for the presence of infection agents may arise, even if one or more animals are infected, because of dilution effects.
5. A positive result when testing for antibodies may simply represent lifetime exposure of some of the milking herd to the agent in question.

Accreditation

The commonest standard used today is ISO17025:2005. This is a formal system which uses internal and external audits, on-site inspections and approval of methods/ documentation to strictly monitor the testing arrangements in place.

4 How do I treat animals who are ill?

Treatment of ill animals

How to

Comply with animal remedies regulations

- Only purchase medicines from your veterinary practitioner or other licensed supplier.
- Store medicines appropriately.
- Follow manufacturer's recommendations – only use medicines as indicated.
- Administer medicines at/by the recommended dose, route and frequency.
- If in doubt, consult with your veterinary practitioner before treating animals.
- Maintain a register recording details of individual animal treatments.
- Observe withholding times for milk/meat.

5 How do I prevent the spread of infectious disease between animals on the farm?

Checklist

Reducing transmission of an infectious disease that is already present within the herd by:

- understanding how infection persists on a farm or within the herd
- understanding how infection is transmitted between cattle
- reducing the burden of infection to which animals are exposed
- increasing the resistance of animals to infection.

How does

Infection persist on a farm or within a herd from year to year?

Infectious agents can persist (i) in infected animals and/or (ii) in the environment.

Cows can remain infected with some disease-causing agents without showing ill-effects and can continue to be a source of infection to other cattle in the herd.

- They may pose a continuous risk in the case of cattle that are persistently- infected (PI) with BVD virus or only an intermittent risk, e.g. Salmonella Dublin "carriers".
- Cattle may be latently-infected with the virus that causes IBR (bovine herpesvirus1).
- Cattle may be infected with the causative agent of Johne's disease (MAP) for years before developing disease but usually become increasingly infectious as the disease progresses.

Infected cattle can contaminate their environment by shedding and this can be a source of infection for other animals. Most infectious agents will eventually be inactivated by direct sunlight (UV light), drying, unfavourable pH, etc.

How is
Infection transmitted?

- Some infectious diseases of cattle are not spread between infected animals but may affect more than one animal in the herd because they have been exposed to a common source (e.g. listeriosis where silage may have been contaminated by soil and has not been well preserved) Some infections are transmitted by vectors (biting flies or ticks), e.g. babesiosis or "redwater".
- However, most of the economically important infectious diseases are transmissible (contagious) and occur after contact between infected and non-infected (susceptible) cattle.
- Contact between animals may be **direct**, e.g. nose-to-nose contact across a gate or fence or **indirect** when a susceptible animal comes into contact with a person, place or thing that has been contaminated by an infected animal, e.g. when nose-tongs are used to restrain different groups of animals.
- Some infectious agents are transmitted by a faecal-oral route (e.g. those agents which cause diarrhoea) whereas others are more likely to be transmitted by inhalation of droplets (e.g. those agents which cause respiratory disease). Alternative routes of transmission include contact with the mucous membranes that line the mouth, nose, eye, etc. and inoculation where an infectious agent is introduced through a break in the skin.

How to
Reduce the burden of infection to which animals are exposed:

- Avoid overcrowding which will increase the rate of contact between infected and non-infected animals and lead to a more heavily contaminated environment.
- Isolate sick animals from the rest of the herd (quarantine) until clinical signs have abated and any discharge has ceased.

For housed cattle:

- Respiratory infections are usually transmitted by inhalation of infectious droplets – allow sufficient airspace and circulation of air within buildings to prevent the build-up of infectious droplets (remember cow comfort requires that buildings are not excessively draughty).
- Other infections (spread by the faecal-oral route) – ensure that the floor area is well-drained and kept clean or alternatively when cattle are on bedded floors - heavily soiled bedding should be removed and fresh bedding material provided on a regular basis.
- Feed and water troughs should be positioned so as to minimise the possibility of faecal contamination.
- Houses should be thoroughly cleaned and disinfected between batches of cattle; note that cleaning is essential before disinfection, as disinfectants are unlikely to be effective and may be rapidly inactivated when applied to dirty surfaces.
- Cows are most vulnerable to disease around the time of calving – hygienic management of calving pens will help to prevent infection of both cow (e.g. coliform mastitis) and calf.

For cattle at grass

- Remember to compost dung before applying it to land.
- Forage harvesting, reseeding and/or tillage should be carried out after application of slurry to pasture, particularly in the case of MAP– infected (Johne's disease) herds.
- Avoid mixing different groups/ages of animals – e.g. milking cows, replacement stock, calves should be grazed separately.

Herd Health and **Infectious Diseases**

6 How do I boost disease resistance in my animals?

How to

Increase the resistance of animals to infection

1. Vaccination is a means of boosting immunity to specific infectious agents – prompting the animal to produce antibodies or other defence against infection. It is not fool-proof and does not provide absolute protection. Usually it is aimed at minimising the impact of infection (i.e. preventing disease, rather than necessarily preventing infection) by tipping the balance in favour of the animal.
2. The age of the animal, its nutritional or metabolic status, stresses of various types and the presence or absence of another disease, collectively exert a strong influence on the cow's ability to resist infectious disease. Good husbandry and reduction of stresses imposed on the animal helps to build disease resistance.
3. Breeding for disease resistance. Disease resistance is a favourable trait that should be considered in breeding programmes but it is likely to be of low heritability and to have a complex genetic basis.

Vaccination in the dairy herd
Vaccines are medicines used to produce or boost immunity against the disease-causing organisms contained in the product as part of an overall disease-management or eradication strategy. They are mainly used for pneumonias, scours and reproductive diseases, and different products are available targetting viral, bacterial and parasitic diseases.

Depending on the product, vaccines may be given by injection into the muscle or under the skin (subcutaneously), or up the nose (intranasally) or by mouth. While most vaccines are designed to protect the animal receiving them, calf scour vaccines are given to the dam, with the calf protection being transferred to the calves via antibodies in colostrum and milk.

Vaccines against diseases that also affect humans (e.g. leptospirosis and salmonellosis) also indirectly protect farm workers and families.

Details of vaccines used in dairy herds with a current marketing authorisation are available from the Veterinary Medicine section of the Irish Medicines Board website http://www.imb.ie.

Do I need to vaccinate for all diseases?
Not necessarily. A decision on vaccination strategies should be taken in conjunction with the herd's veterinary surgeon, taking into account factors including current disease status and test results, herd goals and the likelihood of the disease being introduced into the herd with current management practices.

How to

Choose which vaccine to use

The decision should be based on a range of factors beyond the cost per animal. These include:

- The claims made by the manufacturer for the vaccine. Each vaccine (and all medicines) comes with a detailed data or information sheet which should be read carefully. This provides a range of additional information including dosage regimes, volumes, routes, safety in pregnant animals, what to do if you accidentally inject yourself, storage conditions etc.
- The range of different disease-causing organisms (and strains of these) that the vaccine covers.
- How quickly protection develops (onset of immunity).
- How long does protection last (duration of immunity).
- Age of use in calves (pneumonia vaccines).
- Packaging - how many doses does it come in?
- Ease of administration (volume and route).
- Shelf life of the product (note that, when opened, many products have to be used within a very short time)

Can I vaccinate for several diseases on the same day?
There is often little data on safety or efficacy of vaccines when given in combination. The data sheets for a few products indicate that they can be given on the same day, while for others it is recommended that no other vaccines be given for 14 days before or after. For most, a case-by-case decision is recommended. Read the datasheet and discuss with your vet.

Once I start, do I need to vaccinate forever?
Changes in vaccination policy should be made in conjunction with your vet. Stopping a programme may give short-term savings, but if the herd becomes increasingly vulnerable as a result, without management changes to reduce the risks (e.g. better housing, improved hygiene, revised buying-in policy), then the costs of any subsequent outbreak are likely to exceed the savings.

How effective can I expect vaccines to be?
Vaccination should never be used as a substitute for good husbandry and management. Expectations should be based on what is claimed in the data sheet. For best results ensure:

- vaccines are within date and properly stored (especially after being opened/prepared)
- given properly (route, volume); ensure proper timing for initial course and boosters e.g. pre-breeding, prior to calving etc (see datasheets for details)
- proper management of colostrum and milk for calf scour vaccines (note that feeding pooled colostrum/milk is a recognised risk for spreading of Johne's disease).

Parasite control

Parasite control is essential to enable dairy cattle to reach your targets, and their potential, in terms of growth, body condition, reproduction and milk production. Dairy cattle are susceptible to internal parasites at pasture because they are grazed intensively, and kept in single-age groups, so the most susceptible (young) animals are grazed together at high stocking rates. Immunity to most parasites increases with age, and this is reinforced by infestation. Low levels of parasitic infestation cause little or no impact on production and enable the development of immunity.

7 How do I control parasites on the farm?

Checklist

A successful parasite control programme will:

– focus strongly on calves and replacement heifers

– begin treatments about eight weeks after animals go to pasture, and as required afterwards

– try to graze calves on the cleanest ground available

– rotate calf paddocks as forage areas every few years, or rotavate and reseed regularly

– use anthelmintics selectively, strategically and wisely to allow young animals to develop natural immunity and prevent anthelmintic resistance

– recognise that rough or wet pasture may carry special parasite risks, regardless of whether cattle are at a 'low maintenance' stage of their life or year

– remain vigilant for changes in parasite patterns, or the occurrence of parasitic disease in all age groups.

Roundworm infestation
Intestinal parasites damage the lining of the digestive tract, impairing the ability of the host animal to absorb nutrients. Lungworms live in the large airways where they cause coughing and breathing difficulty (parasitic bronchitis or hoose). Roundworm infestation is primarily a problem for calves in their first grazing season; it can also be a problem in older animals that have not been allowed to develop immunity in year 1.

How to

Recognise an intestinal parasite problem

– Calf/young stock performance is poor – growth rates and body condition fall short of expectations.

– Faeces are fluid (diarrhoea) and the tail and back end is dirty.

– Samples can be tested in the lab for worm egg counts.

How to

Recognise a lungworm (hoose) problem

– Listen for coughs – especially after exercise (e.g. when calves run to troughs at feeding time).

– Look out for breathlessness and weight loss.

– Samples can be tested in the lab for lungworm larvae.

– If dairy cows cough and show a rapid drop in milk yield, consider hoose as one of the possibilities.

Herd Health and **Infectious Diseases**

Checklist

Planning the anthelmintic-based aspects of your control programme

- Any control programme has to be tailored to the individual farm – your advisor and vet can help.
- Select a product group that works on your farm.
- Focus on the active ingredient, not the brand.
- Remember that wormers differ in their duration of activity, and some are short acting, while others have residual effect.
- Fewer treatments are needed if the wormer you use has a residual effect.
- Control in the first part of the grazing season aims to prevent egg-laying and reduce parasite contamination.
- Parasite numbers build up progressively as the grazing season advances, and the risk of disease increases.
- Remember to leave a 'window' between doses of at least three weeks, and preferably six weeks, to allow for development of immunity; allow longer for products with a residual effect.
- Do not depend on wormers alone for worm control.

Liver fluke infestation
Immature liver fluke tunnel through the substance of the liver before reaching the bile ducts where they mature and continue to interfere with liver function.

How to

Recognise liver fluke is causing a problem

- Young stock performance is poor – growth rates and body condition fall short of expectations.
- If fluke infection is very severe, animals may develop severe weight loss, pot belly, anaemia (pale around the eyelid, gums).
- Faecal samples can be tested in the lab for fluke eggs. However immature fluke can cause a lot of damage, and can only be detected by blood tests.
- ELISA tests on milk or blood can detect liver fluke proteins. These can be detected for some time after fluke infection has been cleared, so they need to be interpreted carefully.

How to

Control liver fluke

- Dose young stock with a flukicide in mid-summer and in autumn. The mid-summer dose will reduce the low-level early season fluke infections that seed pasture and infect snails, leading to heavier contamination in the autumn.
- The best flukicide to use in summer and autumn is a product that kills all ages of fluke.
- Cows can be treated at drying off. If the product used has limited effects on immature flukes, the treatment should be repeated after eight weeks of housing, when all flukes should be old enough for the product to kill them.
- Great care is needed when using flukicides in dairy cows because some products are not permitted, and all have milk-witholding times, which must be observed.

Rumen fluke
This parasite is relatively common and harmless in the vast majority of cases. Usually only small numbers live in the rumen and disease caused by rumen flukes is rare in Ireland, and only occurs in certain circumstances. Unlike liver fluke, it requires a water snail for its life cycle, so it is only a threat on farms where pasture is flooded, which may become contaminated with dangerous burdens of rumen fluke larvae, and be a threat when the floods recede.

Anthelmintic resistance
Some parasites have become resistant to specific anthelmintic treatments. These parasites survive treatment, such that repeated treatment increases the proportion of the parasite burden on your farm that is resistant to the drug in question. An effective parasite control programme must, establish if anthelmintic resistance is a problem on your farm, and if so, must address this problem. Some traditional advice on the use of wormers (e.g. dose before moving animals to clean pasture) has now been turned on its head to try and prevent the development of resistance.

How to

Check whether anthelmintic resistance is a problem:

- Sample six calves before treatment and about a week later.

– Assuming there were worm egg counts in the first count, then any count in the second sample suggests that worms survived the treatment and are resistant to that product.

– The closer the repeat sample count is to the pre-dosing count, the more severe the resistance problem is on your farm.

How to
Prevent anthelmintic resistance

– Balance the need to control parasites with the need to ensure that your farm's worm population contains the highest possible proportion of anthelmintic-susceptible worms.

– Think about what the long-term impact of each treatment will be on the pasture's worm population, and whether this outweighs the short-term benefit you will gain from treating the animals on this occasion.

– Consider whether you need to treat every animal. Simply leaving any animals untreated if they are achieving/surpassing growth targets will be hugely beneficial in preventing anthelmintic resistance. It is unlikely that treating this type of animal is cost-effective in any case.

– When animals are going from dirty pasture to clean pasture, consider worming them either a few days before or a few days after moving them, so that the worms they are carrying onto the clean pasture are a mixture of resistant & susceptible worms, rather than exclusively resistant worms (as will happen if they are treated at the time of the move).

– Talk to your veterinary surgeon and agricultural advisor about quarantine dosing of bought-in animals, to ensure you do not bring in animals that are carrying worms that are resistant to further product groups.

How to
Control parasites where anthelmintic resistance is confirmed

– Discontinue use of the wormer, and avoid using any others from that group of products.

– Ensure you apply the prevention of resistance principles above to prevent resistance developing to another group of products.

8 How do I prevent and manage abortion in cows?

Abortion in dairy cows

Any infectious agent that crosses the placenta in the pregnant cow and damages the foetus and/or the placenta can result in pregnancy loss; if the attack occurs in early pregnancy the embryo loss may only be apparent when cows are found to be "empty".

Infection at later stages can result in the cow throwing the foetus (abortion) or delivering a dead calf (still-birth). There is often a delay between the death of the foetus and its delivery, so aborted foetuses and membranes are very often poorly preserved.

Individual or "sporadic" abortions may be caused by various infectious agents (*Arcanobacter pyogenes, Bacillus* spp., fungal agents) or may occur due to other non-infectious insult or injury to the pregnant cow.

Checklist
Infectious agents which may cause an abortion 'storm':

Multiple abortions occurring within a relatively short period of time (an abortion storm) suggest that several cows in the herd have been exposed to an abortion-causing infectious agent. These agents are listed below.

- *Brucella abortus;* Ireland is recognised as officially free of brucellosis since mid-2009.
- Salmonellosis; most commonly Salmonella Dublin infection which is adapted to cattle and tends to persist in infected herds.
- Leptospirosis *(Leptospira hardjo).*
- Neosporosis; a parasitic disease (similar to Toxoplasmosis in sheep) in which dogs play a role in the life cycle of the parasite (*Neospora caninum*); infection is most commonly transmitted vertically, i.e. from cow to calf during pregnancy; feed or pasture contaminated with faeces from infected dogs is another potential source of infection.
- Listeriosis; *Listeria moncytogenes* occurs in soil; disease outbreaks are usually associated with contaminated silage
- BVD and IBR viruses.
- Q fever (*Coxiella burnetti*).

Herd Health and Infectious Diseases

Many of these agents can also be transmitted to humans and can cause disease (i.e. they are "zoonotic") – brucellosis, salmonellosis, leptospirosis, and Q fever. Aborting cows do not normally display signs of illness unless there is retention of the foetal membranes (afterbirth) and uterine infection; salmonellosis is an exception where many of the aborting animals may be ill.

How to
Deal with the aborting cow

- Quarantine the aborting cow from other cattle, especially from other pregnant cows for 2-3 weeks until vaginal discharge has ceased.
- Submit specimens to the laboratory – blood from the cow for brucellosis and for salmonellosis, leptospirosis and neosporosis; and the foetus and afterbirth for post-mortem examination and culture.
- Hygienic disposal of contaminated material; thorough cleaning and disinfection.
- Closely monitor other pregnant cows to ensure that this is not an "abortion storm".

Advice note
There is a legal requirement (for control of brucellosis) on the owner or person-in-charge to isolate an animal that aborts and to either notify the Department of Agriculture, Food and the Marine or to send specimens for laboratory diagnosis.

How to
Prevent reoccurence of abortion storm in future years

- Vaccinate cows where a definite diagnosis of salmonellosis or leptospirosis is confirmed.

9 How do I prevent and manage some of the specific infectious diseases of cattle (Johne's disease, BVD, IBR)?

What is Johne's disease?
Johne's Disease (paratuberculosis) is caused by infection with the bacterium *Mycobacterium avium* subspecies *paratuberculosis* (also known as MAP). The infection damages the intestine and the clinical signs are chronic diarrhoea and weight loss. There is no treatment and animals will eventually die.

Is the disease contagious?
The disease is highly contagious and can exist silently in a herd for several years, with a greater number of young stock becoming infected each year. The first clinical case is often the tip of the iceberg and clinically affected animals will shed large numbers of MAP in their watery faeces.

How is infection acquired?
Most cattle acquire infection early in life, through ingestion of colostrum or milk which contains MAP, or by exposure to faeces, water, feed, bedding or environments which are contaminated by MAP. Most animals become infected in the first 12 months of life.

When do signs appear?
Clinical signs often appear when the animal is 2–6 years old. The time taken for diarrhoea to develop depends on the initial dose of MAP received by the animal and the production stresses on the animal. Calving is often a stressor for infected animals which causes animals to show clinical signs for the first time.

What are the consequences of infection?
The clinical phase (illness) usually lasts for 1 to 6 months and ends with the death of the animal. nfected animals will die earlier, are less productive than herdmates and are a source of infection to other animals in the herd.

How is Johne's disease diagnosed?
The disease is suspected in animals with chronic diarrhoea which is unresponsive to treatment. Infection is confirmed by culturing or molecular testing of faeces for MAP or its DNA. Animals with clinical disease will have MAP antibodies in their blood and milk.

How does MAP get onto a farm?
The disease is often introduced to a MAP-free herd through purchase of an infected animal. Apparently normal but sub-clinically infected animals can shed large numbers of MAP bacteria and contaminate the environment. It is best to have a closed herd and purchase embryos and semen to meet genetic needs. MAP might also possibly be introduced through contamination of pasture, forage or water with slurry.

Are there diagnostic difficulties?
Johne's disease is unlike mastitis or BVD in that animals can be infected for several years but test negative on all tests, until the disease progresses to a certain point. A negative test does not mean the animal is uninfected and therefore emphasis should be on preventing disease introduction and spread, rather than animal testing.

Checklist

Critical control points for Johne's disease

- Maintain a closed herd.
- Disinfect calving pens between each cow and use fresh bedding.
- Record the identity of the dam of each calf.
- Ensure each calf gets colostrum from only its own dam.
- Use milk replacer or pasteurised bulk tank milk for feeding calves.
- Offer hay early to discourage calves from eating contaminated bedding.
- Prevent calves coming into contact with the faeces of adult animals.
- House potential breeding calves separately from adults for their first year.
- Graze calves on new or clean pastures that have not been used for adult grazing and have not had slurry spread on them for at least one year.

The importance of colostrum
Once the disease is present on a farm, the pooling and feeding of colostrum from many cows can rapidly spread Johne's disease to all herd replacements. Colostrum is critical to calf survival and there will be occasions when the dam's colostrum is inadequate. For such situations, farmers should use stored frozen colostrum from older healthy cows (8 years +) and blood test these each year for MAP antibodies.

The Johne's disease herd
When MAP is diagnosed in a herd, the farmer should meet with his/her veterinary surgeon and review all elements of the control plan and its implementation. They should decide on a diagnostic testing regime to assist in identifying infected animals for management or culling purposes.

Bovine Viral Diarrhoea (BVD)
BVD is a highly contagious viral disease of cattle that can be transmitted as easily as the common cold. It can be spread directly by infected animals, or indirectly, for example via slurry and contaminated visitors or equipment. Most infections with BVD are transient infections (TI) without clinical signs. The signs of BVD infection that are noticeable are mainly due to the effects on the unborn foetus. These effects range from foetal losses to calf deformities. Infection with BVD virus within the first 120 days of pregnancy may result in persistent infection of the foetus. Persistently infected (PI) animals will shed BVD virus at high levels for life and PI animals are therefore the most significant source of infectious BVD virus.

Control requires identification and removal of PI cattle and improved biosecurity to prevent reintroduction of the virus. Particular care should be taken to avoid exposure of pregnant cattle to the virus. A national programme to eradicate BVD will commence on a voluntary basis in 2012 and will be based on tissue tag testing of new born calves. Follow this link for further information: http://www.animalhealthireland.ie/pdf/BVDVer3Mar-20100325-1s.pdf"

Infectious Bovine Rhinotracheitis (IBR)
IBR is a highly contagious viral condition that affects the upper airways of cattle, particularly the nasal passages and the windpipe. The virus responsible for the disease is called bovine herpesvirus 1 (BoHV1) but is more commonly referred to as IBR virus. Follow this link for further information: http://www.animalhealthireland.ie/pdf/DavidGraham-IBR.pdf

Sources of further information
Animal Health Ireland – http://www.animalhealthireland.ie/
DAFM Veterinary Laboratory Service - http://www.agriculture.gov.ie/animalhealthwelfare/laboratoryservices/