

The Moredun Foundation
News Sheet Vol. 6 | No. 10 | May 2016



biosecurity for key livestock diseases

Edited and produced by Beth Wells BSc GI Biol PhD, Moredun Research Institute

BIOSECURITY big 5

1

Livestock movement

This is the most likely route for introducing disease. Run closed herds and flocks, otherwise buy from accredited schemes or trusted sources

Quarantine

Always keep introduced animals isolated. Ensure best practice quarantine conditions and check quarantine periods for key diseases

2

3

Diagnostic tests and preventative vaccines

Use these whenever recommended as knowing disease status is important and prevention is better than cure

Hygiene

Practice good hygiene including the use of effective disinfectants. Provision of good environmental conditions will lead to reduced risk of infection

4

5

Health Plans

Improve disease prevention and control by developing flock and herd health plans in consultation with your vet. Use and update them regularly

Accreditation or official control



Disinfection - premises etc

Diagnostic/testing advised



Best practice guidelines

Quarantine and time



Transmissible to humans

Vaccine available



key



Treatment

introduction



BIOSECURITY means taking steps to prevent the introduction and spread of infectious disease. As a critically important part of disease prevention and control, biosecurity is a subject that should be continually addressed as part of normal farm management.

- Good biosecurity practices do not only apply to newly purchased livestock, but also to returning stock from overwintering or summer grazing. Remember these animals have been off farm and potentially mixing with animals from other holdings or wildlife, so the same good practice guidelines should be applied as for bought-in stock
- Try to adopt a closed herd or flock management policy wherever possible, but if you do have to purchase livestock ensure you know as much as possible about their health status. Always aim to purchase animals that have been accredited under a recognised Health Scheme if at all possible or at least know the disease status of the farms you are purchasing from. When buying replacement stock, try to purchase directly from individual flocks or herds and move them directly from the farm of origin to their new premises in your own transporter
- It's not only about introducing a disease that you currently don't have, but it may also apply to introducing a problem you don't have. Think about treatment failure as well as the disease itself, such as anthelmintic or microbial resistance
- When moving animals onto the farm, always ensure they undergo an adequate period of quarantine in secure accommodation before introduction to your existing animals. Check the quarantine period for the diseases you are trying to prevent as there are different recommended quarantine times for different diseases. For most of the key diseases it is crucial that you 'isolate' rather than 'separate' incoming stock from those already in the herd or flock.
Never mix animals together without considering the possible disease risks
- A disinfectant footbath, brush and separate overclothes should be provided at the entrance to the quarantine building. Quarantined animals should be fed, watered and inspected last, followed by hand-washing where possible
- Diagnosis is critical to effective disease control and many key diseases now have sensitive diagnostic tests and/or preventative vaccines available. Any testing and vaccination programmes are best discussed with your vet and included in interactive health plans to ensure timely and accurate application
- Check and test animals for disease and treat if necessary: For the individual farmer, there is an economic benefit to quarantine treatments as any required treatments are confined to a small group of animals rather than a whole flock or herd
- Good environmental hygiene, such as clean, disinfected premises, equipment and personnel is very important in the prevention and control of disease. Different diseases may require particular disinfectants therefore it is critical you select the correct disinfectant for the disease(s) you are aiming to control. Poor hygiene and environmental conditions lead to increased risk of infection. Strive to improve standards outside, in animal buildings and in feed storage areas
- Develop pro-active strategies for disease prevention rather than adopting a reactive approach. Discuss the development of health plans, disease surveillance programmes and disease response strategies with your vet on a regular basis. Interactive health plans are now commonly used, allowing both vet and farmer to work remotely on the same document ensuring regular updating and checking
- Farm security is critical for disease control: Examine ways in which you can improve farm security to prevent animals or people inadvertently bringing diseases in. Focus on farm boundaries such as fencing, farm entry and exit points and farm buildings





biosecurity in action on shetland



SHETLAND FARMERS and crofters face many disadvantages including a poor climate, short growing season and long distance from mainland markets. By working together however they have turned this isolation into an advantage. They use a system of biosecurity and quarantine testing at the single port of entry to Shetland to enable a high health status to be maintained for the Island's flocks and herds. This system improves animal health and welfare on farm and also increases production efficiency. Shetland livestock are more attractive to buyers because they come with a known health status. This testing is done through the Shetland Animal Health Schemes (SAHS).

All sheep, cattle and goats are examined by a vet on arrival at the pier in Shetland. Sheep and goats are tested for Maedi Visna (MV) and Caprine Arthritis Encephalitis (CAE), Enzootic abortion (EAE) (female only) and Caseous Lymphadenitis (CLA). They are also treated for Sheep Scab with a Dectomax® injection and a quarantine drench of Zolvix® for resistant worms. They are re-tested for CLA privately 4-6 weeks later and for MV and CLA six months later through the SAHS. Female sheep are re-tested for EAE after their first lambing in Shetland.

Cattle are blood tested for BVD virus and antibody at the pier. BVD antibody negative animals are re-tested 4-6 weeks later. Pregnant animals which test BVD antibody positive have their calf tested for virus as soon as possible after birth. Farmers are encouraged not to buy in pregnant cattle owing to the risk of importing BVD through the unborn calf. Cattle are also blood tested for Johne's antibody at the pier and have dung cultured for Johne's organism. Cattle, sheep and goats imported to Shetland are entered onto a central database from which reminders for re-tests are sent out.

Shetland's Animal Health Schemes are kept simple (minimal rules and minimal paperwork), effective, and innovative. They have kept the Islands free of sheep scab, EAE and MV. Shetland began a programme of BVD eradication back in 1994 and was free of BVD by 1996. It remains free of BVD today. Disease testing systems adapt as new disease threats emerge and new technologies develop. For example in the early days of the BVD scheme vets had to rush to blood sample calves before they had suckled colostrum to identify BVD virus excretors. Now tissue testing makes identifying persistently infected (PI) calves quickly a lot easier. Shetland also developed its own control systems for Bluetongue virus (BTV) and Schmallenberg.

The Shetland experience shows how much can be achieved in animal health through a system of biosecurity. Individual farms can generate great benefits by knowing their own health status and having an active biosecurity/health plan to maintain and improve it. For certain diseases neighbours and communities can increase these benefits by working together to control disease within a defined geographical area and so reduce the chance of introducing disease across a farm boundary.

*by Hilary Burgess,
Shetland Isles Council
Veterinary Advisor*



biosecurity information for key diseases

when purchasing or bringing in stock



cattle

Bovine Tuberculosis (TB)



Notifiable disease



Compulsory



Until test results confirm clear



Mode of transmission

Aerosol infection by respiratory discharges from infected cattle, or by eating feed contaminated by sputum, milk, urine or faeces from infected cattle or wildlife.

Diagnosis/Testing

Individual pre-movement skin testing with a clear result is compulsory prior to movement of cattle from a High Risk Area (HRA) farm, whether to another farm in a HRA or to a farm in a Low Risk Area (LRA).

Pre-movement testing is required for cattle coming into Scotland from all parts of England and Wales, unless they have spent all their lives in a LRA. The major exceptions to this are for calves less than 6 weeks old and those cattle going straight to slaughter.

Post movement skin testing is now compulsory in Scotland and in the LRAs of England and Wales for animals coming from a HRA. The rationale for this is that the skin test only detects 80% of infected animals so repeated tests will increase the likelihood of detecting infected animals before they cross infect other cattle and possibly wildlife on the new farm.

Quarantine time

In LRAs and in Scotland, where possible, animals bought in from a HRA should be isolated until a clear post movement test has taken place. This has to take place between 60 and 120 days after arrival in Scotland. Cattle going to slaughter within 120 days of arriving on a Scottish holding are exempt from post movement testing.

Quarantine conditions

Assuming post movement testing is planned:

If housed, use a building with separate airspace not shared with any cattle already resident on farm.

If at pasture, use grazing 1 field away from resident stock on all field boundaries; or at least double fenced otherwise.

For dairy cows milk newcomers last; clean out feeders after milking and keep in a separate building until results of post movement testing are known.

Anyone handling cattle in TB quarantine must wash off and disinfect after any contact with them.

Effective disinfectants

FAM diluted at 1:20 should be used to clean boots, protective clothing etc.

Preventative vaccine/prophylaxis

None available.

Official control or accreditation scheme

TB is a notifiable disease, initially detected during routine herd and tracer skin testing (Government), pre/post movement testing (private) or slaughterhouse carcase surveillance.

Purchase advice

Request TB testing history from auction/direct from farmer. Go to www.ibtb.co.uk to look at TB outbreaks in geographical areas from which you are considering purchase of cattle. Consult your vet about relative risks from TB testing history of the farms you are considering purchasing from and ask your vet to speak to the vendor's vet.





Important facts and advice for best practice biosecurity

- **Restrict contact between badgers and cattle:** Use barriers to prevent badgers getting into buildings and limit cattle access to badger latrine areas and setts
- **Manage cattle feed and water:** Prevent wildlife access to feed stores, troughs, licks and water troughs. Don't feed cattle on the ground, but use troughs that badgers cannot access. Pasteurise waste milk before feeding to calves
- **Reduce risk from neighbouring herds:** Erect double fencing; do not use mixed grazing with other holdings if possible; don't use shared equipment/personnel without cleaning and disinfecting between farms and check www.ibtb.co.uk regularly for local outbreaks
- **Minimise infection from cattle manure:** Store for 6 months then spread on arable land/grazing/silage land at least 2 months before it is to be grazed/ensiled. Minimise aerosol and spread only on your own land

For further information see biosecurity advice at www.tbhub.co.uk.

Bovine Viral Diarrhoea (BVD)



Eradication, Scotland
Accredited rest of UK



Until test results known



Mode of transmission

Contact/aerosol

The main source of infectious virus is the secretions/excretions of persistently infected (PI) animals that were infected in the uterus - **if they are removed from the herd, the disease will die out**. Purchased animals must be tested to ensure that they are not PIs. Another mode of transmission is via contact with infected animals e.g. at markets or over-the-fence. Susceptible cattle that are infected shed infectious virus for 1-2 weeks after which the immune response controls the infection. This is called transient infection and these animals present a small risk of infection to other animals while they are shedding virus.

Diagnosis/Testing

Exposure to BVD, in previously infected or vaccinated animals, can be identified by testing for BVD-specific antibodies. Testing for BVD virus (by PCR or antigen ELISA) identifies infected animals. PI cattle will remain BVD virus-positive in subsequent tests repeated at least 4 weeks later, while transiently infected cattle will be virus-negative but antibody positive in a later test.

In Scotland: The Scottish Eradication Campaign requires annual testing for breeding herds. Animals PI with BVD virus can only move directly to slaughter. All keepers of non-breeding herds must test any calves for BVD virus within 40 days of birth.

Quarantine time

A purchased animal coming into a breeding herd from an untested herd must be isolated and tested for BVD virus on arrival. The status of the receiving herd will change to 'not negative' until a negative test result has been received for the animal.

Quarantine conditions

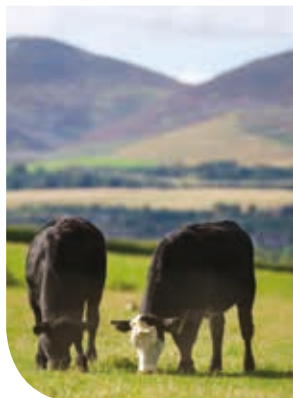
Isolation, ideally in a separate building because all bodily secretions (saliva, urine, faeces, tears) may result in virus transmission through direct contact or aerosols.

Effective disinfectants

Carrying infection from PI cattle via bedding, handlers' clothes/boots or equipment is a real danger; therefore use of standard farm disinfectants at the correct dilution and correct disposal of bedding is essential for effective disease control.

Preventative vaccine/prophylaxis

Several vaccines are in use but their efficacy is dependent on strict adherence to their instructions for use. Because of the danger from infection of pregnant cattle leading to birth of PI offspring, breeding females should be vaccinated before AI or first service, according to the manufacturer's instructions. Booster vaccinations are essential.



Official control or accreditation scheme

Accreditation: Use a CHeCS registered scheme such as HiHealth (Biobest) or PCHS (SRUC).

Control: In Scotland, there is a nation-wide official BVDV eradication scheme: www.gov.scot/Topics/farmingrural/Agriculture/animal-welfare/Diseases/disease/bvd.

In Northern Ireland, BVDV eradication entered the compulsory phase on 1st March 2016 www.animalhealthni.com/BVD.aspx.

Recording: In Scotland, cattle BVDV test results from approved laboratories and the status of animals/holdings are available via the ScotEID database www.scoteid.com/lookup.

Purchase advice

Cattle should be purchased from accredited BVDV negative herds or animals that have been individually tested and have BVDV negative status. Any calves born to recently purchased stock, or in non-breeding herds should be tested within 40 days of birth.

Important facts and advice for best practice biosecurity

- Nose-to-nose contact over fences should be minimised - double fencing with a gap of at least 3m is advised
- Sharing of equipment, including vehicles and trailers, should be kept to a minimum and these should be cleaned and disinfected before use with BVD-negative cattle
- Animals that have been moved from linked premises, or have strayed off-farm, should be isolated and tested as for purchased cattle
- All visitors should disinfect hands, clothing and equipment before coming into contact with at-risk animals, or when moving between groups of animals with different BVD status





Infectious Bovine Rhinotracheitis (IBR)



Accreditation (CHeCS)



2 -3 weeks



Infectious bovine rhinotracheitis (IBR) is caused by bovine herpesvirus-1 (BoHV-1). As well as IBR, BoHV-1 can occasionally cause reproductive and severe neonatal disease and also predisposes cattle to other respiratory disease.

Mode of transmission

Aerosol/nose-to-nose contact. BoHV-1 is most commonly introduced following purchase of, or contact with, cattle excreting infectious virus. Most cattle only excrete large quantities of infectious virus in the two weeks following primary infection, but then have a life-long latent infection. This presents a risk to other cattle due to reactivation of virus excretion by stressful stimuli, such as transport, calving, poor nutrition or other diseases.

Diagnosis/Testing advised

If disease is present, nasal and ocular swabs should be collected for virus detection. Blood should be collected at the time of disease and three weeks later to test for serum antibody. A definitive diagnosis of IBR is best achieved if the appropriate clinical symptoms, virus and antibody detection are all demonstrated. However, for control purposes, individual animals can be tested for antibody. All antibody positive animals must be considered latently-infected carriers with the potential to infect other animals.

Quarantine time

All purchased or potentially infected animals should be quarantined until test results are known (usually 28 days). Serological testing at the start and end of quarantine can be used to determine whether an animal has been infected and is a latent virus carrier.

Quarantine conditions

Quarantined animals must be kept entirely isolated from other stock, including separate airspace. Any visitors should be provided with protective clothing and should not visit other stock after quarantined animals without disinfection of hands, boots, clothing and equipment.

Effective disinfectants

Most standard disinfectants/detergents can be used.



Preventative vaccine/prophylaxis

- BoHV-1 vaccines are very good at preventing clinical disease and reducing virus spread, but they may not prevent field viruses from establishing a lifelong latent infection
- Live attenuated vaccines are commonly used to protect cattle at risk and intranasal vaccines in the face of an outbreak can reduce clinical signs of disease
- Calves can be vaccinated at 3-4 weeks but should be revaccinated at 3 months
- Cattle older than 3 months can be protected by a single dose of live vaccine but 6 monthly vaccine boosters are needed to maintain protection
- There is a range of marker vaccines available. These should be used so that vaccinated cattle can be distinguished from infected cattle by ELISA testing

Is there an official control or accreditation scheme?

All existing schemes have accreditation via CHeCS (www.checs.co.uk).

Purchase advice

Only animals of an equal or higher IBR health status should be purchased. Quarantine rules should be followed.

Any other important facts/advice for best practice biosecurity?

- Risk factors for herds include: purchasing cattle; large herd size; presence of dairy cattle; high density of herds in the region; cattle participating in shows and professional visitors not wearing protective clothing
- Nose-to-nose contact over fences should be minimised and double fencing with a gap of at least 3m is advised
- Sharing of equipment, including vehicles and trailers, should be kept to a minimum and these should be cleaned and disinfected before use with IBR-negative cattle
- Animals that have been moved from linked premises, or have strayed off-farm, should be quarantined and tested as for purchased cattle
- All visitors should disinfect hands, clothing and equipment before coming into contact with at-risk animals, or when moving between groups of animals with different IBR status

Leptospirosis



Accreditation (CHeCS)



Until test results are known



Disease in cattle caused by infection with *Leptospira* bacteria. The Hardjo serovars are common in cattle and infection can cause reduction in milk yield, infertility, abortion in the second half of pregnancy and the birth of weak calves. It can also occasionally cause acute disease in young cattle.

Mode of transmission

Urine, semen and vertical transmission to the unborn calf. Environmental transmission through contaminated water sources and soil is also possible.

Diagnosis/Testing advised

Testing is recommended:

- Detection of specific antibodies (ELISA or MAT)
- PCR on urine (for the identification of carrier animals) or kidney tissue (post-mortem)

Quarantine time

All brought in animals should be isolated from the resident herd until test results are known.

Quarantine conditions

Antimicrobial treatment (e.g. with streptomycin) during quarantine is recommended as antibody testing can fail to detect carrier animals and urinary shedding can be intermittent. Following antibiotic treatment, vaccination of purchased animals is recommended where herd vaccination is carried out.

Effective disinfectants

There are many available – check product for efficacy, correct dilution and application.



Preventative vaccine/prophylaxis

Initial vaccination course involves 2 injections 4 weeks apart, followed by annual booster injections. Vaccination will reduce urine bacterial shedding and will prevent milk drop and abortion, but will not prevent infection in the herd. Strategic antibiotic treatment is recommended in diagnosed cases to reduce pathogen excretion and zoonotic risk. Antibiotic treatment is also recommended in the face of an outbreak or before implementing vaccination in an infected herd.

Is there an official control or accreditation scheme?

There are various schemes available which are run to the CHeCS guidelines.

Purchase advice

Best practice would be to maintain a closed herd to avoid introducing potentially infected animals. If this is not possible, source replacements from accredited herds operating on CHeCS guidelines.

Any other important facts/advice for best practice biosecurity?

- Isolate aborted cattle immediately and investigate cause of abortion
- Dispose of all products of abortion correctly (bury, burn or collected)
- Fence off all surface water/streams/rivers and provide piped water wherever possible
- Leptospirosis can also be introduced into a herd by bulls or through using infected semen for AI. Test bulls before entry into the herd and source semen from accredited bulls where possible

Bovine neosporosis (*Neospora caninum* infection in cattle)



Accreditation (CHeCS)



Mode of transmission:

- Horizontal transmission – ingestion of *Neospora* oocysts that are shed in the faeces of acutely infected dogs
- Vertical transmission – from an infected dam to the foetus through the placenta (predominant mode of transmission)

Neospora is not spread horizontally from infected to uninfected cows within a herd.

Diagnosis/Testing advised

Clinical signs are of little help as several other causes of bovine abortion may cause very similar scenarios.

In the UK, it is a statutory requirement to report all bovine abortions.

Post-mortem (aborted foetuses)

These should be submitted with the placenta and a serum sample from the aborting dam. One or more of the following tests may be used:

- Immunohistochemistry (detection of the parasite in tissue section using specific antibodies)
- Molecular detection of parasite DNA in brain, heart or placenta
- Detection of specific antibodies against *Neospora* in the thoracoabdominal fluid of the foetus
- Histopathology of aborted foetal tissues

Live animals

Blood testing (Serology: detection of specific antibodies against *Neospora* in serum or plasma).

Quarantine time

Not applicable as animals infected with *Neospora* do not represent a herd health risk unless they abort in areas that dogs have access to, or they give birth to persistently infected female calves. If these calves are retained, they will generate infected family lines by transmitting the parasite to their offspring, thereby keeping the infection within the herd.

Quarantine conditions

Not Applicable.

Effective disinfectants

Not Applicable.

Preventative vaccine/prophylaxis

There are no vaccines and no pharmacological treatments licensed for bovine neosporosis.



Is there an official control or accreditation scheme?

Bovine neosporosis is included in CHeCS.

Purchase advice

- Purchase from disease-free herds (e.g. members of cattle health schemes that are accredited free from bovine neosporosis)
- Purchase from herds with records of excellent reproductive performances
- Blood testing (serology) purchased cows - current diagnostics do not detect all infected cattle and false negative results are possible. Repeat testing during two pregnancies may increase the accuracy of results

Any other important facts/advice for best practice biosecurity?

- Closed herd policy – this avoids the introduction of the parasite from external sources
- High hygienic standards
 - ~ Proper disposal of afterbirths and aborted foetuses – to avoid infection of naive dogs
 - ~ Prevent dogs from having access to (and potentially contaminating) cattle feed, pastures and water sources
 - ~ Prevent dogs from having access to cattle areas (especially calving areas) to prevent them becoming infected by ingesting infected tissues
- Inform dog walkers of the potential risk dog faeces may represent to cattle



Cryptosporidiosis



Calves/lambs
2-3 weeks



Mode of transmission

Faecal-oral.

Diagnosis/Testing advised

Submit a faecal/scour sample to your vet for diagnosis to confirm cases and ensure appropriate treatment, disinfectants and control strategies are used.

Quarantine time

Remove scouring calves or lambs from the rest of the group and quarantine for at least 1 week after scouring stops.

Quarantine conditions

Quarantine away from other calves or lambs and feed using separate equipment and after feeding or handling healthy calves. Utensils should be thoroughly cleaned between use with hot water. Personnel should ensure cleaning and disinfection of boots and outer garments after handling scouring calves or lambs.

Effective disinfectants

Many standard farm disinfectants are NOT effective against *Cryptosporidium*. The ones that are effective include:

- 2-3% Keno™Cox - kills 99% oocysts after 2 hrs contact time
- 2-4% Neopredisan - kills 99% oocysts after 2 hrs contact time
- 10% Ox-Virin - reduced oocyst infectivity after 1 hr contact time
- 3% Hydrogen Peroxide - reduced oocyst infectivity after 4 mins

Preventative vaccine/prophylaxis

There are no vaccines at present to prevent disease and only one licensed product in the UK for the treatment of calves (Halocur®). Halocur is also licensed as a preventative method in the UK by giving it to calves for 7 consecutive days from birth. Note: Halocur is not licensed for use in lambs.

Important facts when using Halocur:

- Weigh calves before dosing as it is dangerous to overdose
- Dose after the calf has fed
- Use for 7 consecutive days
- Do not give to dehydrated calves

Is there an official control or accreditation scheme?

No.

Purchase advice

Know your supplier and if you currently do not have a problem with *Cryptosporidium*, you do not want to buy it in, therefore if purchasing calves or lambs keep them separate from young resident livestock until you are sure they are not scouring (2-3 weeks).

Any other important facts/advice for best practice biosecurity?

- Steam cleaning of animal pen areas – to kill oocysts
- Cleaning calving/lambing areas frequently – to reduce oocyst build up
- Deep and regular straw bedding – keeps animals clean/away from faeces
- Keep animals in 'age-groups' – do not mix older animals with younger ones
- Slurry and manure should be well fermented or composted prior to application on pasture





Gastro-intestinal Worms

Yard 48 hours post treatment and keep separate for 3 weeks



Mode of transmission

Oral via ingestion of contaminated herbage.

Diagnosis/Testing advised

Yes, faecal egg counts conducted on a proportion (10%) of quarantined stock 10-14 days after treatment.

Quarantine time

Sheep: Yard all sheep (ewes, lambs and rams) on arrival for 48 hours, treat ALL incoming animals with effective product to remove resistant worms and sheep scab, turn out on to pasture that has carried sheep this season and keep isolated from resident stock for at least 3 weeks.

Cattle: Treat incoming animals with effective product and keep isolated from resident stock for at least 3 weeks.

Quarantine conditions

Keep brought in livestock separate from other farm stock until post-treatment test results are known.

Effective disinfectants

N/A.

Preventative vaccine/prophylaxis

Sheep: Sustainable Control Of Parasites in Sheep (SCOPS) advice: On bringing in stock drench with a wormer from either the 4-AD (Zolvix®) or 5-SI (Startect®) groups + Inject with moxidectin 1% (*see important facts below).

Cattle: Control of Worms Sustainably (COWS) advice: Treat with 2-LV (levamisole) or 1-BZ (benzimidazole).

Is there an official control or accreditation scheme?

No.

Purchase advice

Ensure that administered quarantine treatments have worked.

Any other important facts/advice for best practice biosecurity?

* If sheep have, or will be given Footvax, product contraindication requires that the moxidectin 1% is replaced. Suitable products are either 2% moxidectin OR doramectin OR plunge dipping in an OP (if the dipping + 4 AD option is used than a moxidectin drench should also be given).

Ensure dosing equipment is calibrated and working accurately.

Measure weight of livestock to ensure correct dose administered.



Lungworm

48 hrs post anthelmintic treatment

Not protected for 6 weeks after 1st vaccine



Mode of transmission

Oral via ingestion with contaminated pasture.

Diagnosis/Testing advised

Faecal sample analysis, Baermannisation of samples for presence/absence of lungworm larvae OR serum sample for lungworm ELISA.

Quarantine time

48 hrs post broad-spectrum anthelmintic administration, check data sheet to ensure that treatment will be effective against all stages of lungworm.

Vaccinated calves are not protected until two weeks after their second dose and as such should be protected from high challenge until this time point.

Quarantine conditions

Isolate for 48 hours as with anthelmintic treatment for other round worm infections and monitor closely when turned-out on to pasture especially if the farm has a history of lungworm problems.



Effective disinfectants

N/A.

Preventative vaccine/prophylaxis

Anthelmintics: Most broad-spectrum anthelmintics are highly effective against all stages of lungworms but check data sheet prior to administration.

Cattle: Live attenuated vaccine: For preventative control two doses of vaccine should be given at an interval of four weeks. If a vaccination program is implemented, all calves on farm should be done and the program needs to be continued annually for each calf crop. Calves are not protected until two weeks after their second dose and as such should be protected from high challenge until this time point.

Is there an official control or accreditation scheme?

No.

Purchase advice

Ensure that administered quarantine treatments have worked.

Any other important facts/advice for best practice biosecurity?

- Ensure dosing equipment is calibrated and working accurately
- Measure weight of livestock to ensure correct dose administered
- New stock, even older stock, may bring lungworm on to your farm OR equally may not have been exposed to lungworm previously, therefore not developed a strong immunity to infection and will be susceptible to infection

Johne's Disease



Accreditation (CHeCS)



Until test results known



Sheep & goats.
Limited use cattle



Mode of transmission

Primarily faecal-oral, but also via contaminated colostrum and milk from infected dams, in utero and via contaminated semen.

Diagnosis/Testing advised

The diagnostic tests available and the type of testing advised can depend on the host species and the type of farm e.g. dairy or beef.

In sheep and goats:

- The cost of testing is high compared with the value of the animal
- Not all sheep with Johne's disease will develop antibody responses and the commercial Johne's ELISA test is not optimised for this species
- Sheep can be low shedders and can be infected with a strain type that would not be cultured using the automated liquid culture system currently used for commercial diagnosis of Johne's disease
- Consequently, the options for diagnostic testing in sheep and goats are poor and probably not commercially viable
- However, post mortem examination is advised for thin and culled ewes to pick up Johne's disease as early as possible on the farm
- Vaccination is of use in reducing shedding and clinical disease if detected

In cattle: Johne's disease is much easier to detect and the antibody ELISA is the most widely used diagnostic test for herds.

For beef cattle, annual testing with Johne's serum antibody ELISA and removal of test positive animals is recommended. Follow-up animals with an inconclusive test result using a complementary test such as faecal culture.

For dairy cattle there are different testing regimes using milk and/or serum antibody ELISAs. Consult CHeCS for details on these.

Quarantine time

- The incubation time for disease is in excess of two years, so it is not practical to quarantine animals for this length of time
- Quarantining animals until test results are available is recommended
- It is sometimes necessary to quarantine test positive animals on a farm to prevent spread of disease e.g. a test positive pregnant cow may be quarantined until the offspring is weaned and then both can be sold for slaughter. Heifers born to positive or inconclusive dams should not be retained for breeding





Quarantine conditions

- Accommodation and/or pasture separate from uninfected stock
- Compost manure from the infected animals and avoid grazing stock (particularly young stock) on the same pasture for a minimum of a year after the animals are removed
- Disinfect sheds where infected animals have been housed

Effective disinfectants

Any disinfectant approved by Defra for control of bovine tuberculosis but ensure correct dilutions are applied. For example, FAM may be used on a farm to control a number of diseases but to be efficient against mycobacteria it needs to be used in a more concentrated form.

Preventative vaccine/prophylaxis:

Sheep and goats: A killed vaccine is available for sheep and goats and can be very effective in controlling Johne's disease in these species. It reduces clinical disease and shedding but does not prevent infection, therefore it should be remembered that vaccinated animals can be infected and a source of infection.

Cattle: A formulation is available for cattle but vaccination of cattle must be done with caution as it can interfere with statutory skin testing for bovine tuberculosis and it is not possible to differentiate between vaccinated and infected cattle. Vaccination in cattle is therefore reserved for very highly infected herds and then only for a period of time to reduce the prevalence in the herd.

Is there an official control or accreditation scheme?

Yes, for cattle but not for sheep and goats. There are a number of schemes regulated by the Cattle Health Certification Standards (CHCS).

Purchase advice

- Ideally maintain a closed herd/flock or minimise the purchase of replacement breeding stock
- Only buy from accredited herds or from farms where the absence of Johne's disease has been confirmed for the past 3-5 years
- Where this is not possible and large numbers of replacements are required for rapid expansion, try to buy from a single herd and test the whole herd
- As there are no Johne's assurance programmes for sheep, goats or deer in the UK, effective biosecurity cannot be achieved for these species if significant numbers of replacements are purchased

Any other important facts/advice for best practice biosecurity?

Consider screening cull animals and poor yielders to try to detect Johne's disease at an early stage. Remember that the organism causing Johne's disease can pass between sheep and cattle so beware of buying in replacements of both species, test both species on the farm and be wary of co or sequential grazing. Wildlife such as deer and rabbits could potentially spread Johne's disease, therefore fence off wildlife and control rabbit populations on the farm.

Good hygiene of watering facilities is important and fields should be provided with water troughs where possible. Troughs indoors should be cleaned regularly or alternatively nipple drinkers provided. There are management procedures that can be employed to reduce the risk of transmission on the farm.

Liver Fluke (Fasciolosis)



3 weeks post treatment



Mode of transmission

Ingestion of metacercarial cysts off pasture while grazing.

Diagnosis/Testing advised

Fluke faecal egg count (FEC); coproantigen ELISA (cELISA); serum antibody ELISA (AbELISA); blood test for liver/bile duct enzymes (GGT/GLDH).

Quarantine time

Involves an effective flukicide treatment, not just isolation. After treatment, keep separate from resident livestock for at least 3 weeks (e.g. <http://www.scops.org.uk/endoparasites-liver-fluke.html>).

Quarantine conditions

Indoors or on 'low fluke risk pasture', difficult in practice.

Effective disinfectants

N/A.



Preventative vaccine/prophylaxis

No vaccine available; there is a (small) range of flukicides available, with a spectrum of activity against fluke of different ages.

Is there an official control or accreditation scheme?

No.

Purchase advice

'Buyer beware'!

Any other important facts/advice for best practice biosecurity?

Don't bring fluke onto your farm or, worse still, resistant fluke!

See SCOPS & COWS websites for more information: <http://www.scops.org.uk/endoparasites-liver-fluke.html>
<http://www.cattleparasites.org.uk/guidance/COWS%20farmer%20fluke%20leaflet.pdf>

Mastitis



For Staph aureus and Strep agalactiae only
No specific time advised



Cattle only for E. coli and Staph aureus



Mode of transmission

Dairy:

- Contagious transmission from cow to cow in dairy farms of *Streptococcus agalactiae*, *Staphylococcus aureus* and *Mycoplasma spp.* during milking
- Pathogens such as *Escherichia coli* are acquired from the environment. For other bacteria such as *Streptococcus uberis* both cow to cow contagious transmission and environmental transmission may occur

Beef and sheep: Little is known about transmission in suckler cows and ewes.

Diagnosis/Testing advised

- Clinical inspection of the udder
- Somatic cell count (SCC) testing on milk
- Bacteriological analysis on milk

Quarantine time

No specific time advised, purchased animals should be milked last in order to minimize the risk of spreading infection, until the cow shows two consecutive low SCC/negative bacteriological tests.

Quarantine conditions

Cows purchased should be kept in a separate paddock if possible and milked last.

Effective disinfectants

Many available both for post milking teat disinfection and disinfection of milking equipment and farm environment.

Preventative vaccine/prophylaxis:

Vaccine available in cattle only for *E. coli* and *S. aureus* but its efficacy in reducing the risk of infection is still a matter of debate.

Is there an official control or accreditation scheme?

There are no official control or accreditation schemes.

Any other important facts/advice for best practice biosecurity?

Correct milking routine and high standards of environmental hygiene should be maintained to minimize the risk of spreading mammary infections.

- Farms normally keep SCC data and record mastitis cases, therefore farm SCC data for the previous 6-12 months should be requested before purchasing animals
- Animals should be purchased only from farms with low SCC
- Purchase animals with a clear mastitis record and low SCC for at least 1 year (< 200,000 cells/ml)
- Heifers are significantly less likely to be infected than cows
- Animals should be acquired from farms with no presence of contagious mastitis cases





Caseous Lymphadenitis (CLA)

-  Flock/group basis
-  Until test results known
-  Low risk of infection
- 
- 

Mode of transmission
The most frequent mode of entry of CLA into a flock is through the introduction of infected animals. From these animals, CLA lesions that develop within the superficial lymph nodes (i.e. those lymph nodes that can be palpated during physical examination) may rupture and shed pus containing many millions of infectious organisms. Naïve animals may either be infected directly through contact with infected animals, or indirectly through exposure to contamination from their immediate environment. In all cases, the disease is most likely to spread when the CLA-causing organism gains entry to naïve animals through breaks in the skin.

Diagnosis/Testing advised
Physical palpation of superficial lymph nodes may allow identification of swellings indicative of CLA. This procedure is especially helpful when the flock history of CLA is understood. A blood-test for CLA is also available through SRUC, although the nature of the disease makes use of the test most beneficial on a group rather than individual animal basis.

Quarantine time
CLA is a chronic disease which may take weeks to months to manifest. This makes it very difficult to define an optimal quarantine period. In addition, many animals with CLA develop internal lesions, which cannot be observed through physical examination, so these animals remain an infection risk for the future. The suggested approach would be to quarantine animals for as long as it takes to have blood-testing performed, and rely on blood-test results rather than a defined quarantine period to inform as to the risk associated with new stock.

Quarantine conditions
Quarantined animals should be housed separately in such a way as they cannot come into direct contact with the rest of the flock. Accommodation should be thoroughly disinfected before returning the quarantine area back to general housing.

Effective disinfectants
Most common disinfectants appear to effectively kill the disease-causing organism, including calcium hypochlorite, formalin and cresol solution. The presence of organic material (such as that associated with pus) may necessitate an increased exposure time to disinfectant.

Preventative vaccine/prophylaxis
There is no licensed vaccine for CLA available in the EU. Autogenous vaccines may be made to order and permission may be sought from the VMD for the importation of foreign CLA vaccines for emergency use.

Is there an official control or accreditation scheme?
There is no official control/accreditation scheme for CLA. SRUC operate a pre-sale screening programme through the Premium Sheep and Goat Health Scheme.

Purchase advice
Ask the seller about flock history of CLA. In addition, an understanding of whether the seller vaccinated against CLA is important, since vaccination may give rise to positive blood-test results in the absence of infection.

- Any other important facts/advice for best practice biosecurity?**
- CLA is often spread during shearing as shears can become contaminated with pus from ruptured CLA lesions and is then spread to naïve animals through nicks in the skin
 - Routine disinfection of shearing equipment during use is not practical, therefore, ensure shears are clean at the beginning of shearing and arrange animals in order of age (youngest first) and likelihood (based on blood-testing and physical examination) of having CLA





Enzootic Abortion of Ewes ^(EAE)

- Accreditation (SRUC)
- On abortion
- Risk to pregnant women
-
-
-
-



Mode of transmission

Ingestion or inhalation from products of abortion/lambing, also can be transmitted in utero from mother to foetus.

Diagnosis/Testing advised

- Presumptive diagnosis through assessment of placenta and staining of placental smear with modified Ziehl-Neelsen
- Confirm diagnosis by specific commercial ELISA or PCR

Quarantine time

No need to quarantine replacement animals brought on to farm as the greatest risk of disease transmission occurs at lambing time. Following abortion isolate the ewe from other animals. Animals are generally considered infectious until vaginal discharges have dried up (isolate for at least 7-10 days).

Quarantine conditions

See above.

Effective disinfectants

Chlamydia are susceptible to most disinfectants (including FAM 30 and Virkon [1%]) and detergents, including a 1:1,000 dilution of quaternary ammonium compounds, 1% sodium hypochlorite, 70% ethanol, glutaraldehyde and formaldehyde. They are resistant to acids and alkali.

Preventative vaccine/prophylaxis

Two live attenuated vaccines and an inactivated vaccine are available. The live vaccines must not be administered during pregnancy or while the animal is being treated with antibiotics. The vaccines should be administered at least 4 weeks prior to mating. Antibiotics can be used at the start of an outbreak to reduce losses but should not be used routinely as a means of controlling infection.

Is there an official control or accreditation scheme?

The Premium Sheep & Goat Health Scheme (PSGHS) for EAE operated by Scotland's Rural College (SRUC).

Purchase advice

Purchase replacements from EAE-free accredited flocks (PSGHS).

Any other important facts/advice for best practice biosecurity?

Vaccinate replacements before introducing to a naive EAE-free flock. Caution should be taken to reduce risks of transmission to humans by careful handling of potentially infected live or dead lambs, products of abortion and vaginal excretions. Pregnant women and immunocompromised individuals should not be involved in lambing to reduce risks of transmission. If you have been in contact with ewes/lambs during the lambing period and feel unwell with flu-like symptoms, seek prompt medical advice.



Maedi-Visna ^(MV)

- Accreditation (SRUC)
- 6 months
(2 negative blood tests)
-
-
-
-

Mode of transmission

The virus is transmitted by close contact and frequently via the oral route (via ingestion of infected colostrum/milk, contaminated water or feed), or by respiratory and ocular routes, or via contaminated equipment.

Diagnosis/Testing

MV is a slowly developing and spreading disease caused by the MV virus. Individual animals usually show signs of disease over two years of age and more normally aged four to five years. Most commonly sheep show weight loss and problems breathing. Increased mastitis rates and hind limb paralysis are further signs. In a flock signs of disease may not be noticed until ten years after introduction. Decreased production efficiency and increased mortality are common signs.

This disease is most commonly diagnosed using a blood serum ELISA test to detect antibody against the MV virus. This test is used as a flock screening test. It can also be used as a quarantine test for individual sheep over a year old, with repeat testing six months later.

Quarantine time

Maintain in isolation until quarantine blood test results come back. Because of the long incubation period of this disease, quarantine advice is to maintain in isolation for six months until re-test is clear. In commercial situations this may be not be possible. However, it is important to continue to observe closely for any signs of disease during this time. Repeat blood test six months later.

Sheep from MV Accredited flocks can be introduced into the flock without quarantine or testing for MV, however standard quarantine times and quarantine testing for other diseases will apply.

Quarantine conditions

Keep separate from other sheep; no nose to nose contact or drainage into pens containing other sheep. Avoid sharing a common air space with other sheep. Do not share equipment (for example drenching or injection) with other sheep.

Effective disinfectants

The best advice is to check the individual product label before use and ensure that it is effective against MV virus. A couple of examples which can be used are 'Virkon S®' and 'Blitz®' but other products are available.

Preventative vaccine/prophylaxis

No vaccine or treatment is currently available.

Is there an official control or accreditation scheme?

The SRUC operate a Maedi Visna (MV)/Caprine Arthritis Encephalitis (CAE) Accreditation Scheme. This is open to sheep and goat keepers. To become members of this scheme flocks need to have two initial clear tests between six and twelve months apart and then annual flock screening tests.

Purchase advice

- The lowest risk purchases are from MV Accredited flocks
- If accredited sheep are not available the risk of buying in MV disease can be reduced by pre-purchase or quarantine testing purchased sheep for MV and then repeating this test six months later. This testing is only effective in sheep over a year old
- Reduce risk by purchasing as few sheep as possible and from known and trusted sources
- Remember this disease has a long incubation period so monitor purchased sheep carefully in the six months post purchase

Any other important facts/advice for best practice biosecurity?

- Once introduced to a flock MV can spread without being recognised and be well established before it is diagnosed
- Monitor flock performance and investigate decreasing production efficiency, increased numbers of thin ewes, lambs not thriving, decreased milk yield or decreased fertility
- Different laboratories may offer packages to blood test thin ewes for MV to enable early detection of disease in a flock

Remember goats! Goats can be infected with the CAE virus which is closely related to the MV virus and cross infection between goats and sheep can occur. It is therefore very important if you have goats on your farm to include testing goats in any quarantine testing, accreditation scheme or clinical screening.





Orf



Confirmatory only



2-6 weeks



Mode of transmission

Entry of virus through broken skin.

Diagnosis/Testing advised

Only as confirmatory.

Quarantine time

Ideally 6 weeks (if showing signs) or shorter if no signs appear within two weeks. However, there is some evidence that apparently asymptomatic sheep can lead to outbreaks of disease. This may be due to carrying infectious fomites in the fleece or carriage of virus in the tonsils of previously infected animals.

Quarantine conditions

Isolate away from susceptible animals.

Effective disinfectants

FAM/Trigene/Steam cleaning.

Preventative vaccine/prophylaxis

Vaccine available, but it is a virulent virus which can lead to disease outbreaks therefore not recommended for use in a situation where the farmer has never had a problem with orf in the past.

Is there an official control or accreditation scheme?

No.

Purchase advice

Check for obvious lesions around the face, especially the mouth and nostrils and also around the genital area and on the head. Ask for the vaccination history.

Any other important facts/advice for best practice biosecurity?

- Never use the vaccine unless there has been a history of orf on the farm
- If using the vaccine, ensure lambing sheds, feeding troughs, hard surfaces such as gates and fence posts are fully disinfected prior to re-use/next lambing season
- If infected animals have used a particular pasture/paddock, if possible leave unused for a season before re-introducing susceptible animals
- The virus only infects through broken skin, therefore if possible manage the pasture to ensure thistles/rough grazing is kept to a minimum
- Avoid situations where infected animals are likely to suffer stress, e.g. overcrowding in sheds or removing infected lambs from their mothers, as this is likely to exacerbate disease



Ovine Pulmonary Adenocarcinoma (OPA or Jaagsiekte)



Years



Mode of transmission

Respiratory (also in milk/colostrum).

Diagnosis/Testing advised

- There are no commercially available diagnostic tests
- A diagnostic blood test was developed by researchers but is useful as a flock test and not for individual animals
- Diagnosis of OPA is therefore from clinical signs alone
- Gold standard diagnosis is post mortem histological examination of lung lesions
- Transthoracic ultrasound can detect OPA tumours greater than 2cm in diameter on the ventral surface of the lung

Quarantine time

Years.

Quarantine conditions

Keep bought in group separate from other groups of sheep.

Effective disinfectants

FAM, Virkon.

Preventative vaccine/prophylaxis

None available.

Is there an official control or accreditation scheme?

No.

Purchase advice

Ultrasound scanning may be useful to screen out advanced cases of OPA in new purchases but a negative ultrasound result should not be interpreted as a confirmation that the animal is free of OPA.



Sheep scab (Psoroptic mange)



Notifiable, Scotland



2 weeks minimum



Mode of transmission:

- The sheep scab mite is usually transmitted by direct contact between animals
- However, as mites can exist off the sheep for 16-19 days and infested animals seek relief by scratching and rubbing on fence posts, trees, bushes, gates, farm equipment etc., these are also a source of infection
- Scab can be introduced from neighbouring flocks, the introduction of new stock, animals returning from wintering or from shows and this has implications for treatment, quarantine and biosecurity
- Sheep trailers, handlers, scanning equipment etc can all be potential sources of infection if not properly disinfected between farms/flocks



Diagnosis/Testing advised

- Scratching and rubbing may indicate sheep scab, but these signs can also indicate a chewing lice infestation
- Flock owners should bear in mind that sheep may be infected with more than one ectoparasite (e.g. scab and lice) at the same time and accurate identification of the cause of disease, through consultation with a veterinary surgeon, is critical in definitive diagnosis and selection of an appropriate treatment
- Diagnosis involves a veterinary examination for clinical signs along with skin scrapings taken at the lesion edge for microscopic examination for the presence of mites. However, this method is based on operator experience and accuracy of diagnosis can be as low as 18%
- Moredun have developed a new blood test, which detects antibodies to a protein found only in the sheep scab mite. The test can detect infested animals at an early stage and before the onset of clinical symptoms, which is important in the effective control of the parasite
- SRUC currently provides veterinary surgeons in Scotland with free ectoparasitic examinations of skin scrapings taken from sheep. It is hoped that integrating the results of the skin scrapings with this new blood test will provide a more powerful and reliable diagnostic service for sheep scab

Quarantine time

Treat with an approved product effective against scab mites and quarantine for at least 2 weeks before mixing with the main flock.

Quarantine conditions

During quarantine observe for signs of infestation (nibbling, rubbing, scratching, deranged wool, areas of wool loss etc).

Effective disinfectants

It is not necessary to disinfect vehicles and trailers with a product approved for animal treatment, there are many conventional disinfectants that effectively kill mites but cannot be applied to live sheep (e.g. Chlorox or Virkon).

Preventative vaccine/prophylaxis

Not available to date.

Is there an official control or accreditation scheme?

- Sheep scab is notifiable within Scotland (not the rest of the UK) and is covered by the Sheep Scab Order (Scotland) 2010
- If sheep scab is suspected then (following notification of the Divisional Veterinary Manager if in Scotland), animals should be examined by a vet who will professionally identify the parasite and advise on the correct course of treatment

Purchase advice

Ultimately, it is wise to assume that all sheep being brought onto the farm from whatever source (purchase, over wintering, stragglers etc) are infested and should be treated and then quarantined.



Ovine Toxoplasmosis

(abortion due to *Toxoplasma gondii* infection in sheep)



Risk to pregnant women



Mode of transmission

- Horizontal transmission – ingestion of *T. gondii* oocysts that are shed in the faeces of acutely infected cats (usually kittens), generally via environmental, food or water contamination
- Vertical transmission – from an infected ewe to the foetus through the placenta, resulting in abortion or an infected lamb

Reactivation of the parasite during pregnancy is rare.

Diagnosis/Testing advised

Live sheep:

- Serological testing, either ELISA or IFAT

Abortions:

- Pathological examination and detection of lesions in the placenta, brain or heart of the aborted foetus
- Immunohistochemistry (IHC): Use of anti *Toxoplasma* specific antisera on tissue blocks helps with the species identification/verification of the pathogen causing lesions
- Molecular tests, ie PCR, will confirm presence of *T. gondii* in foetal tissues/placenta but without pathological examination the test will not show that the parasite was the cause of the abortion

Clinical observations:

- These are usually not specific enough because abortions could be due to other causes ie *Chlamydia* or other reasons
- Abortions usually occur in the last trimester but before abortions due to *Chlamydia*

Quarantine time

Not applicable because no sheep to sheep transmission occurs and once infected, sheep do not abort in subsequent pregnancies, even when re-infected.

Quarantine conditions

Not applicable.

Effective disinfectants

Not applicable.

Preventative vaccine/prophylaxis

Vaccine:

- Toxovax® is a live attenuated vaccine
- It is effective and protects against abortions for at least 18 months without natural challenge
- The vaccine needs to be given at least 3 weeks before tupping
- Usually only replacement stock are vaccinated
- The vaccine has a relatively short shelf life

Prophylaxis: There are drugs that can be used to treat sheep infected with *Toxoplasma* but the drug needs to be given for the duration of the pregnancy and therefore is not often used.

Is there an official control or accreditation scheme?

No.

Purchase advice

If you buy either vaccinated or persistently infected ewes then there is no risk for subsequent abortions due to *Toxoplasma* infection.

Any other important facts/advice for best practice biosecurity?

- Vaccination of replacement stock before mating is the best approach to reduce the risk for abortions due to *Toxoplasma* infection
- Having healthy and neutered cats on the farm will also reduce the exposure to *Toxoplasma* oocysts. This means that no kittens are born on the farm and as a result no *Toxoplasma* oocysts are produced because felines are the only host that can produce the infective oocysts



Produced by

The Moredun Foundation

Pentlands Science Park, Bush Loan, Penicuik, EH26 0PZ, Scotland

phone: +44 (0)131 445 5111

e-mail: info@moredun.org.uk

website: www.moredun.org.uk



With grateful thanks for contributions from:

Hilary Burgess BVM&S MRCVS, Shetland Isles Council Veterinary Advisor;

Bridget Taylor, BVM&S MRCVS, Farm Partner, Wright & Morten Veterinary Group LLP;

Dr Michael Fontaine, Benchmark Animal Health, Dr Peter Nettleton and the many Moredun scientists involved.

The authors confirm the facts are accurate at the time of going to press.

© Moredun 2016

All rights reserved. No part of this publication may be reproduced or transmitted in any form or in any means, electronic, mechanical, photocopying, recording or otherwise without the prior permission of the publisher.