

Sheep health

Maximising your flock's potential
through improved health



meatpromotion.wales



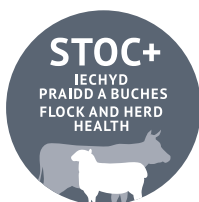


About the project

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The programme encompasses three strategic projects: Stoc+, an animal health planning project, Hill Ram Scheme, a genetic improvement project and Welsh Lamb Meat Quality Project, an eating quality project.

The aim of the programme is to ensure that Wales's red meat sector is as resilient, sustainable and profitable as possible in an increasingly competitive global marketplace.



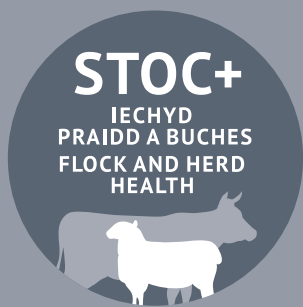
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Foreword

Achieving top performance from your sheep, both for commercial producers as well as pedigree breeders, is essential to maintaining a profitable flock. To achieve this top performance the health and welfare of the flock is paramount. A well fed, well managed flock with good health security goes a long way towards achieving improved profitability. This booklet aims to provide producers with information and advice about the major threats to the health and welfare of their flocks. It also indicates the necessity to have a robust flock health plan in place as well as a good biosecurity protocol which should be regularly updated with your vet.

The original Sheep Health booklet was published by HCC in 2009. This updated version includes the latest advice based on scientific research. The articles have been written with a practical bias towards early recognition of disease but above all on how to prevent the introduction of disease and conditions which will lead to reduced performance and hence loss of profitability.

Flock health planning

Introduction

A flock health plan is an important tool to enable farmers to plan routine treatments within their flock. It is also important for setting targets and for monitoring the health and performance of the flock.

Ideally it should be prepared with your vet and is an invaluable farmer and vet interaction. Whilst having a health plan with your vet may appear costly, this investment, if the actions in the plan are implemented, will be highly cost effective.

Remember that health programmes do not just focus on infectious disease and prevention but also include nutrition and pasture management planning.

It is true that healthy sheep are profitable sheep. Flock health planning aims to prevent disease as well as making the enterprise as profitable as possible.

Basic requirements for a successful plan are:

- Records
- A concise assessment of recent problems
- A review of the previous year's performance
- A clear set of achievable objectives

Making a start

You can contact your vet at any time to create your health plan, but consider having your health plan written well in advance of the new breeding season. The actual time of year will depend on the flock's chosen lambing date. Whilst preferable to initiate a plan at the beginning of the sheep year, if you have plenty to discuss/plan with your vet outside of this time frame, you can make a start on your flock health plan at any time.

Flock records

Records are key to a successful plan which will increase flock profitability on an annual basis. These need not be complex or time consuming. The basic requirements are:

- Projected lamb crop at scanning and the number of lambs finally sold or retained
- Barrens from scanning to lambing (differentiate between true barren and those who lambed but were turned out without a lamb)
- Lamb losses at birth and in the first week of life and losses from seven days of age to end of the selling period

Whilst lambing is always a hectic period. A simple notebook and pencil to record losses is invaluable in planning for better lambing performances in the future.



Constructing the plan

The flock health plan does not need to be a massive document. Some of the very best are based on the diary system whereby the proposed actions are penciled in and on completion are ticked off.

Discuss general control with your vet, as well as preventative medicine and use of vaccines. The following topics are examples of what should be included in your health plan.

Pre-tupping

Rams

- Fertility (discuss a fertility check with your vet and/or look at the previous year's records if it was the only ram used with a group of ewes)
- Body condition score
- Trace element status
- The condition of the teeth, joints and feet
- Are raddles to be used?
- Ram to ewe ratio

Ewes

- Final check of teeth, udders and mouths, if in doubt about any aspect it is advisable to cull
- Condition score and trace element status – is supplementary feeding or trace element supplementation needed?
- Vaccination against abortion. If it is decided that this is required then it must be completed at least 4 weeks (Enzootic abortion vaccine) or at least 3 weeks (Toxoplasma abortion vaccine) before joining with the ram
- Decide how many cycles rams will be allowed. A tight lambing is advantageous to both the wellbeing of the flock and to the shepherd



Post-tupping

Removal of rams

- After tupping keep rams in good condition to reduce future replacement costs
- Remember to vaccinate the rams when the ewes receive their vaccination pre-lambing

Ewes, third month of pregnancy

- Scan the ewes to determine how the ewes should be grouped and fed
- Check body condition score and trace element status indicated from previous results

In most Welsh flocks dosing against liver fluke will be necessary in autumn and winter but the number of treatments and timing will depend on risk (climate, farm history and grazing). Accurate advice on appropriate strategies should be sought from your vet.

Pre-lambing

- Decide on a supplementary feeding regime
- Analysis of home grown fodder is recommended
- Condition score ewes regularly
- Adjust feeding by groups either by age, by fetal load, or preferably by condition score
- Vaccination - pre lambing booster vaccination against clostridial disease should be mandatory and a risk assessment as to the Pasteurella threat made and appropriate vaccines used
- Pre-lambing vaccination against orf (if to be used) must be completed at least seven weeks before due lambing date and at least seven weeks before housing
- In larger flocks make early arrangements for lambing time assistance
- Cleaning and disinfection of the lambing shed
- Check sufficient bedding for the lambing season
- Purchase lambing supplies such as navel spray
- Dagging of ewes if indicated
- Assess feed and forage space allowances
- Construct individual lambing pens
- Revise isolation policy and provision



Lambing

- Decide on castration and tailing policy
- Assess need for colostrum supplementation
- Store / freeze colostrum
- Record any ewes with mastitis or poor milk yield
- Carry out routine procedures such as navel dressing
- Record any ewes with difficult lambings
- If lambing indoors, turn ewes out in small numbers into sheltered paddocks to minimise mis-mothering
- If appropriate, vaccinate lambs against orf
- Record deaths and abortions

Immediate post lambing

- Aborted and barren ewes should be isolated.
- Take veterinary advice about worming all or any ewes at this time. Thinner and younger ewes may need worming if not done before lambing, and Fecal Egg Counts (FEC) are high.
- Consider a fluke treatment against adult fluke, this can be given in spring or early summer, all sheep should be treated.
- Plan for evasive action against *Nematodirus battus*, to minimise risk graze ewes and lambs on pasture not grazed by lambs the previous year (preferably 2 years).
- Plan coccidiosis control strategy if appropriate.
- Plan when to ear tag the lambs if certain genetic lines are to be kept as replacements or if recording birth weights.

Lambs 3-6 weeks of age

- If coccidiosis is a problem preventative dosing of lambs should be considered before the risk period which is usually 4-8 weeks of age

Lambs at six to eight weeks

- At this stage lambs require their first dose of clostridial vaccine with or without a *Pasteurella* component, the latter depends upon a risk assessment
- Consider the risk of disease due to *Nematodirus battus* and treat if necessary, remembering that no treatment is persistent against this parasite

Late spring - summer

- Lameness, worm control and parasite control need to be addressed
- Fly strike preventative measures
- Replacement policy to be reviewed and a decision made on the number required and also the source

History of farm problems

Add any specific preventative treatments necessary based on past problems into your plan, as trace element supplementation in flocks afflicted with white muscle disease, or confirmed cobalt deficiency.

The above is a broad outline of the subjects requiring discussion during the formation of a flock health plan. Each individual flock requires a plan that is specific to itself and which allows for variations in management, terrain, organic status, diseases present in the flock and breeding objectives.

The plan must be updated at least annually to take account of disease threats identified during the previous twelve months

Key steps to flock health planning

Flock health planning can and does make a huge impact on both flock profitability as well as improving welfare.

- Flock health planning has been proven to increase profitability
- It is a living document that must be regularly reviewed
- It must be based on each flock's individual requirements
- It must cover disease, nutrition and pasture management

Flock biosecurity

Keeping disease out is vital to maintaining and improving the profitability of a flock.

In a closed flock situation, fencing to prevent sheep either wandering out or neighbours' sheep wandering in is important. Ideally double fencing should be used where adjoining other sheep farmers. External gates should be padlocked to avoid rustling but also to stop well-meaning strangers from finding neighbours' sheep on the road and mixing them in with your sheep.

Areas of open hill and common land can present challenges to managing the health status of the flocks that graze there and good co-operation between graziers is required.

But the biggest risk to the flock is the buying in of replacement breeding stock, both ewes and rams, either by private sales or through a market.

The best looking group of animals could well be carrying disease which is not apparent at sale time but may emerge in the days and weeks after the sheep have joined the new flock. Iceberg diseases can take years to emerge.

Very costly examples of diseases that can enter a flock this way include:

- Sheep scab
- Resistant round worms and liver fluke
- Footrot
- Contagious ovine digital dermatitis (CODD)
- Enzootic abortion

In addition "iceberg diseases" such as Ovine Pulmonary Adenocarcinoma (OPA / Jaagsiekte), Maedi Visna (MV) and Johne's disease are present amongst Welsh flocks and control is complicated.



Any sheep moving onto a farm, whether a single ram or a group of replacement ewes, must be quarantined for a minimum of 21 days. Good quarantine practices will help to prevent many of these diseases entering your flock.

- 1 All oncoming sheep have the potential to carry resistant internal parasites (worms) which are resistant to one or more of the more common wormers/drenches. The aim of quarantine wormer treatment is to remove resistant worms by using the most effective treatments to which resistance is unlikely. New classes of anthelmintics are now available but it is advisable to seek advice and incorporate quarantine strategies into the flock health plan. Details are also found on SCOPS website www.scops.org.uk.
- 2 After worming yard the sheep for 24 to 48 hours and then turn onto pasture that will contain worms which will dilute any surviving worm eggs passed by the incoming sheep.
- 3 Sheep coming onto a property from whatever source may be infected with scab mites, assess risk. If high – dip using an OP dip (but not within 14 days of giving levamisole) or if using injectable moxidectin this injection can be done sequentially as part of the quarantine wormer treatment. Consider use of the scab ELISA test to detect if a group of animals have been exposed and need treatment (see www.scops.org.uk).
- 4 Get advice on quarantine procedures for liver fluke and consider the possibility of liver fluke resistant to flukicides. Treatment will also depend on the liver fluke situation on your own farm.
- 5 Although sound at the time of purchase sheep can carry the bacteria that cause footrot and Contagious Ovine Digital Dermatitis (CODD) – Footbathing in 2.5-3% formalin or 10% zinc sulphate will reduce the bacteria causing infection but it will not eliminate them from infected feet so examine all feet if possible. Alternatively antibiotics specific to the bacteria can be used as advised by a veterinary surgeon for infected animals, different antibiotics may be prescribed for footrot compared to CODD.
- 6 Enzootic abortion (EAE) can be introduced by latently infected ewes and also by ewes that have previously aborted due to EAE. Latently infected ewes will abort at the subsequent lambing; previously infected ewes may have a 'normal' lambing but can still spread infection in placenta

and discharges. Vaccination of incoming stock will reduce but not prevent spread of infection from latently infected ewes.

- 7 Look carefully for swollen glands around the head and neck which could be due to caseous lymphadenitis (CLA). The stress of sale could also induce clinical signs of orf so keep a close watch on the animals during the 21 day quarantine period.
- 8 If any animals appear to be ill, or lose condition during this quarantine period it is essential to have them examined by a vet and consider testing for disease e.g. Maedi Visna, Border Disease, Johne's, CLA and Liver Fluke.

Flock security is an integral part of flock health planning and the various options outlined above must be incorporated into the plan.

Remember that incoming sheep are not the only threat to flock security. Sheep scab mites can survive off the host for over 16 days. Anybody having contact with infested sheep (shearers, other contractors, vets) must disinfect their protective clothing and wash exposed areas of skin with water (as hot as bearable) before leaving the premises.

Rigorous hygiene and disinfection of vehicles and equipment, especially of shearing equipment, is recommended to prevent the introduction of infections like CLA.

If you are using any other vaccines in your flock speak to your vet about whether it is an appropriate time to administer them to the incoming stock to bring everything up to the same vaccination status.

“**The biggest risk to the flock is the buying in of replacement breeding stock, both ewes and rams, either by private sales or through a market.**”

Planning for healthy sheep

Clostridial diseases

Clostridial diseases are deadly.

There are ten clostridial diseases which can affect sheep. The commonest in Wales are pulpy kidney, lamb dysentery and black disease. The other seven are more sporadic but kill a significant number of sheep every year.

The clostridial bacteria can either exist in small numbers in the various organs of the sheep or form spores which survive in soil for many years. Trigger factors, which vary for each species, set off rapid multiplication.

During this multiplication powerful toxins are released which rapidly destroy the sheep's internal organs. The result is rapid death.

Once symptoms are observed too much damage has been done and despite any treatment death is inevitable.

Fortunately very efficient vaccines are available to prevent sheep dying from a clostridial infection but correct use of these vaccines are required to get good protection.

All sheep require a primary course of two injections 4-6 weeks apart. An annual booster vaccine will then be required and is usually done before lambing. The ewe will then pass antibodies to her lambs via the colostrum giving the lambs protection for a short period in early life.

Ewe lambs to be kept for breeding and that will be tupped as shearlings should have their primary course of two injections before they are weaned. They should then be included with the rest of the ewes to receive their annual boosters. It is a common mistake for shearlings to be missed and not receive their first annual booster making them vulnerable to infection.

Lambs destined for slaughter may require protection against clostridial diseases and will require two doses, the second 4-6 weeks after the first dose.

Remember to include tups and ram lambs in all vaccination programmes.

Orf

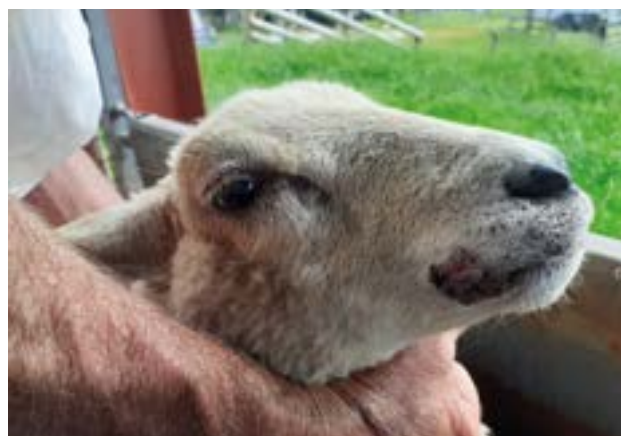
Orf is an enigma causing serious problems on some farms but not others.

Orf is caused by a *parapox* virus which requires a micro-abrasion to infect the tissues immediately under the skin. Disease is seen in very young lambs, grazing weaned lambs, ewes and on ewes' teats. Frequently there is a secondary infection of the lesions with a *staphylococcal* bacteria. Some farms experience a single outbreak but do nothing and the disease does not re-appear, whilst other farms suffer problems every year.

A live vaccine derived from mild strains of field virus is available. The objective is to give the animal a mild dose of the disease so that it will acquire immunity. If orf is not present on your farm do not use this vaccine.

Depending on which class of sheep is affected then appropriate vaccination schedules need to be developed.

- Ewes should not be vaccinated later than seven weeks before lambing or housing
- Lambs can be vaccinated from one day of age
- There is no colostral protection so ewes and lambs should all be vaccinated
- The vaccine should be applied under the foreleg in all animals, not in the groin as the lamb can lick that area and infect its mouth



Orf

Other factors in the control of orf:

- Secondary bacterial infection may be controlled by antibiotics
- The virus can survive for over a year in scabs that have dropped off in dry places but this is reduced in wet conditions. Thus, if an outbreak has occurred in housed sheep the shed and all equipment should be washed down with plenty of water and disinfectant
- Pasture rich in thistles or gorse are a real hazard as they damage the lips allowing virus entry. Weed control should therefore, be part of your farm management plan

Orf is such an enigma that it is important that you consult your vet as to the best approach to control in your situation.

Pneumonia - Pasteurellosis

Pasteurellosis causes pneumonia in adults and lambs.

It can also cause a septicaemia particularly in weaned finishing lambs in the autumn.

Sheep are able to carry *Pasteurella* bacteria in their throats and nasal passages even when they are not showing signs of disease. Recently the names of the bacteria have been changed, those causing pneumonia and young lamb septicaemia are now called *Mannheimia* species, usually *Mannheimia haemolytica* and those causing growing lamb septicaemia are now called *Bibersteinia trehalosi*.

Disease may be initiated either by management or environmental stress, such as handling for dipping, movements and mixing groups of sheep or sudden change of pasture. But deaths due to pasteurellosis can also occur when other pneumonia agents are present such as *Mycoplasma spp*, Ovine Pulmonary Adenocarcinoma or parainfluenza virus. In these cases the lungs are damaged and the opportunist *Pasteurella* bacteria present in the throat travel to the lungs to cause a potentially fatal pneumonia. Other diseases such as worms or fluke can also increase the risk of *Pasteurella* pneumonia or septicaemia by affecting the immune system and reducing ability to fight disease.

It is important to differentiate between primary pasteurellosis and disease in which other agents play a part.

Vaccines are available against pasteurellosis and are efficient in protecting against primary infections; they may be less effective against secondary disease.

The vaccines, like those for clostridial diseases, are inactivated and require two doses to establish any immunity. The risk of disease due to *Pasteurella* can vary between flocks and a decision on whether to vaccinate or when to vaccinate can be based on a risk assessment during flock health planning. Timing of vaccination depends upon the likely risk period and the previous history of outbreaks.

Some protection is passed to the lamb via the colostrum, as for the clostridial diseases, but this only provides protection for the first three to four weeks.

Well established combined clostridial / *Pasteurella* vaccines are available. Their use should be planned and discussed with your vet during flock health planning.



Parasitic roundworms

Roundworms can cause significant production losses and even death in sheep

Resistance to the three older wormer groups (white, yellow and clear) has been found in Wales which means dosing with some products will be ineffective

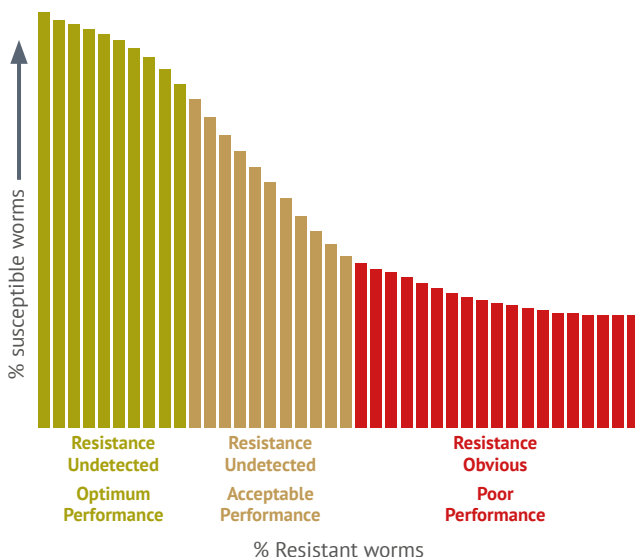
In addition, resistance to one of the newer wormers has also been found in GB

The SCOPS (Sustainable Control of Parasites in Sheep) guidelines should be followed
www.scops.org.uk

For nearly 40 years we have been able to control worms very successfully using regular treatments with highly effective anthelmintics. There is however, an increasing level of resistance to these products in the worm population. It is not too late for most producers to take action and slow anthelmintic resistance down. The development of resistance is a gradual process and the earlier you act the longer you can keep wormers effective.

The diagram below illustrates lamb performance against % resistant worms on the farm. When we test for resistance, for example by using a Faecal Egg Count (FEC) at a set time after drenching, we are looking for the wormer to have killed at least 95% of the worms. In the diagram this is the point where the green and amber zones meet. The important message is that in practice, without a test, you wouldn't notice a fall in sheep performance until 80% or less of the worms were killed. By then you will have entered the red zone from which there is no way back.

Stay out of the red!



The objective of sustainable worm control is to work to keep your farm in the green / amber zone for as long as possible. The challenge is to try and balance effective worm control which will ensure sheep performance and welfare while at the same time, minimising selection for resistance to the anthelmintics in the worm population.

What can we do?

You need to know whether any of the worms present on your farm have developed resistance to any of the anthelmintic groups. A simple Faecal Egg Count Reduction Test (FECRT) whereby you carry out a FEC before and after drenching will get you started. Your vet or livestock adviser can then advise you on how to use this information so you are in a good position to make decisions on future worming policies.

Key steps to control of internal parasites

- Only use wormers when necessary - use (FECs) to check when ewes and lambs require drenching.**
- Use the right dose of the right wormer at the right time. (Don't guess the weight of the animals).**
- Do not routinely dose ewes pre-tupping, focus on lean, immature or infected ewes.**
- Test for wormer resistance on your farm.**
- Avoid bringing in resistant worms - use quarantine treatments.**
- Dosing ewes post lambing may be required but requires strategic planning- seek advice from your vet or livestock adviser.**
- Preserve susceptible worms on the farm and reduce the selection for wormer resistance.**
- Use mixed grazing with cattle (but not goats).**
- Move weaned lambs on to less contaminated areas from late June onwards.**
- Work out a control strategy with your vet or livestock adviser.**

For more information

Consult your vet and refer to the advice from SCOPS which can be found at www.scops.org.uk

Liver fluke

Liver fluke causes substantial economic losses through death, ill thrift and condemnation of livers in abattoirs.

Liver fluke predisposes to other diseases such as black disease.

The incidence of liver fluke has increased greatly over the last few years, with it occurring in the drier eastern areas of the UK which were previously thought to be 'flake free'. Essential to this spread and increased severity, are wet summers.

Eggs are shed from adult fluke in the liver, via the faeces from sheep and cattle on to the pasture. On the pasture they develop and seek out and invade, a mud snail, *Galba truncatula*, where multiplication occurs and the life cycle continues. Finally vast numbers of the infective cercaria leave the snail and move on to the the pasture where they encyst on herbage.

When eaten, these encysted stages, migrate to the liver where they develop into adults. They do not start to lay eggs until they are adult, about ten to twelve weeks old. The full life cycle, from egg to adult, usually takes about four to five months.

In sheep, fluke causes three distinct types of disease with frequent overlap between types.

Acute fluke

Acute fluke occurs when very large numbers of the infective stage are ingested at once, resulting in massive damage to the liver with haemorrhage and tissue damage. In these cases severely affected animals frequently die. It is usually seen in late summer/autumn. Sheep may remain in good body condition as disease progression is rapid.

Examination of the rest of the flock may find other weak and anaemic individuals.

Sub-acute fluke

Sub-acute fluke occurs mainly between late autumn and spring. Sheep are anaemic and lose condition rapidly but survive for about two to three weeks from the outset of symptoms. At this stage the liver will contain mixed ages of fluke but not in the numbers associated with acute disease.

Chronic fluke

Chronic fluke occurs in the winter and spring resulting from lighter infections which have settled in the bile ducts. These destroy red blood cells resulting in anaemia as well as generalised ill thrift and weakness. It is chronic fluke which produces the classic "bottle jaw".

As it takes up to twelve weeks before fluke eggs appear in the faeces, such examinations cannot be used for diagnosing acute or subacute fluke in the autumn. Sadly often the first sign of acute fluke is sudden death, particularly on farms not previously affected. Blood samples can be tested for antibody showing exposure to liver fluke and can detect infection earlier than faecal examination. This is of most use in lambs in their first grazing season.

Chronic fluke can be diagnosed by the examination of faeces and the presence of a single egg is sufficient to confirm infection. Clinical diagnosis and post mortem examination are the most reliable to confirm acute and subacute fluke.



Damaged liver caused by Acute fluke



Liver fluke at different stages - Image from WVSC

Abattoir feedback on liver damage is a useful source of information and farmers should actively request this feedback when they sell their lambs direct to abattoirs. This will help you to understand what the level of infection is and whether current control programmes are effective.

Flock health planning plays a crucial role in the prevention and control of fluke infestation and this should be reviewed each year as environmental conditions change with rainfall and temperature. Your vet will be aware of the wider distribution of fluke in your area and also whether it is moving into a previously free area. Strategic dosing is the best control. It is impossible to remove the snail population although good drainage and fencing off wet areas may help reduce the level of challenge.

For treatment in late summer and autumn, a flukicide that is active against immature fluke is recommended. Treatment may need to be repeated through the autumn and winter, especially if there is a severe challenge. If a spring treatment is required (April - June), then a flukicide with adult activity only can be used. This will reduce the selection pressure on those active against immatures, hopefully preserving their action for the future.

Various flukicides are available and it is important to remember that there are only five distinct chemical products although there are many differently branded products. Your vet will be able to provide advice on the best product to use at which time.

Do not use combination fluke and worm products if worming your animals is not necessary, as these pose a real danger in increasing wormer resistance in roundworms. Use a flukicide only. It is also no good using a product that only kills adult fluke in the autumn, when immature fluke are the real threat.

Cattle generally suffer from chronic fluke and are therefore a source of pasture contamination. If you are fluke free, an effective fluke treatment is required within your quarantine programme to ensure fluke does not enter your farm. This is also important for farms with known fluke so they don't introduce Triclabendazole (TCBZ) resistant fluke onto the holding.

Resistance has been detected against TCBZ on some farms. This needs to be borne in mind if poor results from dosing are seen, however failure to improve may be due to reinfection from heavily infested pasture so it is important to investigate perceived lack of efficacy of treatments.

Coccidiosis

Coccidiosis is caused by an infection with the protozoan *Eimeria spp* which enters the gut lining. Infection occurs by the ingestion of the parasite's oocysts (eggs). These hatch in the small intestine and invade the cells both there and in the large intestine. In these cells they undergo a series of changes and finally reach the stage where oocysts are shed in the faeces.

The source of the initial infection can be oocysts which have survived on the pasture from the previous year or from small numbers shed by the ewe contaminating the environment.

A light infection causes no lasting damage and lambs quickly develop immunity and are protected from further disease.

Serious outbreaks of scouring and disease are associated with the ingestion of large numbers of oocysts. The risk factors for serious outbreaks include:

- Poor hygiene with faecal contamination on the udder of ewes
- The continual use of a single turnout pasture heavily contaminated from previous years or from the current year if lambing is prolonged.
- Younger lambs grazing with lambs a few weeks older or following them onto grazing. The older lambs get a mild infection and become immune but can still pass large numbers of infective oocysts into the environment causing disease in the next group of lambs.

Infected lambs scour and flecks of blood and mucus may be visible. Milder infection cause condition loss and can damage the gut resulting in poor growth rates and stunted lambs. Examination of the faeces may yield up to a million oocysts per gram. However as there are nine species but only two pathogenic species - counts of the pathogenic species can be far lower. Very high counts without clinical signs are unreliable for this reason and do not mean that you have a coccidiosis problem.

Timing of treatment can vary and advice should be sought from your vet.

Measures to reduce coccidiosis infection rates include;

- **Good hygiene**
- **Keeping ewes clean**
- **Application of hydrated lime around drinking troughs and feed troughs**
- **A tight lambing pattern with the use of several turnout paddocks**
- **Avoid following young lambs behind older lambs at pasture, as the older lambs multiply the infection and the younger ones become exposed to large numbers of oocysts.**

External parasites

All parasite infestations of the skin and fleece are costly in loss of condition, treatment and welfare.

Effective control depends on correct identification of the parasite(s) involved.

Ticks and midges transmit other serious diseases.

Permanent ectoparasites (i.e. those that spend their entire life cycle on the sheep) include sheep scab and chewing lice. Less common ones include ear mites, other mange mites, sucking lice and keds.

Semi-permanent ectoparasites (i.e. those with at least one free living life stage) include blowflies and ticks. Less common ones include nasal bot flies.

Diagnosis of Ectoparasite Infestations

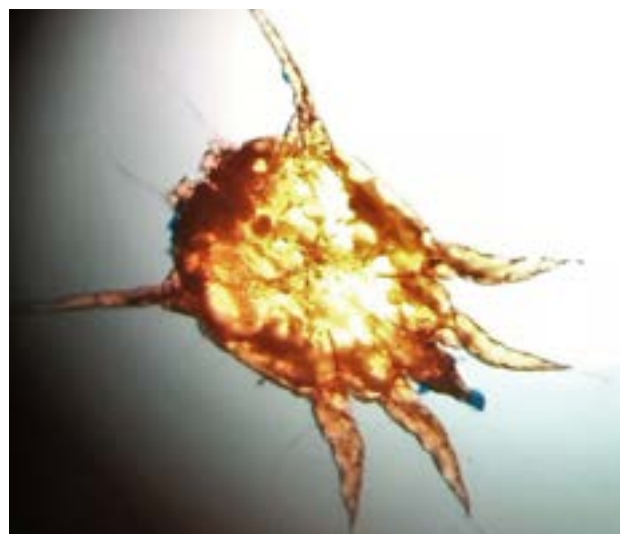
If you suspect an ectoparasite problem in your flock it is important that it is confirmed and identified by a vet.

Don't forget that sheep may carry more than one ectoparasite (e.g. scab and lice) simultaneously. Sheep can also be affected by a number of non-parasitic skin diseases.

Sheep Scab

Sheep scab is an allergic dermatitis, caused by the mite *Psoroptes ovis*. Skin damage is mainly as a result of scratching and rubbing but also through trauma caused by the mite's mouthparts. Skin damage increases leakage of serum, with accompanying scab formation and skin thickening. Early sub-clinical disease is characterised by low mite numbers, very small lesions and very little rubbing or scratching. Sheep with sub-clinical scab can look perfectly normal and can unknowingly be introduced into a flock. A new blood test is able to detect the presence of scab mites on sheep and can be very useful in detecting early infestation. It is best used by blood sampling a number of sheep in a group rather than just testing a single itchy animal.

Later stages of infestation are characterised by a rapid increase in mite numbers and scab cover. Rubbing and head tossing becomes more pronounced; areas of wool loss may appear, together with open, bleeding wounds. Sheep rapidly lose condition.



Sheep scab - Image from WVSC

Transmission

Sheep scab mites survive in tags of wool or scab attached to walls, handling pens, brambles and bushes and are then picked up by other sheep as they pass by.

The majority of scab outbreaks come from:

- Neighbouring farms, through badly maintained fencing and stray sheep or common grazing
- Sheep-to-sheep contact at shows, markets or in livestock lorries
- Introduction of sub-clinical infected sheep in the flock

Lice

Chewing lice (*Bovicola ovis*) are small, pale to red/brown insects that feed on epithelial scales, wool fibres and skin debris. Infestations of lice cause a chronic dermatitis, characterised by irritation, itching, rubbing, tagging and biting of the fleece. These signs may be confused with sheep scab infestation. Chewing lice spread slowly among sheep. Most, but not all, cases occur in the winter.

Severity of infestation appears to depend on the breed, fleece length and overall health of the sheep together with the ambient climate.

Irritation due to modest infestations is enough to provoke scratching and rubbing with damage to fleece and hides. Immune responses to *B. ovis* can result in the nodular skin defect known as "cockle", downgrading the value of the leather.

Blowfly strike

Blowfly strike is the result of an infestation of living tissues with the larvae (maggots) of flies (*Diptera*).

Signs of blowfly strike include agitation and dejection. In breech or tail strike, infested sheep stamp their hind legs, shake their tails vigorously or gnaw and rub at the breech. As lesions develop a distinctive odour is noticeable and the wool becomes matted and discoloured. If the infestation remains untreated the affected area increases and wool is shed from the centre, accompanied by signs of constant discomfort. Secondary bacterial infections may occur.

In body strike, flies are attracted to sheep by the odours of excessive "sweating" and/or decaying organic matter in the fleece, usually over the loins, shoulders, flanks, neck, back, throat or abdomen. In breech strike, flies are attracted to fleece contaminated with urine and/or faeces and therefore scouring animals are at greater risk. The prevalence of blowfly strike is weather-dependent, with most cases of body strike occurring during periods of high humidity or warm periods after heavy rain. Breech strike depends less on weather as the moisture supplied by urine and/or scouring is sufficient to attract flies.

The risk of blowfly strike can be reduced through shearing, crutching or dagging from early April and repeated every 4 to 6 weeks to remain effective. There is some evidence that susceptibility to strike may be hereditary therefore breeding ewes and rams continually struck should be culled.



Blow fly strike



Tick- image from WVSC

Ticks

All active tick stages feed on the blood of sheep. Ticks can be vectors of a number of important diseases affecting sheep, other livestock and humans, such as:

- Tick borne fever (TBF)
- Tick borne encephalitis
- Louping ill
- Lamb pyaemia
- Lyme disease

Off the host, ticks require a humid environment to survive, usually found at the base of dense vegetation, particularly in rough grazing, moorland, heath or woodland.



Tick- image from WVSC

Chemical Treatments

It is important you know which parasite you are treating before deciding which treatment will be most effective. All ectoparasite treatments should be administered strictly according to the manufacturer's instructions.

Misuse can be ineffective, harmful to the environment and select for resistance in the ectoparasites or roundworms (depending on the activity of the treatment). If using injections or pour-ons sheep should be weighed.

Licensing for the use and disposal of OP dips is necessary. Dip baths should be accurately calibrated. Allow dipped sheep to stand in the draining pen for at least 10 minutes to catch and return any run-off to the dipbath. Do not return freshly dipped sheep to normal grazing. Put them in a holding field (with no natural watercourses) next to the dipping set-up with a trough of fresh water for a minimum of 24 hours. If there are natural watercourses in the holding field, fence them off from livestock access.

There are a number of licensed mobile dipping contractors who have all the necessary permits and means to purchase and dispose of the dip.

Key steps to control of external parasites

Operate a quarantine policy for incoming stock.

Itchy sheep need careful examination and a correct diagnosis of the cause.

If permanent ectoparasites are found on one animal the whole group should be considered infested and treated at the same time.

Make sure the chosen treatment actually controls the condition identified.

One missed sheep could re-infest the whole flock.

Protect the operator and the environment through careful handling and use of treatments.



Mastitis

Acute mastitis can kill within 24 hours. Check for chronic mastitis after weaning.

The incidence of mastitis or inflammation of the mammary gland varies enormously between flocks and from season to season. It is predominately caused by bacterial infection and can present as either acute (sudden, rapidly progressive) or chronic (long-term) disease.

The two major causative bacteria are *Staphylococcus aureus* and *Mannheimia haemolytica*. These bacteria normally inhabit the skin, mouth, nasal passages and vagina of adult ewes. During lambing they are passed to the udder skin and teat ends by sucking lambs. The presence of teat damage or skin lesions create an entry point for these bacteria increasing the risk of mastitis. *E. coli* can also cause mastitis and is often picked up from the environment. Poor hygiene at lambing time can allow environmental bacteria to multiply, increasing the chance of infection. Ideally bedding should be kept clean and muddy paddocks avoided.

Acute mastitis cases are usually seen from ten days to three weeks after lambing. There will be heat and swelling of the udder with clotted, watery or bloody secretions. Often the ewe appears lame on the back leg due to udder pain and will not allow the lambs to suckle. The ewe may hang back from the rest of the flock and stop eating. If left untreated the ewe may die rapidly from toxic mastitis. Treatment with injectable antibiotics and anti-inflammatories should be implemented as soon as possible. Treatment protocols should be discussed with your vet and included in your flock health plan. Ewes that do survive may not regain milk supply and go onto develop chronic disease.

Chronic mastitis is usually discovered at weaning or when the ewes are checked for breeding suitability in the autumn. In these cases the udder is hard or contains a number of hard lumps. Lambs from these ewes may not have performed as well as lambs from healthy ewes.

There are a number of risk factors that can predispose to mastitis. Under-fed ewes in poor body condition are less able to fight infection and have reduced milk supply. This results in hungry lambs and over-eager sucking which can damage the teats and udder. Rearing two or more lambs also increases the risk of mastitis as ewes are more likely to develop teat lesions and udder damage from the increased

suckling. Poor udder conformation can also contribute to disease development.

Poor hygiene at lambing time such as dirty, wet bedding and high stocking densities increases contamination of the udder and risk of bacterial entry. Infections may also be spread from ewe to ewe via contaminated hands or equipment, especially if the udder is handled at lambing to assess milk supply. Good hygiene in the lambing shed is essential to reduce the risk and spread of infections.

Older ewes (>4yrs) are at increased risk of mastitis as they are more likely to have a low body condition score and poor udder conformation. Mastitis may also occur in first time lambers as these ewes often take longer to feed their lambs increasing the risk of teat and udder damage. There is also evidence that some breeds and some families within a breed are more susceptible to mastitis. It's therefore advisable not to retain ewe lambs for breeding from a ewe with a history of mastitis. Exposure and chilling of the udder from short tail docking or excessive crutching has anecdotally been linked to the development of mastitis; however this link has not been scientifically proven.



Ewe mastitis - Image from APHA

Metabolic diseases

Twin lamb disease (pregnancy toxemia)

Twin lamb disease is seen in thinner ewes, which are often older ewes carrying more than one lamb. It can also be seen in overfat ewes, which have had a rapid decrease in feed energy intake. It is due to a negative energy balance when a decline in the level of nutrition does not meet the requirements of the ewe during the late stages of pregnancy (when 70% of fetal growth takes place).

Affected ewes appear disorientated and separate themselves from the rest of the flock. They are lethargic with no appetite and can eventually go blind. Treatment is often unsuccessful and death can occur. The ewe should be isolated and offered palatable feeds and water.

Treatment with propylene glycol, intravenous glucose injection and glucocorticoid injection can be successful in some cases in ewes which are still able to walk when treatments commence.

These ewes need to be checked regularly for signs of lambing or abortion as they may be too weak to expel the lambs unaided.

Hypocalcaemia

Hypocalcaemia is a lack of calcium in the blood stream and usually occurs in the late stages of pregnancy and early stages of lactation, when the demand for calcium is at its highest. The affected ewe is weak and unable to stand. The rumen stops working and fluid is often expelled from the nose. Without treatment the ewe can fall into a coma and die within 24 hours.

Affected ewes respond well to treatment which ideally should be a slow intravenous administration of 20-40 mls of a 40% calcium borogluconate solution given over 30 to 60 seconds. Eructation (belching) is seen 1-2 minutes after the injection and she will often quickly stand and walk away within 5 minutes. Alternatively a subcutaneous injection of 60-80 mls of 40% calcium borogluconate solution may be given in 2 or 3 sites over the thoracic wall behind the shoulder and it may take up to four hours before she responds.

Hypomagnesaemia

Hypomagnesaemia or grass staggers occurs in spring and is a deficiency of magnesium caused by increased demand and the forage having insufficient magnesium levels to meet the animal's requirements. It is often associated with a sudden cold, wet spell of weather and animals on lush grazing.

Hypomagnesaemia occurs in ewes within the month before or after lambing, the highest incidence occurring after lambing. Affected sheep often have hypocalcaemia and /or hypoglycaemia as well and should be treated for all three conditions.

The first signs are often death but occasionally the ewe will exhibit restlessness, tremors and unsteady walking. She will then lie down and have involuntary leg movements and frothing at the mouth.

Treatment is in the form of a subcutaneous injection of magnesium sulphate and an intravenous injection of a calcium/magnesium and dextrose mixture.

Control of metabolic diseases

The metabolic diseases discussed here are all associated with the pregnant ewe as she approaches lambing or the lactating ewe. The key to controlling them is body condition scoring the ewe throughout pregnancy and making corrections to her diet based on her nutritional requirements. In large flocks, division of ewes into different groups based on the number of lambs being carried allows for appropriate diets to be fed. Once again planning and being aware of the nutritional value of diets is important in preventing these condition. Supplementation with standard sheep minerals should be discussed with your vet. Over supplementation, or supplementation when it is not needed, can cause harm.



Collecting blood samples

Scrapie

Scrapie is a fatal brain disease of sheep and goats. It is a notifiable disease and must be reported to APHA 0300 303 8268

The genetics of the sheep influences the development of clinical disease and allows for the breeding of clinically resistant sheep – select rams for resistance as a minimum.

Most cases of scrapie occur in sheep between two and five years of age and animals will show a combination of non-specific symptoms. Scrapie should be considered in any sheep or goat over 12 months of age showing nervous or behavioral changes. If there is no obvious alternative diagnosis, the case must be reported to APHA Field Services for further investigation.

Over recent years measures were introduced to reduce the incidence of Scrapie including the Compulsory Scrapie Flocks schemes and active surveillance for scrapie carried out on fallen stock and at abattoirs. Nevertheless cases do still arise.

Susceptibility to scrapie can be genetically controlled and blood testing and selection of breeding animals for resistance is the basis of the control of classical scrapie. Breeding from animals that are resistant to classical scrapie will reduce the incidence of the disease and may lead to its eradication.



Symptoms

Most sheep show a gradual development of clinical signs over a period of several weeks or even months, although in some cases e.g. stress, the condition may worsen rapidly.

Clinical signs may include:

Intense irritation with sheep continually scratching, rubbing flanks or nibbling of the feet or legs.

They may also nibble or grind their teeth when rubbed firmly on the back. Excessive wool damage may be seen.

There may be changes in behaviour from increased excitability with nervousness, fear and aggression or depressed behaviour, lagging behind the flock, vacant staring.

Changes in posture and movement may be observed such as an unusual high stepping trot, a severe lack of coordination, stumbling or unable to stand.

Later in the course of the disease there may be a dramatic weight loss and death.

The only certain way to find out if an animal is infected is to examine the brain tissue under a microscope after slaughter or death.

Atypical Scrapie

Atypical scrapie cases tend to occur in animals over 5 years old with genotypes considered more resistant to classical scrapie and there is seldom more than one case in a flock.

Scrapie Monitoring Scheme (SMS)

Membership of this scheme enables flock owners to demonstrate compliance with the EU Regulations concerning the export of breeding sheep, goats, semen or embryos to other EU States and further afield. In addition to adherence to a set of rules, flocks must undertake post mortem testing of fallen stock. For further information on the SMS contact the SRUC Premium Sheep and Goat Health Schemes (Tel 01835 822456).

Iceberg diseases

Iceberg diseases is a term used to describe diseases which are often slow to develop with more animals harbouring disease than those showing signs. Those sheep showing signs may just be the tip of the iceberg but affected flocks will have overall poorer production. There are five diseases in sheep: Caseous Lymphadenitis (CLA), Maedi Visna (MV), Ovine Johne's Disease (OJD), Border Disease (BD) and Ovine Pulmonary Adenomatosis (OPA / Jaagsiekte).

Detection and treatment can sometimes be difficult but for flocks aiming for best performance it is important to consider these diseases in the flock health plan and how to prevent them from entering the flock.

Caseous Lymphadenitis (CLA)

Caseous lymphadenitis (CLA) is caused by *Corynebacterium pseudotuberculosis*. It mainly enters through cuts and abrasions for example at clipping or from rams fighting, but it can also be breathed in. The condition causes abscesses in the animal's lymph glands often around the head and neck but also in internal organs e.g. lungs.

In the UK CLA is most prevalent within terminal sire sheep breeds. In most flock outbreaks the first animals to be identified with CLA have been rams.

Testing

There is a blood test that detects antibodies to *C. pseudotuberculosis*. The SRUC Premium Sheep & Goat Health Schemes operate a pre-sale screen in which breeding animals are screened for evidence of infection prior to sale. Blood testing and separation, or culling of infected animals will help to control CLA in infected flocks.

Vaccination

CLA in sheep is effectively untreatable, since even prolonged use of antibiotics usually fails to eliminate all the infectious organisms from the body. There is no licensed vaccine in the UK but an Australian vaccine can be imported under special license.

Controlling spread

Where present in a flock, isolating young stock from all older sheep from weaning onwards has been shown to greatly reduce spread of the infection amongst the younger groups. Blood testing with negative results will then allow the owners of infected flocks to sell young breeding stock with increased confidence that CLA is not being sold on too.

- **CLA is a chronic infectious disease that causes abscesses in the lymph nodes and internal organs.**
- **Lesions most commonly seen are external lumps that are usually abscesses in lymph nodes.**
- **Losses occur through culling of infected animals and whole or partial carcass condemnation.**
- **CLA can affect animal condition, milk production and reproductive performance.**
- **It is caused by a highly infectious bacteria that can survive in the environment for several months.**
- **It is present throughout the UK and is emerging now in the commercial sector.**
- **The main cost of CLA in Wales is the loss of sales of breeding animals that become infected.**



Maedi Visna

Maedi Visna (MV) is a viral disease that entered Britain more than 30 years ago. Sheep of any age can become infected, but as there is a long incubation period signs are typically seen in animals of more than two years of age. There is no cure or vaccine available.

MV is fatal once typical clinical signs have developed, although only a proportion of infected sheep will develop signs (potentially 25-30%). Other infected sheep may have reduced productivity and will remain infected for life, continuing to spread the virus.

Clinical signs include:

- Pneumonia
- Progressive paralysis
- Wasting
- Arthritis
- Chronic mastitis

Recent research has shown that the number of infected flocks in the UK is increasing. The disease is costly with increased ewe culling due to wasting, general poor health, chronic mastitis and poor fertility. There is also a reduction in overall flock productivity, with reduced lamb crops, increased lamb losses and poor lamb growth rates. Export restrictions may apply for live sheep and semen from MV positive flocks.

A voluntary accreditation scheme is available through the SRUC Premium Sheep and Goat Health Schemes, which requires accredited sheep to be kept completely separate from non-accredited sheep. Membership of this scheme can add value to the sale of breeding stock and can form an important strategy in flock biosecurity.

Border Disease

Border Disease is also known as ‘hairy shaker’ or ‘fuzzy lamb’ disease. The disease is caused by infection of the foetus in early pregnancy with Border Disease Virus (BDV), a virus which is very closely related to Bovine Viral Diarrhoea (BVD) virus in cattle. If you are co-grazing with cattle, you must consider that sheep with Border Disease are a risk. Cattle infected with BDV by sheep can develop a fatal disease called Malignant Catharral Fever (MCF).

When susceptible ewes in early pregnancy are infected, the virus crosses the placenta and invades the foetus. The ewe shows no disease but the foetus is infected and may die and be reabsorbed, be aborted or stillborn. Some infected foetuses will be born alive and appear normal but will be persistently infected (PI) and become a constant source of infection in the flock. In other cases the virus causes severe brain damage and the wool growth is affected resulting in lambs which are shaky, wobbly and have a hairy coat, the “hairy shaker” lambs.

There is currently no vaccine available and the focus should be on not allowing the disease to enter your flock. The most common way for a flock to become infected is through buying in replacement stock in the autumn that are persistently infected. These infect the flock and the disease becomes evident at lambing the following year with increased barren ewes, abortions, stillborn and “hairy shaker” lambs.



Ovine Pulmonary Adenomatosis

Ovine Pulmonary Adenomatosis (OPA) is a fatal disease caused by the Jaagsiekte virus which affects the lungs. The virus is spread nose to nose in respiratory droplets, so affected flocks may consider avoiding trough feeding and outdoor lambing or minimal housing to reduce spread.

Clinical signs are typically seen in older sheep 3 - 4 years old but sheep under a year old can be affected.

Clinical signs include:

- Chronic wasting.
- Difficulty breathing.
- Sudden death from secondary Mannheimia (previously called Pasteurella) infection.

Flocks that have a high number of thin older ewes might be harbouring the disease.

Diagnosis can only be made on a post mortem examination, however ultra sound scanning has proved useful in detecting affected sheep.

There is no treatment or vaccine so affected sheep must be removed from the flock.



Images show OPA infected lungs - Images from WVSC

Ovine Johne's disease

Johne's disease is caused by the bacterium *Mycobacterium avian subspecies paratuberculosis* (MAP) which also affects cattle. MAP is shed in faeces, milk and colostrum and can survive for a long time in the environment.

Sheep usually pick up the infection via the faecal /oral route during the first few months of life or from the milk of infected ewes.

Clinical signs are usually wasting in 3 - 4 year old sheep. Some sheep develop "bottle jaw" where fluid accumulates under the jaw.

Testing for this disease can be challenging. Blood test to look for antibodies may only become positive in the later stages of the disease. Testing pooled faeces can be used as part of a screening programme to assess the status of a flock.

There is no effective treatment for Ovine Johne's disease. A vaccine is available but is unlikely to eradicate the disease from a flock without stringent management interventions. This vaccine is now available from your veterinary surgeon in the UK and is called Gudair.

A voluntary accreditation scheme is available through the SRUC Premium Sheep and Goat Health Schemes which require blood, milk and faecal screening with a health plan in place for the farm, covering the control of Johne's disease.



Vector-borne viruses

In recent years farmers will have become aware and may have experienced two viral diseases that were previously unrecorded in the UK, Bluetongue virus (BTV) and Schmallenberg virus. Both are carried by midges and infection is spread between animals via biting midges.

Bluetongue virus

Bluetongue virus is a Notifiable Disease and if suspected it must be reported to APHA 0300 303 8268

Bluetongue virus (BTV) is transmitted by midges of the *Culicoides spp* and occurred for the first time in the UK in 2007. Farmers were aware of it prior to this due to increasing numbers of cases being detected across continental Europe. Great Britain was officially declared free again from bluetongue on 5th July 2011, it continues to circulate in Europe.

Clinical signs:

- Raised temperature, lethargy and loss of appetite
- Eye and nasal discharges
- Drooling as a result of mouth ulceration and/or tongue swelling
- Swelling of the head and/or neck, lips, ears and above the feet (coronary band)
- Severe lameness – affected sheep may be stiff and reluctant to rise
- Reddened skin and there may be haemorrhages into or under the skin
- Respiratory problems – difficulty breathing
- A 'blue tongue' is only occasionally seen
- Abortion

Death rate can be as high as 70 per cent of a flock, and those that survive may lose condition and experience reduced production including infertility (particularly males).

“**Bluetongue is a notifiable disease meaning if you suspect your sheep may have bluetongue this should be discussed with your vet and reported to APHA as soon as possible.**”

Vaccines were produced and these proved very effective in bringing the disease under control and limiting the spread of the disease but affected farms did in some cases suffer considerable losses.

The key implications now for sheep farmers are:

- There are no further BTV specific restrictions on exporting sheep and cattle from Great Britain.
- There is a risk of reintroduction via windblown midges across the channel, as there is still active infection in some European countries.
- Current import controls remain for susceptible livestock entering GB from BTV restricted zones across Europe and livestock farmers are urged to think carefully about importing animals from areas that are known to be infected with Bluetongue virus.

For the latest information on the situation regarding BTV and any import and export restrictions please refer to the Welsh Government, APHA and Defra websites. Bluetongue is a notifiable disease meaning if you suspect your sheep may have bluetongue this should be discussed with your vet and reported to APHA as soon as possible.

While farmers need to remain vigilant in case this disease re-emerges in Wales, specific treatments or vaccines do not need to form part of the flock health plan.



Schmallenberg virus

Schmallenberg virus was detected in northern Europe during autumn 2011 following disease in cattle that included fever, loss of appetite, body condition and diarrhoea. From December 2011 deformed foetuses were born to sheep, cattle and goats in the affected regions. The first case of Schmallenberg in the UK was detected in early 2012 and the virus subsequently spread across the UK causing devastating losses to some sheep flocks.

The disease is transmitted by midges of the *Culicoides spp* and possibly other insect vectors, and if an animal becomes infected during pregnancy the foetus may be born with severe abnormalities depending on what stage of pregnancy the infection occurred. The abnormalities seen as a result of Schmallenberg virus include: incomplete brain development, twisted legs, jaw abnormalities and twisted spines. Lambs may be born dead or non-viable as a result. Deformities can result in lambing difficulties, and veterinary advice should be sought to ensure the safety and welfare of the ewe.

Vaccines may be available for use in cattle and sheep.

This is a new disease, and as yet there is much not known about the disease and its implications to farmed livestock. The Welsh Government and APHA websites will have the most up to date information for producers seeking further information.

Farms need to plan accordingly in their flock health plans. This will require close collaboration with their vet to ensure they have the latest advice and know which course of action to take.

“**The first case of Schmallenberg in the UK was detected in early 2012 and the virus subsequently spread across the UK causing devastating losses to some sheep flocks.**”



Why is lameness important?

Lame sheep do matter

Lame sheep will not help the productivity of your farm, the pain will prevent them from reproducing. Not only will lameness effect your finances, but also the welfare status of your flock.

Lameness is a very important topic to discuss with your vet, having a plan in place to tackle it, it is also important to be able to distinguish the different causes of lameness.

Impact of lameness on your flock

- Lower ram fertility
- Rams unable to serve ewes
- Lower lambing percentage
- Increased risk of pregnancy toxaemia
- Lower lamb birth weights
- Less milk production
- Less wool production
- Increased mortality
- Reduces lamb growth rates



Sheep kneeling - Image by Joseph Angell

What are the common causes of lameness?

Scald and footrot are the commonest causes of lameness and can affect many animals within a flock. In young lambs, septic arthritis (joint ill) infections are a more common cause of lameness, often caused by bacteria in the environment.

But there are other important causes of lameness in all age groups, so making a correct diagnosis is important - only then can the correct treatment be chosen and measures to try to prevent future problems be decided upon.

Distinguishing features of different types of foot lameness

- **Scald** - the skin of the cleft between the claws is inflamed, moist and swollen, but there is no separation or under-running of horn. All age groups are vulnerable, often many animals being affected within a short time period.
- **Footrot** - this starts as scald between the claws, and spreads to separation of the horn near the heel, extending along the sole and even up

the wall in serious cases. There is the typical footrot smell, with accumulation of blackish cheesy debris under the loosened horn. The bacterium *Dichelobacter nodosus* is found in scald and footrot, and is typically combined with *Fusobacterium necrophorum* in severe cases of footrot. Footrot is an infectious disease, the causal organisms can be carried on infected feet and on pasture for up to 16 days. For every obvious case there will be several other less obvious cases, and it cannot be effectively controlled unless it is treated as a flock problem.

- **Contagious ovine digital dermatitis (CODD)** - the cause of this serious disease is not fully understood but is probably associated with the organisms that cause digital dermatitis in cattle. In contrast to footrot, which starts in the sole and spreads outwards and upwards, this starts with a sore area at the coronary band and spreads down the claw rapidly undermining the horn. In severe cases the whole horn capsule is detached leaving raw exposed claws. Permanent damage to the foot may result.



Footrot



CODD - Image by Joseph Angell



Shelly hoof - Image by Joseph Angell



Toe granuloma

- **Shelly hoof** - this is a common condition in which the outer wall of the claw becomes loosened forming a pocket which becomes impacted with soil. The sheep only becomes lame when the soil is forced far under the hoof wall and an abscess forms which eventually bursts at the top of the hoof. The sheep then gradually recovers but lameness may recur if the loose horn is not trimmed away.
- **White line (toe) abscesses** - infection develops along a tract under the horn of the wall causing acute lameness. Eventually pus bursts out at the top of the hoof after which the sheep gradually recovers, although the horn may become loosened and cracked.
- **Pedal joint abscess** - this serious type of infection is more common in heavy rams. The animal is extremely lame with a swollen painful claw. Pus bursts out at several places often around the coronary band but also the tip of the hoof, including between the claws. The joint within the hoof becomes permanently damaged and the animal remains chronically lame. Veterinary treatment is necessary; often the only solution is to amputate the claw.
- **Granuloma (Proud flesh)** - this is often the result of paring and damaging the sensitive tissues that can be close to the surface especially at the toe. It can also follow severe footrot or puncture wounds. A strawberry-like growth develops which may become covered with loose horn that never heals properly and bleeds when touched. Veterinary attention is needed.

Other types of foot lameness include soil balling, puncture wounds and growths of skin between the claws which become infected and painful.

“ Making the correct diagnosis is important- only then can the correct treatment be chosen and measures to try and prevent future lameness problems.

Lame sheep - treatment

Treatment of lameness

Lameness in sheep requires an accurate diagnosis of what is causing the problem before deciding on which course of action to take. Scald, footrot and CODD need to be treated as flock problems, picking out individual lame animals for treatment will only result in satisfactory control if done promptly and regularly (every few days). Various treatments are available and should be selected based upon the particular flock circumstances. When an individual sheep or flock is lame and fails to respond to the usual treatments, veterinary advice should be sought.

Footbathing

This is an effective way of treating scald and mild footrot on a flock basis when there are suitable facilities on farm. Sheep must have clean dry feet before bathing and stand on a hard dry surface for at least 20 minutes afterwards. Stand-in pens, which can hold a number of sheep, are better than walk-through baths; this makes sure that all feet are treated and allows sheep to be held in the treatment for the required length of time.

Gathering sheep in damp or dirty handling pens will spread foot rot.

Several different chemicals are available. The best known are:

- **Zinc sulphate** - (10%). Needs a stand-in time of about 5 minutes, sometimes longer (read the instructions!).
- **Formalin** - (2-3% is usually adequate, never stronger than 5%). Walk-through, but has the disadvantage of being unpleasant and irritant to use; it can also cause too much hardening of horn if used frequently. However weak formalin (2%) may be the most practical way of treating scald. Formalin footbaths should be made up fresh as they degrade when muddy.

Other treatments for lameness include;

- **Antibiotic sprays** - Effective against scald and mild footrot, particularly for individual or small numbers of sheep. Not to be used with footbathing as it gets washed off and is just a waste of money!
- **Antibiotic injections** - Can be very effective for footrot or CODD cases and for ewes in late pregnancy to avoid too much handling. Also may be necessary for foot abscesses where pus cannot be easily released. Consult the vet for advice on antibiotic use.

Lame sheep - prevention

Remember, if the cause of lameness is not clear, normal treatments are not working or a sheep is severely lame veterinary help should be sought on welfare grounds.

Prevention of lameness

It will never be possible to prevent all lameness, but the aim should be to minimise the incidence of scald, footrot and CODD, if it is already present in the flock. By keeping these under control and not allowing advanced or chronic cases to develop (footrot and CODD), much less time will need to be spent on treatment of individuals.

The keys to prevention are:

- **Footbathing** – after gathering and moving to fresh grazing, as well as before and during housing, to protect against scald and to prevent footrot spreading. But only useful if facilities are suitable.



Foot bathing system

- **Vaccination** - specifically against footrot, this can help in control, but needs to be part of an overall foot care plan. Protection is not very long lasting, so care is needed with timing. Take veterinary advice.
- **Maintaining a clean environment** - dry, well bedded pens in sheep houses and well drained areas where sheep congregate around feed or water troughs will help to prevent the spread of footrot as well as joint infections in young lambs.
- **Culling chronically infected sheep** - these act as a constant source of infection for others.
- **Trimming** - Routine trimming is no longer recommended. Only trim grossly overgrown horn if it is affecting the animal's ability to walk. Take care not to trim so severely that the foot bleeds. Do not trim feet where there is any active infection, cure the infection first and if the foot does not wear down once the sheep is weight bearing on that foot then you may wish to do some careful paring. Studies have shown that lame sheep treated only with an antibiotic injection, recover quicker than those which have an antibiotic injection plus foot paring.



Foot trimming - Image by Joseph Angell

Footrot can be controlled in all flocks and eradicated from closed flocks, but it is very easy to re-introduce the disease by carelessness or lack of thought. There are ten strains of the bacteria *B. nodosus* on UK farms, some are more virulent (cause more severe disease) than others. Therefore it is important not to introduce new strains to your flock.

All new sheep coming onto a farm should be quarantined from the resident flock until they have been examined, treated as necessary and rechecked before mixing.

There is a useful tool to help control lameness called the 'Five Point Plan'. This tool can help you see how you manage lameness now and help you see where you need to improve. When creating your health plan, ask your vet to go through the Five Point Plan with you.

If you haven't got CODD, you don't want it. Don't buy it in.

Key steps to control of lameness

Don't wait for lameness to become a problem, use quarantine to keep it out and take pro-active prevention measures.

Do not purchase problem stock that can infect the rest of your flock.

Footbathing must be carried out with the correct strength of the chosen chemical.

Correct diagnosis of the cause is essential. Treat footrot as an infectious flock problem.

When in doubt of the cause seek veterinary advice.

Cull chronically infected sheep.

Sheep abortions

Abortion causes losses of at least £100 per ewe. The three commonest causes of abortion in ewes in Wales are enzootic abortion (EAE), toxoplasmosis and those caused by campylobacter. EAE and toxoplasma are a risk for pregnant women.

There are many reasons for ewes to abort - both infectious and non-infectious. But there are three main causes which contribute to over 75% of all diagnosed cases. If ewes start to abort it is vital that an accurate and quick diagnosis of the cause is made. The laboratory will need both the dead foetus and the afterbirth. Without both a diagnosis is less likely to be made. Should the initial submission fail to identify a cause or even if a cause was identified but abortions continue, it is important to collect further aborted material during the outbreak as more than one agent may be present within the flock. Such knowledge is essential when formulating treatment, control and prevention strategies.

Whatever the cause of the abortions it is vital to consult your vet as to the best way to treat and prevent in the future.

Why is abortion important?

Every year abortion in sheep causes huge financial losses both to individual farmers and to the Welsh sheep economy. Most abortions occur in the later stages of pregnancy, thus the loss is not just the potential value of the lambs but also the cost of carrying non-productive ewes through a high input period. Various estimates have been made of the actual cost of an abortion and most studies suggest £100 per ewe minimum.



Enzootic abortion (EAE)

The commonest cause of abortion in Wales is enzootic abortion of ewes (EAE) which causes about 50% of all diagnosed cases. The organism responsible is *Chlamydophila abortus*. The life cycle is complex which makes it difficult to control.

Infection occurs at lambing time in susceptible ewes either pregnant or in those which have just lambed. The infection does not produce abortion in that year. (Except in exceptional cases where infection occurs before day 120 of pregnancy). The organism remains in the ewe in a latent state. At the next pregnancy at about day 120 the organism produces an acute infection of the placenta (afterbirth) resulting in abortion. The afterbirth and discharges from the ewe are highly infectious.

EAE abortions occur in the last three weeks of pregnancy and the products of abortion are the source of infection. But the story is not that simple. Ewes which have aborted will, at the next pregnancy, produce live viable lambs, but infection may still be present in the afterbirths and discharges. It has been demonstrated that ewe lambs will abort at their first pregnancy if derived from a heavily infected flock. Rams are unlikely to have a major role in the spread of EAE.

EAE can enter a flock in several ways. The most common is by the purchase of latently infected replacement ewes or ewe lambs from infected flocks. These will abort at the next lambing. The other common entry of infection is by purchasing ewes which have aborted and are sold on as breeding females. These will lamb normal viable lambs but as they are infected will introduce disease into the flock so abortions will occur in the second year after their purchase. Another source of infection is the carriage of infected placentas by predators (crows and foxes) from a neighbour's farm.

“**Studies have indicated that the use of vaccine in already infected flocks reduces losses to about 1% and disease can be eliminated over a period of years.**”

Initial losses can be catastrophic with up to a 30% abortion rate in newly infected flocks. Chronically infected flocks suffer losses between 5 to 12% annually.

EAE control

Treatment and control can be effective but need to be discussed and planned with input from your vet. In the face of an outbreak antibiotic treatment with oxytetracycline may reduce the abortion rate but does not reduce or stop the shedding of the *C. abortus* either in the placenta or in discharges. Such treatment cannot reverse placental damage with the result that lambs are carried closer to term but remain weak at birth with consequent high mortality. Antibiotic use in agriculture is coming under intense scrutiny and whole group injection can only be justified as an emergency measure then vaccination must be adopted.

Control is by the use of vaccines. Studies have indicated that the use of vaccine in already infected flocks reduces losses to about 1% and disease can be eliminated over a period of years.

In common with all infectious causes of abortion, aborted ewes must be isolated and aborted material and infected bedding removed and destroyed. Ewes that give birth to dead/weak full-term lambs should also be isolated. Lambs fostered on to aborted ewes should not be retained for future breeding.



Aborted lamb - Image from APHA

Toxoplasmosis

The second commonest cause of abortion in Welsh flocks is toxoplasmosis. Unlike EAE toxoplasmosis is an environmental disease caused by the protozoan parasite *Toxoplasma gondii*.

It is important to note that this disease is also zoonotic. The main host is the cat. Young cats will shed up to a million oocysts (eggs) per gram of faeces, but a sheep can become infected by as few as 200 oocysts. Infection arises from pasture or food stuffs contaminated by cat faeces. In the case of the upland and hill flocks this frequently occurs when supplementary feeding starts in winter and before lambing.

Four distinct stages of lamb loss are associated with toxoplasma infection.

Infection before day 70 of pregnancy results in fetal death and re-absorption producing a barren ewe. Infection between day 70 and 110 results in fetal death and mummification. In the case of twins one may survive and the other succumb. Infection from day 110 onwards results in abortion of near full term lambs. In some flocks very late infection results in the birth of weakly lambs which despite every attention die at three to four days of age.

No treatment is possible in the face of an outbreak. Once a ewe has become infected it is immune for life and will produce viable lambs in future pregnancies.

Toxoplasmosis control

Control is by vaccination, a live vaccine is available. Discuss the disease and vaccination with your vet.

Remember that infected sheep are immune for life so to spread the cost some flocks will only vaccinate the replacements as they come into the flock. In this way a fully vaccinated flock is slowly established and costs are spread.

Sheep exposed to toxoplasmosis and also those that have aborted due to EAE may be identified retrospectively by blood testing.



Outbreaks of Campylobacteriosis are sporadic but can be devastating with up to a 30 to 40% loss rate.

Campylobacteriosis

This is the third commonest cause of abortion. This is caused by two closely related bacteria *Campylobacter fetus sub-species fetus* and *Campylobacter jejuni*. Abortions occur usually in the last six weeks or in some cases weak lambs are born. Unlike EAE or toxoplasmosis there are no characteristic lesions in the placenta.

Outbreaks of Campylobacteriosis are sporadic but can be devastating with up to a 30 to 40% loss rate.

Contamination of feeding troughs by bird faeces is a recognised source but carrier ewes may also introduce infection to a flock. Overstocking of pregnant ewes whether outside or housed seems to contribute to a greater severity of an outbreak.

Infected ewes acquire a lifelong immunity hence the sporadic nature of outbreaks. No effective treatment is available in the face of an outbreak.

Good hygiene at lambing with the immediate removal of any ewe which has aborted to an individual or sick pen helps to minimise the risk of spread to the remaining ewes, whether housed or lambing outside.

Key steps to abortion control

Practice good hygiene at lambing and also remove any ewe which has aborted immediately.

Remove and destroy any aborted material and infected bedding to minimise the risk of spread.

In cases of abortion quick laboratory diagnosis is vital and may require more than one sample for an accurate diagnosis.

EAE and toxoplasmosis can be well controlled by vaccination.

Antibiotics should only be used in the face of an outbreak of EAE, never as an annual preventative.

Consult your vet as to the best and most cost effective way to prevent abortions in the future.

Take care in sourcing replacements, they may be infected with EAE.

EAE and toxoplasma can infect people and pregnant women should not be involved with sheep at lambing time and should not come into contact with dirty infected overalls.

Summary

By being proactive with your health planning and updating your health plan annually with your vet, all of the above can be managed and avoidable.

Consider the following:

- **Vaccination against clostridial disease is essential**
- **Orf requires a special assessment**
- **Follow the SCOPS guidelines for the control of parasites in sheep**
- **Fluke causes considerable economic loss and requires an individual farm strategy for its prevention**
- **Coccidiosis may be reduced by good management**
- **If permanent ectoparasites are found on one animal the whole group should be considered infested and must be treated at the same time**
- **Metabolic disease can be managed by good nutrition, regular condition scoring and pasture management at turnout**
- **Operate a quarantine policy for incoming stock**
- **When it comes to lameness think about the 5 Point Plan to help reduce the causes of lameness**



Further information

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For further information on this booklet
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