

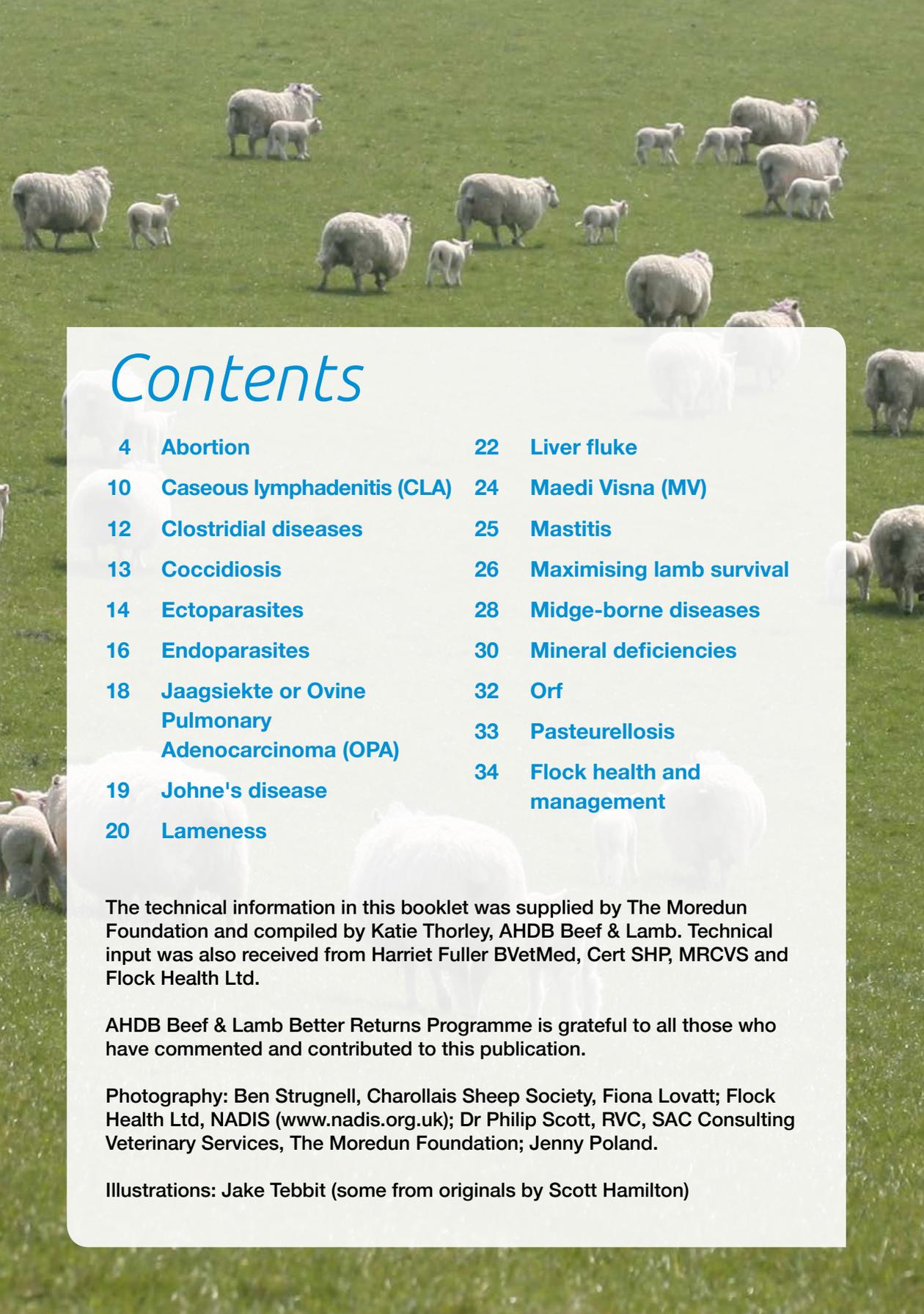
BETTERRETURNS



Sheep diseases directory



BEEF & LAMB



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Introduction

Diseases in sheep and cattle have made the headlines many times over the last few years. The impact of a disease can range from an annoying setback in production to a devastating infection leading to widespread culling of the flock. What is certain, however, is that every disease has an impact on returns.

This directory introduces diseases, gives you some guidance as to what signs to look out for and signposts you on to the next steps to take. It is intended to provide something of an early warning system for sheep producers. The main message from the Better Returns Programme is that the earlier you develop a control strategy or consult your vet about a potential problem, the less likely it is to have an impact on your productivity and flock performance.

Many diseases can be prevented through biosecurity measures and improved flock health management.



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Abortion

Following an abortion within the flock, it is important to follow a strict protocol until you have determined its cause. Most of the common causes of abortion in sheep are infectious including chlamydial abortion, toxoplasmosis, campylobacter and border disease. The aim is to limit any potential spread of infection as contaminations may cause an outbreak leading to more abortions within the same period or even the following year.

Take the following steps after any abortion:

- If you have more than two abortions over two days, contact your vet immediately. It is likely your vet will recommend samples of the lambs and placentas are sent to a laboratory for testing, so it is important to speak to your vet prior to disposing of any abortion material
- Dispose of dead lambs, placentas and heavily contaminated material (such as bedding) as promptly and effectively as possible, preferably through incineration, as they are a danger to other sheep and humans
- Isolate the aborted ewes until the discharge has cleared up, but ideally for six weeks
- Clean and disinfect lambing pens
- Talk to your vet before using antibiotics, as there are only specific times when the vet may advise using them, eg during an enzootic abortion outbreak

Chlamydial (Enzootic abortion of ewes – EAE)

Infectious abortion is a major flock health problem. Chlamydial abortion, accounting for about half of all infectious abortions, is caused by highly specialised bacteria called *Chlamydia abortus*.

It can lead to the birth of large numbers of weak or dead lambs. It has been estimated that the cost of this disease to the UK flock is £23.8 million a year.

Vaginal discharge, dead lambs and placentas from infected ewes are heavily contaminated with the bacteria, which can spread infection to other ewes in the flock and to newborn female lambs. Ewes can carry the infection without showing any clinical signs and then abort in their next pregnancy.



Implications

About 20 per cent of ewes that abort due to chlamydial abortion retain the organism in their bodies and excrete it during the lambing period the following year. The level of abortion can therefore build up in a flock over a period of years after initial infection. However, ewes that have aborted due to chlamydial abortion will not usually abort from this same cause again.

Chlamydial abortion is a zoonotic infection (it can be transmitted to humans). Infection can cause severe illness in pregnant women and can result in miscarriage. Pregnant women should avoid all contact, either direct or indirect, with lambing ewes.

Early signs and identification

The first sign is usually stillborn or weak lambs one or two weeks before the expected due date. Infected ewes can have one dead lamb and one live (weak or healthy) lamb. Aborted lambs may look normal but sometimes look pot-bellied due to a collection of body fluid under the skin.

The placenta typically appears thickened and dark red in colour and often has a dirty yellow material sticking to the membranes between the cotyledons (buttons).

Ewes generally seem healthy, but will have a discharge.

Next steps

(See standard abortion protocol in the blue box on page 4).

Management practices need to be adopted in flocks that are free from infection to prevent exposure. Only purchase replacement sheep from 'EAE-accredited' flocks.

There are currently three available enzootic abortion vaccines. For protection, vaccination must take place before the tupping period, although one may be used in the face of an outbreak.

Flocks that have chlamydial infection or buy in replacements of unknown status will benefit from vaccinating replacement ewes as they enter the flock. Generally, it is only necessary to vaccinate a ewe once in her lifetime. If ewes are latently infected at the time of vaccination, they may still go on to abort, although the risk of this is reduced by vaccination. For flocks that breed their own replacements, you should identify and cull ewes that abort due to chlamydial infection. Ewe lambs that have been fostered onto aborting ewes should not be retained for breeding.

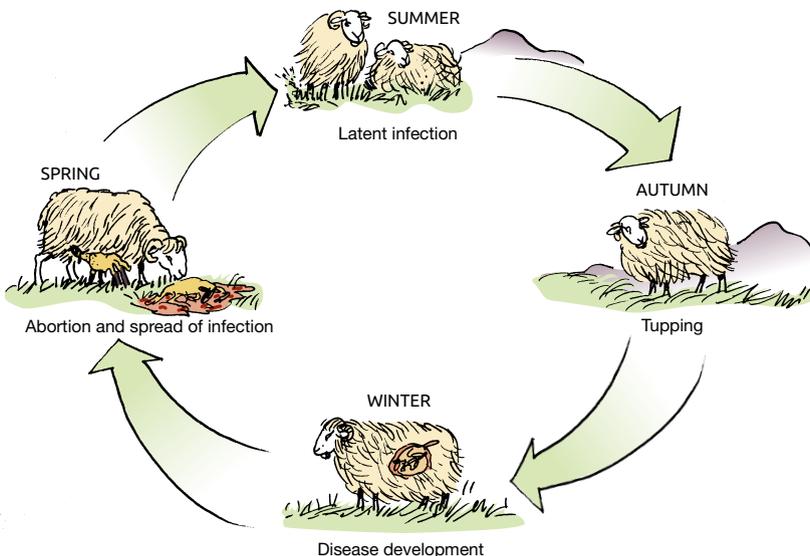


Figure 1. Enzootic abortion life cycle

Abortion

Toxoplasmosis

Toxoplasmosis is caused by infection with the parasite *Toxoplasma gondii* (*T. gondii*). It is present worldwide and can affect a range of warm-blooded animals including sheep and humans. It is the second-most commonly diagnosed cause of infectious abortion in ewes, accounting for about a quarter of cases.

Cats become infected through ingestion of the parasite within cysts in the muscles of their prey – usually small rodents. The toxoplasma parasite then multiplies in the intestine lining of the cat's gut to produce millions of oocysts (eggs) that pass out in the faeces for a short time and can contaminate food stores, pasture and water supplies. The oocysts can survive in the environment for up to 17 months if conditions are favourable (moist and warm).

Toxoplasmosis is not directly transmitted between sheep. Sheep are exposed through environmental contamination.



Figure 2. Toxoplasmosis life cycle

Reservoir

Implications

It has been estimated that abortions due to toxoplasmosis cost the UK sheep industry £12.4 million every year. *Toxoplasma* can cause serious disease in pregnant women and immunocompromised people. Accidental exposure of the vaccine to humans can also cause infection.



Early signs and identification

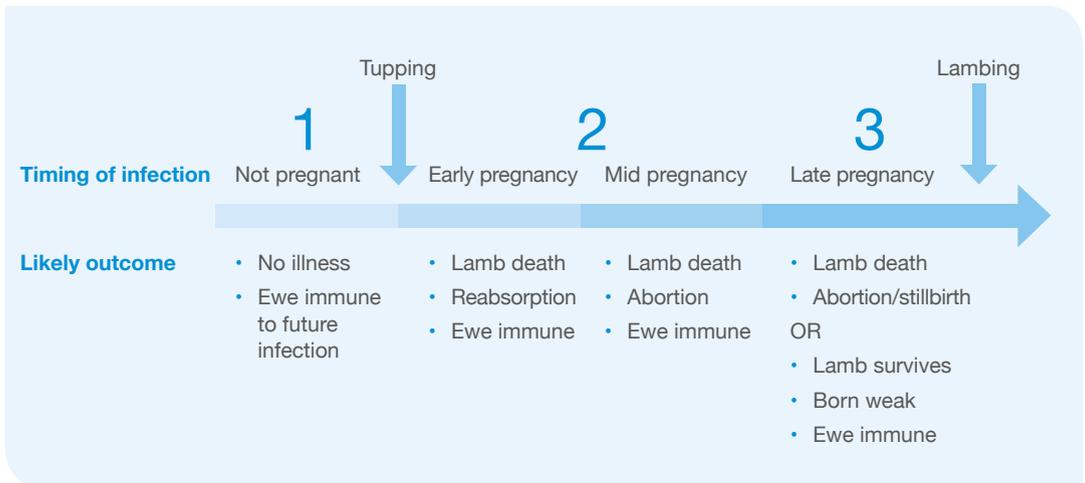


Figure 3. Timing of toxoplasma infection

If ewes become infected with toxoplasmosis in early pregnancy, foetal reabsorption occurs and ewes can appear barren. Infection between days 50 and 120 of pregnancy results in premature birth of stillborn or weak lambs, or mummified foetuses. Sheep infected with toxoplasma parasites when not pregnant develop a strong natural immunity and are unlikely to abort due to this cause in the future. To diagnose toxoplasmosis, submit dead lambs with their placenta to a veterinary laboratory. Tests can confirm the infectious agent so that the correct action can be taken.

Next steps

You cannot protect your flock from toxoplasmosis by keeping a closed flock, as sheep become infected from eating oocysts in the environment. The main control options are vaccination and drug therapy. Vaccination is the most effective method of preventing *T. gondii* infection. It produces long-lasting protection through a single injection. Vaccination must be conducted at least three weeks before tugging. Never vaccinate pregnant ewes. It is a live vaccine so handle with care.

Feeding the coccidiostat decoquinate to ewes during the last two thirds of pregnancy can reduce lamb losses due to toxoplasmosis. It is most effective if being fed at the time the infection is picked up rather than after. This is significantly more costly than vaccination.

Abortion

Campylobacter

Abortion due to the bacteria *Campylobacter fetus* and *Campylobacter jejuni* is increasing within UK flocks.



The bacteria usually enters the flock via carrier sheep and is spread in faeces and vaginal secretions. Wildlife (especially carrion) can also act as carriers onto a farm. The infection is then maintained in ewes which develop carrier status.

Implications

Infection in naive flocks can result in high levels of abortion (up to 30 per cent). This can cause significant production losses in affected flocks.

Early signs and identification

Abortions typically start two weeks after infection, usually in the last few weeks of pregnancy and lead to aborted lambs or the birth of full-term, weak lambs.

Next steps

Control during an outbreak is difficult due to the speed of spread through the flock. Antibiotics offer limited benefits in reducing abortions.

Campylobacter abortion will spread more rapidly to ewes kept in intensive conditions, ie housed or on root crops in late pregnancy. It is important that sheep are managed in clean environments, particularly when they are in late gestation. Ensure that feeding troughs and areas are hygienic.

Once ewes have aborted, they will develop a good immunity that protects them from further infection.

Abortion from this disease tends to cycle through flocks every three to four years as ewes are replaced and flock immunity wanes.

Purchased replacement sheep should be managed and kept separately until after their first lambing to prevent the entry of *campylobacter* into the main flock. A vaccine is available to use, but it must be imported from Australia, under license.

Border disease

Caused by a pestivirus, Border disease is present in all secretions and excretions including semen. It is closely related to the Bovine Viral Diarrhoea (BVD) virus in cattle, which can also provoke an illness very similar to Border disease when it infects sheep.

Implications

The Border disease virus mostly causes issues in pregnant sheep. High mortality rates and large numbers of weak lambs can cause significant production losses in affected flocks.



Lambs born PI with Border disease may have poor growth rates

Early signs and identification

When ewes are infected with Border disease in early pregnancy, it can result in high barren rates. When ewes are infected further through pregnancy, the disease causes stillbirths, live but weak lambs and persistently infected (PI) 'hairy shaker' lambs that show symptoms of brain damage.

'Hairy shaker' lambs usually appear different with a hairy fleece, a smaller, dome-shaped head and spindly legs. These lambs are PI and if retained in the flock will act as a source of infection. However, not all PI lambs are easy to spot.

Older lambs and ewes can be blood sampled either to look for evidence of persistent infection or to see if they have been exposed to Border disease. Speak to your vet about this.

Next steps

The risk to a naive flock is when a PI sheep is brought onto the farm – it may be a bought-in store lamb, a ewe lamb replacement or a pregnant ewe carrying an infected foetus.

Any bought-in sheep should be kept away from the main ewe flock until after lambing to protect the pregnant ewes. Once it is clear that there are no disease issues within the bought-in group, they can be mixed with the main flock.

Suspect 'hairy shakers' or weak lambs should not be retained as breeding animals even if apparently recovering.

Caseous lymphadenitis (CLA)

Caseous lymphadenitis (CLA) is a bacterial disease affecting sheep and goats worldwide, causing the formation of abscesses. It is more significant where more intensive husbandry is practised.

The first reported case in a sheep in the UK was in 1991. It is difficult to estimate the total number of cases as many are not reported. CLA is endemic throughout the UK, with commercial and pedigree producers recognising the need for vigilance and control.

CLA is a chronic infection of tissue and the lymph glands. Bacteria enter through cuts and abrasions and are sometimes breathed in.

Implications

CLA causes economic loss due to the premature culling of infected animals and carcase contamination. Sometimes the carcase can be downgraded or condemned. The disease can have an impact on animal condition, milk production and reproductive performance. It could influence market trading, as unsightly abscesses affect sales of breeding sheep. Although instances are rare, the disease can be passed on to humans.

Early signs and identification

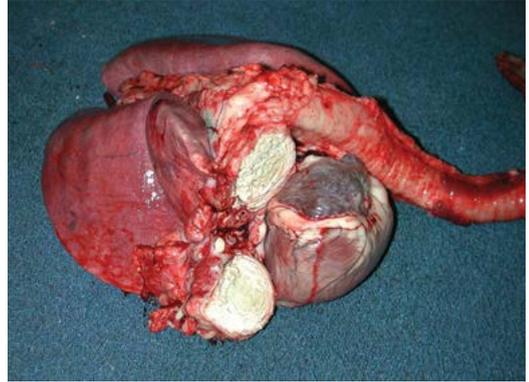
The bacteria that cause the disease can survive in the environment for several months and are highly infectious. Clinically, the lesions are seen as external lumps, usually around the head and neck area. Abscesses can also be found in the lungs or other internal organs.

The abscesses often contain cheesy pus that is loaded with highly infectious bacteria.

The lymph nodes around the head and neck are the most commonly affected areas.

CLA abscesses in internal organs and lungs can lead to respiratory distress and chronic weight loss.

The abscesses are usually cold and painless, but in extreme cases, the sheep may become thin and die. This disease is highly infectious and therefore difficult to eradicate once established.



Abscesses on the lungs



A typical abscess on the face, caused by CLA



Abscesses in internal organs

Next steps

Control measures should include:

- Quarantining (of animals and premises)
- Blood testing to establish flock status
- Screening a flock of origin for the presence of CLA antibodies (it is a more appropriate use of the blood test than an individual animal screen)
- Culling infected animals
- Maintaining rigorous hygiene procedures during handling and management tasks
- Dipping shearing equipment in strong disinfectant or chlorine bleach before and after use

Antibiotic treatment is ineffective. A heightened awareness of CLA and prompt veterinary investigation of suspect animals are required.

Current areas of research involve developing an effective vaccine that will not interfere with the CLA diagnostic blood test. Until this is available, a number of producers are importing a vaccine from Australia.

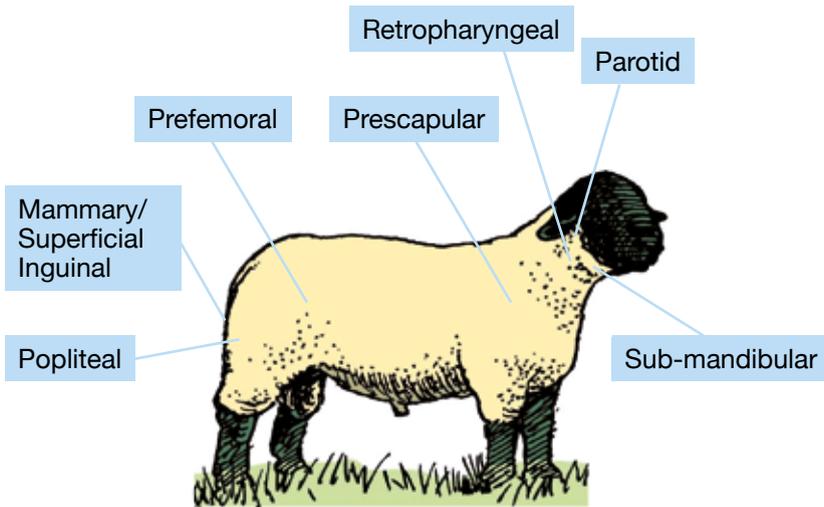


Figure 4. Position of the lymph glands in which caseous lymphadenitis abscesses may be seen or palpated

Clostridial diseases

Clostridial bacteria have the ability to form exceptionally tough structures known as spores, which allow them to survive for many years.

The bacteria and spores are everywhere in the environment and most often in soil. They also exist in small numbers in healthy animals, where they are harmless until another factor causes them to multiply and produce powerful toxins. These factors include:

- Changes in management or diet
- Injuries
- Activity from intestinal worms or liver fluke

Implications

Other than a small percentage of black leg cases and malignant oedema, all clostridial diseases result in sudden death, despite treatment. Cheap and effective vaccines are available, however deaths due to clostridial diseases remain high, resulting in significant losses to the sheep industry.



Early signs and identification

There are different types of clostridial disease, which fall under three categories depending on the systems or organs involved:

1) Those affecting the gut and internal organs through the release of toxins, including:

- Lamb dysentery
- Struck
- Pulpy kidney
- Braxy
- Black disease
- Bacillary haemoglobinuria
- Abomastitis
- Toxaemia

2) Those causing muscle damage or gangrene and the circulation of clostridial toxins in the blood, including:

- Blackleg
- Gangrenous metritis and navel ill
- Big head
- Malignant oedema

3) Those causing nervous damage:

- Tetanus
- Botulism
- Focal symmetrical encephalomalacia

In the case of certain infections, such as focal symmetrical encephalomalacia or botulism, the animal may survive for several days. The incidence of botulism in sheep has increased in recent years and is usually linked to contact with poultry litter.

Next steps

Due to the ever-present nature of the bacterial spores in the soil, the speed at which clinical disease develops and the unpredictability of disease outbreaks, prevention by vaccination is the only practical way to reduce mortality.

The vaccines licensed for sheep in the UK are multivalent, which means they protect against several types of clostridial disease. However, the vaccines do vary in the diseases they cover and the choice of vaccine should be discussed with your vet as part of your flock health plan.

Vaccinations of purchased stock should be included in your essential quarantine management programme to prevent importing and spreading infectious diseases.

Coccidiosis

Coccidiosis is caused by a protozoan parasite called *Eimeria*, of which there are many species, but only two, *E. ovinoidallis* and *E. crandallis*, cause disease in sheep. They are host-specific, which means they only affect sheep and not other animals.

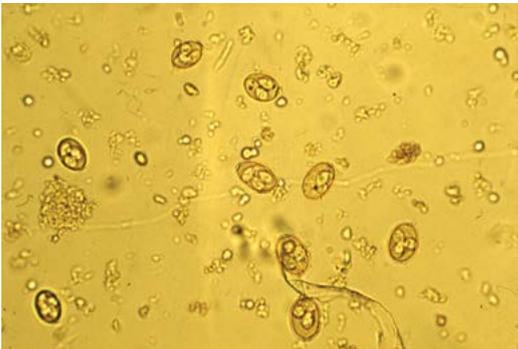
Coccidia oocysts (eggs) are ingested from the environment and hatch inside the gut. They penetrate the intestinal cells lining the gut and multiply there, causing severe damage. Very large numbers of oocysts are then released in the faeces to contaminate the environment.

Adult ewes will shed low levels of oocysts into the environment but lambs shed very high levels when infected.

Oocysts are difficult to kill and can survive in buildings and on pasture from the previous years' lamb crop. Lambs are safe from disease for the first couple of weeks of life and are generally able to mount a good immune response, especially if they were exposed to a low level of oocysts very early in life.

Implications

Lambs of four to eight weeks are most at risk from infection. Coccidiosis will be seen when naïve lambs, or those that have an impaired immune system (because of concurrent disease or stress), are exposed to large numbers of infective oocysts. This particularly occurs when young lambs are moved into a field where older lambs were kept.



Coccidia oocysts (eggs) under a microscope

Early signs and identification

Damage to the gut lining causes straining and abdominal pain with diarrhoea or scour that may contain mucus and blood. Dehydration and death can occur in severe cases, with significant mortality rates in young lambs exposed to a high challenge. Animals that survive infection, as well as those lambs that were subclinically affected, can be unthrifty, with poor growth rates.

It is important to get a diagnosis by contacting your vet if young lambs in your flock suffer from diarrhoea or poor growth rates. Ideally, a number of lambs in the group should be sampled (both affected and unaffected) and the samples sent for cocci speciation.



Next steps

Treatment and control are farm-specific, with different groups of lambs at varying risks, depending on their age and management. Treatment should be targeted and control plans reassessed each year. It is important to discuss a strategic plan with your vet to reduce the risk of inappropriate or incorrect timing of treatments.

Ectoparasites

There are a number of parasites that inhabit the skin or fleece of sheep in the UK. These can significantly affect performance, reduce reproductive potential, and reduce meat and milk production.

The effective control of parasites depends on whether the parasite is permanent (spending its entire life cycle on the sheep) or semi-permanent (at least one stage free-living).

Permanent ectoparasites include scab mites, chewing lice and less common ones such as ear mites, mange mites, sucking lice and keds.

Semi-permanent ectoparasites include blowfly strike, ticks and less common nasal bot flies and head flies.

Implications

Sheep scab alone costs the UK sheep industry £8.3 million every year. Flock owners have a legal responsibility to prevent or cure infestations.

Ectoparasites can affect the welfare of the animal and untreated infestations of scab or blowfly can be fatal.

Although control can be expensive, labour-intensive and time-consuming, it is of paramount importance to ensure good animal welfare and minimise any financial losses that ectoparasites can cause through reducing flock performance.

Health, safety and environmental laws have strict requirements to follow. Parasites are more likely to develop resistance to treatments that are not effectively administered.

Early signs and identification

It is vital to get the correct diagnosis from the vet as more than one type of parasite could be causing a problem at the same time.

If permanent ectoparasites are found on one animal, the whole group should be considered infested and therefore treated. If one sheep is missed, it could reinfest the whole group.



Wool on fencing can indicate that sheep have been rubbing against it in an attempt to relieve itching

Sheep scab is the popular name for psoroptic mange. It occurs on all wool-covered parts of the body as well as in the ears and produces intense irritation, causing significant welfare issues. The sheep scratch, the skin becomes damaged and wool detaches.

Affected sheep will be suffering from intense itching. It is likely they will rub their shoulders and flanks against fencing and will attempt to bite at their shoulders. Symptoms are similar to that of chewing lice so seek advice from your vet.



Sheep scab mite

Chewing lice live in the woolly areas of the sheep, feeding on wool and skin debris. They are often found on sheep in poor body condition and so can be an indicator of other underlying diseases.

Affected sheep appear irritated due to the itching and will be attempting to scratch their shoulders and flanks. Symptoms are similar to those of sheep scab.

Ticks feed on the blood of sheep and are carriers of other diseases. Tick populations are increasing in the UK and farmers of hill-grazing sheep report high losses of lambs from tick-borne diseases.

Ticks are harder to identify than other ectoparasites. The condition of affected sheep may deteriorate and they can become very weak due to ticks causing anaemia. Ticks can be seen on the skin through careful examination. They are often found on the areas of the sheep not covered by thick wool such as the head and legs.

Blowfly strike occurs due to infestations of the larvae (maggots) of the greenbottle or bluebottle fly. They feed on the skin and flesh of the sheep, causing raw and sore exposed areas that attract more flies.

Blowfly strike is easily identifiable through observation. Affected sheep will often be seen to be distracted from grazing, sometimes isolate themselves from the group, nibble at wool and will rapidly lose weight. Untreated blowfly strike can be fatal.



Blowfly strike larvae

Next steps

Good biosecurity can prevent the introduction of permanent ectoparasites. Appropriate fencing will also prevent contact with neighbouring flocks. Quarantine incoming stock for at least three weeks. Looking for signs will help prevention.

Thoroughly disinfect vehicles and trailers used to transport livestock as even permanent ectoparasites can survive off the sheep for a period of time.

Treatment of external parasites can be through various methods: injection, plunge dipping or by pour-ons or spot-ons.

- If plunge dipping, it is essential to know the capacity of the bath so the initial concentration of dip wash is as per the product data sheet
- Only use the two closed systems to charge the bath and to top up. These systems reduce the risk of the operators being exposed to the dip concentrate

- Always top up as per instructions; if not, the dip wash will strip out (adhere to the fleece) and later sheep will not carry enough insecticide for it to be effective
- Do not dip tired, thirsty or heat-stressed sheep
- Do not dip in wet weather
- Allow dipped sheep to drain in designated draining pens and do not return to pasture until all excess dip has been shed

When dipping sheep, use protective clothing, handle equipment carefully and stick to the manufacturer's instructions. Organophosphate (OP) dip concentrates are only licensed to be used in a plunge dip. There are no products licensed for use in showers or jetties.

Pour-ons and spot-ons need to be applied accurately and each manufacturer may recommend subtle differences. Use appropriate, calibrated guns and always clean with warm soapy water, then rinse after use. Store in a safe, dry place. When treating sheep with these products, make sure that they are applied centrally, along the back line. If placed to one side, the product will not spread evenly around the body. No pour-on or spot-on is effective against sheep scab.

For more detailed information, see the BRP manual 10: **Controlling external parasites for Better Returns** and **BRP cattle and sheep parasite control product guide** available at beefandlamb.ahdb.org.uk

Endoparasites (internal worms)

Worms are a major threat to the performance and health of lambs. Controlling worms is a vital part of any management programme. As the industry intensifies, effective worm control has become increasingly dependent on anthelmintics (drugs that expel parasitic worms from the body by either stunning or killing them). Worm resistance to the anthelmintic groups 1–BZ, 2–LV and 3–ML is now widespread in the UK.

Implications

The number of farms with resistant worms is increasing. Be aware that the shift to resistance is irreversible and threatens all farms. There are two relatively new anthelmintic groups, 4–AD and 5–SI, available in the UK. SCOPS (Sustainable Control of Parasites in Sheep) advises that these new wormers are integrated into current worm control programmes to help extend the efficacy of existing products.

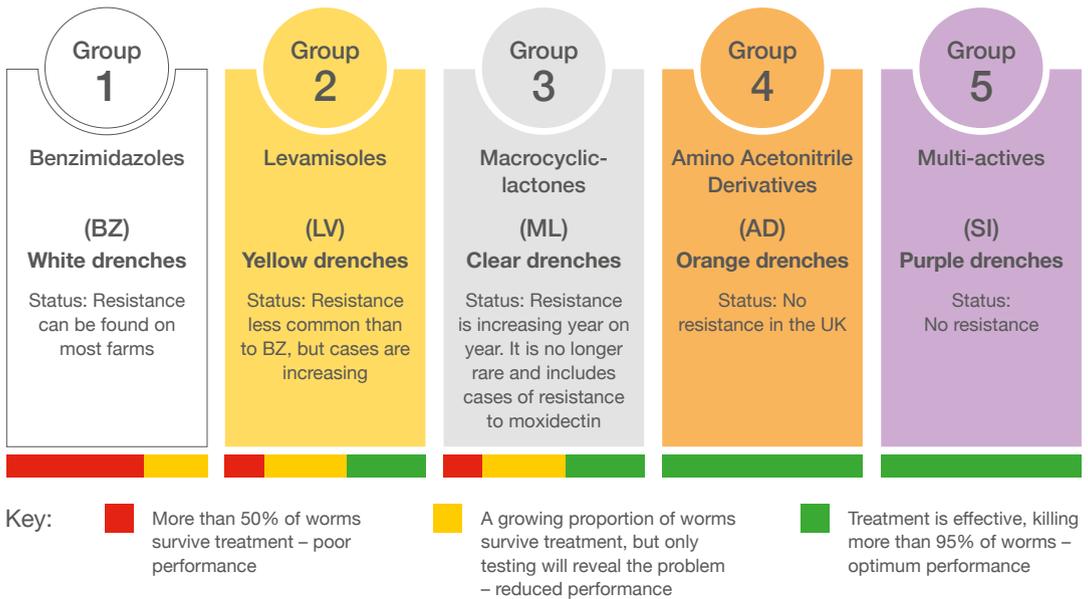


Figure 5. Groups of wormers, showing existing resistance

Drench test

A drench test is a practical and relatively simple way to see whether the anthelmintic group being used is starting to lose its effectiveness. Follow these simple steps:

1. Take a dung sample before the lambs are drenched and establish the initial egg count by having a faecal egg count (FEC) test completed on the sample.
2. Treat all the lambs in the group, taking extra care to ensure dose rate and administration technique are correct. If not the test results will be misleading.
3. Wait for seven days (for Group 2–LV products) or 14 days (for Group 1–BZ or Group 3–ML products) and re-sample the same group of treated lambs to establish if the treatment was effective and the FEC has reduced.



Next steps

Effective quarantine of all sheep brought onto the farm is critical to protect against resistant worms.

Administering the drench correctly is vital. Drenching guns should be checked for measuring accuracy and sheep weighed to ensure the correct amount of drench is given.

Use faecal egg counts to check ewes and lambs worm status, then drench if required.

There are two basic rules in the fight against resistance:

- **Good drenching practice** – always use anthelmintics properly, killing the maximum number of worms from every drench used and choosing the correct product at the right time, at the appropriate dose rate
- **Reducing selection pressure** – using anthelmintics less often and avoiding practices that select rapidly for resistance, eg drenching and then putting treated sheep straight onto clean pasture

Apply SCOPS principles in the approach to worm and liver fluke control. SCOPS recommends that:

- Ewes are not wormed pre-tupping unless they are thin or ewe lambs
- Lambs are not wormed and then moved directly to clean pasture. Retain lambs on original pasture for 48 hours to dilute the effect of any resistance, or a proportion of 10–15 per cent of the stronger lambs showing no evidence of scour should be left undosed

The challenge to sheep from worms builds over the season. A successful control strategy takes these dynamics into account. Figure 6 is an example for a spring-lambing flock.

For more detailed information, see the BRP manual 8: **Worm control in sheep for Better Returns.**

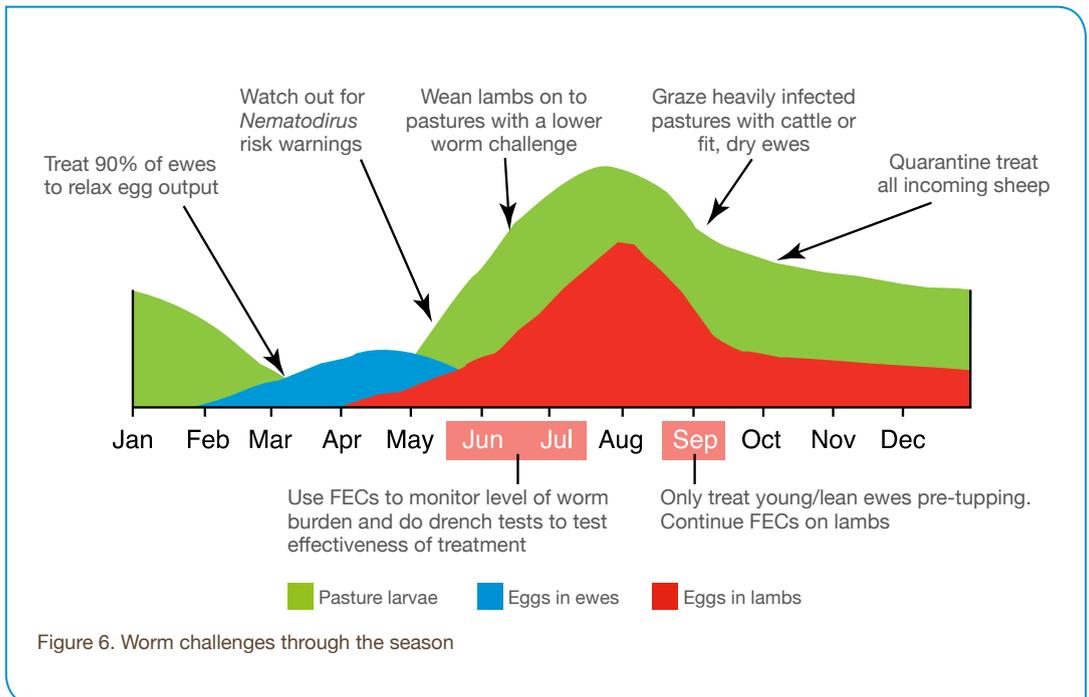


Figure 6. Worm challenges through the season

Jaagsiekte or Ovine Pulmonary Adenocarcinoma (OPA)

Ovine Pulmonary Adenocarcinoma (OPA) is an infectious lung cancer of sheep caused by a virus known as Jaagsiekte Sheep Retrovirus (JSRV).

There is a very long incubation period between infection and the onset of the disease. Therefore, the number of animals in a flock that are infected with the virus may be much greater than the number that develop symptoms.

Most cases are seen in adult sheep of two to four years old, but instances have been reported in lambs as young as two months and in sheep as old as 11 years.

Implications

OPA causes significant losses due to increased mortality, increased culling and reduced performance of ewes.

Early signs and identification

The symptoms of OPA are those of a chronic pneumonia, ie general loss of condition and breathing difficulties. A feature unique to OPA is over-production of fluid in the lungs, which may be apparent as a watery discharge from the nose, especially if the hind legs are raised up above the head.

Sheep with OPA often suffer secondary infection with pasteurella. In this case, the course of the disease is shorter and affected sheep are found dead or die within a short time of the disease being noticed. Post-mortem examination of the lungs is advised to confirm the diagnosis.

Next steps

Once clinical symptoms develop, the disease is normally fatal and there is no treatment available. In affected flocks, regularly inspect adult sheep, then remove and cull any affected animals. It is also recommended to remove offspring of affected ewes.

Any suspect sheep should be isolated from the main flock immediately and reassessed or culled.

There is still no laboratory test that can confirm diagnosis, although research in this area is ongoing.

Transthoracic ultrasound is being used increasingly by vets to identify affected sheep in all but the earliest stages of disease. Speak to your vet for more information.



Watery discharge from the nose, a typical symptom of OPA

Johne's disease (Paratuberculosis)

Johne's disease is a chronic infection affecting the small and large intestine of ruminant animals.

The disease is caused by infection with a bacterium called *Mycobacterium avium subsp. paratuberculosis* (MAP), a very slow-growing organism that can survive for long periods in the environment.

The disease is spread through ingestion of the bacteria shed in the faeces of infected animals. The infection can also be passed on in colostrum or milk and across the placenta to unborn lambs. Young animals are more susceptible to infection than adults. The incubation period is two to four years and the animals often show no signs of illness until later in life. Sheep that are infected but show no signs of disease are said to be 'subclinically infected' and act as carriers. The disease is usually introduced to a farm through the purchase of subclinically infected stock.

Implications

Johne's disease causes a significant loss in productivity, higher numbers of thin ewes and increased culling.

Early signs and identification

The identification of Johne's disease is problematic and there is no single diagnostic test that can detect all its stages. Subclinically infected stock are extremely difficult to diagnose and can even test negative. Post-mortem is the most reliable means of diagnosis. In sheep, diarrhoea is usually not a symptom, unlike in cattle.



Marked weight loss in sheep affected with Johne's disease

Faecal samples can be used to detect the presence of MAP when it is being shed in the faeces.

Blood samples can be examined by your vet for evidence of protein loss (hypoalbuminemia), which will provide useful information in flocks where disease is suspected.

It is also possible to look for Johne's antibodies in the blood, but this test is not very sensitive so there is a high risk of false negative results.

The disease is characterised by severe weight loss that is irreversible and ultimately leads to death.

Next steps

The early culling of affected animals and their offspring will help to limit the disease. However, vaccination appears to be the most effective method of control.

There is a vaccine available for use in the UK that successfully reduces the levels of clinical disease and shedding of infection.

Unfortunately, there is currently no way of reliably identifying subclinically infected animals, so the risk of introducing infection with bought-in stock remains.

Rabbits and other wildlife will carry MAP, so trying to eradicate it from a property can prove impossible.



Johne's disease can cause the small intestine to thicken and be coloured with a bright orange-yellow pigment

Lameness

Lameness in sheep flocks is one of the most common and persistent disease problems.

It is unrealistic to expect a flock to never have lame sheep, but it is important they are treated as soon as practically possible. Infectious forms of lameness need to be dealt with on both an individual and a 'whole-flock' basis. Easy-to-use and appropriate handling facilities are necessary to make foot care practical to carry out as well as effective.

A target of less than two per cent lame is realistic on farms where a control plan has been discussed with the vet.

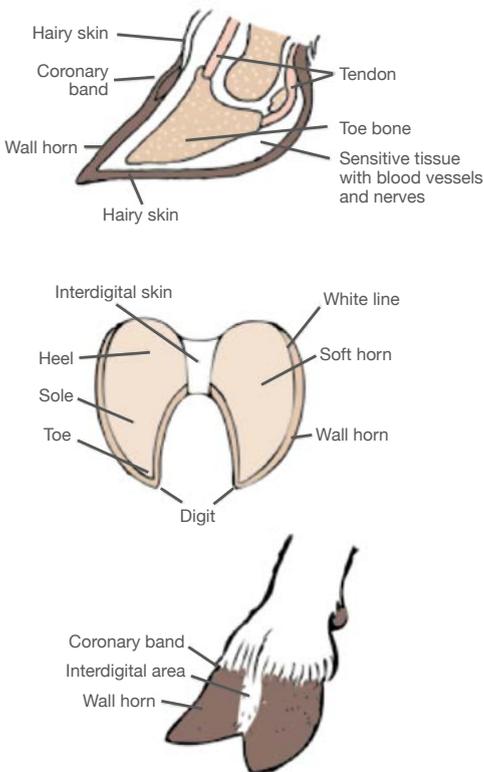


Figure 7. Diagrams of the sheep's foot

Implications

Lameness costs the industry £24.4 million every year. As well as resulting in significant economic loss, lameness is an important welfare concern. Lame sheep are less able to graze and compete for feed. This results in reduced performance and premature culling, in addition to the costs of treatment and the labour involved in administering it.

Early signs and identification

First signs of lameness can be quite subtle, but early identification and prompt treatment of individuals or groups as appropriate is essential to reduce spread.

Scald is usually characterised by red/pink inflammation in between toes with a white/grey pasty 'scum' on top which can smell. It is more likely to occur if stocking rates are high.



Scald

Footrot occurs when there is a separation of the hoof horn, usually starting in the interdigital space. It is most likely to spread during warm, moist conditions. Sheep will often walk on their knees due to the pain.



Footrot

Contagious ovine digital dermatitis (CODD) initially occurs at the top of the hoof (the coronary band). The infection progresses downwards to the toe and can result in the whole horn capsule falling off. Outbreaks can be severe, affecting up to 50 per cent of the flock.



CODD

Next steps

Working with your vet to identify the cause of lameness in your flock is crucial to the success of any treatment and control.

Treatment – When lame sheep are identified, it is important that they are isolated and treated appropriately as soon as possible, but ideally within three days.

The most common causes of lameness, scald, footrot and CODD, are infectious, with effective treatment in adult sheep requiring the prompt use of injectable or topical antibiotics. The procedure for use of antibiotics in lame sheep should be discussed with your vet as part of your flock health plan. The infected feet should not be trimmed if possible, as trimming spreads infection and delays healing.

Control – The five-point plan is a recognised industry standard, useful in the control of lameness caused by infections and importantly, helps to prevent new cases.

1. Avoid spread of infection (in gateways, at gatherings)
2. Treat lame individuals quickly and effectively
3. Quarantine bought-in sheep for three weeks
4. Cull persistently lame sheep
5. Vaccinate to protect against footrot

Foot health, including shape, horn quality and susceptibility to footrot may be inherited. Therefore, it is important to select breeding stock with sound feet.

Foot trimming should be kept to a minimum or avoided completely. In particular, care must be taken not to cause bleeding, which is painful and can lead to formation of granulomas.

For more detailed information on lameness, see the BRP manual 7: **Reducing lameness for Better Returns**.

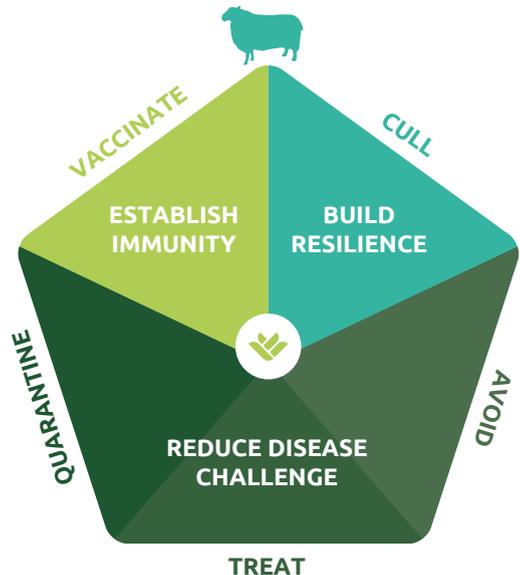


Figure 8. Five-point plan for tackling lameness

Liver fluke

Liver fluke disease, or fasciolosis, is caused by a parasite, *Fasciola hepatica*, which can infect all grazing animals but mainly affects sheep and cattle. The incidence of fluke disease is influenced by climate, particularly summer rainfall, because the complex life cycle of the parasite involves two different hosts and several free-living stages.

Adult fluke are found in the bile ducts of the liver of sheep and cattle. The main intermediate host in the UK is the mud snail, *Galba truncatula*, which is found in wet, muddy conditions and particularly in areas associated with poor drainage, including around water troughs and muddy gateways. Fluke disease can only be maintained in areas that have a suitable habitat for the mud snail. However, fluke disease can also reach drier areas via bought-in animals.

The reported incidence of liver fluke disease in sheep and cattle has increased over recent years. This may be due to changing climate (milder winters and wetter summers) but also because of adaptations within the fluke parasite itself. It is becoming less predictable in terms of location and timing.

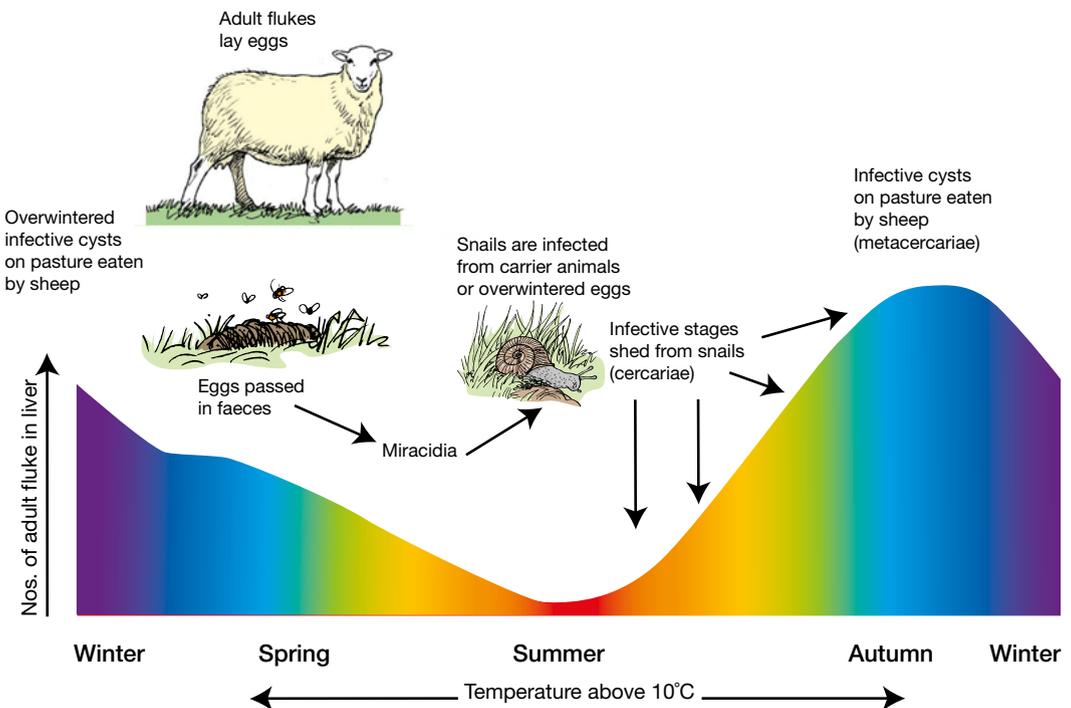


Figure 9. Liver fluke life cycle

Implications

Liver fluke disease causes significant losses to the UK sheep industry. Severe disease results in death, while milder infections provoke a significant reduction in flock performance eg reduced lambing percentages, reductions in lamb growth rate.

Early signs and identification

There are three clinical forms of liver fluke with varying degrees of severity depending on the timing, level and duration of the ingestion.

Acute fasciolosis occurs when sheep ingest massive numbers of infective cysts from herbage over a relatively short period, generally in the autumn/early winter. These develop into young fluke, which move through the liver and cause excessive damage. Sudden death occurs before fluke eggs appear in faeces. Other sheep in the flock will often be anaemic, with the inside of their eyelids pale and their abdomen may be swollen.

Sub-acute fasciolosis occurs when infection is acquired over a prolonged period. Usually, there is damage to the liver tissue and adult flukes are visible in the bile ducts. Death is less rapid and usually occurs later in the winter, around November–February. Signs include:

- Rapid weight loss
- Anaemia
- Shedding of low numbers of fluke eggs

Chronic fasciolosis is the most common and widespread form, which can occur at any time of year. Moderate numbers of eggs will be present in faeces and other signs include:

- Reduction in fertility
- Progressive loss of body condition/weight
- Anaemia
- Pale membranes
- Swelling below the jaw (in severe cases)

Death is rare in well-nourished sheep.

Next steps

Reducing the areas where mud snails live, through drainage and fencing off wet areas, may help to lower the incidence of disease.

Available products vary in their ability to kill immature stages of fluke, so product choice will depend on the time of year. The most effective drug against young immature fluke is triclabendazole, hence this has been the most frequently used flukicide in the UK.

On the other hand, reports indicate that resistance to triclabendazole is widespread. It is therefore more important than ever to use the correct product at the right time and not to overuse any particular drug.

Resistant fluke can be introduced to a farm by bought-in sheep. The quarantine of bought-in sheep should be included in your flock health plan and should involve products other than triclabendazole. Sheep can continue to shed fluke eggs for up to three weeks after treatment, so bought-in sheep should not be grazed on wet land (potential snail areas) for at least three weeks after the quarantine treatment. Administration of products that only kill older immature fluke (eg nitroxylnil or closantel) should be repeated after six to seven weeks.

Consult your vet to develop a treatment and control plan specific to your farm.



Severe damage to sub acute fluke affected liver (left) compared to normal liver (right)

Maedi Visna (MV)

Maedi Visna is a progressive wasting disease of sheep caused by infection with a lentivirus. The infection is spread orally via infected milk and colostrum and by inhaling infected aerosol droplets.

The prevalence of MV across the UK is increasing, with clinical signs becoming more widely recognised.



Thin ewes affected with Maedi Visna

Implications

As a chronic disease, MV leads to significant production losses within the flock. Affected animals start to show clinical signs from two years of age and older, and may leave the flock due to loss of condition. MV affects the udder and can cause a chronic mastitis that may be difficult to detect, but results in a noticeable reduction in milk production. Flocks hit by the disease show losses due to reduced survival and growth rates in lambs born to affected ewes.

Early signs and identification

The early signs of infection can be difficult to spot due to the slow progression of the disease. Once clinical signs are noticed within a flock, a large number of sheep will have become infected.

Clinical signs are often seen in older sheep and include a chronic pneumonia with breathing difficulties or exercise intolerance. Neurological signs such as a 'dragging' hindlimb gait or circling can be seen.

Chronic mastitis cases are associated with hungry or poor growing lambs.

Disease can be confirmed on post-mortem of cull ewes and it is important that you discuss with your vet if your flock is experiencing poor performance and poor ewes.

Next steps

There is no vaccine available for MV and due to the long incubation period of the disease, detection in the live animal can be problematic. It can be diagnosed via blood samples, once the ewe has formed an antibody response. Testing should therefore be routinely carried out annually or even more frequently in affected flocks. Positive animals should be culled.

Lambs from infected ewes should not be retained for breeding as they may have become infected via the colostrum or milk.

Accreditation

If you wish to maintain and demonstrate freedom from MV in your flock, you can join the Premium sheep and goat health scheme (PSGHS). Accreditation requires testing a significant proportion of the flock on a regular basis as well as strict adherence to suitable biosecurity.

Flock screen

Identifying whether a commercial flock is affected by MV is best achieved by testing the most likely animals to show disease, ie the older, thin, cull ewes.

A regular, annual test of 12 cull ewes is being carried out on many flocks as a relatively inexpensive part of the health plan to monitor for disease.

It is sensible to source replacement ewes from flocks that routinely screen for MV to reduce the chance of buying in infected animals.

Mastitis

Mastitis is an inflammation of the mammary gland, usually caused by bacterial infection. It frequently results in the loss of the affected half of the udder and consequently the culling, then replacement of a ewe. There are two forms: acute and chronic. Acute mastitis is a very painful disease.

It is thought that infection occurs through the teat canal or teat sores, allowing bacteria to infect the udder. The shape of the udder and the teats have shown to have a big effect on the chances of mastitis occurring. It is caused by a range of bacteria, including *Staphylococcus aureus*, which lives on the skin of the ewe and *Mannheimia haemolytica*, which is plentiful in the throat of healthy lambs.

Implications

Mastitis can result in loss of udder function, reduced milk yield, quality and occasionally death. Due to the reduced milk yield and quality, lamb growth is often impaired. Mastitis usually results in culling of affected ewes and in lowland flocks is one the main reasons for culling.

Early signs and identification

Acute mastitis is usually seen in the first weeks after lambing and can rapidly progress to cause death of the ewe.

The ewe may stop the lambs suckling, her udder may become hot, red, swollen and extremely painful. Infected ewes have no milk in the affected quarter, but instead a watery liquid that may contain pus or blood. If the ewe survives, the udder often becomes cold and clammy, and the dead tissue falls away.

Signs of acute mastitis:

- Hungry lambs
- High temperature
- Loss of appetite
- Hindlimb 'lameness' or altered gait caused by the painful udder
- Hot, hard, swollen udder
- Behavioural changes such as reduced activity or increased vocalisation due to pain

Chronic mastitis can occur during lactation or at weaning. A ewe may not appear ill and changes to the udder can be barely detectable, but milk yield reduces. It is more easily detected at the pre-tupping check, when the udder is not full of milk and the affected area may appear enlarged, hard or lumpy.

Next steps

Hygiene in the lambing sheds and pens will reduce the risk of mastitis caused by environmental organisms such as *E. Coli*. Consider vaccinating against orf to avoid teat lesions and ensure good fly control.

Select replacement ewes with neat udders and teats placed at the 'twenty to four' position.

Reduce udder damage through ewe management:

- Check the type and amount of protein in the diet at late pregnancy. Adequate levels of bypass protein will drive good milk supply
- Ensure ewes are well fed in early lactation to improve milk yield – hungry lambs damage teats
- Do not expect a ewe to rear triplets
- Check your weaning policy – put ewes on a reduced diet away from sight and sound of lambs but always provide water

Antibiotics and fluid therapy can help save an infected ewe's life but does not help save the affected half of the udder. Non-steroidal anti-inflammatory drugs given at the same time as antibiotics will help reduce the pain and swelling to significantly improve the welfare of the ewe.

Once ewes with mastitis are identified, ensure their numbers are recorded so they can be culled before the following tupping.



Maximising lamb survival

A few losses around lambing are unavoidable in any flock, but high levels can be avoided if sound husbandry, health measures and skilled shepherding are practiced.

Reasons for losses:

- Abortion
- Infectious disease
- Hypothermia
- Predators
- Difficult lambing
- Genetic defects

Early signs and identifications

There are a variety of causes that can lead to abortion (miscarriage). During pregnancy, optimum growth of the placenta is crucial to lamb survival and development. Hormones affect colostrum and mothering ability of the ewe. Do not under-feed or over-feed ewes. Correct ewe nutrition is vital to ensure good lamb birth weight and plentiful milk supply.

Hypothermia occurs when the lambs' body temperature falls below 39°C. Lambs are born with a supply of energy, which lasts for up to five hours, but if the lamb does not feed in this time, it will become hypothermic. Chilling also causes hypothermia, especially in lambs that have not fed adequately.

Joint ill is caused by infection, which usually enters the body through the navel in very young lambs or through tagging, docking or castration wounds in slightly older lambs. Affected lambs are usually dull, with one or more swollen, painful joints. Infection can also occur in the spine, resulting in paralysis of either the hindlimbs only, or all the limbs.



Lamb affected by joint ill

Watery mouth is usually fatal. Affected lambs typically stop feeding, show signs of abdominal pain and are wet around the mouth. *E. Coli* is commonly isolated from cases. However, inadequate colostrum intake is usually the underlying cause.



Next steps

Isolation facilities are essential in any flock. They provide some protection through separation of sick animals and provide a suitable environment for intensive care.

Facilities should be well lit, have hot water readily available and power points should be accessible for supplying a lamb-warming box and infrared lights.

Ensure all lambs receive adequate colostrum (50ml per kg body weight) immediately after birth and have their navels treated with 10 per cent iodine.

If any ewes or lambs become ill, isolate and treat them. Remember that some infectious diseases can be transmitted to humans.

Managing hypothermia

Lambs can become hypothermic through exposure during the first few hours after birth, or after five hours due to starvation. In lambs that are severely hypothermic (body temperature less than 37°C), treatment should follow the lamb survival flowchart (Figure 10).

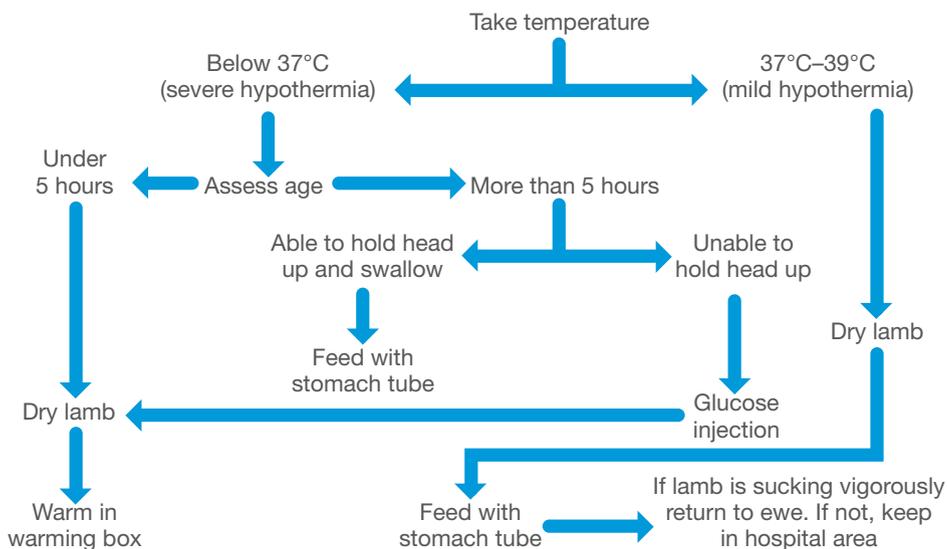


Figure 10. Lamb survival flow chart

Pre-lambing

- Scan, group and feed ewes by number of lambs
- Analyse forage and supplements accordingly. Good nutrition of pregnant ewes is paramount
- Ensure shelter is available for outdoor flocks – even if just bales of straw
- For indoor flocks, ensure you have adequate lambing pens
- Footbath ewes prior to housing. Treat and segregate lame ewes
- Vaccinate ewes against clostridial diseases

At lambing

- All lambs' navels should be treated with 10 per cent iodine immediately after birth to disinfect and dry up the cord. This prevents microorganisms tracking up the cord. Repeat a few hours later
- Ensure lambs have adequate colostrum to provide them with the essential antibodies to protect them against infection (at least 50ml per kg body weight in the first six hours and 200ml per kg in the first 24 hours)
- If you castrate or tail using a rubber ring, this must be done in the first week of life

Assisted lambings

- Aim to provide maximum supervision to lambing ewes with minimum interference
- Assist if a ewe has been straining for an hour but nothing is showing, or if a ewe has been straining and given up
- Before internal examination, think cleanliness. Use arm-length disposable gloves and copious lubrication to manipulate lambs with minimal damage
- When deliveries are prolonged or traumatic, it may be necessary to administer antibiotics and pain relief. Discuss this with your vet as part of your flock health plan

For more detailed information on lamb survival, see the BRP manual 14, **Reducing lamb losses for Better Returns.**

Midge-borne diseases

Schmallenberg Virus (SBV)

Schmallenberg Virus affects ruminants and is spread between animals by biting midges and from mother to offspring through the placenta. Direct transmission from animal to animal is thought to be unlikely.



Implications

Since 2011, SBV has been identified as the cause of congenital deformities or abortion in lambs and calves throughout Europe, with the number of cases varying over different years.

Early signs and identification

Adult sheep with SBV generally do not show any signs of clinical disease. Lambs affected are often born with fixed, inflexible joints, a twisted neck or spine, a domed skull and a short jaw. Some animals are born with a normal appearance but have abnormalities with their nervous system and exhibit signs such as inability to suck, blindness and seizures. Other diseases or toxins may cause these signs, so discuss any suspected cases with your vet.

It is possible that one lamb from a multiple birth can be affected and the other lamb/s can be normal.



Next steps

A vaccine against SBV is licensed for use in UK. The recommendation for sheep is to give a single dose to ewes prior to tupping. Discuss use of the vaccine with your vet.

Bluetongue Virus

Bluetongue Virus (BTV) is an infectious viral disease spread by biting midges, of the genus *Culicoides*. It is not currently endemic within the UK but entry is possible through the importation of infected animals and via windborne midges.

Climatological studies suggest that the south and south-east coast regions are more likely to be exposed to infected midges if they are blown across from northern France. The midges are most active between the months of May and October.



Swelling of the face, nasal discharge and crusting around the muzzle; all typical signs of BTV

Implications

High mortality rates have been recorded in sheep infected with BTV in comparison to other ruminant species. Significant production losses (including abortions and reduced lactation) are also seen in affected flocks.

Early signs and identification

Sheep infected with BTV appear unwell, depressed and reluctant to move (due to lameness), with a high temperature. The face and ears swell and nasal discharge is present, with scabbing and crusting around the muzzle. Affected animals experience excessive salivation due to ulcers in the mouth and the tongue may swell. Discharges from the eyes may also occur and the skin around the hoof often reddens.

Next steps

There are at least 27 strains (serotypes) of BTV virus worldwide, with BTV 8 recently re-emerging in central France. The likely spread of midges across the channel, and therefore the risk of incursion of disease, is being closely monitored. Animals that recover from an infection of BTV will be immune to that strain of the virus but not to others.

Vaccination is the only effective way of protecting against BTV and vaccines are available for use in the UK.

Remember

BTV is a notifiable disease and you must contact your vet immediately if you see any suspicious clinical signs.

Mineral deficiencies

Minerals are required in a sheep's diet in different quantities. Trace elements are needed in very small quantities but are essential for the maintenance of health. Others, such as calcium and phosphorus, are required in larger quantities.

Implications

A lack or over-supply of any one mineral or vitamin can cause a variety of problems.

Early signs and identification

Calcium – Hypocalcaemia, or a lack of calcium in the blood, occurs in late pregnancy and is usually brought on by physical or nutritional stress. In the earliest stages, ewes may be very excitable and anxious, but as the condition progresses, muscle weakness causes ewes to go down and become progressively comatose.

Avoid stressing ewes in late pregnancy. Ewes with hypocalcaemia show a response to subcutaneous injection of calcium solution.

Cobalt – In certain areas of the country and on some pastures, cobalt is deficient. Symptoms of deficiency are common and particularly seen in lambs around and after weaning. They may be weak, with a poor fleece and very poor growth rates. Cobalt deficiency will also affect ewe fertility.

If cobalt deficiency is suspected in lambs, blood samples are required to confirm the cobalt status. Where there is recognised deficiency, lambs will require routine cobalt supplementation from mid-summer. This may be in concentrate feed, in rumen boluses or in a long-acting injection form. Liquid drenches can also be given, but these need to be repeated every few weeks to maintain levels.



Lambs suffering from cobalt deficiency and poor growth rates as a result

Copper – Sheep may suffer copper deficiency because the level in soil is inadequate, or because other minerals are binding to copper and preventing its absorption. The most important effect of copper deficiency is swayback in young lambs, causing a lack of coordination and a tendency to sway on their back legs. The condition can be congenital or delayed and some lambs are so badly affected that they are unable to stand.

Pastures can be monitored for copper status and for the presence of other trace elements (such as molybdenum) that may interfere with or enhance copper availability.



Lamb suffering from swayback, often caused by copper deficiency

On the other hand, excess copper is poisonous to sheep. They store copper in the liver with varying efficiency, depending on genetics. Chronic copper toxicity is most likely to occur in sheep fed concentrate feed over a prolonged period.

Acute poisoning can be due to accidental overdose, so care must be taken when drenching for deficiencies or if the sheep have access to another source of copper (eg in orchards or land treated with pig slurry).

Iodine – Levels are low in some areas of the UK and are particularly affected by grazing certain forage or root crops. Low iodine levels can adversely affect ewe fertility and lamb viability. Care must be taken with supplementation as oversupply has been shown to affect the absorption of immunoglobulins from colostrum.

Magnesium – Hypomagnesaemia or lactation tetany usually occurs in ewes within four to six weeks after lambing. Affected ewes show trembling and are often either unable to walk or walk in an uncoordinated manner. If stressed, they will rapidly become recumbent, with rigid extension of the legs and tetanic spasms. Death can often be very rapid.

Ewes have no capacity to store magnesium and therefore require a constant dietary supply to meet their needs. Ewes under stress, nursing multiple lambs and grazing lush spring grass are at most risk of hypomagnesaemia. Magnesium levels are low in rapidly growing spring grass. The use of magnesium boluses or supplementary forage to increase salivation may reduce the risks of disease in flocks with known problems. Potassium can interfere with magnesium uptake, so care must be taken when applying early-season fertiliser to pastures.

Vitamin E and selenium – In many areas of the UK, soil is deficient in selenium and levels of both selenium and vitamin E are low in roots or poorly conserved grain and forages.

Low selenium levels will affect growth rates, immunity and ewe fertility. White muscle disease (stiff lamb disease) affects lambs up to six months old when fed on a low vitamin E and selenium diet.

Lambs may be born weak and die, or they may develop signs of generalised weakness and stiffness. Selenium deficiency may also affect ewe fertility by causing high embryonic mortality at the time of embryo implantation.

Where deficiency is identified, supplementation can take the form of drenches, boluses or injectable selenium. When flock selenium status is marginal, it may be appropriate to carry out trial supplementation to determine if benefits to production can be achieved.



Lamb suffering from white muscle disease

Next steps

Discuss with your vet an approach to assessing the trace element status of your farm. It is particularly important to ensure that any supplementation is appropriate and targeted to the needs of your individual flock.

Status can often be determined through the analysis of blood samples, although in some cases (eg copper status) it may be more useful to consider liver samples taken at the abattoir or from fallen stock.

For more detailed information, see the BRP+ document **Trace element supplementation of beef cattle and sheep** at beefandlamb.ahdb.org.uk

Orf is a highly contagious skin condition, which affects mainly young animals in their first year of life.

Other skin conditions can be confused with orf. The more serious outbreaks are generally associated with intensive sheep husbandry where there is a build-up of infection in the buildings.

Infection will only establish where the skin or gums have already been damaged. Thus, rough food or pasture may make sheep more prone to infection.

Implications

Orf causes production losses due to periods of poor growth in lambs and increased risk of secondary infections.

Orf can also infect humans, leading to localised swollen, red areas, which can be painful and on occasions provoke severe systemic reactions.

Early signs and identification

The typical symptom of orf is scabby lesions around the mouth and nostrils of lambs. These can be extensive and result in serious disease, and on rare occasions, mortality.

Infection normally runs a course of four to six weeks and is associated with poor growth during that period.

Orf can also affect other parts of the body, particularly the teats of ewes and lower legs of lambs. Ewes with infected udders may refuse to let lambs suckle and have an increased risk of developing mastitis.

Next steps

There is no practical method of killing the virus once it has infected the animal. However, the use of topical antibiotic spray and injection in severe cases, as agreed in the health flock plan, will minimise the risk of affected animals developing secondary bacterial infections. Attention to feeding may prevent weight loss in lambs having difficulty sucking and pain relief should be provided to severely affected lambs.

The virus will survive outside through winter, though not in wet conditions.

Cleaning and disinfecting buildings, especially wooden structures, is important in controlling orf as it can persist in buildings for many years.

There is an effective vaccine available, consisting of viable organisms that may contribute to the environmental pool of infection. The vaccine should be applied to ewes eight weeks before lambing and the ewes should be kept away from the lambing area until the scabs are shed. Vaccinated ewes do not pass immunity on to their lambs, so lambs should be vaccinated shortly after birth, usually as they are turned out. In no circumstances should the vaccine be used on farms that do not have a problem with orf.



Lambs suffering from orf lesions

Pasteurellosis

Pasteurellosis is the term used to describe a number of disease forms caused by two related bacteria:

- *Mannheimia haemolytica*, which causes pneumonia in all ages and septicaemia in young lambs
- *Bibersteinia trehalosi*, which causes severe systemic infections and sudden death in older lambs

Both types of bacteria are found in the nose and tonsils of normal, healthy sheep.

Implications

Pasteurellosis affects all ages of sheep and causes significant losses to the sheep industry. Disease is often very acute, with animals found dead.

Early signs and identification

Pasteurellosis is often triggered by stress, which may be increased by:

- Management activities (dipping, castration, clipping, dosing for worms, gathering in warm weather)
- Transportation
- Climate (warm, still weather and cold, wet, windy weather)
- Diet change
- Other infectious disease (viruses, tick-borne fever, other bacteria)

M. haemolytica causes acute pneumonia in all ages, from about two months onwards, occurring either as flock outbreaks or as sporadic cases.

Signs of acute cases include:

- High temperature
- Death
- Depression
- Laboured breathing

In very young lambs, *M. haemolytica* causes a septicaemia and they are usually found dead.

B. trehalosi causes severe systemic disease, most commonly seen in hogs and store lambs from September to December. Typically, a number of sudden deaths occur over a few days following transportation and/or a change of diet.



Frothy fluid may be seen around the mouth and during the terminal stages of pasteurellosis

Next steps

Managing the flock to reduce all the trigger factors outlined above is crucial to prevention and control. This includes providing plenty of forage to buffer any diet change.

Vaccination is effective in reducing losses against both types of pasteurellosis. A primary course of two doses is needed to stimulate immunity. Booster doses should then be given prior to periods of high risk.

There are combined vaccines that protect against clostridial diseases and pasteurellosis.

While lambs born to vaccinated ewes are protected against clostridial diseases for a couple of months, they are only protected against pasteurella for a couple of weeks. Producers concerned about pasteurellosis in lambs should give them a full course (two doses) from three weeks old. It may be necessary to give a third dose before the autumn.

Flock health and management

Biosecurity and disease prevention

When purchasing replacement ewes or rams, ensure you know their health status. Any pen of animals might bring new infection to the farm. A sound biosecurity programme can minimise the dangers.



Keep bought-in stock separate from the existing flock for at least three weeks with adequate biosecurity measures

Buying new sheep

When purchasing new sheep, compare the health status of your flock with those for sale. If you are Maedi Visna (MV) accredited or Enzootic abortion (EAE)-free, check the status closely.

For private sales, look at the rest of the flock, not just those for sale, and ask questions about their health status performance. Ask what the owner vaccinates against, if they have diagnosed CODD on their farm and check their ectoparasite prevention methods.

Through markets, it is more difficult to check the health status of the flock, but try to talk to the vendor and ask the same questions.

If you are purchasing a ram, get into the pen and check his reproductive organs. Ensure he has two testicles of even size, not too soft and with no lumps or bumps.

Some sheep are sold with health warranties such as treatment for scab, but you do not know if the vendor administered the treatments correctly.

Isolate all new stock for at least three weeks and carry out all the treatments yourself. Being over-cautious is not a bad thing to protect your own flock's health status.

Ideally, purchase all replacements from an individual flock and transport directly from origin to the new premises. This prevents diseases being picked up.

Ensure the vehicle is properly cleansed and disinfected. Avoid sharing transport and mixing stock from different sources. Where possible move sheep using your own transport.



Quarantine of incoming sheep

Any sheep brought onto the holding need to be quarantined (even if returning from a show) to prevent the introduction of sheep scab, resistant worms and footrot in particular, but also fluke, lice and CODD. Any purchased sheep must be considered at risk of carrying the first three. The others are based on a risk assessment.

Incoming animals should be quarantined for a minimum of 21 days. On arrival, sheep should be treated for scab and internal parasites. Current SCOPS advice is to yard or house sheep – do not put them directly onto pasture or in contact with other sheep. Treat them as soon as possible, drench with 4-AD or 5-SI wormer and inject with moxidectin (one per cent), which will also remove the threat of sheep scab. After 24–48 hours, turn out onto pasture that has carried sheep in the current season and keep isolated from the resident flock for at least three weeks.

Quarantine treatment to prevent the incursion of drug-resistant liver fluke is discussed in the liver fluke section.

The bought-in sheep should be regularly footbathed and examined for signs of lesions while in quarantine.

Flock health plans

A health plan should be reviewed regularly with the vet and farm staff for all flocks. All routine treatments and vaccinations should be planned so they can be ordered and scheduled at the most appropriate time.



Medicines

Best practice for the use of animal medicines:

- Use the correct medicine for the job
- Use it at the correct time
- Use the correct dosage for the weight of the animal
- Complete the full course prescribed by the vet
- Administer the medicine correctly
- Only use medicines that have been stored correctly and are not contaminated by dirt or other medicines
- Do not use medicines that are past their expiry date
- Record date, dose, animal, withdrawal period
- Dispose of unused medicines safely
- Adhere to withdrawal periods

For more detailed information on medicines see the BRP manual 11: **Using medicines correctly for Better Returns.**

Top 10 flock health tips:

1. Flock protection – do not buy in disease
2. Monitor the health status of your flock – what problems do you have? What problems do you need to avoid?
3. Improve the health status by discussing a culling policy with your vet
4. Control diseases that cannot be eradicated. Vaccination against clostridia, pasteurilla, abortion and footrot have positive cost benefits
5. Discuss all treatment protocols with your vet to ensure that you are using the correct treatment at the correct time for a successful outcome
6. Use management practices to improve health, eg pasture management to reduce worm or fluke risk
7. Improve the environment, eg ventilation or hygiene at lambing
8. Record reproductive performance
9. Record all procedures carried out
10. Form a team approach to reduce disease costs through farm health planning, involving the farmer, shepherds, vets and other advisers

Sheep BRP Manuals

Manual 1	Marketing prime lamb for Better Returns
Manual 2	Buying a recorded ram to generate Better Returns
Manual 4	Managing ewes for Better Returns
Manual 5	Growing and finishing lambs for Better Returns
Manual 6	Target easier management for Better Returns
Manual 7	Reducing lameness for Better Returns
Manual 8	Worm control in sheep for Better Returns
Manual 9	Improving ewe breeding for Better Returns
Manual 10	Controlling external parasites for Better Returns
Manual 11	Target ewe fertility for Better Returns
Manual 12	Improving ewe nutrition for Better Returns
Manual 13	Improving sheep handling for Better Returns
Manual 14	Reducing lamb losses for Better Returns

See the AHDB Beef & Lamb website beefandlamb.ahdb.org.uk for the full list of Better Returns Programme publications for beef and sheep producers.

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