

Understanding Liver Fluke in Sheep Flocks

PARASITE CONTROL LEAFLET SERIES UNDERSTANDING LIVER FLUKE IN SHEEP FLOCKS 11.02.2020



PARASITE CONTROL PROGRAMME



Parasite Control
Animal Health Ireland.ie

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Contributing to a profitable and sustainable farming and agri-food sector through improved animal health

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Introduction

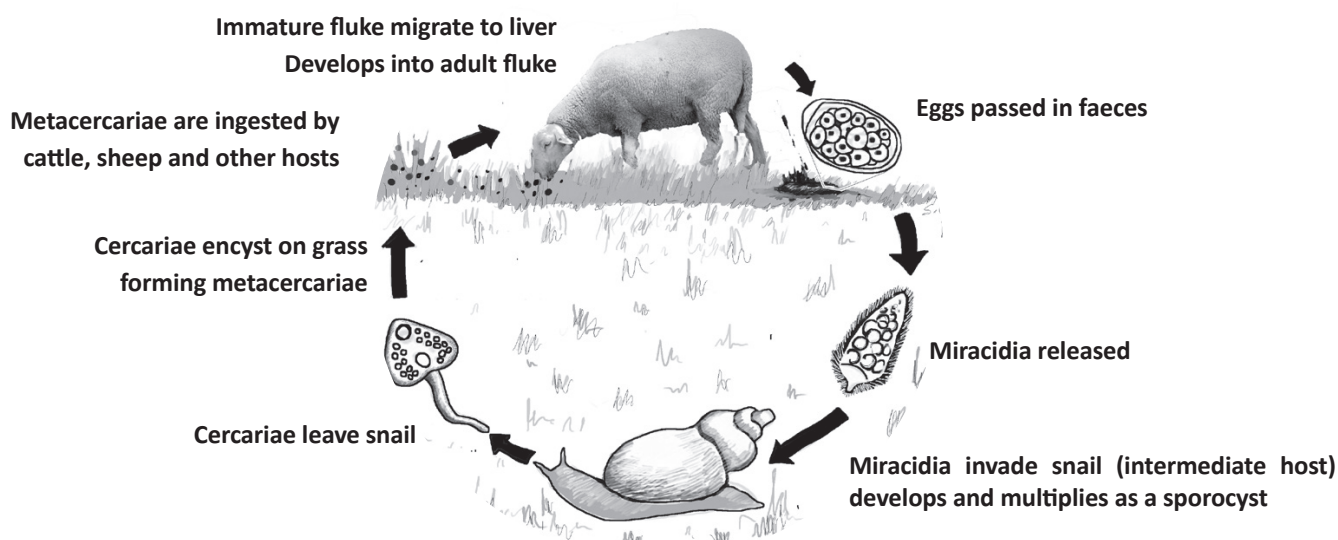
Liver fluke (*Fasciola hepatica*) are flatworm parasites which commonly infect grass-fed cattle and sheep in Ireland but can also infect other grazing animals. Recent survey data has suggested that >60% of Irish sheep flocks will have liver fluke infections, with farms on wet lowland pastures being most susceptible. However, due to the favourable climate, almost all sheep farms in Ireland are at risk of infection. Disease caused by liver fluke (fasciolosis) can result in serious clinical signs and high levels of mortality in severe infections. Liver fluke infections in both sheep and cattle are responsible for significant economic losses to the Irish industry. Liver fluke is therefore an important concern for sheep farmers.

Liver fluke infections can cause losses in different ways:

- On farm, liver fluke can cause either acute, subacute or chronic disease in sheep. Acute disease is the most alarming as it can cause rapid death in a large proportion of affected sheep. Subacute or chronic disease may also be serious and cause significant production losses.
- Low levels of liver fluke infection can cause general ill-thrift and significantly reduce growth rates, wool production, lambing percentages and ewe milk production.
- The livers of animals which are, or have previously been, infected with liver fluke will be condemned at slaughter as not fit for human consumption.

The liver fluke life cycle

Sheep and lambs become infected by eating grass contaminated with the encapsulated infective larvae of the liver fluke parasite, known as metacercariae. In the intestine, the larvae (immature flukes) are released from their cysts, cross the intestinal wall and move into the liver. They typically spend 8-12 weeks moving through the liver and causing considerable tissue damage. The immature flukes finally reach the bile ducts where they continue to grow and develop into mature adults, feeding on the sheep's blood and producing thousands of eggs each day. The eggs are carried in the bile into the small intestine from where they are passed out in the faeces and reach the pasture. Once the eggs are on pasture, exposure to sunlight (increased environmental temperature) and moisture trigger the eggs to hatch, and a small larval stage (the miracidium) emerges. These larvae must find and penetrate a snail (the so-called liver fluke snail or mud snail) which are found in wet or 'flukey' areas on individual farms. In the snail the larvae develop through the sporocyst and redia stages before roughly 500-1000 of the final larval stage (cercaria) emerge from the snail and settle on grass as encapsulated infective larvae (metacercariae) ready to be consumed again. Without appropriate treatment, adult liver fluke can survive in sheep for many years.



Liver fluke disease

Liver fluke disease (fasciolosis) can occur in three forms:

1. ACUTE DISEASE

Acute fasciolosis can occur in sheep 2-6 weeks after large numbers of metacercariae are ingested over a short period of time. The large numbers of parasites which then emerge in the intestine and travel to the liver cause severe damage.

Signs:

- Sudden death, with/without prior warning
- Weakness, abdominal pain and reluctance to move
- Jaundice (yellowing of the mucous membranes and whites of the eyes)
- Anaemia due to internal blood loss (pale membranes)

Timely treatment with a product effective against early immature fluke (flukicide containing triclabendazole [TCBZ]) is crucial to combat acute disease outbreaks. Occasionally animals fail to respond to treatment, either due to anthelmintic resistance or because the livers (which are damaged by the invading fluke) are no longer able to convert the TCBZ to its active form. In these cases, alternative treatments (which do not require conversion by the liver to an active form) must be used. However, TCBZ is the only ingredient approved for treating early immature fluke.

2. SUBACUTE DISEASE

Subacute fasciolosis occurs when a smaller number of metacercariae are ingested, or ingestion takes place over a longer period of time. However, the migration of the parasites still causes significant internal damage to the animal as the infection progresses.

Signs:

- Rapid weight loss
- Lethargy
- Anaemia (pale membranes)
- Sometimes death

Sub-acute infections are often caused by a mix of immature and late immature stages occurring at the same time as adult parasites in the same animal, and treatment with a suitable flukicide covering both adult and immature fluke is required (See Table 2).

3. CHRONIC DISEASE

Chronic fasciolosis occurs in animals that have had an untreated liver fluke infection for some time.

Signs:

- Progressive, sometimes extreme weight loss
- Submandibular and/or ventral oedema (bottle-jaw and swollen stomach)
- Diarrhoea
- Anaemia (pale membranes)

Treatment with a flukicide effective against adult parasites is needed (See Table 2).

These signs can also arise due to a number of other conditions, so speak to your veterinary practitioner before making treatment decisions.

Detecting liver fluke in sheep flocks

A faecal egg count (FEC) can test for the presence of adult fluke in sheep*. This test cannot detect if there are immature liver fluke infections in animals, and the number of eggs produced by adult fluke fluctuate, so a negative FEC does not guarantee the absence of liver fluke. The season, history of liver fluke infection on farm and clinical signs should be considered before a diagnosis of liver fluke infection is ruled out when the FEC is negative. This is especially important during seasons when the FEC test becomes unreliable (**Table 1**).

For good quality faecal egg counts, it is essential to obtain fresh faecal samples and ideally the samples should reach the laboratory within 24 hours. Pooled samples can be more cost effective but are less sensitive at detecting low levels of infection. For pooled samples, equal quantities of faeces should be taken from 5-15 animals per management group.

	Winter to spring	Summer to autumn	Late autumn to winter
Fluke life stage likely to be present	Adult flukes likely	Immature flukes likely	Mixed immature and adults likely
Faecal egg counts expected (given as eggs per gram [epg])	Higher FEC >100 epg	Low FEC Eggs unlikely	Lower FEC <100 epg
Sheep clinical signs	Chronic disease risk	Acute disease risk	Subacute to chronic disease risk

Table 1: Liver fluke life stage and expected FEC

A coproantigen ELISA or serum ELISA can also be performed and may detect immature fluke infections before eggs are seen in a FEC test. The coproantigen ELISA is a test which detects evidence of early liver fluke infection in faecal samples before the parasites are mature enough to produce eggs. A serum ELISA can determine if the animal has developed antibodies to liver fluke infection. However, this test cannot distinguish between a current or a previous infection.

Treating animals at risk of acute/subacute liver fluke infection on farms with a history of fluke infection is advisable. The ideal time to treat can vary depending on the weather conditions from year-to-year. The annual DAFM liver fluke forecast, issued in autumn each year (<http://www.agriculture.gov.ie>) can help identify an emerging high-risk period when treatment is indicated. Years with mild temperatures and high rainfall during summer can result in a high risk of liver fluke infection. Taking FECs across the year can help identify the best time to use drug treatments on farm.

**A liver fluke FEC may also detect rumen fluke eggs. Rumen fluke infections in sheep do not always require treatment, but it is important to note that the treatment for rumen fluke infection differs to that required for liver fluke.*

Controlling liver fluke on farm

Most control programmes rely heavily on flukicidal drenches to kill fluke once animals are infected and ideally before they can cause serious disease. Different drugs are effective against differing stages of liver fluke infection (Table 2). It is important to select a product with the appropriate active compound given the time of year and stage of infection that requires treatment. In all cases meat withdrawal periods must be strictly observed.

Weeks post-infection	1	2	3	4	5	6	7	8	9	10	11	12+
Triclabendazole (TCBZ)	-	90-99%		>99%								
Rafoxanide	-			50-90%			91-99%					
Closantel, Nitroxynil	-						50-90%			91-99%		
Albendazole, Oxyclozanide *	-									50-70%		80-99%
* Albendazole and oxyclozanide are available but have no effect on liver fluke less than 10 weeks old and are not normally recommended. However, they may be suitable for chronic disease or where triclabendazole resistance occurs.												

Table 2: Examples of the effectiveness of drugs used to control liver fluke infection

Timing of treatments

In order to protect the efficacy of flukicide drugs it is recommended that different active compounds are used in rotation to avoid over-exposure of a liver fluke population to a single drug treatment. A common rotation regime involves using closantel or nitroxylnil in the spring and triclabendazole in the autumn/winter. Treatment plans should be tailored to specific farms.

Treatment failure and drug resistant parasites

Treatment failure and drug resistance are easily confused but are different concepts. Treatment failure occurs when parasites are exposed to a lower than recommended dose of the drug (or when the wrong drug is used relative to the stage of infection). Drug resistance is present when parasites survive in the presence of a drug at a dose that would usually kill them. Failing to administer drug treatments correctly, or at the right dose, increases the risk of drug resistance in a parasite population. Some tips for successful treatment:

- Choose an active compound appropriate to the stage of infection.
- Check that scales are accurate to weigh animals (or at least the largest animal in each group of the same age/condition) and dose according to weight.
- Calibrate the dosing gun regularly, and before each period of dosing.
- Dose carefully using the correct technique.
- Store drugs correctly and only use previously opened products in accordance with manufacturers' recommendations.
- Rotate the drugs used on-farm to avoid developing resistance.
- Ensure treatment against early immature fluke is as early as possible based on previous farm experience. Treating animals that are already ill, or where mortality has occurred, can result in diminished treatment success in the remainder of the group.

Resistance to anthelmintic drugs, including triclabendazole, has already been reported in many countries, including Ireland. After ruling out inadequate dosing or the incorrect product for the infection stage, if resistance is suspected on farm, faecal egg count reduction testing can help establish treatment efficacy (see Technical box).

TECHNICAL BOX

There are currently no validated field tests for detecting liver fluke resistance in live animals but faecal egg count reduction testing (FECRT) can be indicative of resistance.

A FECRT can only be done when adult liver fluke are expected to be present. Individual faecal samples are collected from the same 10 animals pre-treatment and three weeks post-treatment with a flukicide. Samples are sent to the laboratory for a faecal egg count and a reduction in egg counts of 90-95% imply a successful treatment.

A coproantigen reduction test can be similarly performed on samples from 10 animals pre-treatment and two weeks post-treatment with a flukicide. Mean coproantigen positivity should fall by 90% if treatment is successful. Treatment success should be evaluated against the expected life stage of the liver fluke present and the efficacy of the product for that stage. Triclabendazole efficacy can be assessed when late immature or adults are present, whereas other flukicides should be tested at times when only adults are expected.

If possible, confirmation of suspected resistance by dose and slaughter trials can be undertaken.

Minimising the risk of liver fluke infection

Not all approaches to minimising liver fluke infection risk will be practical or cost-effective on all farms, but the seriousness of liver fluke infections means they all warrant consideration, and action where feasible. To reduce the risks of animals becoming infected with liver fluke there are several options to consider:

- Improve the drainage of any wet fields to reduce the habitat of the snail host that transmit liver fluke. Consider fencing off very wet areas which cannot be drained. Alternatively, risky fields could be used for silage. The risk of infection by liver fluke parasites in ensiled grass is dramatically reduced if silage is properly preserved.
- Plan grazing rotations to avoid placing animals on the wettest fields during the highest risk periods (late summer through to early winter).
- Make use of fluke risk forecasts and FEC tests to inform grazing rotation and treatment plans, as the seasonality of liver fluke risk is highly dependent on climate and can vary from year-to-year.
- After lambing, move ewes and lambs onto the driest fields to minimise the risk of acute disease in growing lambs.

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