

## Fluke Diagnostics

### Liver fluke

In the UK, fasciolosis associated with the trematode, *Fasciola hepatica* has been seen traditionally most frequently in west Wales, SW England and SW Scotland. However, cases are now occurring across the UK, including East Anglia. It is suspected that warmer, wetter winters may be allowing the intermediate host, the snail *Galba (Lymnea) truncatula*, to survive in areas where fasciolosis was once uncommon.

### Life cycle

Adult fluke, living in the bile ducts, produce eggs that are excreted in the faeces of the host. These only hatch in moist conditions over 5°C and the hatched miracidia must find a snail host within 30 hours. After several asexual stages, which only occur if ambient temperature is over 10°C, the flukes leave the snail as cercariae, which attach to the herbage and encyst as metacercariae. Following ingestion by cattle, these release immature fluke, which cross the intestinal wall and peritoneum to reach the liver, migrating for 4-5 weeks before entering the bile ducts. Egg laying begins 10-12 weeks after ingestion.

The risk of fasciolosis is governed by the number of intermediate snail hosts in the environment which prefer moist/wet conditions. Snails burrow into the soil in dry periods, emerging when conditions are more favourable.

The life cycle tends to favour infection in late summer and autumn, infection originating from miracidia hatching from eggs in the spring. Spring infection also may occur, when cercariae emerge from overwintering snails.

### Clinical disease

Acute fasciolosis: this is usually seen in sheep rather than cattle. Outbreaks occur usually in the autumn and early winter but, in wet years, also may occur in the spring. Disease is associated with large numbers of immature fluke migrating through the liver parenchyma. Acute haemorrhagic anaemia and hypoalbuminemia occur and signs include weakness, pallor, possibly abdominal pain and hepatomegaly, and death which may occur with no premonitory clinical signs. The disease also may have a subacute form, where the disease course takes a little longer, animals taking up to 2 weeks to die.

Chronic fasciolosis: this is seen in both sheep and cattle and is seen most frequently in the winter and spring. Disease is associated with the blood-sucking activities of adult fluke in bile ducts. Signs include weight loss, reduced milk yield in cattle, submandibular oedema in severe cases and, particularly in sheep, anaemia and terminal scours.

## Diagnosis

### a) Faeces samples

i) Flotation and sedimentation methods can be used for fluke ova detection. Flotation is quicker, but sedimentation is more sensitive and is the test used at Axiom. However, as fluke egg production is intermittent, if eggs are not seen this does not necessarily mean the animal is not infected and the test is estimated to have a sensitivity of around 40 to 60%. Furthermore, during the pre-patent phase, which lasts around 8 weeks, eggs will not be excreted. Combining faecal samples from several animals improves the chances of finding fluke eggs and will act as an indicator of infection within that group.

ii) Faeces antigen ELISA test: this detects fluke antigen (digestive enzymes), associated with fluke migration and feeding, in the faeces of infested cattle. The test tends to become positive when fluke migrate close to or enter bile ducts and therefore it will detect late immature fluke as well as adult fluke. The test generally detects fluke infestation around 2 to 3 weeks before fluke eggs are detectable in the faeces. The test will only be positive if fluke are present adjacent to or in the bile ducts (unlike fluke serology tests) and it will become negative 1-3 weeks post successful treatment.

### b) Serum samples

Liver fluke ELISA detects titres from around 2 weeks post infection and these tend to peak 6 weeks post infection. However, titres may remain elevated for several months following infection and even following treatment. Therefore, interpretation of a positive titre can be problematic as it is difficult to determine firstly if it corresponds to active infection or secondly if treatment has been successful. Nonetheless, during the grazing season, depending on pasture infectivity, there is likely to be continual exposure to fluke and positive results therefore may indicate current infection.

### c) Bulk milk samples

Bulk milk ELISA for liver fluke is useful as a monitoring tool, perhaps most useful for annual monitoring in the autumn. The test is able to give an idea of the level of seropositivity and therefore exposure to fluke in the milking herd, but it does not necessarily equate with the number of clinical cases of fluke in the milking herd.

### d) Biochemistry and haematology

Although by no means the only differential for these changes, elevation of AST and GLDH can be seen with acute fasciolosis and raised AST and GGT levels with chronic fasciolosis. Hyperglobulinemia and hypoalbuminemia also are often seen. Haematology may reveal an eosinophilia and anaemia which, in acute fasciolosis, tends to be normochromic and, in chronic fasciolosis, hypochromic and macrocytic.

## Rumen fluke

Originally thought to be *Paramphistomum cervi*, recent molecular work has identified the rumen fluke affecting domestic ruminants in the UK as *Calicophoron daubneyi*, the predominant rumen fluke in mainland Europe. It shares a common intermediate host with *Fasciola hepatica*.

### Life cycle

Rumen fluke have a similar lifecycle to liver fluke and use the same intermediate snail host. Mixed infections of liver fluke and rumen fluke are therefore common. After ingestion, encysted metacercariae attach and the immature stages feed for up to six weeks on the mucosa of the duodenum. They may also be found in the ileum, jejunum and abomasum, before moving into the forestomachs, where they develop into adults and are superficially attached to the rumen mucosa.

### Clinical disease

While there is plenty of evidence of clinical and subclinical disease associated with liver fluke infection in both cattle and sheep, there is much less evidence of disease associated with adult rumen fluke infections in the UK. However, there have been occasional reports of severe watery scour, anorexia, dehydration and death in both cattle and sheep associated with large numbers of immature larval stages developing in the small intestine of young stock.

## Diagnosis

Rumen fluke can be detected in the sedimentation test used to detect liver fluke eggs. The eggs of *C. daubneyi* can be differentiated from those of *F. hepatica* as, although of similar size and shape, they are colourless unlike the yellow-brown egg of liver fluke. The liver fluke faecal antigen test will not detect rumen fluke.



Fig.1 Acute fasciolosis in an ovine liver – note tortuous haemorrhagic tracts through the parenchyma



Fig. 2 Chronic fasciolosis in a bovine liver – fibrotic thickening of the bile duct walls is characteristic for liver fluke infection

## Liver Fluke on Post Mortem Examination

This is the most sensitive method for detecting fasciolosis and, if suspected in a group in which animals are dying, it is advisable to carry out a gross post mortem examination to verify fasciolosis as the cause.

Acute fasciolosis: swollen, friable, pale liver with haemorrhagic tracts throughout and serosanguineous fluid in the abdomen. Immature flukes can be recovered from the tracts, by hand maceration of a portion of the liver, or from the fluid; these can be difficult to see with the naked eye and a hand lens may be useful.

Chronic fasciolosis: bile ducts grossly thickened and enlarged, particularly in the ventral liver lobe; these may be visible above the surface of the liver. Cysts may be seen, caused by blockage of ducts by flukes and cellular debris, and the parenchyma may be extensively fibrosed. Adult flukes can be recovered from the bile ducts and gall bladder. These gross pathological changes can also be obtained as feedback from condemnations at the abattoir.

## Rumen Fluke on Post Mortem Examination

This is the only way of reliably diagnosing immature rumen fluke infestation. Signs include reddening of the proximal intestinal mucosa, with large numbers of immature flukes on the surface, visible to the naked eye as brown/pink 'bubbles' less than 1mm in length. These can be confirmed as immature flukes on microscopic examination of intestinal scrapes. There is also marked mesenteric lymphadenopathy and watery large intestinal content (Millar and others, 2012).

Adult rumen fluke are approximately 1 cm long and may be found in large numbers feeding on the wall of the rumen and reticulum.

Millar M., Collof A. and Scholes S. (2012). Disease associated with immature paramphistome infection. *Veterinary Record* 171: 509-510.

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The Manor House, Brunel Road, Newton Abbot, Devon TQ12 4PB  
Tel: 01626 357776 • [dsfarm@axiomvetlab.co.uk](mailto:dsfarm@axiomvetlab.co.uk)

