

Liver fluke

The liver fluke is a parasite that infects ruminants such as cattle, sheep and goats, but also horses, hares and sometimes also humans (zoonotic pathogen). The liver fluke parasite that most commonly occurs in our country is called "Fasciola hepatica". In addition, sometimes the small liver fluke occurs, called "Dicrocoelium dendriticum".

The liver fluke *Fasciola hepatica* lives, as an adult parasite (2 to 4 centimetre flatworm), in the bile ducts of the host's liver. The adult liver fluke parasite produces many eggs that are excreted via the bile through the manure. For the further development of the liver fluke, an intermediary host is required, namely the liver fluke snail "*Galba truncatula*". Therefore, liver fluke disease can only occur where this intermediary host occurs. The liver fluke develops through various stages, the so-called liver fluke cycle. In principle, the cycle for all animal species is the same.

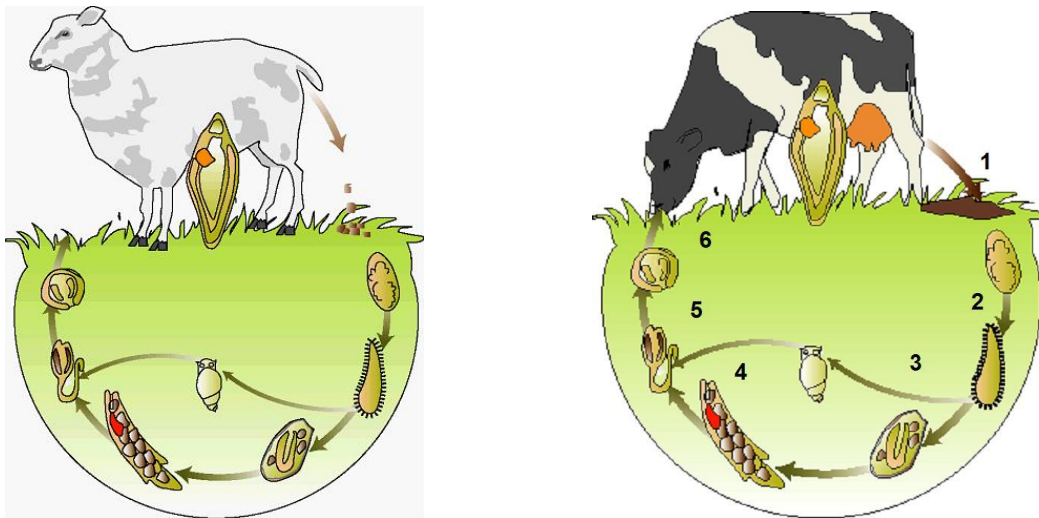


Figure 1: Cycle of the liver fluke.

The liver fluke cycle consists of six phases:

The liver fluke infected host (e.g., dairy-, beef cattle, sheep) excretes eggs via the manure and contaminates the meadow.

- 1) The small liver fluke larva (miracidium) is developed from the eggs of the liver fluke
- 2) The miracidium larva is looking for a liver fluke snail (*Galba truncatula*)
- 3) The liver fluke snail becomes infected with larvae and larvae will multiply. From one larva there will be 150 to 200 tail larvae (cercarians)
- 4) Under wet conditions, the tail larvae leave the snail (host). The tail larva is going to swim to the top of grass leaves. The tail larvae settle itself on the top of grass leaves, loses their tail and encapsulate to infectious cysts (metacararies).
- 5) The host takes up the infectious cysts through the grass. After ingestion of contagious cysts, very small liver fluke parasites migrate through the intestinal, through the abdominal cavity to the liver. In the liver, the liver fluke infection becomes mature.
- 6) About ten to twelve weeks after the infection, the adult liver fluke parasite will produce eggs. An adult liver fluke parasite produces about 4,000 to 7,000 eggs a day.

Symptoms of acute versus chronic liver fluke infection

The liver fluke infection can, in principle, occur in an acute and chronic form. Acute hepatic fluke is mainly observed in ovine and caprine animals and by a migration of thousands of young liver fluke parasites through the liver, causing death of the host due to bleedings. Especially sheep and goats, who have been grazing on heavily infected meadows, are very sensitive and can suddenly

die from acute liver fluke, six to eight weeks after infection, and even without clinical appearances.

Chronic liver fluke is the most common form in cattle and sheep. In cattle, the disease is often present without clear disease symptoms. In severe liver fluke years, reduced milk production, poor growth (of the juvenile animals), reduced resistance, reduced fertility and premature calving are the main complaints in cattle.

In sheep and goats, the adult liver fluke causes irritation and inflammation of the liver tissue. Growth retardation, weight loss and anaemia are the results of a liver fluke infection. The mucous membranes of sheep and goats are pale and in severe infections sometimes yellow in colour. Between the cheekbones oedema may occur. The fur is often dry, and a lot of fluids can occur in the abdominal cavity. Pregnant animals can reject the foetus, and in severe liver fluke cases, with adult liver fluke parasites, animals can die as a result of chronic liver fluke.

Damage

The effects of a severe hepatitis can be very serious in sheep and goats. In severe liver fluke outbreaks, more than a thousand of sheep per year may die due to an acute or chronic liver fluke infections. In cattle, the damage is mainly due to a reduced milk production, lower fertility and poor growth in young animals.

Growing resistance against triclabendazol

The growing resistance of the liver fluke to triclabendazole is becoming a concern. The first cases of liver fluke resistance for triclabendazole were established in 1998. The resistance occurred in both cattle and sheep. In the years thereafter, more and more reports were received from triclabendazole resistance. This resistance was especially visible in sheep, as they are more susceptible to liver fluke infection and more mortality occurs in these animal species.

There is no other medical treatment that also prevents young liver fluke stages. In the years after 1998, the number of farms with liver fluke resistance to triclabendazole increased steadily.

Diagnosis

Acute liver fluke is demonstrated by means of pathological examination of dead animals or blood examination of lambs. Chronic liver fluke is demonstrated by blood, tank bulk milk and manure, and pathological examination.

Contamination route

The crucial factor for maintaining the liver fluke cycle is the presence of the liver fluke snail. This snail is an intermediary for the liver fluke parasite. The liver fluke snail lives in places where the soil is moist for the most part of the year, such as in trenches, slopes, trampled ditches and quarries behind dikes. The liver fluke snail hardly suffers from severe winters, but is prone to drought. The development of the stages of the liver fluke cycle outside the host can only take place at a temperature above 10 degrees Celsius. Liver fluke eggs that contaminate the meadows through manure have developed, under good conditions, into infectious cysts in August and September. The largest infection rate with liver fluke parasites will take place from August to November depending on the weather conditions. Because the contagious cysts, deposited on the grass, can survive well at low temperatures and sufficient moisture, and thus can infect animals also during the winter months.

Diagnostics and research on liver fluke

Veterinary labs can offer a complete package for liver fluke diagnostics and research. You can choose the right diagnosis or research to gain insight into the liver fluke situation on the company.

Tank bulk milk research in dairy cattle

It is possible to investigate via tank bulk milk whether liver fluke plays a role in lactating cows. The results of a tank bulk milk analyses can vary between no, few or many antibodies to the liver fluke parasite. In the tank bulk milk program, the tank bulk milk is examined for antibodies against liver fluke parasite once a year (October / November).

Blood research

By blood screening, antibodies against the liver fluke parasite can be demonstrated by an ELISA test within approximately three to four weeks after infection. In this case, the animals must be investigated in their first hatching season, as previous infections may be demonstrated for a longer period of time (even years). Blood tests on liver enzymes GLDH and gamma-GT will determine the liver function. Deviating liver values may indicate liver fluke disease.

Manure (faeces) research

Livestock testing, on the presence of liver fluke eggs, can be done by manure (faeces) testing. Only adult liver fluke parasites produce eggs, and therefore this investigation is not useful until ten to twelve weeks after infection. Manure (faeces) research can be done individually, but can also be done by means of a mixed sample (minimum five animals, but preferably ten animals or more). This gives you a reliable image and a good impression of whether or not there is no adult liver fluke parasite infection. Most research on hepatic fluke can be performed after December / January, depending on the autumn infection.

If a liver fluke infection is detected, it is advised to treat the animals. Discuss the follow-up steps (e.g. treatment, further investigation or preventive measures) with your vet.

Treatment

In September a preliminary forecast and in November a final forecast is given on the presence of liver fluke. In some years, the spring forecast will be given in April / May.

Based on climatological data, slight counts and snail research on over thirty forecasting companies, they predict the severity and moment of hepatic infestation. Based on the predictions, preventive measures can be taken, research or strategic treatments will be carried out.

Liver fluke alerts

With the liver fluke alerts, animal owners are informed at the right time on the current risks of liver fluke, and vets will give the farmers practical tips on how to manage liver fluke on their farm.

Liver fluke mapping and grazing strategies

In farms, with regular liver fluke infections, risky areas may be mapped by the "liver fluke mapping" strategy. The presence (and amount) of liver fluke snails is then mapped. The mapping data can be processed in a meadow-calendar, avoiding as much as possible risky meadows for grazing during the most risky period (August / September to March / April). Dairy cattle and cattle, that produce milk for human consumption within three months, can not be send out into risky areas.

Keep the animals as much as possible on dry meadows in autumn and winter, or put them on the stable. A veterinarian specialist can help you to map the appearance of liver fluke on your meadows (liver fluke mapping).

Liver fluke monitoring by tank bulk milk

Tank bulk milk analysis is a low-threshold method to check whether a liver fluke parasite has infected your lactating cows. If the test shows that your farm is infected, you can take appropriate and timely correct measures and possibly start treatment. If it appears that liver fluke does not play a role on your farm, you should avoid unnecessary treatments.

First investigate on liver fluke

The main measure against liver fluke infections is to cure infected animals, to prevent the spreading of liver fluke eggs on meadows. Check on regularly basis blood and manure samples on liver fluke to clarify the liver fluke situation on your farm. This is the best way to determine whether treatment is required. You can prevent unnecessary treatment against liver fluke, and thus preventing a possible resistance against this parasite.

Treatment

Treatment is effective (and necessary) when a liver fluke infection has been demonstrated by analysis. Make sure that the correct dose is used and the medicine is given correctly.

Cattle

When selecting medication, consider the efficacy of the medication and the waiting time of the drug. Consult with the practitioner if treatment is needed and which medication is the best one.

Proper dosage is important

Research shows that at large scale the medication doses was too low, because the live weight of an animal is regularly estimated to be too low. Weighing cattle or using a measuring tape can prevent treatments with too low doses. Weighing or measuring the lightest and the heaviest animals often gives a good indication. The effect of treatment can be monitored by manure examination after three weeks.

Milking cows

For lactating cattle, liver fluke medicines may currently not be registered. Only after consultation, the vet can start a treatment to be carried out based on the 'cascade regulation'. Only after lab analyses, the vet can choose to use a "not registered" medicine for lactating animals. In this respect, the veterinarian should take into account the waiting times of the different medicines.

Sheep and goats

For an adequate treatment, initially triclabendazole and closantel are effective for sheep and goats. Triclabendazole is most suitable, especially because of the good activity against the very young stages of the liver fluke parasite. From one to two weeks after infection, the efficacy of triclabendazole is approximately 90 to 100 percent. Closantel works against liver fluke stages older than six to eight weeks. Only for infections of more than ten weeks, the effectiveness is above 90 percent. Closantel should be dosed accurately due to a greater risk of poisoning.



Figure 2: Examination of meadows on liver fluke snails

