

Rumen fluke in cattle: Future research perspectives in IBERS

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Take home messages:

- There is often no clinical significance of rumen fluke, but if calves grazing waterlogged pasture show signs of severe diarrhoea, rumen fluke diagnosis should be considered.
- Rumen fluke infections are often seen as co-infections with liver fluke, as they have a similar lifecycle.
- We don't know very much about rumen fluke, but work at IBERS, Aberystwyth University is trying to find out more to help the agricultural industry.

Rumen fluke infections (paramphistomosis) in cattle are increasingly being reported. Serious issues with the parasite genus *Paramphistomum* are reported in sub-tropical and tropical regions, with cases of paramphistomosis causing morbidity and mortality in ruminants. However, these issues are rarer in temperate regions such as the UK. Historically, rumen fluke have been identified in cattle since the 1950's, yet in the past decade, much more attention has been given to their presence due to increases in reports of cases in ruminant livestock, especially cattle. Clinically, there is thought to be little significance of the parasite in the UK. So if there is little risk with the parasite, should we be concerned about it? This article will outline some of the scientific details that we know about rumen fluke and how the Institute of Biological, Environmental and Rural Science (IBERS) parasitology research at Aberystwyth University is paving the way in lab and field discovery research.

Rumen fluke – what we know so far

Prevalence of rumen fluke appears to vary between regions of the UK, 29% and 52% of cattle were identified within abattoirs in Scotland and Ireland, respectively, to have a rumen fluke infection. It is generally accepted that there is one prominent species identified in the UK – *Calicophoron daubneyi*. Furthermore, paramphistomosis is often seen as a co-infection with liver fluke, likely due to similarities in the lifecycle including the same intermediate host.

Infected cattle excrete rumen fluke eggs within faeces, which then develop within pasture to hatch miracidia which go on to infect the intermediate host - mud snail *Galba truncatula*. Once the infection has developed within the snail, the snail sheds cercariae onto the pasture, which encyst, forming the metacercaria that are ingested by grazing cattle. These immature fluke migrate to the small intestines where they latch onto the mucosa and feed. It is at this stage that a clinical infection is more likely to be found. Once the flukes mature to adults they migrate to the rumen where highest densities are found in areas where papillae are located, mainly the rumen and reticulum. The adult fluke anchor onto these papillae which causes a [mechanical irritation and morphological changes](#). Thus, although there are often no clinical symptoms of the disease, at the rumen level there is a chronic inflammatory reaction and pathological changes at the site of interaction between rumen fluke and the cattle host. [A number of deaths in young cattle](#) have been recorded due to very large burdens of immature rumen flukes. These severe cases were associated with acute diarrhoea and dehydration amongst other symptoms but had to be confirmed as a rumen fluke infection via post-mortem, to identify the larvae in the intestines. Furthermore, the diagnosed calves had come from

waterlogged pasture, which is a prime environment for the intermediate snail host of liver fluke. Thus it has been recommended that if vulnerable livestock from commonly flooded grazing areas are presented with severe diarrhoea, an infection with rumen fluke should be considered in the diagnosis.

The closeness in the relationship of rumen fluke to liver fluke has instigated some difficulties in diagnosis and treatment. The presence of rumen fluke eggs can make the diagnosis of liver fluke through faecal egg counts (FEC) more difficult. The egg morphology is similar, but rumen fluke eggs are identified as a paler egg, compared to the yellow colour of liver fluke eggs.

Secondly, the treatment practice of rumen fluke has proved to add some implications to liver fluke anthelmintic resistance. Oxytoclozanide is effective against rumen fluke and also liver fluke, but only at the adult stage of the lifecycle. Cattle are able to tolerate high loads of rumen fluke without seemingly having any detriment to health or production. Therefore, it is disputed as to whether a routine use of oxytoclozanide for rumen fluke should be utilised at times of the year when immature liver fluke infections are present. A reduction in the routine usage method may help in a reduction in flukicide resistance within liver fluke (see the [Farming Connect Liver fluke article](#) for more information).

Finally, as fasciolosis and paramphistomosis are connected through lifecycles and co-infections, it is difficult to tease out the full effects of rumen fluke on production. Weight loss in cattle has been attributed to high immature rumen fluke loads. Yet, through the use of [scientific modelling that accounts for liver fluke presence](#) as well as rumen fluke, there was a lack of effect of rumen fluke on production losses in cattle. Although this would need to be verified in whole animal studies.

IBERS – driving rumen fluke on-farm and lab discovery research

We are still very much in the unknown stages with regards to rumen fluke in the UK. The overarching message at present is that rumen fluke infections are likely to continue at a higher level, although farmers should not be overly concerned, it is something that they should be aware of, especially on wet farms and during wet summers. However, rumen fluke have a high genetic diversity similar to liver fluke which will likely mean that they are also highly adaptable. Thus there is a need for us to understand more about these parasites.

Work at IBERS, Aberystwyth University is striving to develop a greater understanding of rumen fluke which will lead to better management and control strategies in the future. At present the research group has three PhD projects and a post-doctoral project that are working towards answering a range of questions both in the field and the laboratory.

In the field, the group has already identified that within Wales the intermediate [rumen fluke host is the same as liver fluke](#) – *G. truncatula*. Further work is ongoing to establish the prevalence of rumen fluke within Wales, with early results showing that cattle across Wales may be commonly infected with rumen fluke. Furthermore, on-farm data is being utilised within scientific modelling to establish a better picture of the risk factors related to rumen fluke infections over Wales as a whole. Once this data is published, a much better understanding of the issues in Wales will be achieved.

In the lab, discovery projects are working to develop our understanding of the parasite as a whole and the interaction between the fluke and the host within the rumen. These studies will then

lead on to the elucidation of the effects of adult rumen fluke burdens on cattle production. Through a better understanding of the fundamentals of the parasite, more informed management strategies can be undertaken in the future. Diagnostics to differentiate between rumen and liver fluke would be highly beneficial to prevent misdiagnosis, therefore work is ongoing to identify biomarkers for diagnostic tests. Finally, the group is also looking at screening natural products for their anthelmintic properties against rumen fluke to improve the current reliance on one drug.

For more information on the growing area of parasitology research within IBERS visit: https://www.aber.ac.uk/en/ibers/research/research-groups/parasitology_epidemiology_group/. Updates will be available on published results of the projects described here over the next three years.