

Liver fluke and wader scrapes at Kirkton – the story so far.

Dr Philip Skuce

Philip is a Principal Scientist at the Moredun Research Institute in Edinburgh. He has worked at the Institute for >20 years on various aspects of the sustainable control of parasitic helminths (worms & fluke) in livestock. His particular research interests include improved diagnosis in the host animal and the environment, vaccination studies and the detection and management of anthelmintic resistance. He is also the Institute's spokesperson on livestock and climate change and the Scottish Environment Food and Agriculture Research Institutes (SEFARI) Knowledge Exchange Sectorial Lead for livestock.

So fluke, why is it important?

The liver fluke is a highly pathogenic flatworm parasite that causes significant disease and production loss in grazing livestock-around £50 million worth of loss in Scotland alone! Over the last 10 years, resistance to some flukicides (the medicines used to treat fluke) has been seen in some regions of Scotland. This means that our approach to dealing with this nasty parasite must change, or we may lose the ability to control it altogether- leading to additional losses.

'Flatworm Parasite' ...tell me more!

The liver fluke is complicated, with a life cycle that involves a tiny mud snail intermediate host, *Galba truncatula*. Livestock become infected by ingesting microscopic fluke cysts, which are shed by infected snails on grazing pasture. These snails like to live in boggy, wet ground, and thrive in warm, wet summers- which allow numbers to build up. Mild winters then mean the snails aren't killed off, creating a parasite reservoir for the next grazing season. Wildlife such as deer and rabbits can also become infected, meaning that the life cycle is maintained even if livestock are not present.

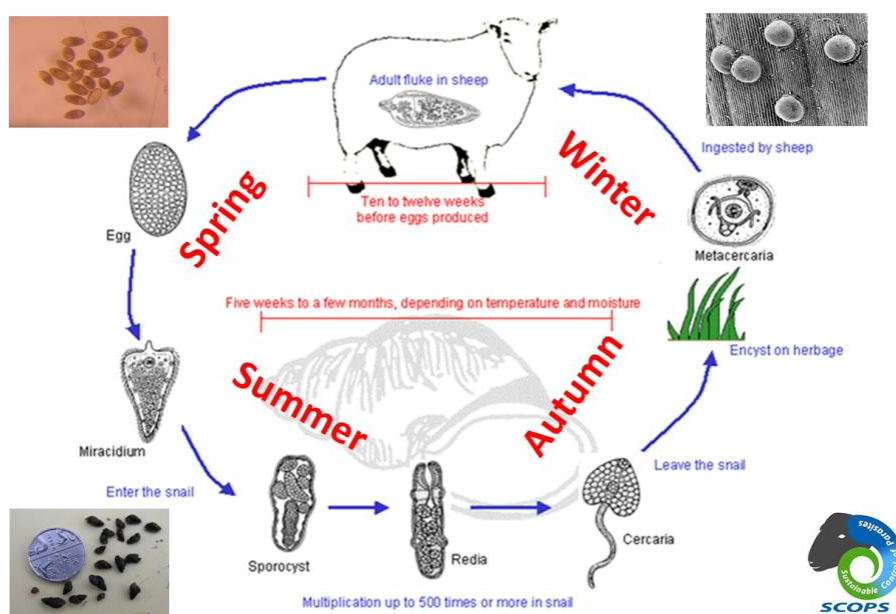


Figure 1- The 'typical' seasonal liver fluke life-cycle

So what has this got to do with the environment and biodiversity?

Farmers and land managers are understandably resistant to graze these boggy, wet areas of ground, due to them potentially increasing the risk of a fluke infestation. Some options within the Scottish Government's Agri-Environment and Climate Change Scheme (AECS) promote the retention and enhancement of wetland features within grazing fields, to benefit amongst others, curlew and lapwing. Grazing these wet areas is beneficial as it helps prevent colonising plants from choking other vegetation and creating a mosaic of habitat types. Grazing also augments the invertebrate population, which provides a valuable food source for wader birds. To understand the relationship between fluke and environmental features better, we have teamed up with SRUC's Hill and Mountain Research Centre at Kirkton and Auchtertyre, and are undertaking a 3-year monitoring research project looking at the impact that creating wader scrapes has on the fluke prevalence within the sheep flock- so keep checking back to see what we've found!



Figure 2- Newly created wader scrapes within-by fields beyond at SRUC Hill and Mountain Research Centre, Kirkton and Auchtertyre.

how does the experiment work?

SRUC Kirkton and Auchtertyre Farms were accepted into an AECS contract in January 2016. As part of the contract, they opted to create a habitat that was beneficial to wading birds such as snipe, oyster catcher, redshank, lapwing and curlew. Part of that habitat creation involved constructing wader scrapes in an in-bye, permanent grassland field. The aims of the study are to:

- Confirm the fluke status of in-bye fields – involves monitoring sheep by faecal egg count (FEC), collecting mud snails, identifying snail species and screening for presence of fluke infection by PCR.
- Monitor establishment of wader scrapes over time – involves collecting and counting snails, determining species ID and fluke infection status by PCR, deployment of cellophane rafts in attempt to monitor cysts shedding (Oct 2016- present)
- Monitor fluke status of sheep grazing newly established wader scrapes (June 2017- present) – involves faecal egg count from Day 0 and at regular intervals, thereafter.



Figure 3- The wader scrapes at SRUC Hill and Mountain Research Centre.

What has been found so far?

August-November 2016

- Sheep from the in-bye fields (not the wader scrape field!) have been found positive for liver fluke, established by FEC. There have been two types of snails found- *Galba* and *Radix*, with the *Radix* snails being negative for fluke, and some of the *Galba* snails positive.
- Sheep that were grazed in newly established scrapes in September for a few weeks, all tested negative for liver fluke.
- Snails identified in the wader scrapes have all been *Radix*; and all tested negative for liver fluke. There were no *Galba* snails found.
- Fluke has been found in the wildlife population, with deer faeces tested having a low FEC that was positive for liver fluke.



Figure 4- *Radix* snail shedding metacercarial cysts in vitro, thought to be *Notocotylus* sp.

June 2017 -present

- Sheep from the in-bye field had a low FEC positive for fluke in June. They were then treated with a flukicide and when tested in July, were negative for liver fluke. A few *Radix* snails were found, but no *Galba* snails.
- Sheep tested negative for liver fluke before they went onto the wader scrapes.
- Wildlife faeces tested negative for liver fluke.
- Relatively large numbers of *Radix* snails present, some *Galba* snails, all currently negative for liver fluke
- Some *Radix* snails shedding metacercarial cysts, likely to be *Notocotylus* sp, a flatworm parasite of wetland birds (to be confirmed!).

What's next?

From the limited scoping field work we've undertaken at Kirkton since the wader scrapes were established in late 2016, it would appear that many of the component parts of the liver fluke 'jigsaw' are in place to maintain the life-cycle and promote infection of grazing livestock. The issue now becomes one of objective liver fluke risk assessment, something we're not particularly good at, even on dedicated livestock farms! As with routine fluke control, every farm, indeed, every field is different and we must objectively assess the risk as such. In this context, we held a very successful 'Worming your way to profit' on-farm event at Kirkton on Friday 7th July, under the auspices of the Soil Association 'Farming With Nature' Programme. This included discussion of the fluke life-cycle, diagnostic, treatment and control options, followed by a visit to the wader scrapes and further discussion about practical fluke risk assessment. Read more about 'Worming Your Way to Profit'.

We will continue to keep you updated on the results and any more interesting observations over the course of this experiment!

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