PhD Project Advertisement

Project title: New tools for sustainable control of liver fluke in ruminants
Project No: FBS2022-15-Betson-sq
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Project description:

New tools for sustainable control of liver fluke in ruminants

Food producing animals are infected by multiple species of parasites, which severely compromise their health and productivity. The liver fluke *Fasciola hepatica* is amongst the most common and highly pathogenic parasites of cattle and sheep in many parts of the UK. Control of this parasite involves strategic treatment of ruminants with flukicides (drugs which kill flukes), guided by "fluke forecasts" which predict risk of liver fluke infection based on climate data. However, resistance is emerging to the most widely used flukicide, posing a severe threat to sustainable liver fluke control. Meanwhile, current fluke forecasts are based on old data and there is limited information available to validate new models, so new methods of tracking fluke populations are needed.

This PhD project aims to generate and use genomic data from liver fluke to develop a large panel of novel genetic markers for this parasite. These markers will be used to analyse seasonal variations in liver fluke population structure in sheep and cattle in different geographical locations in the UK, providing important insights into disease burden, infection transmission and the potential for emergence and spread of flukicide resistance. In addition, new "fluke forecasting" models will be developed and tested using data collected during the project, including parasite genetic data. This will enable better predictions of when and where liver fluke infection is likely to occur, leading to improved and sustainable control of this parasite, and ultimately better livestock health and productivity.

Training opportunities:

The student will gain experience in technical skills including parasite diagnosis, molecular biology, genomics, bioinformatics, statistics and climate-based mathematical modelling to understand parasite infection dynamics and fluke forecasting. The student will learn how to design epidemiological studies and carry out fieldwork and will also gain experience in writing and presenting work to scientific and lay audiences and engaging with stakeholders. Although based at University of Surrey, the student will also have the opportunity to work in the laboratory of the supervisor at Queen's University Belfast.

Student profile:

This project would be suitable for students with a veterinary degree or a degree in biological sciences or a quantitative disciplines such as mathematics, physics or engineering. Demonstrated interest in the topic, for example through prior experience of working with parasites or related pathogens would be beneficial. Some

experience of molecular laboratory settings, for example through undergraduate projects or placements, would be helpful. As the project involves genomics analysis and modelling components, demonstrated ability in these areas and interest in the use of those approaches would be advantageous.

References:

https://doi.org/10.1016/j.parint.2020.102071

https://doi.org/10.1098/rsif.2018.0072

https://www.research.ed.ac.uk/en/publications/a-high-throughput-deep-amplicon-sequencing-method-to-show-the-eme

Funding particulars: