

Microbiome-parasite relationships and dynamics in livestock in response to pasture management and ecological stressors

Supervisory team:

Lead supervisors: Dr Jordana Rivero (Rothamsted Research), Dr Konstans Wells (Swansea University)
Prof Andrew Neal (Rothamsted Research), Dr Tamsyn Uren Webster (Swansea University)

Host institution: Rothamsted Research (North Wyke), Swansea University

Submit applications for this project to Swansea University

Project description:

Livestock grazing comprises a main land use type in the UK and can have a profound effect on biodiversity and ecosystem services. It shapes entire landscapes and is an important source of greenhouse gas emission. Intensive farming can also affect the spread of parasites and antibiotic resistance. Yet, while there is mounting evidence that gastrointestinal parasites of animals are interacting with complex microbiota (i.e. the system of micro-organisms in the gastro-intestinal tract) that provide critical function to the host in terms of nutrition supply, immune response, and host resilience, little is known about how different pasture and livestock management strategies affect its functional diversity and resilience against environmental stressors such as climate extremes or anthelmintic drug treatment.

The objective of this studentship is to investigate parasites and microbiome-stressor relationships and the methane emissions of cattle kept under different pasture management regimes. The research aims to explore these intricate relationships by:

- i) Identifying potential drivers of cattle infection with gastrointestinal helminths and pathogenic bacteria
- ii) Providing first insights into microbiome-parasite interactions under different pasture management regimes and changes in the microbiome over time in response to environmental stressors
- iii) Exploring how pasture composition and management affect methane emission and animal health.

The candidate will adopt an exciting interdisciplinary approach that combines field research with laboratory work and ecological modelling. The student will capitalise on the well-established long-term research facilities at Rothamsted Research (North Wyke) and modern laboratories facilities in Swansea. A comprehensive training programme will be provided by the interdisciplinary supervisory team's expertise in animal health and disease ecology (Dr Wells), molecular physiology and microbiomes (Dr Uren Webster), and grazing livestock systems (Dr Rivero).

Competitive applicants should have:

- A degree in a relevant subject (animal ecology, veterinary science or epidemiology, evolutionary, molecular or computational biology) with an emphasis on data analysis and/or existing molecular skills.
- Strong time and data management and interpersonal skills.
- Evidence of good verbal and written communication skills.

This project offers an opportunity for diverse skill acquisition. Candidates need to demonstrate a genuine interest in combining field research, laboratory techniques relevant to parasitology and animal health research and ecological modelling (including time series analysis).

Our aim as the SWBio DTP is to support students from a range of backgrounds and circumstances. Where needed, we will work with you to take into consideration reasonable project adaptations (for example to support caring responsibilities, disabilities, other significant personal circumstances) as well as flexible working and part-time study requests, to enable greater access to a PhD. All our supervisors support us with this aim, so please feel comfortable in discussing further with the listed PhD project supervisor to see what is feasible.