Spatial interactions between livestock and their environment as a determinant of parasitic disease risk

Supervisory team:
Main supervisor: Dr Eric Morgan (University of Bristol)
Dr Christos Ioannou (University of Bristol)

Others in supervisory team/collaborators: Dr Colin Torney (University of Exeter)

Host institution: University of Bristol

Project description:

Parasites cause massive losses to the sheep industry worldwide and have major detrimental effects on the welfare of animals. Overuse of drugs has led to resistance in a number of economically-important parasites, and a more sustainable approach of only treating highly infected individuals is advocated. However, assessing infection from laboratory-based measurements such as faecal egg counts is costly. This project will develop the use of Global Positioning System (GPS) collars and accelerometers to monitor sheep behaviour, in order to understand how space use is related to risk of infection, how space use changes with increased parasite load, and how parasite load affects movement and the ways in which individual sheep interact with one another. Finally, you will design and carry out controlled field experiments to test the effects of anti-parasite drugs on these parameters, to determine whether the effects of parasite load on behaviour can be reversed.

The project will focus on gastrointestinal nematodes such as *Teladorsagia circumcincta*, the liver fluke (whose snail intermediate host prefers wet environments), and ticks (which prefer edge habitat and rough grazing, and carry several important diseases). There will be large components of both fieldwork and data analysis, with significant support from all three supervisors. Pilot projects will build on existing studies relating habitat use to tick and nematode risk, and on use of GPS data in animal behaviour studies.
The student will gain training in a wide range of skills, including assessment of welfare indicators and parasite load, sampling microhabitats to effectively map at-risk areas in fields, field observations of behaviour to corroborate GPS data, data analysis to extract potential behavioural indicators from GPS coordinate data, and statistical analysis to explore how parasite load is associated with space use and movement.

There is little utilisation of behavioural assays in livestock husbandry to assess infection and its consequences, despite the numerous effects parasites have on animal behaviour in a range of species. This project will break new ground by harnessing technology to monitor behaviour and assess the interaction between behaviour and parasite infection. A major long-term goal of the project is to develop behavioural indicators for infection risk and parasite load which can be utilised in real-world settings.