FoodBioSystems DTP - PhD Project Advertisement Text

Project Title: FOODBIOSYSTEMS - Integrating plant and animal responses to parasite infection under climate change

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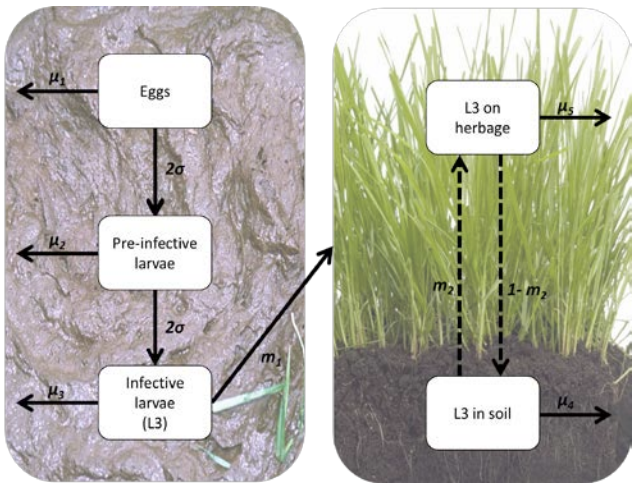
Research Group: FOODBIOSYSTEMS BBSRC DTP
Project ID: FBS2020-51

Application Deadline: 6 March 2020

Project Description: Climate change is causing increased unpredictability of parasitic disease in animals, while developing drug resistance limits options for control. This project will consider how to manage parasite infection in grazing animals in this new era, using integrated approaches. Grazing on plants with secondary metabolites active against parasites can reduce reliance on drugs and improve outcomes. Work to date, however, has focused on demonstrating effects and seeking mechanisms, rather than optimising use to improve parasite control under climate change.

The main hypothesis of this project is that plants with antiparasitic efficacy can be more effectively used when integrated with other interventions, towards specific epidemiological aims. This will be addressed by synthesising existing information on plant-based anthelmintic interventions, including proven efficacy in different trials, nutritional value and delivery systems, and exploring the epidemiological consequences of using them, by running parasite transmission models. This approach will extend to impacts on the development of antiparasitic drug resistance, leading to recommendations for targeted use of nutraceuticals to delay resistance. Models will be validated by comparing predictions with the results of farm trials using grazing of 'bioactive' swards, taking advantage of opportunities to measure parasite larval dynamics at pasture on grass versus mixed swards, and plant secondary metabolite concentration and effects on drug resistant and susceptible nematodes. Outcomes will be a better appreciation of how interactions between climate change and farm management affect options for integrating plant-based parasite control in practice, and a framework for assessing and optimising impacts, including to 'spare' drugs and improve sustainability of parasite control in support of food security.



Funding Notes: This project is part of the FoodBioSystems BBSRC Doctoral Training Partnership (DTP), it will be funded subject to a competition to identify the strongest applicants. Due to restrictions on the funding, this studentship is only open to UK students and EU students who have lived in the UK for the past three years.

The FoodBioSystems DTP is a collaboration between the University of Reading, Cranfield University, Queen's University Belfast, Aberystwyth University, Surrey University and Brunel University London. Our vision is to develop the next generation of highly skilled UK Agri-Food bioscientists with expertise spanning the entire food value chain. We have over 60 Associate and Affiliate partners. To find out more about us and the training programme we offer all our postgraduate researchers please visit https://research.reading.ac.uk/foodbiosystems/.

Training opportunities: The student would benefit from training in predictive biology, specifically modelling parasite transmission dynamics under climate change. Laboratory skills will include diagnosis of parasite infection in livestock, and bioassays using nematode eggs and larvae (development, survival and motility). Parallel projects funded by UKRI will permit participation in field trials in the UK, Ireland and potentially Africa, depending on student aims and aptitude.

Student profile: This project would suit a student with good quantitative skills and a strong interest in modelling biological systems. Some experience of laboratory settings and a demonstrated interest in the topic would be an advantage.

References:

Hoste H et al. (2015) Tannin containing legumes as a model for nutraceuticals against digestive parasites in livestock. Veterinary Parasitology 212, 5-17.
Morgan ER et al. (2019) 100 questions in livestock helminthology research. Trends in Parasitology 35, 52-71.
Rose H et al. (2015) GLOWORM-FL: A simulation model of the effects of climate and climate change on the free-living stages of gastro-intestinal nematode parasites of ruminants. Ecological Modelling 297, 232-245.