PhD Project Advertisement

Project No/title: FBS2026 07 Betson sa / *Investigating the gut parasite Eimeria in UK sheep: parasite species diversity and impacts on the gut microbiome*

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Project Details

Eimeria parasites are very common infections of farmed animals in the UK and worldwide. They cause gut disease (coccidiosis) in young animals including sheep, cattle and poultry, leading to diarrhoea, reduced weight gains and even death. Research on Eimeria in sheep is limited and there are no vaccines available to control infections. Control relies on good animal husbandry and use of drugs. However, there are reports of resistance to one drug used to control sheep coccidiosis. A number of Eimeria species infect sheep and some are more likely to cause disease. Microscopy is often used to distinguish between Eimeria species, but is not reliable particularly if sheep are infected by multiple species. DNA-based methods have not been widely applied in the UK. Another area where further research is needed, is understanding how Eimeria infections impact on the sheep gut microbiome, as gut microecology plays a critical role in animal health.

Research aims: The project will address knowledge gaps relating to Eimeria in UK sheep. You will carry out field studies to determine how common different Eimeria species are in UK sheep, risk factors for and seasonal variations in infection. You will also investigate interactions between Eimeria and the sheep microbiome.

What you will do: The project will involve a range of approaches. You will use a questionnaire to collection information on risk factors for infections, undertake field sampling on sheep farms in the UK and process the samples in the lab using microscopy and parasitology. You will test out and optimise published molecular methods (e.g. PCR and sequencing) to determine which Eimeria species are present in the samples. You will carry out epidemiological data analysis to investigate associations between risk factors and Eimeria infections and explore seasonal changes in Eimeria infections. To investigate interactions between the gut microbiome and Eimeria infections, you will undertake 16S amplicon sequencing followed by bioinformatic analysis.

References:

1. Bangoura B, Bhuiya MAI, Kilpatrick M. Eimeria infections in domestic and wild ruminants with reference to control options in domestic ruminants. Parasitol Res. 2022; 121(8):2207-2232. doi: 10.1007/s00436-022-07564-x.
2. Keeton STN, Navarre CB. Coccidiosis in Large and Small Ruminants. Vet Clin North Am Food Anim Pract. 2018; 34(1):201-208. doi: 10.1016/j.cvfa.2017.10.009.
3. Madlala T, Okpeku M, Adeleke MA. Understanding the interactions between Eimeria infection and gut microbiota, towards the control of chicken coccidiosis: a review. Parasite. 2021; 28:48. doi: 10.1051/parasite/2021047. Salamon, D., Zapała, B., Krawczyk, A. et al. Comparison of iSeq and MiSeq as the two platforms for 16S rRNA sequencing in the study of the gut of rat microbiome. Appl Microbiol Biotechnol. 2022; 106:7671–7681. doi: 10.1007/s00253-022-12251-z
4. Zahedi, A., Liu, D., Yang, R. et al. Next-generation sequencing amplicon analysis of the genetic diversity of Eimeria populations in livestock and wildlife samples from Australia. Parasitol Res 2023; 122:615–624. doi: 10.1007/s00436-022-07764-5.

Student profile

Essential for project: A background in one of the following: biology, veterinary medicine or animal science.
Desirable for project: Prior experience or knowledge of: parasitology, molecular biology, microbiology, epidemiological analysis and/or bioinformatics.
Minimum requirements for all FoodBioSystems applicants: An upper 2nd class degree (or equivalent) in a subject relevant to the project. Candidates with a lower class of Bachelors degree, but merit or above at Masters level will also be considered**. D**emonstrable skills in problem-solving, team-working, communication and time-management.

Training

Project specific training opportunities: The supervisory team will provide a bespoke training programme as follows: University of Surrey a) Understanding the practical and contextual background of the UK sheep industry through discussions with farm vets and farm visits b) Laboratory skills in parasitology (including parasite identification) and molecular biology, through hands-on training c) Study design, research methodology and epidemiological data analysis Aberystwyth University d) Microbiome analysis, through hands-on training e) Bioinformatics, through training provided by the team and formal courses. You will have the opportunity yo present your work at internal and external conferences. You will be encouraged to participate in outreach activities and engage with stakeholders, (e.g. vet practices, farming and veterinary societies). You will have the opportunity to develop teaching skills by demonstrating in undergraduate practicals.

FoodBioSystems training opportunities: Throughout their studentship, all FoodBioSystems doctoral researchers participate in cohort training that covers four key themes: food systems, big data (data analytics and modelling), business, and research fundamentals. All doctoral researchers complete a placement: either project-related with a non-academic (CASE) partner or unrelated to the project and outside the academic environment (PIPS). Details of training are available on the DTP website: https://research.reading.ac.uk/foodbiosystems/training/

Project supervision style

This multi-disciplinary project brings together a unique supervisory team with expertise in parasitology, molecular biology, epidemiology, microbiome analysis and sheep health. You will be based at UoS but undertake trips to AU to undertake training. Early on MB and you will agree on mutual expectations. MB will ensure you are fully integrated into her research team and have appropriate training and supervision to undertake laboratory and fieldwork. You will meet MB individually fortnightly, and attend MB's weekly lab meetings, in addition to monthly hybrid meetings with the full supervisory team. At certain points, you will have more contact with other supervisors e.g. AE to provide support with study design and epidemiological analysis, RL to facilitate understanding of sheep farming and JP to provide training on microbiome and bioinformatics analysis.

Stipend (Salary)

FoodBioSystems DTP students receive an annual tax-free stipend (salary) that is paid in instalments throughout the year. For 2025/26 this is £20,780 (£22,780 at Brunel University) and it will increase slightly each year at rate set by UKRI.

Equity Diversity and Inclusion

The FoodBioSystems DTP is committed to equity, diversity and inclusion (EDI), to building a doctoral researcher (DR) and staff body that reflects the diversity of society, and to encourage applications from under-represented and disadvantaged groups. Our actions to promote diversity and inclusion are detailed on the FoodBioSystems DTP website and include:

- Offering reasonable adjustments at interview for shortlisted candidates who have disclosed a disability or specific learning difference.
- Guaranteed interview and applicant mentoring schemes for applicants, with UK home fees status, from eligible under-represented ethnic groups **and** who meet the profile essential for the project.

These are opt-in processes**.**
Our studentships can be offered to home students on a part-time basis, and studentship end date and stipend payments will be amended to reflect the part-time registration. The minimum registration for DTP funded part-time students is 0.5 FTE (studying an average of 20 hours per week over 8 years). We regret that part time registration is not available to international students due to complexities of visa restrictions.

Funding note

We welcome applications from candidates with Home/ROI fees and international fees status. This studentship is funded by UKRI and covers stipend, fees at Home/ROI rate, and research costs. The host university will not charge UKRI funded international students the difference between Home/ROI fees and international fees.

Costs that must be found from other sources or met by the individual student include: visa fees, healthcare surcharge, relocation costs and guarantor services.

For up to date information on funding eligibility, studentship rates and part-time registration, please visit the FoodBioSystems website.