

FoodBioSystems DTP - PhD Project Advertisement

Project title:

FBS2021-56-Mooney: Multi-omics approach to predict economically important health and production traits in sheep

Lead supervisor:

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Project description:

Sheep production plays an important role in the UK agri-food sector employing around 35,000 people on farm with a further 120,000 allied jobs. The number of sheep in the UK is estimated at 22 million heads in 2019 (DEFRA), including a reported 2 million in Northern Ireland (DAERA). Due to small commercial herd size, UK farmers have to rely on using breeding programmes from breed societies and pedigree breeders to improve efficiency, sustainability and profitability of sheep production to address the challenge of producing enough food in a sustainable system to feed the growing global population.

Within animal breeding, recording health, efficiency, and quality of production traits can be expensive and “hard to measure”, requiring specialised equipment and is often time consuming. Therefore utilizing proxy traits which are easy to record, trait-specific and highly correlated with the target traits, will help accelerate genetic progress in breeding programmes. Progress in bioanalysis demonstrates that metabolites which reflect complex phenotypes at the molecular level can be used as the proxies for “hard to measure” phenotypes and diseases.

The main hypothesis of this project is to identify metabolites as the targeted proxies for “hard to measure” phenotypes and to develop novel statistical models that can predict economically important traits in sheep, namely health records (e.g. liver fluke and other parasite burdens), and carcass characteristics (e.g. weight gain and meat quality) in lambs. The ultimate aim is to develop multi-omics predictive tools that can be applied at a commercial farm level. The project will apply multi-disciplinary approaches including genomics, bioinformatics, metabolomics, big data analysis, statistical modelling, and functional biology to enhance sustainability in animal production.

Training opportunities:

The student will have the opportunity to work with researchers in Queen's University Belfast, Cranfield University and Agri-Food and Biosciences Institute (AFBI) and therefore benefit from working within an environment underpinned by strong applied and industrial-focused collaboration, and will contribute to transferable and professional skill development in preparation for a career in research within academia, industry or the policy sector. The student will benefit from QUB involvement in the QUADRAT NERC DTP facilitating additional training (including in data analytics) and opportunities for cross-disciplinary interaction. The QUB Postgraduate Research Development Programme will develop transferable skillsets whilst QUB and AFBI will provide bespoke training in quantitative genetics, bioinformatics and genome and metabolomics data analysis. The student will have the opportunity to enroll on components of the 'Food Safety and Health' and 'Advanced Bioanalytical Methods' MSc in Global Food Security modules at QUB and additional training in bioinformatics at Cranfield University (e.g. via the Applied Bioinformatics MSc course). The research infrastructure, scientific expertise, and regional diversity that this project encompasses will facilitate the training of a data analytic scientist with the unique skillsets and expertise needed to address a spectrum of research questions within the agri-food and animal health field. As a CASE studentship, the project provides a unique opportunity for the student to work directly with AFBI and learn about the needs and research gaps of agri-food, and how research can address these needs through both governmental (e.g. DAERA) and commercial directed avenues of research and knowledge exchange.

Student profile:

This project would suit a student with good quantitative skills and a strong interest in modelling biological systems with a degree in Biological Sciences, Computer Sciences, Statistical Sciences or similar. Demonstrable knowledge of biology, with some research experience in at least one of (1) quantitative genetics, (2) bioinformatics, (3) metabolomics, or (4) data sciences would be an advantage.

Funding particulars:

This is a CASE project with in-kind support from AFBI, an Arms-Length Non-Departmental Public Body with DAERA as its sponsor Department. AFBI's work can be summarised as leading improvements in the agriculture industry, Enhancing the natural and marine environments, and Protecting animal, plant and human health.

Funding Note

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.

The studentship is open to UK and international students (including EU countries) however due to funding rules, no more than 30% of the projects can be allocated to international students.

The funding will include a tax free stipend (minimum £15,285 per year), support for tuition fees at the standard UK rate (currently £4,407 per year) and a contribution towards research costs. **Please note** that the host universities have not yet confirmed the level of fees charged to international students funded by the DTP. Fee levels may vary across the institutions. This information will be shared on the FoodBioSystems DTP website as soon as it becomes available.

To apply

Please go to [FoodBioSystems DTP website](#) for information on how to apply for this studentship. The closing date for applications will be 8 February 2021.