PhD Project Advertisement

Project title: *Climate-Friendly Beef: Long-Term Assessment of Methane Inhibitors*

Project No: FBS25-50-Theodoridou-qr

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Project Description: Livestock contributes 30% of methane released into the atmosphere, more than any other single source. The UK Committee on Climate Change (2020) has recommended a 64% reduction in greenhouse gas emissions, as necessary, to meet the 2050 targets. At the same time, the Food and Agriculture Organisation has projected that the demand for red meat will continue to increase at the rate of ~1.5% per year to meet a growing population and rising living standards in developing countries. Methane-suppressing feed products commercially available (e.g., 3NOP, nitrate additives) are key policies for achieving full UK decarbonization by 2050, as outlined in the Carbon Budget Delivery Plan. However, their long-term effect on animal performance; ruminal microbiome; and carcass quality is not known and at the same time needs to be adopted as technologies to reduce farm-gate emissions by kg of beef. This project aims to address these gaps of knowledge in growing and finalizing beef cattle. This project targets the entire life cycle of beef cattle, from the last third of gestation in the dam to birth and the finishing period, aiming to improve environmental sustainability in beef and dairy-origin beef production by reducing emissions. The key research question is: what are the effects of long-term MSA, alone or combined, to dairy-origin beef cattle on performance, methane emissions, rumen microbiome, and carcass quality? The project will utilise in vitro screening to select the most potent inhibitors and their combinations for animal trials and generate prediction models to quantify methane emissions in beef production systems in a whole production cycle.

Research objectives and methods:

(1) Continuous gastrointestinal tract model: In vitro screening to select the best commercial MSA and their combinations (supplementary effect) at different dietary conditions.

(2) Long-term study in animals: Evaluate the long-term impacts of MSA on dairy-origin beef animals using the selected feed additives and/or their combinations (in vitro study 1).

3) Modelling to quantify methane emissions. a) Develop prediction models to quantify methane emission factors in beef and dairy-origin beef production systems in a whole production cycle. b) Modelling to quantify reduction rates in methane emissions in beef and dairy-origin beef cattle fed MSA in a whole production cycle.

Training opportunities: Training will be provided via all partners and will cover cross-disciplinary transferable skills to enhance student's future career prospects. At QUB: animal nutrition-related training on analytical methods: i) feed composition, ii) ammonia and volatile fatty acids iii) microbiome analysis, metataxonomic/metagenomic sample processing, sequencing, and downstream analysis, iv) development of models to quantify methane emissions. The student will complete an 18-month placement at the CASE partner (AFBI), gaining practical experience in vivo animal trials with beef, including methane emissions, feed intake, productivity, and animal health assessments. At URE: i) use continuous gastrointestinal tract model to evaluate methane reduction and fermentation parameters. The student will receive training also in data analysis and statistical software. QUB offers a Careers Development Programme where students can participate in a range of interactive workshops covering communicating postgraduate research skills to employers, effective academic applications, preparing for job interviews.

Project supervision style: The lead supervisor will hold individual meetings with the student every week to review progress and tackle any arising issues. The entire supervisory team will meet monthly to maintain alignment between academic objectives and industry goals. Placement: The student will have 1:1 meeting with the lead supervisor every two weeks to ensure continued academic guidance, alongside weekly meetings with the CASE supervisor to receive focused support on the animal trial. The plan ensures academically rigorous, industry-relevant research through collaboration and regular feedback.

Student profile: This project would be suitable for candidates who have an upper second-class degree in a related science (e.g. animal science, veterinary, food science, biology), and a keen interest in animal nutrition/physiology, dairy science, laboratory analyses -omics technologies and/or bioinformatics.

Stipend (Salary):
FoodBioSystems DTP students receive an annual tax-free stipend (salary) that is paid in installments throughout the year. For 2024/25 this is £19,237 (£21,237 at Brunel University) and it will increase slightly each year at the 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 encouraging 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 interviews for shortlisted candidates who have disclosed a disability or specific learning difference.
- [Guaranteed interview](#) and [applicant mentoring](#) schemes for applicants, with UK home fee status, from eligible under-represented ethnic groups.

These are opt-in processes**.**

Our studentships are offered on a part-time basis in addition to full-time registration. The minimum registration is 50% FT and the studentship end date will be extended to reflect the part-time registration.

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