

PhD Studentship: Characterisation of novel oligosaccharide prebiotic fractions to improve gut health in monogastric farm animals

Key academic contact: Dr Emily Burton, School of Animal, Rural and Environmental Sciences (ARES).

The project:

The European reduction in antibiotic use in animal production is expanding to other continents with the aim of phasing out prophylactic use entirely for animals. Therefore, there is a strong demand from both meat producers and feed companies for novel alternatives to sustain high production volumes and feed efficiency while maintaining the health and welfare of the animals. In their full form, long chain polysaccharides have detrimental effects on nutrient absorption and digestive transit through the gut in monogastric species such as pigs and poultry. However, it has been suggested that shorter polysaccharide chains may act as a prebiotic and therefore support immune function and help maintain positive gut microflora profile.

This project will investigate a novel oligosaccharide product that has been developed by AB Agri, as part of an existing project within the company. This product is a completely new approach to prebiotic inclusion in animal feed and will be the first investigation into this area worldwide. This studentship will characterise the product both in terms of efficacy and mode of action in broiler chickens in the first instance.

There is potential for the project to investigate other monogastric species, particularly piglets, which are another fast growing sector with a requirement for alternatives to antimicrobials to support gut health and performance. An initial commercial study in broiler chicks will investigate the dose response of this novel product when compared to a commonly used xylanase enzyme which breaks down long chain polysaccharides. A broiler study will be carried out with sequential samples taken at different time points throughout the study to allow the dose response over time to be assessed. Samples of caecal content will be collected for screening of gut microflora; digesta samples will be collected for digestibility measures, VFA and oligosaccharide content; gut tissue samples will be collected for assessment of histological morphology and mucin adherence and plasma samples will be collected for immunoglobulin and hormone analysis.

The final phase of the study will use (if necessary) animal studies or models to assess the mode of action of the product when fed at the optimal dose response. Complimentary areas of interest to be explored during the project will include the development of novel techniques including the measurement of caecal temperature post mortem, using Infra-Red Thermal Imaging.

The School of ARES:

Nottingham Trent University has an outstanding reputation for our commitment to research that shapes lives and society. The School of Animal, Rural and Environmental Sciences is located at the NTU Brackenhurst Campus. It has a growing postgraduate community which benefits from the support of the NTU Doctoral School in addition to the subject specialist expertise within the School.

Nottingham Trent University Poultry Research Unit provides a platform for both industry technologists and fundamental scientists to explore the interplay between nutrition, welfare and sustainability of poultry production. The unit encompasses a dedicated suite of buildings including a 48 pen bird room, sampling and analytical laboratories, a feed manufacture room and secure feed storage areas; with office of the unit manager at its centre. The Poultry Research Unit is embedded within the University's School of Animal,

Rural and Environmental Sciences and draws on facilities and research groups described as World Class in RAE2008.

The unit currently provides an infrastructure to support three poultry scientists at post-doctoral level and a further three PhD students with plans to double its capacity. This unit supplies a vital conduit from fundamental science to global industry impact. It has been selected by the RCUK as an impact case study to be presented to UK Government in negotiation for future funding, and cited by a global leader in feed supplements as "one of the top 10 poultry research centres in the world".

Further information regarding research within the School can be found at:

<https://www.ntu.ac.uk/research/research-at-ntu/academic-schools/research-at-the-school-of-animal-rural-and-environmental-sciences>

and further information regarding research within the Poultry Research Unit can be found at <https://www.ntu.ac.uk/research/groups-and-centres/projects/poultry-research>

Specific qualifications/subject areas required of the applicants for this project:

To be eligible to apply, you must hold, or expect to obtain by July 2017, a BSc Hons (2:1 or above) in Animal Science or a related discipline. For informal discussions, please contact Emily.burton@ntu.ac.uk

Applicants are required to submit a completed application form and a research proposal document 1000-2000 words including references that outlines potential techniques available to address the objectives outlined above.