

PhD Project Advertisement

Project title: *AI-Based Acoustic Monitoring in Turkey Poults for Productivity, Health and Welfare*

Project No: FBS25-05-Oni-sr

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Project description: As global demand for poultry continues to grow, there is an increasing need for sustainable, efficient, and welfare-focused farming methods. Traditional methods of monitoring poultry flocks are time-consuming, labour-intensive and often subjective, prompting the need for advanced techniques. Vocalisation is a physiological parameter and serve as important indicators of health and well-being. Turkeys produce different vocalisations with a dearth of information on calls and matching with different health and welfare states. Identifying, classifying and matching different vocalisations will allow for timely intervention leading to improved health, productivity, and welfare. Artificial Intelligence (AI) models have shown enormous potential in various fields, including vocalisation and animal behaviour analysis. This project will use a non-invasive AI enhanced acoustic monitoring to analyse and predict turkey health and welfare states. This approach will combine cutting-edge technology, machine learning, and data science with turkey health management.

Research aims: This project aims to develop an AI-driven monitoring tool to classify and interpret turkey vocalisations as indicators of flock health and welfare. For this purpose vocalisations will be recorded and faecal samples collected over multiple production cycles, while also monitoring health, welfare and production metrics. Recordings will be pre-processed and annotated to isolate meaningful vocalisation segments. Machine learning (ML) algorithms will be used to develop a model capable of accurately classifying these vocalisations while faecal samples will be screened for micro-organisms using molecular techniques. The model's performance in interpreting health metrics during production cycle will be evaluated and correlated with possible infections.

Overview of students' work: The student will undertake a multi-phase research project involving three production cycles, each with 50 turkey poults. Throughout the study, audio recordings, faecal samples, and health metrics will be collected to investigate turkey welfare and health. Initially, the student will focus on setting up research equipment, refining experimental designs, sample screening and collecting baseline data. Subsequently, student will work on data pre-processing, feature extraction, and the development of an initial AI model capable of classifying health indicators. This phase will also involve testing and refinement to enhance model accuracy. In the later stages, the student will optimise the AI model to ensure it delivers reliable and actionable predictions. The project will provide an opportunity to develop expertise in AI and data science while gaining practical experience in sustainable turkey farming practices. Its outcome will consequently promote better turkey welfare practices and offer valuable insights into precision livestock farming.

Training opportunities: The student will gain experience and training from researchers at the University of Surrey and University of Reading. The training will cover turkey welfare and production, molecular microbiology, and acoustic processing. Throughout the studentship, the student will receive training in AI and machine learning, data preprocessing, feature extraction, and statistical analysis, enhancing students ability to develop and optimise the AI tool. Workshops on research communications and publication skills will prepare the student for disseminating findings. Experiential learning is also embedded through on-farm data collection across three production cycles in a commercial environment, offering exposure to a poultry environment applicable to real world scenarios. This will offer hands-on experience in data collection and understanding commercial poultry operations. Continuous skill development

opportunities, including molecular techniques, machine learning for big data and research dissemination, are available to ensure candidates with limited prior expertise can succeed in this interdisciplinary project.

Project supervision style: The project supervision will be planned to ensure comprehensive support for the student throughout the PhD. The lead supervisor will meet with the student every month for a one-on-one discussion to review progress, address challenges, and plan upcoming tasks. Online supervisory team meetings, including all co-supervisors, will be held to provide broader input on the project's interdisciplinary aspects and facilitate an inclusive feedback. The student will attend group meetings face to face or online as the case may be to present, share findings, discuss research progress, and receive peer feedback. Quarterly progress reviews will be used to evaluate milestones and adjust the research plan as needed. Feedback on drafts of written work, including reports, manuscripts, and the thesis, will be provided within two weeks of submission. Monthly meetings in year 4 will focus on finalising analysis, thesis writing, submission and viva readiness.

Student profile: This project would suit a student with interest in digital biotechnology for Animal health with a degree in animal sciences, veterinary sciences and a background/interest in farm animal welfare with evidence of considerable laboratory experience. The ability to learn skills around research communication, animal welfare, molecular microbiology, AI and machine learning are important.

Stipend (Salary):

FoodBioSystems DTP students receive an annual tax free stipend (salary) that is paid in instalments throughout the year. For 2024/25 this is £19,237 (£21,237 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.

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](#).