

## **Learning from mother hens: Influence of maternal care on chicken welfare and microbiomes**

### **Supervisory team:**

**Main supervisor:** Dr Jo Edgar (University of Bristol)

**Second supervisor:** Prof Paul Wigley (University of Bristol)

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**Host institution:** University of Bristol

### **Project description:**

For a chick, the hatching and early life period is crucial for establishment of their gut microbiome; the population of microbes in the gut that helps keep it healthy. Transfer of these beneficial microbes from the mother to the eggshell and newly hatched chick are known to protect young birds against harmful pathogens. However, on large farms, allowing chicks to be reared by hens is not commercially viable and most of the world's 71 billion commercial domestic chicks emerge from disinfected eggs and hatch into incubators, with no opportunity for maternal microbiome transfer. Studies have shown that, instead of being colonised by species-specific 'good' microbes, the microbiome of commercial chicks has become 'humanised', with the main source of bacteria in the early or pioneer microbiome of chicks being hatchery workers and the hatchery environment. It is not currently known what the full implications of these 'clean' hatching and rearing environments are on the birds' health and welfare. We do know that urgent welfare and economic problems currently limit the economic and environmental sustainability of this growing market sector, with high levels of mortality, attributed to infection and dehydration in young chicks, through to injurious pecking and bone weakness as adults.

When seeking solutions to prepare young animals for the challenges of later life, a great deal can be learnt from studies of natural maternal behaviour. This project will investigate the extent of natural microbiota transfer between hens and chicks and the implications of artificial (commercial practice) brooding on the chick microbiome. As part of this, the project will utilise deep learning-based approaches to reveal the behavioural repertoire of hens whilst incubating eggs and how individual differences in maternal care are associated with transfer of microbiomes to the egg shell and chicks. It will elucidate the importance of maternal care on microbiota transfer, as well as chick health, welfare and productivity.

The successful candidate is expected to have a background in biological or health sciences and an interest in animal welfare, microbiomes and AI-based approaches. They will be based within the "Animal Welfare and Behaviour", "Infection, Immunity and Immunotherapy" and "Digital and Data" research groups at Bristol Veterinary School in Langford, North Somerset. The student will gain skills in assessment and interpretation of animal behaviour and welfare, microbiomes, as well as using deep learning to detect animal behaviour changes.

**Our aim as the SWBio DTP is to support students from a range of backgrounds and circumstances. Where needed, we will work with you to take into consideration reasonable project adaptations (for example to support caring responsibilities, disabilities, other significant personal circumstances) as well as flexible working and part-time study requests, to enable greater access to a PhD. All our supervisors support us with this aim, so please feel comfortable in discussing further with the listed PhD project supervisor to see what is feasible.**