Project Title: Dynamics of Campylobacter and antimicrobial resistance in the food supply chain.

Supervisor(s) names: Professor Michael Bonsall

Department(s)/Organisation(s): Dept. Plant Sciences, University of Oxford

e-mail: michael.bonsall@zoo.ox.ac.uk

Deadline: 31st July 2018

Brief description of project: There is increasing interest in food animals as a source of antimicrobial resistant (AMR) bacteria in humans [1, 2]. Campylobacter, the most common bacterial cause of gastroenteritis, has been identified by the World Health Organisation as a high priority antibiotic resistant pathogen, due to extensive quinolone resistance as well as resistance to other common antimicrobials [3]. There are also many biologically and methodologically interesting questions around the development of AMR in Campylobacter, an organism that is found widely in wild animals, food animals and the natural environment, all of these reservoirs acting as sources for human infection. These questions include:

• How and where does AMR evolve?

• How does AMR spread?

• Does AMR offer a survival advantage in particular niches or affect transmission to humans through the food chain?

As with other bacteria, AMR can be measured directly in Campylobacter and/or inferred from whole genome sequence (WGS) data. We now have access to very extensive WGS data and isolate collections, which also enable Campylobacter population structure and evolution of the bacteria to be described and the levels of gene sharing (Horizontal Gene Transfer, HGT) and its importance to AMR to be measured.

This studentship is linked to a UK Food Standards Agency (FSA) project that provides data from over 5,000 human infections from 1997 to 2018, and from the food chain. This includes hundreds to thousands of genome sequenced isolates from each of a range of animal species, and from different points in the food chain. Campylobacter isolates and WGS data are available from: poultry on farms; abattoirs; retail meat; and human disease. The FSA project is also collating isolates from other projects globally, with extensive international collections available for analysis. This studentship will take a multi-disciplinary approach and will include training in molecular microbiology, bioinformatics, evolutionary analyses, and mathematical modelling.

(This project is supported through the Oxford Interdisciplinary Bioscience Doctoral Training Partnership (DTP) studentship programme. The student recruited to this project will join a cohort of students enrolled in the DTP’s interdisciplinary training programme, and will be able to take full advantage of the training and networking opportunities available through the DTP. For further details please visit www.biodtp.ox.ac.uk.)
Funding notes:

The studentship is fully funded by the Food Standards Agency and will include a per annum stipend of £14,777 and Home/EU fees and an annual Training Support Grant, for 4 years.

References: