University of Prince Edward Island

Faculty of Veterinary Medicine
Summary of Dissertation

Submitted in Partial Fulfilment
of the Requirements for the

DEGREE OF MASTER OF SCIENCE

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The Molecular Analysis of the Genetic Footprint of Fresh Retail Poultry Meat and the Poultry Fecal Microbial Resistome

The primary goal of this research project was to study persistence and dissemination of mobile antimicrobial resistant genetic elements in poultry farms with potential for transmission to humans through the food chain. The study had three key objectives including 1) determining the composition of antimicrobial resistant (AMR) bacterial communities and their resistomes in fresh fecal samples collected from layer, broiler breeder, and broiler farms in Nova Scotia and in fresh chicken meat purchased from Prince Edward Island grocery stores; 2) determining microbiome compositions of fecal and litter samples from the three poultry types; and 3) identifying antimicrobial resistance genes (ARGs) associated with mobile genetic elements (MGEs). We hypothesized that poultry farms would be a source of a wide variety of ARGs, including those associated with MGEs; that AMR bacteria and/or their ARGs may persist through the food production process, posing a risk of transfer to humans through contact with chicken meat; and that microbiome and resistome compositions would differ between layer, broiler breeder, and broiler chickens. In general, our results suggest persistence of AMR bacterial species in the poultry environment. These species may subsequently disseminate their ARGs to other bacterial species accumulated during poultry production and food processing. This has public health significance as AMR bacteria on chicken meat could be transferred to humans and/or transfer ARGs to human pathogens. There was overlap in bacterial species identified after AMR enrichment and in microbiomes of the non-enriched fecal and litter samples. These included genera that were among the most abundant in the fecal and litter microbiomes, indicating that AMR bacteria are prevalent in the poultry fecal microbiome and can persist in the litter. Persistence of AMR bacteria and ARGs in poultry litter could lead to dissemination into the environment during disposal or use as fertilizer on agricultural fields leading to contamination of soil and water bodies, creating reservoirs of resistance.

Publications

Two manuscripts in preparation for publication.

Presentations

Poster presentation at The Canadian Society of Microbiologists Annual Conference (June 2024; Western University, London, Ontario)

Biographical Data

Born in Pickering, Ontario

Awards

- Path & Micro Graduate Student Scholarship (2023)
- NSERC Canada Graduate Scholarships – Master's Program (2024)