PROJECT SNAPSHOT

4C: Reducing Antimicrobial Use by Selecting for Animals More Resilient to Infectious Disease

Pillar: Prevention of Transmission
Theme: Innovation and Commercialization
Keywords: Host Animal; Microbiota; Genetics; Immunity; Resilience

AMR One Health Consortium

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AIM

Animals show variation in susceptibility to specific diseases. This variation could potentially be targeted to select for animals that are more resilient to infection. This project aims to identify methods of identifying resilient animals.

WHY IS THIS IMPORTANT?

Disease resilient animals have improved animal health and welfare, while maintaining performance and reducing antimicrobial use (AMU) after infection. They require fewer antimicrobial treatments to reach market weight or to produce eggs and milk. The selection of disease resilient animals has the potential to increase the sustainability and competitiveness of livestock agriculture in Canada.

OUTCOMES

1. New tools to identify disease resilient animals for use in the selection or management of livestock to help reduce AMU.

2. New knowledge of disease resilience mechanisms.

3. Microbial populations that support resilience and can be targeted as probiotics.

RESEARCH QUESTIONS

1. Can disease resilience be predicted in healthy animals from new phenotypes?

2. How to apply these phenotypes to develop selection tools? (e.g. genomic selection).

3. Can tools be developed to improve the management of susceptible animals? (e.g. targeted treatment of individuals vs. the population).

OUR APPROACH

1. A natural disease challenge model for pigs will be used to mimic commercial disease exposure. Samples and phenotypes are collected to identify and predict resilient animals in high health units.

2. High throughput multiomic tools will be used to study variation in susceptibility to disease. Case control studies of field samples will be used, e.g. for Bovine Respiratory Disease.

3. Analysis of omics data will be done to determine associations of disease response (resilience vs susceptibility) with the potential to screen for resilience and identify performance outcomes in young animals.

4. Leveraging links across the Consortium to obtain new funding support. This includes the use of samples from Project 5B.

ALIGNMENT WITH THE AMR - ONE HEALTH CONSORTIUM

LEVERAGED SOURCES OF SUPPORT

Agriculture Funding Consortium (RDAR and Alberta Innovates) • Beef Cattle Research Council • Genome Alberta • Genome Canada • PigGen Canada • University of Alberta, University of Calgary and Agriculture and Agri-Food Canada Infrastructure • USDA National Institute of Food and Agriculture (with Iowa State University)

KNOWLEDGE & TECHNOLOGY EXCHANGE AND EXPLOITATION

- Identification of new tools for the management of groups and individuals based on their genetics.
- Validate tools and develop operating procedures for adoption by industry.

TRAINING OF HIGHLY QUALIFIED PERSONNEL

- 1 Research Assistant (Project Manager)
- Other HQP trained within the associated projects (e.g. 1 Technician, 1 summer student, 2 PhDs, 2 Postdoctoral Fellows)

AFFILIATIONS: UNIVERSITY OF ALBERTA | UNIVERSITY OF CALGARY | Agriculture and Agri-Food Canada

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