

TITLE: Metagenomic investigation of the intervention measures to reduce on-farm use of antibiotics in Canadian hog barns

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ABSTRACT

Background. Many Canadian food animal producers have implemented production practices aimed at producing animals efficiently while avoiding the use of antibiotics. In the swine industry, one such program is the ‘raised without antibiotics’ (RWA) program. Our goal was to compare the effect of the adoption of the RWA approach with non-RWA pig production operations on overall antibiotic usage and the prevalence of antimicrobial resistance (AMR) and pathogen abundance.

Results and discussion. We are conducting a multi-year longitudinal investigation by collecting fecal matter, manure, nasal swabs, and environmental samples from participating RWA and non-RWA barns. The experimental approach uses whole genome sequencing (WGS) to rapidly sequence pathogen and antibiotic-resistance genes in the collected samples, in conjunction with open source tools and data pipeline analyses. The results obtained thus far showed a substantial reduction in the Tetracycline-ARG drug class in RWA barns as compared to non-RWA barns. Since tetracyclines are among the drugs still heavily used in conventional barns, this suggests that RWA measures could reduce resistance to tetracyclines. In addition, RWA barns also have a significantly reduced group of MDR-ARGs. This could be linked to lower amounts of various drug classes recorded as being used in RWA barns, such as the Antifolates and β -lactams, compared to conventional (non-RWA) barns. **Conclusion.** The resistome, virulome and bacterial diversity in the two types of barns show a possible correlation between RWA and mitigation of AMR. **Take home message.** Metagenomic comparison of RWA vs. non-RWA production operations indicated trends towards the reduced presence of AMR genes associated with a reduction in overall use of antibiotics, thereby supporting efforts by the swine industry focused on curbing the development and spread of antimicrobial resistance.