Postdoc developed methods to track impact of antibiotics on pigs

By Jordan Stidham

The United Sates Department of Agriculture Agricultural Research Services Research Participation Program gave Nicole Ricker, Ph.D., the opportunity to use the newest sequencing technology to develop methods to track antimicrobial resistance in pigs and better understand the impact of antibiotics on their gut bacteria.

Nicole Ricker, Ph.D., discovered early in her professional endeavors that she enjoyed challenges. She had questions that she wanted answered, so she pursued more challenging positions and persevered until she felt that she had acquired the skills to start answering those complex questions.

Ricker received her doctoral degree in environmental science from the University of Toronto at Scarborough. Ricker's thesis focused on bacterial genetics and horizontal gene transfer. One of her main goals as a postdoctoral researcher was to expand her skills in bioinformatics because those skills are becoming essential in her field.

The United States Department of Agriculture (USDA) Agricultural Research Service (ARS) Research Participation Program provides opportunities for students, postgraduates, established scientists and faculty to participate in programs, projects and activities at ARS-designated facilities to help ARS solve agricultural problems of high national priority.

As an ORISE participant, Ricker was mentored by research microbiologist Heather K. Allen, Ph.D., and was stationed in the Food Safety and Enteric Pathogens Research Unit at the National Animal Disease Center (NADC) in Ames, Iowa. A group of researchers at the facility investigate bacterial pathogens from host animal and food safety perspectives.

Ricker's main research project explored different ways to administer antibiotics to pigs and then measure the impact of the antibiotics on the bacteria that live inside the large intestine of the animals.

Gut bacteria play an important role in keeping animals healthy, so disrupting them with antibiotics can have negative impacts for the health of the animal.

The purpose of her research was to better understand whether giving the pigs antibiotics by injection could minimize the negative impacts, such as on antibiotic resistance (AR).

AR is a growing concern in both humans and livestock, and there is an increasing demand for non-antibiotic alternatives in animal production. “This research will help us optimize our agricultural practices so that we can promote animal health, while minimizing the use of antibiotics and limiting their spread within the environment,” said Ricker.

Ricker not only expanded her expertise in AR in animal production systems, but she also learned a variety of bioinformatics tools for the analysis of big data sets.

The preeminent highlight of the experience for Ricker was the support provided by the program and the host facility. “The stipend and health insurance benefits allowed me to focus on doing my best without the added financial stress that is common in postdoctoral research. The travel funds allowed me to network and present my findings at a variety of conferences,” she said.

Through this experience, Ricker was invited to speak at the annual meeting for the American Association of Veterinary Laboratory Diagnostics. She also spoke to microbiology graduate students at Iowa State University, and was selected as a speaker at the American Society for Microbiology (ASM) conference on Innovative Microbial Ecology for Mitigation of Antibiotic Resistance and Bacterial Diseases.

In addition to these events, Ricker had the opportunity to present posters at five conferences and she attended a five-day bioinformatics workshop titled “Explorations in Data Analysis for Metagenomic Advances in Microbial Ecology (EDAMAME),” as well as a handful of R programming language workshops.

She had the opportunity to take part in a number of volunteer outreach programs through NADC and Iowa State University to local elementary schools and local Girl Scout troops.

During Ricker’s time with the USDA ARS Research Participation Program, she grew immensely as a researcher in terms of interacting with multidisciplinary teams, grant writing, scientific writing and computational skills. She created long-term relationships with collaborators that will be essential to her future success.

Since her appointment ended in December 2018, Ricker has accepted a faculty position at the Ontario Veterinary College at the University of Guelph in Ontario, Canada.

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