

Modeling the transmission dynamics of *Salmonella spp* in finishing pig herds

Summary Report:

Project title: Modeling the transmission dynamics of *Salmonella spp* in finishing pig herds.

The overall goal was to model the transmission dynamics of *Salmonella spp* in finishing swine on a commercial herd. Analysis of quantitative data from a longitudinal study of *Salmonella* in finishing pigs was conducted, including shedding patterns and serovars differences. A preliminary agent-based model was built to study the dynamics of transmission of the three major *Salmonella* serovars. This model will be the framework to investigate the role of serovar-specific and individual-specific factors affecting *Salmonella* transmission in swine.

Meeting participants:

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Report:

The overall goal was to model the transmission dynamics of *Salmonella spp* in finishing swine on a commercial herd. Analysis of quantitative data from a longitudinal study of *Salmonella* in finishing pigs was conducted, including shedding patterns and serovars differences. Descriptive, principal components analysis and survival analysis were conducted to explore the trends and diversity of *Salmonella* shedding in terms of concentration shed and serovar. An agent-based model was built to study the dynamics of transmission of the three major *Salmonella* serovars (*S. Derby*, *S. Agona* and *S. Johannesburg*) and taking into account the duration and concentration shed. The model was developed in NetLogo software.

This model will be the framework to investigate the role of serovar-specific and individual –specific factors (i.e., age susceptibility) affecting the *Salmonella* transmission

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in swine. In addition, it will be the initial model to investigate the role of pigs shedding high concentrations of *Salmonella* in the disease dynamics, and to evaluate the effectiveness of intervention strategies in reducing the contamination in swine herds and cross-contamination at slaughter houses. The long-term goal is to extend these agent-based models to other food-borne pathogens in pork.

A preliminary study was conducted in order develop a project to evaluate other factors influencing *Salmonella* transmission in swine, which will be a component for a Postdoctoral Fellowship proposal at NIMBioS in Fall of 2013.

This work is in collaboration with Dr. Julie Funk, Associate Professor, Department of Large Animal Clinical Sciences, College of Veterinary Medicine, Michigan State University, MI, USA.