Research Experiences for Undergraduates (REU) 2012 Abstract

CROSLEY, E., NIVENS, A., RUBIN, I., LANZAS, C., PHAN, T., LELU, M., and S. LENHART. Spatially explicit model of *Salmonella* transmission in grower pigs. National Institute for Mathematical and Biological Synthesis, Knoxville, TN, Bowdoin College, Brunswick, ME, Maryville College, Maryville, TN, Cornell University, Ithaca, NY, University of Tennessee, Knoxville, TN.

Salmonella represents 11% of all foodborne illness in the United States and 28% of all foodborne illness leading to death. One of the largest reservoirs for Salmonella, and a leading cause for the disease in humans, is the pig farming industry. Understanding the disease dynamics on the farm level is a key to developing meaningful strategies to control the disease and mitigate the public health risk. There is a general trend in modern, large-scale pig farming towards larger populations of pigs per pen and larger grower houses. To help understand the implications of this trend, we have created a spatially explicit epidemic model of a grower house in an intensive, all-in-all-out pig farm, The model shows that the number and configurations of the pens in the grower house can have a significant impact on the final disease prevalence and that the physical structure of the grower house cannot be ignored when developing a model for Salmonella in these farms. We also determine that the most helpful strategies for controlling the disease are to decrease the number of pigs per pen and work to reduce the between-pen contact and transmission.