

Model Published on Impact of Foot-and-Mouth Disease Outbreak

A research project in the Kansas State University College of Veterinary Medicine presents the largest model to date for evaluating the impact and control of a potential outbreak of foot-and-mouth disease in livestock.

Mike Sanderson, professor of epidemiology in the college's diagnostic medicine and pathobiology department, and Sara McReynolds, a former graduate student of Sanderson's, published the results of their research in the December issue of the journal Preventive Veterinary Medicine.

The researchers developed simulation models to assess the impact of livestock herd types and vaccination on foot-and-mouth disease outbreaks using the North American Animal Disease Spread Model. In this study, potential foot-and-mouth disease virus outbreaks in the central region of the U.S. were simulated to compare different vaccination strategies to a depopulation-only scenario. Their work received funding from the U.S. Department of Homeland Security's Foreign Animal Disease Zoonotic Center, which is now the Institute for Infectious Animal Diseases; the Kansas Department of Agriculture; and the U.S. Department of Agriculture through Iowa State University.

Based on data from the U.S. Department of Agriculture National Agricultural Statistics Service, a simulated population of 151,620 livestock operations characterized by latitude and longitude, production type and herd size was generated. Data for the study was generated by surveying livestock producers in Kansas and Colorado in order to determine the rate of contact between herd populations.

"The results of this study will provide information about the impacts of disease-control protocols, which may be useful in choosing the optimal control methods to be used by the livestock industry and animal health professionals to meet the goal of rapid effective control and eradication," Sanderson said. "The challenge behind this project is that you don't want to destroy the livestock industry in the process of trying to destroy the virus. You have to control the virus in a way that allows the industry to survive as effectively as possible."

Sanderson said the modeling study will support a subsequent project.

"We have more work underway in what is called a 'Secure Beef Supply Plan,' which is a project in collaboration with Iowa State University," Sanderson said. "Our modeling work also is being used here at K-State for an economic model developed by Ted Schroeder, a university distinguished professor of livestock marketing in the agricultural economics department."

McReynolds graduated from Kansas State University with a Doctor of Veterinary Medicine and Master of Public Health in 2008 and a doctorate in pathobiology in 2013. She is currently the assistant state veterinarian in North Dakota.

"Our results only give an indication of what could happen in the livestock industry when following specific control protocols," McReynolds said. "Livestock movement control and good biosecurity to limit disease transmission between farms will be very important. More research would be needed to better understand the optimal response to a foot-and-mouth disease outbreak in the central U.S. as well as in livestock operations in other parts of the country."