Parameterization of the Multi-scale Epidemiologic/Economic Simulation and Analysis (MESA) Model for Classical Swine Fever Virus

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Project Scope: Classical swine fever (CSF) is a highly contagious viral disease of swine that poses a significant economic threat to the U.S. swine industry. CSF was first recognized in the U.S. in 1833 and eradicated in 1978 after an intensive 16 year campaign, which cost $140 million. CSF remains endemic in many regions around the world, including the Caribbean basin and areas of Mexico. The ease of access to the virus represents a constant threat to the U.S. swine industry for both intentional and non-intentional introduction. To assess the potential impact of an outbreak of CSF in the U.S., the DHS Foreign Animal Disease Decision Support System MESA (Multi-scale Epidemiologic/Economic Simulation and Analysis) at Lawrence Livermore National Laboratory was parameterized for CSF and used to simulate and evaluate national scale outbreaks.

Recent Progress: A literature review was performed and recognized disease experts were contacted to determine the latent, subclinical and clinical disease state transition periods for CSF. The model uses the lengths of these transition periods to calculate the number of animals in each state within an individual facility type based on specified probability distributions. Various commercial swine operations were contacted to obtain information on the type and frequency of contacts. This information was applied to the 2002 U.S. swine census data provided by the National Agricultural Statistical Service (NASS) to calculate contact rates between facility types. Disease outbreak scenarios of CSF have been simulated and are currently being evaluated at different geographic locations within the U.S.

Future Plans: Lack of understanding of factors that influence local, regional and national spread of CSF in free-ranging (feral swine), semi-confined (backyard/transitional herds), and completely confined and vertically integrated large-scale swine production facilities is a major limiting factor in foreign animal disease prevention and control. Therefore, a feral swine disease outbreak model will be developed within the MESA model and used to understand the epidemiologic and ecologic role of transitional/backyard swine operations and feral swine in outbreak scenarios and the potential challenges they pose for animal disease control policy. In addition, regional and national scale economic consequences and control strategies from outbreaks of CSF in commercial, transitional/backyard, or feral swine will be assessed.

Relevance to listed research areas: CSF is a biological threat to the U.S. swine industry. Understanding and evaluating disease spread, economic consequences of, and control strategies for CSF outbreaks will directly enhance the ability of DHS to prepare for, respond to and recover from a biological attack with this agent.