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## ERS and Collaborators Model Foot-and-Mouth Disease Outbreaks

Maintaining the competitiveness of U.S. livestock and poultry in domestic and international markets requires addressing the challenges and anticipating the disruptions of disease threats. Despite some successes in eradicating livestock diseases (contagious bovine pleuropneumonia, 1892; foot-and-mouth disease (FMD), 1929; screwworms, 1959; hog cholera, 1978), the United States finds itself continuously challenged by known and newly emerging threats, both foreign and endemic. Bovine Spongiform Encephalopathy (BSE, or mad cow disease) is one disease that has recently been targeted by U.S. prevention and mitigation systems.

Among the tools in the ongoing battle against livestock diseases are models that simulate disease outbreaks and their economic effects. These models help measure the economic impacts of alternative control strategies. A new modeling tool integrates epidemiological simulations from a North American Animal Disease-Spread Model (NAADSM) developed by USDA's Animal and Plant Health Inspection Service with an economic model developed at Purdue with ERS collaboration. This integrated framework can be used to assess effects of a disease outbreak and subsequent mitigation efforts on livestock supply, demand, and trade for up to 20 calendar quarters.

A purely hypothetical outbreak of FMD in small Midwest hog operations was simulated to assess the effect of mitigation strategies and impacts of export embargoes for beef, beef cattle, hogs, and pork. Even though few animals had to be destroyed in the

simulation, many agricultural sectors suffered losses. However, domestic meat supplies increased, lowering prices for domestic consumers. Total losses to livestock-related enterprises from the hypothetical FMD episode ranged between \$2.8 billion and \$4.1 billion, depending on disease intensity, the outbreak's duration, and the response scenario. In 2007, losses in that range would have represented 2 to 3 percent of forecast livestock cash receipts. In the simulations, the swine and pork sectors recovered soon after export restrictions ended, but beef and cattle effects lingered due to the longer cattle production cycle. Production of all commodities returned to pre-disease levels in less than 2 years.

The framework is flexible and can be applied to many livestock diseases. It allows the integrated modeling of both economic effects and disease-spread effects from an outbreak; it can assess the effects of a disease outbreak on major agricultural sectors, along vertical market chains, from production to consumption; and it can project the impacts of the disease outbreak, by quarter, for 5 years.  $\mathbb{W}$

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**This finding is drawn from . . .**

*Economic Impacts of Foreign Animal Disease*, by Philip L. Paarlberg, Ann Hillberg Seitzinger, John G. Lee, and Kenneth H. Mathews, Jr., ERR-57, USDA, Economic Research Service, May 2008, available at: [www.ers.usda.gov/publications/err57/](http://www.ers.usda.gov/publications/err57/)



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