DHS Science and Technology Directorate

Vaccines and Diagnostics Project

The Challenge

The United States is at risk for outbreaks of foreign animal diseases (FADs). High priority FADs include Foot-and- Mouth Disease (FMD), Classical Swine Fever (CSF) and African Swine Fever (ASF). While no FADs currently exist in the United States, the challenge lies in being adequately prepared for a potential FAD outbreak. If a FAD outbreak occurred today, the only available solution would be to wait for international markets to produce the correct (matched) FAD vaccine and ship it to the United States. This approach puts the United States at a huge disadvantage in responding to a FAD outbreak. Being properly prepared for FAD outbreaks facilitates faster response, a shorter recovery time and less economic damage.

What is it?

The Foreign Animal Disease Vaccine and Diagnostic program enhances national preparedness by developing countermeasures (vaccines and diagnostics) to protect against the highest priority FADs that could disrupt the U.S. livestock industry and associated agricultural sectors. The FAD Vaccine and Diagnostic program develops new response and recovery products for these high consequence livestock diseases to ensure a rapid, adequate supply of safe and effective vaccines in the face of a FAD outbreak.

FMD is a severe, highly contagious viral disease. The virus causes acute morbidity in cows, pigs, sheep and goats. A recent modeling study in only 8 U.S. states demonstrated that an aggressive emergency vaccination program could reduce the losses to producers and consumers by $132B and to the federal government by almost $10B for FMD.

CSF is a highly contagious and economically significant viral disease of domestic and feral pigs. Infection with CSF results in poor reproductive performance and in some cases, death within 1-3 weeks.

ASF is the most lethal and most rapidly spreading swine disease in parts of Asia and Eastern Europe. A U.S. outbreak of ASF could result in losses of up to $1B per year. There is no existing vaccine and it is considered the "Ebola of pigs".

Figure 1. Disruption of the U.S. livestock industry will in turn disrupt other important agricultural sectors (i.e. Dairy, corn, wheat) and their associated jobs.

Accomplishments

DHS S&T has been extremely successful in collaborating with USDA and industry to test and produce commercially available FAD vaccines.

- A FMD vaccine against one virus serotype licensed in 2012 can be commercially produced inside the United States as it does not it does not contain the full FMD virus genome.
- USDA approval of vaccine import permits has given the United States the ability to access internationally produced FMD and CSF commercial vaccines in the event of an outbreak.
- 1st licensed Rift Valley Fever (RVF) cattle vaccine in the U.S. RVF is a zoonotic disease that can infect humans and animals.

Future Directions

- Development of next-generation, FMD recombinant vaccines that are broadly protective against multiple virus strains that will reduce the number of vaccines required for the veterinary stockpile by at least 50%.
- Transition of effective FAD vaccine candidates to the domestic animal health vaccine private sector for commercialization so products are broadly available in the event of U.S. outbreak.
- Testing and evaluation of pathogen-agnostic vaccine platforms that can be rapidly produced (weeks vs. years) to be used in the event of an FAD in which the pathogen has substantially changed, is unknown or yet-to-be diagnosed.
- Preparation for an International Vaccine and Diagnostic trial to test DHS FMD new vaccines and diagnostic countermeasures in endemic countries to inform emergency responses in the U.S.

Homeland Security
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To learn more about the Vaccines and Diagnostics program, please contact Michelle Colby at Michelle.Colby@hq.dhs.gov or Roxann Motroni at Roxann.Motroni@hq.dhs.gov.

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