DHS Plum Island Animal Disease Center Science Program: Vaccine Development

Science and Technology

FIGHTING TRANSBOUNDARY DISEASES WITH SCIENCE

Transboundary animal diseases can affect the food supply and wreak havoc on the U.S. economy. Currently, vaccines for the most common diseases like African swine fever (ASF) and foot-and-mouth disease (FMD) are not available. However, the Department of Homeland Security (DHS) Science and Technology Directorate's (S&T) Plum Island Animal Disease Center (PIADC) is working to solve these issues.

Since 2005, the DHS PIADC Science Program, comprised of both federal and contractor scientific staff, has executed a broad portfolio of Food, Agriculture, and Veterinary Defense (FAV-D) related projects. This program is focused on projects related to preventing, protecting against, mitigating, responding to, and recovering from the intentional, natural, or accidental introduction of trade-restricting transboundary animal diseases to the U.S. scientists supporting the science program execute research, development, test, and evaluation (RDT&E) efforts on FAV-D projects, primarily involving ASF virus (ASFV) and FMD virus (FMDV).

IMPACT

The DHS PIADC Science Program specializes in conducting pivotal scientific studies in direct support of transitioning transboundary animal disease vaccine candidates initially developed by industry sponsors through the U.S. Department of Agriculture (USDA) Center for Veterinary Biologics' (CVB) regulatory approval process for product licensure. Achieving product licensure allows DHS to provide usable tools to DHS components, first responders, and the USDA National Animal Vaccine and Veterinary Countermeasures Bank.

CURRENT PROJECTS

DHS S&T continues to invest in the development of next generation FMD and ASF vaccine RDT&E. Examples include:

FMD Rapid Response Virus-Like Particle Vaccine Platform (Industry Partner):
With industry partner Medicago Inc., the DHS PIADC Science Program is developing and optimizing an FMD virus-like particle vaccine platform, which can be used to rapidly produce FMD vaccines in the U.S. Several proof-of-concept and feasibility vaccine efficacy studies have been successfully completed in swine.

FMD Rapid Response RNA Vaccine Platform (Industry Partner):
The USDA established a cooperative research and development agreement to conduct proof of concept swine vaccine efficacy studies in 2022 using a novel RNA vaccine. The vaccine is formulated in a lipid nanoparticle, similar to the current mRNA vaccine platforms recently approved by the Food and Drug Administration for COVID-19.

ASF Vaccine Development:
The DHS PIADC Science Program continues to work toward the development of an ASF vaccine, including the identification of live attenuated and subunit vaccine candidates. With the support of industry partners through cooperative research agreements, DHS scientists are collaborating toward the development of several vaccine candidates. PIADC Science is also supporting innovative manufacturing processes that would speed the delivery and reliability of ASF vaccines.

OPPORTUNITIES

The DHS PIADC Science Program is working to identify USDA CVB licensable, rapid response transboundary animal disease diagnostic vaccine platform technologies through current and future solicitations.

Additionally, the first two commercially available vaccines to protect against ASF in livestock were approved in Vietnam in 2023, thanks in part to USDA Agricultural Research Service (ARS), which collaborated with Vietnamese scientists to develop the vaccine. The vaccines, NAVET-ASFVAC and AVAC ASF LIVE, are based on the live attenuated strain of the ASF virus that was originally developed at PIADC by USDA ARS in 2015. The approval of these vaccines represents a breakthrough in the development of ASF vaccine candidates.