

# Plant-Based Expression Vectors for Rapid, High-Throughput Development of Animal Vaccines

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## IMPACT STATEMENT

Current methods of vaccine production can require 18 to 24 months to license a conventional vaccine as a countermeasure to an outbreak of a high-consequence animal disease. This study is expected to demonstrate the potential for surge capacity production in half that time.

## THE CHALLENGE

Vaccines are a critically important countermeasure for responding to and recovering from foreign animal, zoonotic or emerging diseases. Current vaccine production methods fail to provide sufficient capacity or adequate speed to satisfy national or global needs to combat the introduction of a newly emerging strain of a recognized disease (e.g., foot-and-mouth disease [FMD]), a novel emerging disease (e.g., Schmallenberg virus) or a potential pandemic event (e.g., highly pathogenic avian influenza). For example, current vaccines for FMD are based on inactivated stocks of live virus. These inactivated preparations are stored in the North American FMD Vaccine Bank and require shipment to the United Kingdom for formulation prior to use, meaning vaccine formulated from these stocks will not be available for use in the United States for approximately 7 to 14 days. Even this short delay can result in significantly advanced disease spread for such a highly contagious pathogen as FMD.

## THE SOLUTION

Vaccination strategies to control emerging strains and/or diseases, such as the FMD example, will require a more effective and rapid response than available from conventional approaches such as live-attenuated or inactivated vaccines. In recent years, plants have been used to produce recombinant proteins including subunit vaccines and antibodies. The main advantages of using plant systems for the production of vaccine antigens against emerging diseases are their independence from pathogenic viruses and cost and time efficiency.





## FEATURES AND BENEFITS

- The flexibility and speed of plant technology enable high-throughput screening and optimization of biotherapeutics before they ever reach clinical trials.
- There are significantly lower facility and production costs associated with plant-based technology.
- Plant-based systems are guaranteed to scale to meet increased and varied demand.
- This study is a proof-of-concept project designed to demonstrate the versatility, speed and low costs associated with utilizing a plant-based expression system for the production of antigens that can be subsequently formulated for use in animal vaccines.
- This study will demonstrate the versatility of this system and its ability to respond to an emerging disease with a recombinant vaccine in approximately half the time required for production of conventional vaccines.
- Recombinant technology has the potential to be used as an alternative to live attenuated vaccines to differentiate infected from vaccinated animals to help restore domestic and international trade.

## TECHNOLOGY TRANSITION

This proof-of-concept study will be conducted in three phases and is being performed in collaboration with an animal health industry partner. At the end, the project should produce data on the immunogenicity of a formulated vaccine, including a commercially licensed adjuvant. A logical follow-on to this project would extend to a challenge study in a well-defined model.

## Contact

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