

## **African swine fever vaccine challenge**

We are helping keep Australia free from a deadly disease of pigs that has swept through Asia.

### **Key points:**

- **African swine fever is a deadly disease of domestic and wild pigs.**
- **Australia is currently free of the disease, but an outbreak would be devastating to the industry.**
- **We are working with MBF Therapeutics to evaluate a DNA vaccine candidate to protect pigs from this disease.**

African swine fever (ASF), which is caused by African swine fever virus (ASFV) has recently spread through Asia, in what is considered the worst livestock pandemic in history.

In its wake, millions of pigs have been killed from the disease and to prevent the disease spreading, lowering pork production and devastating people's livelihoods.

An ASF outbreak in Australia would have a significant impact on pig health and production in Australia. There would be wider economic impacts, including loss of access to overseas markets for our pork products.

The ABARES report '[Potential economic consequences of African Swine Fever in Australia](#)' estimated a small-scale outbreak in domestic pigs followed by eradication of the disease would cost between \$117 million to \$263 million.

We spoke to Dr David Williams, an expert in ASFV at our Australian Centre for Disease Preparedness, to find out what we are doing to help combat ASF.

### **What is African swine fever?**

ASF is a highly lethal and contagious disease of domestic and wild pigs.

"Symptoms of the disease can range from mild to severe. In its severe form, ASFV can kill up to 100% of the pigs it infects," David said.

"ASF is not a threat to human health and the virus cannot be transmitted from pigs to humans."

### **Is there a vaccine?**

After decades of research, promising ASF vaccines have been recently developed and commercialized in Vietnam. These vaccines contain one or more gene deletions to weaken the virus and are known as modified live virus vaccines."

"Unfortunately, there are limitations with using these vaccines," David said.

"The vaccine is currently only effective against one strain of the virus."

"Another disadvantage is that modified live virus vaccines have inherent safety issues because they may revert to a disease-causing form under some circumstances."

"Furthermore, the manufacturing process is complex, as is the handling and distribution of the vaccine."

“And these vaccines cannot be used in sows, or in pigs with underlying infections or illnesses because of possible side-effects.”

### **Could we use this vaccine in Australia?**

“A complicating factor with the gene-deleted modified live virus vaccine is that it is very challenging to tell the difference between a pig that has received the vaccine and one that is sick with the virus using antibody tests,” David said.

“Therefore, if we used this type of vaccine in Australia in the absence of disease outbreaks, it would be very difficult to demonstrate our status as a country free from ASFV.”

“There is also the risk that some pigs that are vaccinated with a modified live virus vaccine develop a less severe form of ASF that could then spread to other pigs, as seen in other countries.

Therefore, this type of vaccine is currently considered unsuitable for use here.

### **What would happen in an outbreak?**

“Currently Australia is free from African swine fever virus. This provides us with the ability to trade our livestock products with many countries, some who restrict imports from countries that have the virus,” David said.

“For Australia to continue trading, we must be able to provide evidence that we remain free from the virus.”

“If there were an outbreak of ASF virus here, there would likely be an immediate stop to pork exports.”

“We would implement practices to control the outbreak with the aim of eradicating the virus.”

“To reestablish trading rights, we must again prove we are free of the disease.”

### **What is our solution?**

The challenge is to develop a safe and effective vaccine against all ASFV strains that can be produced economically, at scale, and that will be readily adopted by pig producers.

Our Australian Centre for Disease Preparedness (ACDP) is working with US company MBF Therapeutics to evaluate their DNA vaccine candidate.

“MBF Therapeutics will provide us with an ASF vaccine candidate produced via their T-Max™ platform.

We will then investigate exactly how the pig immune system reacts to these candidate vaccines,” David said.

“The T-Max™ platform is based on technology adapted from immunotherapeutic treatment of human cancer and aims to eliminate pathogens as they enter the body.”

“This protects the animal from infection and prevents disease transmission between animals.

The vaccine candidates produced using this platform target T-cells response in the immune system. T-cells are one of the important types of white blood cells of the immune system and play a central role in the adaptive immune response.

### **Is it safe and effective?**

“Our goal is to create a safe and effective vaccine that can be used in all stages of swine production, including sows, while preventing disease in individual animals and limiting transmission within the herd and environment.” David said.

“One of the great advantages of the T-Max™ platform is that it can be designed to include markers that allow us to distinguish between vaccinated pigs and those that have been naturally infected.”

### **What other research are we doing on ASF?**

“With the launch of our Immune Resilience Future Science Platform, we have recently started several new projects focused on deepening our understanding of the ASFV and how the pig immune system responds, David said.

“Each project will utilise new and emerging technologies to help uncover new information about ASF. You can find more information about this research on the [Immune Resilience Future Science Platform website](#),” David concluded.

*CSIRO's ACDP is a vital part of Australia's preparedness for disease outbreaks. Its microbiologically and physically secure facilities allow teams to work safely with animal and zoonotic diseases while keeping them securely contained.*

[Read about our other work at ACDP, helping to protect Australia from outbreaks of infectious diseases of animal and humans.](#)