

## SWINE HEALTH

**Title:** Evaluation of two novel live attenuated swine influenza vaccines against newly emerging H3N2 virus infection and transmission – **NPB #14-004**

**Investigator:** Yan Zhou

**Institution:** Vaccine and Infectious Disease Organization-International Vaccine Centre, University of Saskatchewan, Canada

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### Scientific Abstract:

Major subtypes of swine influenza viruses circulating in North America are H1N1, H3N2, and H1N2. Then, SIVs keep evolving and produced variants. H3N2 variant, a newly emerging SIV after the 2009 pandemic, belongs to cluster IV H3N2 and carries genes from 2009 pandemic H1N1. Previously we developed two potential live attenuated vaccines against swine influenza. In this study, we investigated whether our two novel live attenuated swine influenza vaccines would provide protection to newly emerging H3N2 virus infection and to decrease virus transmission in pigs. Avian origin H1N1 SIV was used as a backbone of both live vaccines. R345V has the modification of H1N1 swine influenza virus (SIV) hemagglutinin (HA) cleavage site to render the elastase sensitivity, whereas SIV/606 carries double H1 and H3 (cluster I) subtype of HAs. To evaluate the vaccine efficacy of two live vaccines against infection and transmission of H3N2v, groups of pigs were vaccinated before the virus infection. A commercial SIV vaccine (FluSure XP, Zoetis) was included in this study as a control as it contains H3N2 strain, which belongs to same cluster as H3N2v virus. After the virus infection, groups of contact pigs were housed in the same pen with H3N2v virus infected groups. Although use of live vaccines induced antibody responses to H3N2v, these antibodies lacked hemagglutinin inhibition (HAI) activity while FluSure XP induced antibodies with level of HAI. It implied that there was no or limited protection by live vaccine induced antibodies. H3N2v virus was released in nasal mucus in a day after the infection. In terms of, SIV/606 live vaccine group was comparable to PBS control group. R345V vaccination also failed to control the transmission of H3N2v while vaccination of FluSure XP reduced amount of shedding virus and number of animals shedding the virus. However, once the healthy pigs, which have no protective immunity against H3N2v virus, had contact with infected animals, virus infection occurred and contact pigs started to release the virus. Results of lung lesion score and virus titer in lung and lung lavage fluid suggested that both live vaccines provided partial protection to limit the virus replication in lower respiratory tract.

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For more information contact:

National Pork Board • PO Box 9114 • Des Moines, IA 50306 USA • 800-456-7675 • Fax: 515-223-2646 • [pork.org](http://pork.org)

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