

Live attenuated influenza vaccines may have advantages for use in swine

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Recently published veterinary research at Iowa State University shows that influenza vaccines administered in the upper respiratory system of pigs are more effective in some key respects than standard vaccine injections.

Live attenuated [influenza vaccines](#), administered intranasally to swine, provoke a broader immune response than whole inactivated virus vaccines, which are the current standard. That broader immune response provides better cross-protection against variant influenza viruses circulating in swine, said Phillip Gauger, an assistant professor of veterinary diagnostic and production animal medicine.

Gauger and Amy Vincent, a veterinarian at the U.S. Department of Agriculture's National Animal Disease Center, recently published a paper in the academic journal *Virology* demonstrating a strength of live attenuated [influenza virus](#) vaccines.

"Our research with live attenuated influenza vaccines has consistently shown broader cross-protection," Vincent said. "This most recent paper demonstrates that the LAIV also have reduced risk of contributing to negative effects of vaccines when the infecting strain is substantially different than the [vaccine](#) strain."

Influenza is a serious concern for pork producers because the viruses can spread quickly through a herd and lead to severe secondary bacterial infections. Influenza can affect all ages of swine but is exceptionally

costly in nursery and grow-finish pigs, Gauger said.

"Vaccines are a way to help control respiratory disease and transmission of the virus in swine and reduce the economic losses that go along with it," he said. "We're working to find vaccines that provide optimal immunity and are practical for producers to administer."

Live attenuated vaccines are created using a virus that has been genetically manipulated so that it no longer has the ability to cause disease but maintains the capacity to stimulate immunity. Administered directly into a pig's respiratory system, where the virus would also enter to infect a pig, the vaccines provoke a response that combats a wider range of influenza virus variants. The delivery method differs from whole and inactivated vaccines, which are injected into the muscle of a pig.

"Delivery of the vaccine to the respiratory tract provides upfront, initial immune response," Gauger said.

Gauger said the live attenuated influenza virus vaccines may also provide better control of the interplay between human and swine influenza viruses.

But live attenuated influenza virus vaccines also have some drawbacks, he said.

"These vaccines might be a challenge for pork producers to administer in a herd setting," he said. "So we're looking for an effective method of delivery."

"Another disadvantage is that some of the laboratory tests we use to predict vaccine effectiveness with our traditional influenza vaccines don't work as well for LAIV," Vincent said. "But, in an experimental

challenge, where the real test of a vaccine is made, they just work."

Additionally, live attenuated influenza vaccines haven't received government approval for use in pork production, and Gauger said researchers must still conduct more studies to understand the basis for the effectiveness and field applicability of the vaccines.

More information: Phillip C. Gauger, Crystal L. Loving, Surender Khurana, Alessio Lorusso, Daniel R. Perez, Marcus E. Kehrl Jr., James A. Roth, Hana Golding, Amy L. Vincent, "Live attenuated influenza A virus vaccine protects against A(H1N1)pdm09 heterologous challenge without vaccine associated enhanced respiratory disease," *Virology*, Volumes 471–473, December 2014, Pages 93-104, ISSN 0042-6822, [dx.doi.org/10.1016/j.virol.2014.10.003](https://doi.org/10.1016/j.virol.2014.10.003).

Provided by Iowa State University

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