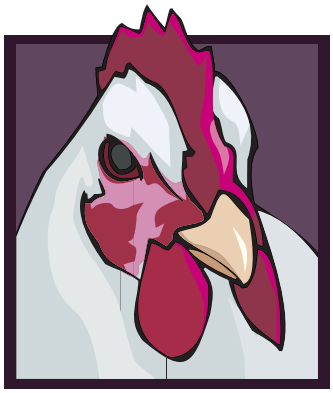
Vectored Vaccines for Avian Influenza



Cases of avian influenza infections of poultry and humans have caused the world to be on alert for a pandemic. Agricultural Research Service (ARS) veterinary medical officer and laboratory director David Swayne and his team at the Southeast Poultry Research Laboratory in Athens, Georgia, are developing new viral-vectored vaccines to facilitate vaccine efficiency against avian influenza. A vector is a biological carrier of genes of another pathogen.

Vectors such as the turkey herpesvirus, infectious laryngotracheitis virus, and adenoviruses are being used and could allow mass application of vaccine. Development of new vaccines will help to protect birds and humans in the event of an outbreak of avian influenza in the United States. "Mass-application technologies, like a spray or in ovo injection, for new viral or bacterial vector systems will provide economic incentives for adoption over current labor-intensive, manual, individual-bird injection methods used today," says Swayne.

Swayne and his research team are working with Mount Sinai Hospital in New York to develop a spray vaccine for avian influenza that uses the Newcastle disease virus as a vector. "This combination allows us to use one vaccination that will protect against both avian influenza and Newcastle disease," says Swayne. Another collaboration with Meriel, Inc., of Athens, Georgia, is using fowl pox as a vector for avian influenza virus, yielding one vaccine that lends protection for both of those diseases.

"We are also working with the University of Pittsburgh and Vaxin, Inc., of Birmingham, Alabama, to develop vaccines using adenoviruses as vectors," says Swayne. The common cold is caused by an adenovirus. The avian influenza gene is inserted into the adenovirus, and the preparation can be injected into individual birds or potentially sprayed onto many birds at one time.

Another advantage of using these types of vaccinations is that vaccinated birds can be distinguished from infected birds. "It is very important to be able to tell the difference between a bird with a natural infection of avian influenza and a bird that has been vaccinated with the virus," says Swayne. "This differentiation assures international traders that the poultry is not infected with the virus, but rather protected against it."—By **Sharon Durham,** ARS.

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Heat Inactivates Avian Influenza and Newcastle Disease Viruses in Egg Products

Avian influenza (AI) and Newcastle disease (ND) are poultry diseases of great concern to the poultry industry. The viruses that cause these diseases can be killed by heat. But the exact parameters for inactivating them by pasteurization had not been established—until now.

Agricultural Research Service (ARS) scientists have shown that the same industry-standard pasteurization temperatures and times established for *Salmonella* inactivation in egg products can also kill AI and ND viruses.

Pasteurization is a short-term, low-heat process used to kill bacteria in milk, egg products, and other food items without changing the cooking properties or flavor of the food.

David Swayne, laboratory director of the Southeast Poultry Research Laboratory in Athens, Georgia, found that AI and ND viruses could be destroyed by pasteurization. He determined that heat inactivation occurred from 55˚C to 63˚C. The time needed to inactivate the viruses depended on virus strain and egg product.

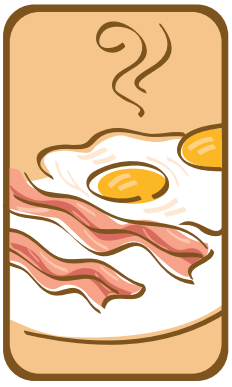
"While there are studies indicating that these viruses can be transmitted to birds by ingestion, there are no definitive results showing the same is true for humans. But inactivating the viruses in egg products will preclude possible transmission to humans."

Swayne artificially infected four commercial egg products with two AI viruses (one with low pathogenicity and one with high pathogenicity) and three ND viruses (two with low virulence and one with high virulence). He then subjected the products to standard, recommended pasteurization temperatures and times and found them to be effective at killing the viruses.

"This study is important because we were able to determine inactivation curves for various temperatures and times for future reference," says Swayne.

In 2002, more than $322 million of processed egg products were traded internationally. Exporting countries must provide assurances that their products are free from specific infectious agents that could severely affect poultry health.

Through this work, ARS has now shown that, with pasteurization, egg products potentially infected with AI and ND viruses can be safely exported and used for food consumption, thereby increasing international trade and improving food safety.—By **Sharon Durham,** ARS.



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