

## Advances in vaccines

# Managing Emerging and Reemerging Diseases in Poultry

**T**he U.S. poultry industry depends on the annual production of billions of healthy birds—mostly chickens and turkeys—that end up in hundreds of different food products. Both established and emerging poultry diseases, and the pathogens that cause them, are continual threats to the industry and a major focus of ARS research.

Today, avian influenza is much on people's minds around the world, although it's not a new disease in wild or domesticated birds. Concern about it has steadily risen since the appearance in Asia and the Middle East of a strain known as H5N1 that has led to human infection.

In wild birds, it's carried in the intestines and doesn't usually make the carriers sick. But some strains quickly infect other birds, damaging their internal organs and often progressing to death.

To better understand the origins and spread of recent outbreaks, David Swayne, director of ARS's Southeast Poultry Research Laboratory (SEPRL) in Athens, Georgia, and veterinary medical officer David Suarez have been collaborating with Russian scientists to identify and characterize avian influenza strains. (See "International Partnership for Poultry Safety," *Agricultural Research*, November 2005, p. 8.)

Since 1998, microbiologist Erica Spackman and the SEPRL team, aided by Kevin Winker at the University of Alaska, have been collecting and analyzing wild bird samples—more than 12,000 to date—from western Alaska, in an effort to monitor possible entry into North America of the Asian H5N1 virus via migrating birds.

Having access to more effective vaccines will help protect both birds and humans in the event of new outbreaks. To counter possible spread of avian influenza and other serious diseases, Swayne and SEPRL scientists are experimenting with using viruses as carriers, or vectors, for delivering protective vaccines. This imparts resistance to both disease-causing agents. (See "Vectored Vaccines for Avian Influenza," *Agricultural Research*, February 2006, p. 21.)

For example, they're testing adenoviruses and alphaviruses as vectors—even trying the virus that causes Newcastle disease. Such combination vaccines could perhaps protect a bird against two or more diseases at once and be delivered by injection into eggs,

to save time and money. "Mass application technologies—like sprays or in-ovo injections—of new viral- or bacterial-vector vaccine systems will be more economical than the current manual injection of individual birds," says Swayne.

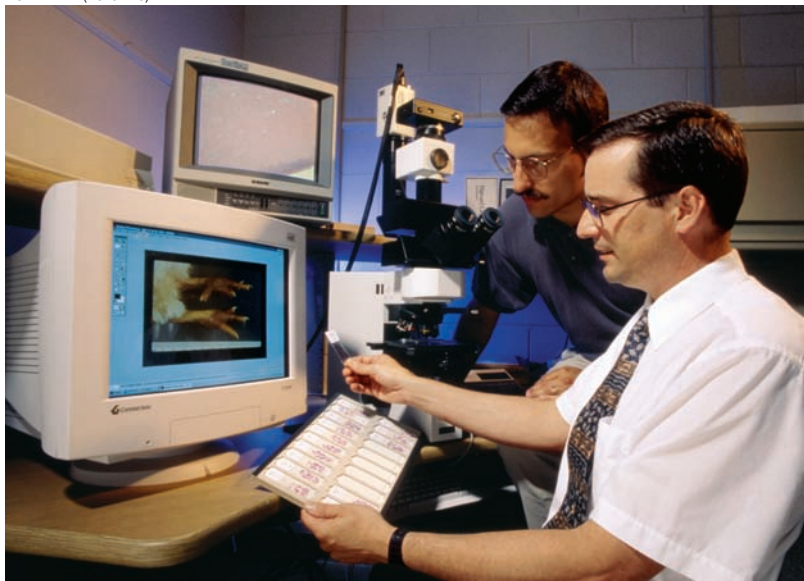
Another advantage of these innovative vaccines is that birds with natural infections can be distinguished from vaccinated birds—which is very important for international trade.

For more than 80 years, Newcastle disease has caused U.S. poultry production problems. While domestic strains cause only mild symptoms, arrival of exotic strains could cause devastating poultry losses. In 2005, SEPRL's Daniel King and collaborators in Kazakhstan published their sequence analysis of Newcastle disease virus (NDV) isolates from Kazakh chickens. A global database now makes that data available to scientists everywhere who are researching NDV molecular epidemiology with a view toward protecting the world's poultry.—By **Sharon Durham**, ARS.

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Veterinary medical officers David Suarez (left) and David Swayne evaluate tissue sections (top monitor) from chickens infected with H5N1 influenza. The bottom monitor displays a photo of chicken legs showing physical damage resulting from the flu virus.