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Genetic marker vaccine could provide answers during an outbreak of avian influenza — and save the poultry industry millions of dollars.

By RUSTY CAWLEY

Imagine a farmer who owns two chickens. He knows that one is infected with deadly bird flu, avian influenza H5N1, and that the other is vaccinated against the same disease. But he doesn't know which is which. How does the farmer tell them apart? He can't.

This dilemma is one that U.S. poultry producers may face one day if avian influenza H5N1 comes to American shores.

If you can't tell the difference between infected and vaccinated chickens during an outbreak, you have to slaughter them all. And you have to take the hit on your bottom line.

But the National Center for Foreign Animal and Zoonotic Disease Defense (the FAZD Center), which is headquartered at Texas A&M University, is working on the problem.

Founded in 2004 as a Department of Homeland Security Center of Excellence, the FAZD Center develops products to defend against the invasion of foreign animal diseases that could threaten public health or the national economy. This category includes avian influenza H5N1, which not only kills birds but (because it is a zoonotic disease) may also infect humans who come in contact with diseased birds.

"The poultry industry is among the nation's largest sources of protein," FAZD Center Director Neville P. Clarke said. "At any one time, there are more than 8.8 million chickens in commercial production, according to the USDA Agricultural Census.

"If we can accurately identify vaccinated chickens, we can significantly reduce the potential damage to the industry from an outbreak of avian influenza," he said. "We can reduce unnecessary slaughter, ease trade restrictions, and lessen the environmental challenges of wholesale slaughter and disposal. We can also more substantially protect the industry's workforce from infection."

FAZD Center principal investigators Sanjay Reddy and Blanca Lupiani are developing an avian flu vaccine with a genetic marker and a test to detect that marker in birds that receive the vaccine. Both investigators belong to the faculty of the veterinary pathobiology and poultry science departments at Texas A&M.

Their work applies the DIVA strategy, which has proven successful in other areas of animal health. DIVA stands for "differentiating infected from vaccinated animals."

According to the strategy, if you engineer a genetic marker in a vaccine, you should be able to create a test that identifies the marker.

With this test, poultry producers and government regulators may accurately separate vaccinated chickens from infected chickens. And doing so could save millions of dollars in unnecessary slaughter of healthy poultry.

The trick is to engineer a genetic marker in the vaccine without diminishing the vaccine's power to protect the chicken from the disease.

Reddy and Lupiani are focusing on the NS1 mutant virus as a potential answer. After more than two years of research, their data suggest that the NS1 mutant virus will provide accurate identification without weakening the vaccine.

The FAZD Center is also working on a DIVA vaccine for Rift Valley fever, another highly contagious and economically devastating animal disease that is now exotic to the United States. Found in sub-Saharan Africa, Rift Valley fever causes death and abortion in livestock and severe flulike symptoms in humans.

Both DIVA vaccines will undergo laboratory testing in 2008–2009. ◂

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