

A New, Rapid Test for Avian Influenza

Avian influenza is a vexing problem for poultry producers in the United States. One strain of the virus that causes the disease, H7N2, has been endemic in live-bird markets in the Northeast and Florida since 1994. These markets sell a broad variety of live poultry, often to specific ethnic markets. Consumers can choose either at-home or in-shop preparation of the bird.

Unfortunately, live-bird markets also serve as central mixing areas for avian influenza viruses and can harbor them for a long time. These markets can act as reservoirs from which viruses can potentially spread to larger, commercial facilities. Current regulatory efforts are ineffective in eradicating the virus.

ARS veterinary medical officer David Suarez has developed a test to quickly identify H7N2 presence in a flock. It's called an RRT-PCR test, short for real-time, reverse-transcription, polymerase chain reaction. Suarez's test, using a fluorescent probe, produces results in less than 3 hours.

Avian influenza infections can range from sub-clinical (with no symptoms), to mild (with production losses), to severe (with high rates of illness and death). The deadly form is called HPAI, short for highly pathogenic avian influenza.

"It can be difficult to identify the mild form because it is hard to differentiate it from other, more pedestrian health problems the flock exhibits," said Suarez, who is in the Poultry Disease Research Unit, in Athens, Georgia.

Suarez's test uses the virus's genetic code to identify it. The gene that identifies H7N2 avian influenza virus is the hemagglutinin gene. It's a rapidly evolving gene that has a high rate of amino acid substitutions, which may seem small in the grand scheme of the virus's genome. But each substitution moves the virus from a mildly pathogenic strain closer to a highly pathogenic strain—one that can kill an entire flock in as little as a week.

The last HPAI outbreak in the United States occurred in Pennsylvania in 1983 and 1984. Through

combined federal, state, and industry efforts this outbreak was controlled. But milder avian influenza viruses were isolated from live-bird markets in several states from 1986 to 1989.

Recently, in Virginia, a mild form of avian influenza infected 197 flocks, and 4.5 million birds had to be killed to prevent further spread of the virus. Though the virus remained fairly innocuous, it had the potential to mutate and become deadly.

The mild-form H7N2 virus has been found in commercial poultry operations at least three times in the last 5 years, causing disease and serious economic losses for the industry.

"The costs of the 1983–84 outbreak were staggering: \$63 million in federal funds and \$350 million in increased consumer costs. This new test may avoid a replay of that devastating scenario by identifying the viruses earlier and with more accuracy," said Suarez.—By **Sharon Durham, ARS.**

This research is part of Animal Health, an ARS National Program (#103) described on the World Wide Web at <http://www.ars.usda.gov>.

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David Suarez, veterinary medical officer, and Suzanne DeBlois, biological science laboratory technician, prepare to load chicken tracheal swab samples into a real-time PCR machine.