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ON THE COVER Contrary to traditional
thinking, adding lengthier periods of
darkness to broiler lighting regimes actually
improves health and production
parameters. See story on page 14.
Quick and easy on-farm test for avian influenza in the works

When it comes to disease diagnostics, time is of the essence. And yet there is currently no commercial, on-farm detection technique for poultry diseases like avian influenza (AI).

University of Guelph engineering professor and Bionano Laboratory director Suresh Neethirajan is working on a solution that he estimates is about 18 months away from commercialization: an on-farm diagnostic tool that can quickly and easily identify the presence of AI using only a droplet of blood or small litter sample.

“Currently, we have to take oral swabs, or litter or blood samples and send to labs for testing and then wait for several days to get results,” Neethirajan explains. “With this new tool, farmers can do the test themselves and the wait time for results is down to just a few minutes.”

Once a test result is in, it is electronically stamped by the handheld diagnostic tool with date, time and collection location, and can be sent in real-time to veterinarians or other designated recipients. In an outbreak situation, quarantine can be implemented almost immediately.

The tool can differentiate between various AI strains. “It can be very challenging to differentiate between high pathogenic and low pathogenic avian influenza, but the developed biosensor lets farmers make that call,” Neethirajan says. “Low pathogenic happens frequently, but high pathogenic is very rare and we have to be prepared in terms of enhancing surveillance and biosecurity in the barn.”

Neethirajan has completed a variety of tests to ensure his diagnostic solution can be used at a low cost in what he calls low resource settings, like farms in remote locations.

He’s developed a paper-based biosensor where a small strip of paper is dipped in the blood or litter sample. It changes colour in only seconds based on the presence or absence of disease and with the help of a smartphone the user can detect what’s on the paper.

His technology is currently in the validation stage, including determining whether it can be integrated with other technologies in development, such as a vocalization project he’s also working on.

According to Neethirajan, poultry make different sounds at different frequencies depending on whether they’re cold, hot, thirsty, hungry, mating or not feeling well. Thus, he’s looking to see if the disease-diagnosing biosensor can read their signals to detect disease from the sounds instead of having to sample litter or blood.

Although many details surrounding the diagnostic technology are yet to be finalized, Neethirajan estimates the cost per paper-based test to be less than 50 cents each, and around $1.00 per test completed with the handheld device.

The testing module he’s developed for AI has also been adapted for Fowl Adrenal Virus and Coronavirus.

The Ontario Ministry of Agriculture, Food and Rural Affairs – University of Guelph Partnership, Poultry Industry Council, Canadian Poultry Research Council, Egg Farmers of Canada, Livestock Research Innovation Corporation, Natural Sciences and Engineering Research Council of Canada and Mitacs all support the project.

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Suresh Neethirajan in his lab at the University of Guelph.