

In search of PRRS-resilient pigs



Could a blood test be a predictor of susceptibility?

BY LILIAN SCHAER

IT'S ONE OF the most economically significant diseases in Canada's pig industry, causing losses at all production stages, but so far the search for a way to eliminate or minimize the impact of Porcine Reproductive Respiratory Syndrome (PRRS) has proven difficult.

Now, Prof. John Harding of the University of Saskatchewan is heading up a project supported by Ontario Pork that is looking at whether a very specific biomarker can be an indicator for resilience or susceptibility to PRRS in pigs.

Other project collaborators are from Queen's University and PigGen Canada, including three commercial Ontario hog farms.

CD163 is a molecule that has been linked to PRRS. It's available in two forms, bound receptor and soluble, and Harding is working to determine whether soluble CD163 (sCD163) in pigs can be used as a predictor of PRRS.

"CD163 is an important receptor on the surface of macrophages used by PRRS to establish infection. Soluble CD163 is the form found in blood that is a potential biomarker of various human and animal diseases or conditions," Harding explains. "Levels of sCD163 in blood rise and fall in response to inflammation and bacterial and viral infections."

There are seven domains on the molecule, he added, with domain five

being the one that binds to PRRS virus. Work by various researchers globally is looking at various approaches of either altering or removing domain five to influence PRRS susceptibility in pigs. Simply removing it may have unwanted consequences, he cautions.

"The molecule is required to eliminate hemoglobin from the body as it is broken down; it's toxic if it's broken down and you don't eliminate it," he says. "One of my concerns with just eliminating CD163 is I'm not aware of any other mechanism to remove hemoglobin from the body."

The main goal of Harding's current project, though, is to use existing and new blood samples to evaluate

CD163 as a blood biomarker. The theory is that sCD163 levels in serum before an animal gets sick or in response to infection may correlate to disease severity, making it an easily measured predictor of resilience.

There is currently no data about how sCD163 levels change in pigs during gestation or number of litters, or as they move through the nursery, growing and finishing stages. To establish the baseline sCD163 levels in healthy animals, blood samples are being collected and analyzed from high health status pigs on three Ontario farms.

To establish how sCD163 serum levels change post-infection, Harding's team will analyze deep phenotypes and blood samples from past respiratory and reproductive disease projects: the PRRS Pregnant Gilt Model at University of Saskatchewan and the PRRS Host Genetics Consortium project at Kansas State University.

"We will select a subset of animals from both of these projects, focusing on the really susceptible and resilient animals so we can correlate sCD163 serum levels with PRRS resilience," he explains.

Harding's work will also tie in with the PigGen Canada Natural Disease Challenge Model underway at the Centre de développement du porc du Québec inc. in Deschambault, Québec to correlate sCD163 levels with resilience to other infections beyond PRRS that are found in commercial barn settings.

To analyze all the samples, Harding's 18-month project has developed an in-house ELISA test for pigs using commercially available antibodies. Commercial ELISA kits for CD163 are available currently but, according to Harding, they are expensive and don't work well in pigs because they

are designed for human use.

"We want to provide a low cost, universally accessible ELISA protocol or assay to the swine industry," he says.

"PRRS control requires traditional and non-traditional approaches; biosecurity and vaccination only go so far," he adds. "We lack effective tools to predict disease resilience at

the individual animal and herd level. This could lead to future identification of genetic markers to select resilient pigs."

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