BREAKOUT SESSION 6: Swine Health and Genomics

Content and photos by Geoff Geddes

Part one: Genomics and Swine Health

Graham Plastow

It may be a poor icebreaker at most parties, but swine disease is a hot topic in the pork industry these days. So too is genomics, an area within genetics that concerns the sequencing and analysis of an organism's complete DNA. Thus it was only natural that the two subjects intersect as part of a research project, especially given the high cost of swine disease for commercial pig production. And who better to lead that project than Graham Plastow? As CEO of the Livestock Gentec Centre and a professor in the Department of Agricultural, Food and Nutritional Science at the University of Alberta, Plastow is a pioneer of the application of genomics in livestock. And when he talks about genomics and swine health, everybody listens.

With an international consortium led by Canadian researchers and industry partners, the Genome Canada project was launched in 2010. Its premise was that identifying genetic markers associated with animals performing well when exposed to disease should lead to tools that can improve swine health. Since Porcine Respiratory and Reproductive Syndrome (PRRS) and Porcine Circovirus Associated Diseases (PCVAD) were costing the industry $100 million a year, they seemed like a good place to start. Researchers aimed to provide new diagnostic tools for selecting pigs that are genetically less susceptible to PRRS and PCVAD.

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Over the next five years, the team identified individual variation in host response to infection with these two diseases in nursery pigs, and in fetal outcome after infection of pregnant gilts with PRRS. Among other things, they found several phenotypic factors and immune response mediators associated with viremia, weight gain and fetal outcomes, as well as litter size and reproductive performance. These factors can also help predict relevant traits such as growth and litter size after infection, antibody response after vaccination or infection, and sow lifetime productivity.

What they learned and what comes next

While they identified consistent results within disease models, the results appear to be disease specific. For diseases like PRRS (that now costs the U.S. over $650 million annually), this may not be an issue as the high economic impact justifies the expense of a genomic approach. But pigs are susceptible to many diseases, with one of the first symptoms for any pathogen being loss of appetite, and the resulting reduced growth can be a costly problem for producers. Interestingly, though, this project found that certain pigs are disease resilient, in that they are able to maintain their performance despite being infected. More importantly, it appears that this difference in how pigs react to disease can be identified in a blood sample and used to select for resilience. The next generation of studies will seek to establish whether developing more resilient pigs is possible.