Season 3, Episode 3: Genetic Resilience in Swine with Dr. Jack Dekkers

Dr. Jack Dekkers, Iowa State University, discusses genetic disease resilience in swine. Including ongoing research and how you can measure and anticipate disease resilience in your herd.

Defining resilience

Disease resilience is an animal's ability to maintain performance standards during a disease challenge. Resilience varies widely from one pig to another. A pig with greater resilience is better able to cope with disease and therefore recover more quickly. There is a definite genetic component to disease resilience. Dr. Jack Dekkers and his research group have dedicated their efforts to further narrowing down which genes are involved, as well as predictors genetic companies and commercial producers can measure to determine a pig's disease resilience. One disease Dr. Dekker's has evaluated extensively is Porcine Reproductive and Respiratory Syndrome (PRRS).

Research

A consortium of several genetic companies, with genetic nucleus herd production in Canada, is making an enormous effort to advance the understanding of disease resilience in the pork industry. The consortium is called [PigGen Canada](#) and includes seven genetics companies, Alliance Genetics, ALPHAGENE, DNA Genetics, Fast Genetics, Genesus Genetics, Hypor Canada and Topigs Canada. PigGen Canada has a test station set up in Quebec, where pigs undergo disease challenge. The research barns operate under a continuous flow system, every three weeks a new batch of pigs is brought in from one of the genetic suppliers. Each new batch is exposed to the older batch of pigs, therefore introducing disease to the naive group. The research objective is to determine predictable measures of disease resilience, even in healthy pigs, that can be utilized by genetic companies to select for resilience within nucleus herds. Another exciting collaborative project between Dr. Jason Ross's research group, Dr. Dekker's research group, and Topigs Norsvin is analyzing the genetic regions that make certain pigs more susceptible to pelvic organ prolapse (POP).

Identifying and quantifying

There are several factors that have been identified as predictors of disease resilience. Including genetic regions, blood parameters as well as feed intake data. Many genes are involved in disease resilience. Therefore, genetic companies cannot select from a single region. One region heavily involved is called the major histocompatibility complex (MHC). The MHC is part of the genome involved in the immune system. Blood samples can also be used to analyze several parameters related to disease resilience. Specifically, metabolite levels, gene expression and immune assays. There is also research underway examining the fecal microbiome as an indicator of disease resilience. Feed intake data can be used by producers and genetic companies to predict disease resilience. Pigs with more variation in day to day feed intake have been shown to be less resilient. A novel evaluation method is measurement of stress hormones in hair. Hair reflects the stress an animal was under while the hair was growing. Cutting hair at different time points during a disease challenge can help quantify levels of stress an animal was under. Disease has a costly impact on the pork industry, but disease resilience can improve outcomes of a disease challenge and subsequent treatments.

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