Australian Government
Department of Industry, Innovation and Science
Business Cooperative Research Centres Programme
Pork CRC
CRC for High Integrity Australian Pork

2B-103: Selection for disease resilience – Pilot study

Project Leader: Susanne Hermesch[1]

Project Participants: N. Sales[2], T. McKenna[3], C. R. Parke[3], M. M. Bauer[3]

[1]Animal Genetics and Breeding Unit |University of New England | Armidale NSW 2351
[2]Elizabeth Macarthur Agricultural Institute| Woodbridge Rd Menangle | Narellan NSW 2567
[3]University of Queensland|Gatton QLD 4343

Aims and Objectives:

The aims of this project were a) to develop procedures to record multiple weight measurements, immune parameters and disease incidence on farm, b) to develop an assay for haptoglobin, c) identify environmental factors and d) estimate heritabilities for immune and growth traits.

Key Findings:

A data set with 15 growth and 20 immune traits was developed for genetic analyses of disease resilience in pigs. These data were combined with all performance trait available to show that selection for direct and maternal genetic effects will influence growth in a similar pattern. Estimates of weekly batch quantify environmental influences. This random effect accounted for 11 to 59% of phenotypic variation for various growth traits, while heritabilities and common litter effects varied from 0.04 to 0.37 and from 0.02 to 0.33 for these traits. Most immune traits were moderately to highly heritable. There were 14 immune traits with moderate to high heritability estimates ranging from 0.20 to 0.68. Weekly batch accounted for most of the phenotypic variation for immunoglobulins and haptoglobin demonstrating that these measures are good indicators of herd health.

A scoring system for disease incidence was developed which provides an avenue to monitor incidence of specific diseases. The majority of mortalities (68%) occurred shortly after weaning while most treatments (57% of all treatments) were required for grower pigs. These medical interventions were often related to tail biting in this high-health herd.

Disease resilience was defined as a two-dimensional trait which requires information about prevalent infection challenge and performance of pigs when challenged by infection.

Measurements of air quality (temperature, humidity, carbon dioxide and ammonia) were collected in individual pens housing weaner, porker or finisher pigs. Considerable variation was found in the micro-environments of individual pens for these air quality measures.

Application to Industry :

Immune traits were recorded shortly after weaning. The moderate to high heritability estimates for these immune traits available early in life prior to selection of pigs offer opportunities for genetic improvement of health status of pigs.

Micro-environments within a shed can be easily monitored with simple and cost-effective air quality measures. A better monitoring system of air quality of individual pens will have positive effects for the health and welfare of pigs.

The scoring system for disease incidence can be used to monitor incidence of various diseases more precisely on farms. Adoption of this scoring system requires appropriate software and training to ensure consistency of scores among operators.

A measurement technique was developed for haptoglobin which is a good indicator of herd health.

Information required to define disease resilience was outlined at an industry workshop. So far, the project has resulted in 5 publications and 2 presentations available to industry.