

**Project 2B-106: Simple tests for immune responsiveness of sires and the association with piglet mortality**

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**Aims and Objectives:** The aim of this project was to develop a testing procedure to obtain immune competence phenotypes for mature boars, and to subsequently investigate if sire variation in immune competence was reflected by differences in the survival of their offspring (pre- and post- weaning), and/or potentially other performance attributes.

**Key Findings**

In this study we developed a commercially practical procedure to obtain immune competence phenotypes for mature boars. Boars were allocated into immune competence groups based on their relative rankings for humoral immunity (antibody production) and cell-mediated immunity (delayed-type hypersensitivity skin test). Immune grouping of boars was significantly ( $p=0.004$ ) associated with estimated breeding values for pre-weaning survival of piglets. This suggests that variation in immune competence of sires was transmitted to offspring, with impact on survival outcomes for piglets. There was no evidence for antagonistic associations between immune competence grouping of boars and genetic merit for other economically important traits.

**Application to Industry**

Direct selection for improved health and disease resistance attributes is difficult to achieve for pig breeding companies due to a lack of cost-effective measures, combined with high health status and extensive vaccination schedules of nucleus herds. These aspects limit opportunities to develop selection criteria based on standardised natural disease challenges. One alternative approach for animal breeding applications is to assess immune competence in selection candidates using measureable, heritable phenotypes generated by a model test procedure, for use as indirect selection criteria. These phenotypes must be obtainable in a commercial setting, where restrictions exist on the use of un-registered products to induce measurable immune responses, required to assess immune competence.

In this study, we successfully developed a model test procedure for measuring immune competence phenotypes of commercial boars, and demonstrated that immune competence grouping of these boars was associated with mortality outcomes of their progeny. Immune competence testing using the testing procedure developed here is therefore feasible in the Australian pig industry. Results from similar test procedures applied in other industries have demonstrated reduced incidence and severity of disease(s), as well as cost savings and production benefits for genotypes with high immune responsiveness. We recommend further work in the Australian pig industry to establish the potential gains from immune competence testing in nucleus pigs for health, welfare and production outcomes of their progeny.