

Pork CRC Initiatives February 2018

By Pork CRC CEO Dr Roger Campbell

CRC looks up genes to see what it can see

This month I will update you on three recently completed Pork CRC projects.

Two attempted to develop traits and techniques for disease resilience and progeny survival and one compared how swing sided farrowing pens and farrowing crates impact piglet survival and performance.

Fitting genes

There has been a chase globally for means of selecting pigs that are genetically more resilient to variation in the environment and disease challenge.

Progress has been slow because of the difficulty in measuring the relevant traits in enough pigs and getting adequate numbers across environments.

We do know that more feed efficient pigs seem to have greater resilience to disease challenge and that genomics is likely to help identify the relevant animals and progress a potentially big advance in disease management.

However, geneticists at AGBU, Armidale, NSW, have recently made good progress.

Resilience measure

Firstly, AGBU Associate Professor Susanne Hermesch and her colleagues globally reported in their results from Pork CRC Project 2B-105 ('Genetic parameters for health, survival, immune competence, post-weaning growth and disease resilience of pigs') that answers may lie in haematological traits and performance of pigs immediately after weaning (to five weeks of age). The two are related and the researchers suggest the main haematological traits are haptoglobin and white blood cell count. It appears they have something here and need more information linking these traits (haematological measure and performance to five weeks) to survival and performance to sale.

Immune tests

Secondly, Dr Kim Bunter from AGBU, working with scientists at CSIRO and Rivalea Australia within Pork CRC Project 2B-106 ('Simple tests for immune responsiveness of sires and the association with piglet mortality'), developed some simple tests which identified sires with significantly higher estimated breeding values (EBVs) for pre weaning survival.

The project aimed 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.

The researchers 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).

Great outcome

The researchers found that immune grouping of boars was significantly ($p=0.004$) associated with EBVs for pre-weaning survival of piglets, suggesting 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.

They concluded that immune competence testing, using the testing procedure developed, was feasible in the Australian pig industry. Results from similar test procedures applied in other industries have demonstrated reduced incidence and severity of disease(s), plus cost savings and production benefits for genotypes with high immune responsiveness.

I think it's an important outcome and combined with the results of Pork CRC Project 2B-105 suggest we may be getting closer to genetic means of improving animal health and reducing our reliance on antibiotics. Details of both projects are included in the final reports on Pork CRC's website – both represent excellence in science and have commercial implications. Well worth reading.

To discuss the implications further, contact Kim Bunter (2B-106) or Susanne Hermes (2B-105).

Reducing confinement

The most recent research report on alternatives to farrowing crates is Pork CRC Project 1A-110.

In 1A-110, Dr William van Wettere from University of Adelaide and his colleagues from SunPork Farms SA, investigated the survival and performance of piglets under different management systems in swing sided farrowing pens. They compared these with moving sows and litters from farrowing crates to single litter pens at day seven and with sows and litters housed in farrowing crates throughout lactation.

Swing sided pens, which enable one side to be opened at any time, giving the sow and litter more freedom, have been promoted by the Danes and others during the past three years, although their practicality and welfare implications remain questionable.

The three swing sided pen treatments investigated in the study were: pens closed from entry to farrowing house to day seven; pens closed from day before farrowing to day seven; pens remained open to day seven and throughout lactation.

The work was conducted in commercial research facilities and was one of the largest scale studies of its type ever conducted. Weaning age averaged 26 days and average sow parity was 3.3.

In summary (**Table 1**), leaving the swing sided pens open through lactation resulted in significantly higher preweaning mortality than all other treatments, with farrowing crates having the lowest mortality. Piglet losses in the open pen system were three times higher than in farrowing crates.

Results are similar to those of previous studies in the same farrowing pens, clearly showing that leaving pens open during farrowing can result in extremely high piglet losses. In this study, piglet losses were higher in the open system throughout lactation. The higher mortality in the swing sided pens closed to day seven suggests there may be a design fault, which is common with any of these types of systems. The results confirm that freedom type farrowing pens, especially if left open in early lactation, can have severe adverse effects on piglet welfare and sow productivity.

Details of the pens and other outcomes are included in the report on Pork CRC's website – well worth reading, it also covers the effects of systems/treatments on piglet growth performance and subsequent reproduction and how all are affected by season (summer and winter). Piglet mortality

across the housing treatments was not affected by season, but aspects of reproduction were. Some of the seasonal effects are shown in **Table 2**.

Table 1 – effects of housing during farrowing and lactation on piglet losses to weaning (day 26)

Treatment	Crate	Crate to Pen	SSP closed to day 7	SSP closed day-1 to day 7	SSP open
Replicates	145	121	118	112	112
Born alive	11.2	11.5	11.3	10.9	10.8
Piglet losses (n/litter)	1.19 ^a	1.33 ^{ab}	1.73 ^b	1.71 ^b	3.46 ^c
Number weaned	9.8 ^a	9.4 ^{ab}	9.2 ^b	9.3 ^b	7.9 ^c

SSP - swing sided farrowing pen, abc treatment means with different superscript letters are significantly different (P<0.05)

Table 2 Experimental period and subsequent reproduction of sows that farrowed and lactated during summer or winter

Performance indicator/Season	Winter	Summer
Experimental period		
Total born	12.16	12.15
Born alive	11.05	11.28
Piglet losses to weaning (n/litter)	2.03 ^b	1.63 ^a
Weaned	9.0	9.3
Subsequent		
Weaned sows mated (%)	84	90
Farrowing rate of those mated (%)	85	85
Sows farrowing a second litter	71 ^b	76 ^a
Total born	13.57 ^a	12.43 ^b
Born alive	12.54	11.62

a,b means with a different superscript letter are significantly different (P<0.05)

Next month I will cover where we sit globally on cost and productivity and where we need to improve to become a force in the global pork industry. I think we're getting closer, but let's see if you agree.

To give you a taste of what's to come, I can tell you that I believe we are globally competitive in herd feed efficiency, measured as total feed used divided by total carcass weight produced/sold. The bad news is that it might be difficult to tease out the cause of high HFC i.e. a value above 3.8.

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