



Established and supported under the Australian Government's Cooperative Research Centres Program



## Pork CRC Research Summary

### Project Number & Title:

2D-101 Management strategies to improve the growth performance of gilt progeny

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**Background:** The progeny born to gilts (first parity sows) have been found to be lighter at birth and weaning compared to the progeny from older parity sows. Post-weaning, gilt progeny grow slower and tend to be more susceptible to disease with higher rates of medication and mortality compared to sow progeny. The aim of this project was to identify risk factors for the relatively poor growth and survival of gilt progeny compared to older parity sow progeny with particular emphasis on identifying the roles of weaning weight, pathogen carriage and immune responsiveness

**Methodology:** Four main experiments were conducted during this project:

**Experiment 1 - Supplemental milk trial** - In winter, supplemental full cream milk (SM) was provided to gilt and sow litters during the 4 week lactation (40 gilt and 40 sow litters with SM and the same number of litters without SM). Piglet performance (weights, medications, mortality) was recorded from birth to 10 weeks of age. This experiment was repeated in summer.

**Experiment 2 - Deuterium oxide trial** - During the summer replicate of Experiment 1, milk yield of 11 gilt and 11 sow litters were determined using the deuterium oxide dilution technique. This was conducted over 3 two-day measurement periods (7-9, 14-16, 21-23 days of lactation).

**Experiment 3 - Lawsonia trial** - *Lawsonia intracellularis* (LI) was used as a model including 60 sows and 60 gilts (with equal numbers of seropositive and seronegative dams). Dam faecal samples were collected at 7, 14 and 21 days lactation for LI-PCR. Colostrum (day 0) and milk (day 14) samples were collected for LI-antibodies. Piglet serum samples collected at 4, 8, 12, 16, and 20 weeks of age for LI-antibodies. Weights were collected for piglets at 4, 10, 16, and 22 weeks of age.

**Experiment 4 - Immunity and cross-fostering trial** - 64 gilts and 64 sows were vaccinated with Tetanus toxoid 7 and 4 wks before farrowing. Blood was collected pre-vaccination and 2 wks after 2<sup>nd</sup> vaccination. Piglets were cross-fostered at birth to create 16 gilt and 16 sow litters each containing 5 gilt-born and 5 sow-born piglets. Piglet performance was recorded at birth, 4, 10, 16, and 22 weeks of age. 3 gilt-born and 3 sow-born piglets per litter were blood sampled at 2, 4, and 7 wks of age to measure innate and adaptive immune responses related to birth/rearing dam parity

### Key Findings/Conclusions:

- Piglet birthweight, piglet milk intake and dam-immunity transferred from gilts compared to older parity sows were identified as the main risk factors for the poor growth and survival of gilt progeny.
- Immaturity of the gilts at the time of first farrowing and lactation is likely to be the main reason for lower gilt progeny birth weight since nutrients are partitioned to support their own growth as well as that of the foetuses. This similarly affects potential milk yield along with a lower initial quantity of mammary tissue in gilts compared to sows who remodel tissue from previous lactations.
- There were no apparent immune responsiveness deficiencies identified among gilts or their progeny, however gilts appeared to have a reduced ability to transfer antibodies from serum to colostrum relative to sows. More research focussed on improving gilt exposure to farm-specific pathogens is likely to improve the growth performance of gilt progeny

### Potential Users of Information (including value assessment):

The key audience for this information is pig producers. Management strategies to reduce disease susceptibility among gilt progeny, including increased exposure of their dams, modified vaccination strategies and segregated rearing will reduce medication costs and improve growth performance

