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The induction of a fertile oestrus in lactating sows and the subsequent effect mating in lactation has on oocyte quality and embryo survival

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ABSTRACT

The ability to stimulate a fertile oestrus during lactation provides an opportunity to increase piglet weaning age whilst maintaining 2.4 litters per sow per year. Determining the optimal time and method to induce lactation oestrus in the sow as well as ensuring subsequent reproductive outcomes are not negatively affected are vital for the commercial adoption of lactation oestrus systems. Research reported in this thesis investigated firstly, the stimulation of a fertile oestrus early in the post partum period, and secondly, the effect of boar contact and split-weaning in late lactation on oocyte quality, early embryo development and embryonic gene expression. Experiment one demonstrated that the provision of full daily boar contact from day 7 post parturition resulted in a significantly higher proportion of sows expressing lactation oestrus within 26 days of farrowing compared to sows that received no boar contact. Of sows mated within 26 days of farrowing, there was no effect of boar contact or weaning at 7 days on number of piglets born in the subsequent litter. Experiment 2 followed on from a previous study which demonstrated improvements in subsequent litter size when sows had a portion of their litter weaned (split-weaned) prior to mating in lactation. We demonstrated that reducing litter size from 11 to 7 piglets on day 18 of lactation did not increase in the percentage of ova fertilised *in vitro* or the percentage of ova that developed to blastocyst stage from sows slaughtered on day 21 post parturition. Follicular fluid concentrations of oestradiol were higher in split-weaned sows; however, the capacity of the collected follicular fluid to support *in vitro* maturation of pre-pubertal oocytes was unaffected by suckled litter size. Blastocyst development rates were lower for sows which lost > 5% compared to < 5 % of their body weight from day one to 21 post parturition. Sows split-weaned on day 18 post parturition, mated in lactation and slaughtered on day 30 of gestation had higher embryo survival compared to sows split-weaned at oestrus or suckling a full litter

for the duration of lactation. Split-weaning either on day 18 of lactation or at the first detection of lactation oestrus resulted in higher pregnancy rates and heavier embryos compared to sows suckling a full litter of piglets. Split-weaning resulted in minimal differences in gene expression of day six *in vitro* produced embryos or day 30 *in vivo* produced embryos. Overall, this thesis demonstrates that boar contact is an effective stimulant of lactation oestrus in multiparous sows and reducing the litter size prior to mating in lactation and minimising sow weight loss over lactation is beneficial to the subsequent litter.

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LIST OF PUBLICATIONS ARISING FROM THE THESIS

Refereed scientific journal publications

Weaver, A. C., Kind, K. L., Terry, R., van Wettere, W. H. E.J., 2014. Effects of lactation length and boar contact in early lactation on expression of oestrus in multiparous sows. *Animal Reproduction Science*, *149*(3), 238-244.

Refereed conference publications

Weaver, A.C., Kind, K.L., Terry, R., van Wettere, W.H.E.J., 2012. Effect of lactation and boar exposure during early lactation on expression of oestrus in multiparous sows. *Reproduction in Domestic Animals Supplement.* 47, 556-556.

Weaver, A.C., Kind, K.L., Foxcroft, G.R., Dyck, M.K., Tsoi, S., van Wettere, W.H.E.J., 2013. Split-weaning increases subsequent embryo survival of sows mated in lactation. In 'Manipulating Pig Production XIV', p.133, eds. J.R. Pluske and J.M. Pluske, (Australian Pig Science Association: Werribee).

Weaver, A.C., Kind, K.L., Foxcroft, G.R., Dyck, M.K., Tsoi, S., van Wettere, W.H.E.J., 2013. Effect of split-weaning on subsequent blastocyst development rates *in vitro* and embryonic gene expression. In 'Manipulating Pig Production XIV', p.213, eds. J.R. Pluske and J.M. Pluske, (Australian Pig Science Association: Werribee).

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Weaver, A.C., Kind, K.L., Kelly, J.M., van Wettere, W.H.E.J., 2015. Oocyte quality and embryo survival are impaired when sows mated in lactation lose more than five percent of their body weight. *Animal Production Science*, *55*(12), 1506-1506.

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