

Managing the lactating sow to stimulate lactation ovulation

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Bachelor of Science (Agricultural Science) with First Class Honours

A thesis submitted in total fulfilment of the requirements for the degree of

Doctor of Philosophy

School of Animal and Veterinary Sciences

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Roseworthy, South Australia

Australia

July 2015

ABSTRACT

In lactation, sows are typically anoestrus, with ovulation occurring three to seven days after weaning at approximately 24 days post-partum. Increasing piglet age to greater than 28 days improves piglet performance and welfare; however, it also results in reduced sow farrowing frequencies, making the commercial adoption of increasing piglet weaning age unsustainable. Stimulating a sow to ovulate in lactation represents a solution as it enables lactation length to be increased whilst maintaining reproductive efficiencies.

The aims of the research reported in this thesis were to investigate mechanisms to reliably stimulate a lactation oestrus in multiparous and primiparous sows. Secondly, to determine the effect of these strategies on piglet growth, subsequent pregnancy rate, farrowing rate and litter size. The mechanisms investigated were focused on: reducing the suckling input to the sow through split weaning or low-confinement alternative lactation housing; and fence, or full physical, boar exposure.

The importance of a reduced suckling input was demonstrated in Chapter Two. The proportion of sows expressing a lactation oestrus increased as the number of piglets weaned on day 18 of lactation increased from zero, three, five to seven. Additionally, early weaning did not compromise growth of the split weaned piglets, with both early and late weaned piglets experiencing similar body weights by day 40 of age.

Chapter Three evaluated the effect of full physical boar exposure commencing at day 10, 14 or 18 postpartum on the incidence of lactation oestrus in primiparous and multiparous sows. A high proportion of multiparous sows expressed a lactation oestrus in response to boar exposure compared to first parity sows; however, the summer months impacted this expression. No benefits of commencing boar exposure before day 18 post-partum on lactation oestrus expression were observed.

Chapter Four coupled full physical boar exposure with split weaning of piglets at day 18 postpartum within a commercial piggery. Boar exposure was effective at stimulating a lactation oestrus in multiparous sows whereas primiparous sows require, in addition to boar exposure, a reduction in suckled litter size. A high incidence (24%) of lactating multiparous sows that received no stimulation spontaneously ovulated before weaning resulting in a prolonged weaning to oestrus interval. These results suggest that for the modern sow, weaning is not necessary for ovulation. Lastly, Chapter Five demonstrated that low confinement lactation housing from seven days postpartum, in combination with fence line boar exposure, was not sufficient to stimulate a lactation oestrus.

Overall, split weaning to seven piglets in conjunction with physical boar exposure resulted in the highest proportion of lactation oestrus expression with this response greater in multiparous sows than primiparous sows. Season affected the proportion of lactation oestrus expression, and this requires further investigation. Furthermore, the incidence of spontaneous ovulation during lactation suggests that the inhibition of LH release during lactation is less severe in modern genotypes. In conclusion, this thesis has demonstrated that boar exposure effectively stimulates lactation oestrus

with a further increase observed when a distinct reduction in the suckling stimulus has occurred, particularly in the multiparous sow.

DECLARATION

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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Robyn Terry

ACKNOWLEDGEMENTS

I decided to undertake my PhD within the pig industry as I saw it as my way into a career in agriculture. Over the course of my PhD I have learnt so much which has transpired into my current position as the Research and Innovation Manager of Production Innovation with Australian Pork Limited. However, I could not have gotten to that point without the continual guidance and support of the Pork Cooperative Research Centre for High Integrity Australian Pork, namely Dr Roger Campbell, and my supervisors Dr Karen Kind and Dr William van Wettere.

Of course you can't complete a PhD without a little help from your friends and family. To Alice Weaver and Michael Wilkes I am truly in your debt for your unwavering support and friendship and for keeping me laughing in the good times and the bad. To my family, thank you for your encouragement and help along the way, especially with the labelling of what seemed like endless amounts of Eppendorf tubes. A special mention to my sister and brother-in-law, Lisa and Daniel, who allowed me to share their house and family whilst on a student budget. A debt that I will never be able to re-pay to you both – unless you're both homeless. To my partner, Ern, you are the best support I could ever hope for. Thank you for pushing me to do things I didn't think I could and, for always believing in me, especially when I didn't.

A PhD was a learning curve from my honours degree, which was a learning curve from my undergraduate degree. So it goes without saying that working at Australian Pork Limited has been another learning curve. So lastly, thank you to Dr Darryl D'Souza, the R&I team and APL for allowing me time to write up my thesis whilst working.

LIST OF PUBLICATIONS ARISING FROM THE THESIS

Refereed scientific journal publications

Terry R, Kind KL, Hughes PE, Kennaway DJ, Herde PJ, van Wettere WHEJ (2013) Split weaning increases the incidence of lactation oestrus in boar-exposed sows. *Animal Reproduction Science* **142**, 48-55.

Terry R, Kind KL, Weaver AC, Hughes PE, van Wettere HEJ (2015) Optimal timing of boar exposure relative to parturition for stimulation of lactation oestrus. *Livestock Science* **177**, 181-188.

Terry R, Kind KL, Lines DS, Kennett TE, Hughes PE, van Wettere WHEJ (2014) Lactation estrus induction in multi- and primiparous sows in an Australian commercial pork production system. *Journal of Animal Science* **92**, 2265-2274.

Refereed conference publications

Terry R, Kind KL, Hughes PE, van Wettere WHEJ (2011) The effect of split weaning on piglet growth. In "Manipulating Pig Production XIII", p. 209, ed. R.J. van Barneveld, (Australian Pig Science Association: Werribee).

Terry R, Kind KL, Hughes PE, van Wettere WHEJ (2011) The effect of split weaning and boar contact on the incidence of sow lactational oestrus. In 'Manipulating Pig Production XIII', p. 210, ed. R.J. van Barneveld, (Australian Pig Science Association: Werribee).

Terry R, Kind K, Weaver A, van Wettere W (2012) Boar contact is an effective stimulant of lactation oestrus. *Reproduction in Domestic Animals Supplement*. **47**, 556-556.

Terry R, Kind KL, Lines DS, Kennett TE, Hughes PE, van Wettere WHEJ (2013) Boar exposure and split weaning used in a commercial herd to induce oestrus in lactation. In 'Manipulating Pig

Production XIV', p. 210, eds. J.R. Pluske and J.M. Pluske, (Australian Pig Science Association: Werribee).

Terry R, Kind KL, Lines DS, Kennett TE, Hughes PE, van Wettere WHEJ. Boar contact, parity and suckled litter size affect lactation oestrus: a commercial study. In '*9th International Conference on Pig Reproduction*', 2013, Olsztyn, Poland, p. 134.

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