INDUCTION OF OESTRUS IN LACTATING SOWS

Report prepared for the

Co-operative Research Centre for an Internationally Competitive Pork Industry

By

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Executive Summary

A previous study (Downing *et al.,* 2007) provided 'proof-of-concept' that oestrus can be induced during lactation using an injection of gonadotrophins (PG 600 : Intervet) at 19-24 days after parturition, combined with boar exposure and piglet separation for 16 h each day until mating.

The objectives of this project were threefold:

1. Trial the concept under commercial practice
2. Test the hypothesis that induction of oestrus during lactation and postponing weaning age to 35 days has no effect on subsequent mating and farrowing performance when compared with a cohort of sows weaned at 20 days after farrowing.
3. Test the hypothesis that postponing weaning to 35 days after farrowing will increase piglet weight at weaning and increase growth at 70 days of age when compared to a cohort of piglets weaned at 20 days after farrowing

The study was conducted at QAF Meat Industries, Corowa, NSW with 46 multiparous sows maintained in conventional farrowing crates and housed in the same room. At 20 days after parturition the sows were treated with either an injection of PG 600 combined with boar exposure and piglet separation from 1600 to 0800 hours each day until mating by AI; or sows were weaned into dry-sow stalls, combined with boar exposure each day until mating by AI. Piglet separation on induced sows ceased after AI. The piglets remained on each induced sow until weaning at 35 days after farrowing.

At 35 days after farrowing, all sows were housed as one group in straw-based accommodation. Pregnancy was confirmed at 40 days after mating by ultrasound. All pregnant sows were farrowed subsequently as one group in the same room.

Project outcomes were as follows:

- The study confirmed that the previous findings by Downing *et al*. (2007) were repeatable under commercial conditions
- Induction of oestrus at 24-25 days after farrowing and postponing weaning age to 35 days had no effect on subsequent mating and farrowing performance
- Out of 23 sows allocated to each treatment, 87% of sows were mated within a mean of 4.3 days resulting in a subsequent farrowing rate of 65% and an average of 11.3 piglets born alive per sow
- Although postponing weaning age to 35 days increased mean piglet weight by 0.9 kg, this weight advantage was not maintained to 70 days of age

Implications of this project for the Australian pig industry are as follows:

- This new sow strategy uncouples weaning from reproduction in the sow, transfers mating activity to the farrowing crate and allows weaning age to be increased without compromising subsequent farrowing performance
- We are confident this new sow strategy can be used to induce oestrus at 20-21 days after farrowing with the potential to reduce non-productive sow days and provide an additional two piglets per sow per year
- Ease of adoption by industry is likely to be 60% because of the commercial availability of PG 600, the minor change required to farrowing accommodation to enable piglet separation for 4-5 days and the application of AI to sows housed in farrowing crates

We now know that oestrus can be induced during lactation at 24-25 days after farrowing with no effect on subsequent farrowing performance. A further study is recommended to see if it is possible to induce oestrus at 20-21 days after farrowing to further reduce non-productive sow days.

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1. Introduction

The idea of inducing oestrus in the sow during lactation is not new. Studies over the last 50 years (reviewed by Armstrong *et al.,* 1999) have produced conflicting results when gonadotrophins were used during lactation to promote follicular growth and induce ovulation. We speculated that these strategies were unsuccessful because unrestricted suckling activity for 24 h per day limits the release of lutenising hormone, which restricts gonadotrophin support for the final stages of follicle maturation and oestradiol production.

A previous study (Downing *et al.* 2007) however, with only eight sows provided 'proof-of-concept' that oestrus can be induced during lactation using an injection of gonadotrophin at 19-24 days after parturition, combined with boar exposure and piglet separation for 16 h each day until mating.

This finding provided an opportunity to uncouple weaning from reproduction in the sow. If this new sow strategy is feasible in commercial practice it should be possible to delay weaning to increase piglet weight at weaning with subsequent benefits in piglet growth and/or health.

The objectives of this project were threefold:

- Trial the concept under commercial practice;
- Test the hypothesis that induction of oestrus during lactation has no effect on subsequent mating and farrowing performance when compared with a cohort of sows weaned at 20 days after farrowing, and;
- Test the hypothesis that postponing weaning to 35 days after farrowing will increase piglet weight at weaning and increase growth at 70 days of age when compared to a cohort of piglets weaned at 20 days after farrowing.

2. Methodology

Forty six Large White x Landrace PrimeGro™ Genetics FI multiparous sows were allocated at random on the basis of parity at 20 ± 1.8 (mean ± SD) days after parturition to two treatments: either an intramuscular injection with 400 I.U. of PMSG + 200 I.U. of hCG (PG 600; Intervet), combined with boar exposure at 0730 and 1530 h and piglet separation from 1600 to 0800 h each day until mating by AI; or weaned, combined with boar exposure each day until mating by AI.

The sows were housed in conventional farrowing crates in the same room at QAF Meat Industries, Corowa, NSW. Litter size was standardized at 11.4 ± 0.54 piglets per sow. Each sow had voluntary access to a commercial, lactating sow diet and water was provided from a nipple drinker in each crate. Piglets were provided with supplementary heating and a nipple drinker in each farrowing pen. Sows which were weaned at 20 days after farrowing were housed in conventional dry-sow stalls.

Piglets on each induced sow were separated to the adjacent farrowing pen vacated by a weaned sow and piglets. Piglet separation ceased after artificial insemination and the piglets remained on each induced sow until weaning at 35 days after farrowing.

All piglets had voluntary access to a commercial creep diet from 20 days after farrowing. Following weaning, piglets were housed in 28 separate-sex

groups of 15 pigs per pen with supplementary heating. Live weight was recorded in all piglets at 20, 35 and 70 days post-partum.

At 35 days after farrowing, all mated sows were housed as one group in straw-based accommodation. Pregnancy was confirmed at 40 days after mating by ultrasound. All pregnant sows were farrowed subsequently as one group in the same room.

Induction to mating interval and piglets born alive were analysed by Student's t-test using the sow as the statistical unit. The difference between proportional measures for sows confirmed pregnant and sows farrowed was tested using Chi-square analysis.

The difference in mean piglet live weight at 20, 35 and 70 days post-partum was assessed by analysis of variance using the pen as the statistical unit. The difference between treatments in the number of piglet deaths and piglets removed from trial was not analysed due to confounding associated with differences in housing (farrowing crate versus weaner pen) and air space per pig.

3. Outcomes

i) Mating and farrowing performance

The mating and subsequent farrowing results are presented in Table 1.

Table 1. *Mean (± SE) mating and subsequent farrowing performance of 46 multiparous sows either induced[1] during lactation or weaned at 20 days after parturition and mated by artificial insemination.*

Measurement	Induced	Weaned	P
Mating performance			
Sows mated within 7 days	20	20	-
Induction to mating interval (days)	4.4 ± 0.1	4.2 ± 0.1	0.176
Sows confirmed pregnant after 40 days	19	16	0.267; X^2 1.23
Farrowing performance			
Sows farrowed	16	14	0.465; X^2 0.53
Piglets born alive per sow	11.9 ± 0.7	10.6 ± 0.7	0.194

[1]Injection PG 600 combined with boar exposure and piglet separation (1600-0800 h) each day until mating.

There was no significant difference in either mating or subsequent farrowing performance between sows induced during lactation or weaned at 20 days after parturition. Out of 23 sows allocated to each treatment, 87% of sows were mated

within 4.3 days resulting in a subsequent farrowing rate of 65% and an average of 11.3 piglets born alive per sow.

Cessation of piglet separation at 24-25 days after farrowing and postponing weaning until piglets were 35 days of age had no effect on subsequent pregnancy rate or farrowing performance when compared to a cohort of sows weaned at 20 days post-partum.

ii). Piglet performance

Piglet performance from 20 to 70 days post-partum is presented in Table 2.

Table 2. *Mean (± SE) performance of piglets derived from 46 sows which were either induced[1] during lactation or weaned[2] at 20 days after parturition*

Measurement	Induced	Weaned	P
Piglet live weight			
Day 20 (kg)	5.9 ± 0.2	5.7 ± 0.3	0.66
Day 35 (kg)	8.8 ± 0.5	7.9 ± 0.4	0.11
Day 70 (kg)	26.8 ± 0.8	28.1 ± 0.9	0.33
Piglet deaths			
21-35 days	2	3	
36-70 days	5	1	
Piglet removals[3]			
21-35 days	7	10	
36-70 days	7	1	

[1]Injection PG 600 combined with boar exposure and piglet separation (1600-0800 h) each day until mating by AI. Piglet separation ceased after AI and piglets remained on each induced sow until weaning at 35 days after parturition.

[2]Weaned piglets from induced and weaned sows were housed in the same room in 28 separate-sex groups of 15 pigs per pen.

[3]Includes piglet deaths and piglets removed from trial.

There was a non-significant trend (P=0.11) for piglets which remained on induced sows to be 0.9 kg heavier at 35 days of age compared to piglets weaned previously – see Table 2. However, this live weight advantage for induced piglets at day 35 was not maintained to 70 days of age.

Although piglet feed intake was not recorded in this study, it appears that piglet separation between injection of PG 600 and mating was insufficient to increase intake of creep feed. We speculate that once piglet separation ceased,

piglets continued to consume their dam's milk in preference to creep feed. Hence, the growth of piglets was checked following weaning at 35 days of age and the live weight advantage at day 35 was not maintained to day 70.

A similar number of piglets of piglets were removed from trial for the induced (14 piglets) and weaned treatment (11 piglets).

No information was recorded on antibiotic treatment of piglets in each treatment.

4. Application of Research

This new sow strategy has the potential to reduce non-productive days in the breeding herd. An opportunity now exists to see if it is possible to inject PG 600 earlier than 20 days after parturition. We are confident oestrus can be induced during lactation at 20-21 days post-partum. The deliverable will be a reduction in non-productive period by 10 days per reproductive cycle for sows weaned at 26 days post-partum; and 7 days for sows weaned at 23 days after farrowing. Potential benefits include an additional two piglets per sow per year. We estimate this benefit alone will increase industry profitability by 10%.

Ease of adoption by industry is likely to be 60% because of the commercial availability of PG 600, the minor change required to farrowing accommodation to enable piglet separation for 4-5 days and the application of AI to sows housed in farrowing crates.

This new sow strategy allows for flexibility in when to wean without compromising the number of litters per sow per year. However, it appears from the current study that piglet separation for 16 h per day for 4-5 days only from injection of PG 600 until mating was insufficient to increase creep feed intake and reduce the growth check following weaning at 35 days of age. Recent research conducted in the Netherlands (Berkeveld *et al*., 2007) suggests that piglet separation is required each day from day 20 until weaning at day 35 (or later) to increase creep feed intake and limit the growth check following weaning.

Despite a reduction in weaning growth check, Berkeveld and co-workers found that postponing weaning and subjecting piglets to a prolonged period of intermittent suckling did not improve subsequent piglet growth when compared to conventional weaning. This conclusion is similar to the findings from the current study. However, Berkeveld *et al*. (2007) suggests that an intermittent suckling regime will reduce the potential risk of post-weaning diarrhea and the need to treat piglets with antibiotics.

5. Conclusion

This new sow strategy confirms the previous findings of Downing *et al.* (2007), uncouples weaning from reproduction in the sow, transfers mating activity to the farrowing crate and allows weaning age to be increased without compromising subsequent farrowing performance.

The strategy has the potential to reduce non-productive days in the breeding herd. We are confident oestrus can be induced during lactation at 20-21 days post-partum resulting in an additional two piglets per sow per year.

6. Limitations/Risks

We now know that oestrus can be induced during lactation at 24-25 days post-partum. Application of this new technology to industry requires a further study to see if it is possible to induce oestrus at 20-21 days after parturition to reduce non-productive sow days.

7. Recommendations

As a result of the outcomes from this project we recommend a further study to answer the following questions:

- Is it possible to inject PG 600 earlier than 20 days post-partum to reduce non-productive sow days?
- Can the period of piglet separation and the timing of this separation be reduced?

8. References

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