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Pork CRC Research Summary

5A-101. Improving sow reproductive output through dietary manipulation in late lactation.

Project Leader: Professor Paul Hughes

Background:

There is now a wide body of evidence to show that sows place the highest priority on milk production during lactation & will normally attempt to maximise the output of milk nutrients for their offspring regardless of maternal nutrient intake. Hence, in many situations lactating sows are compelled to rapidly mobilise maternal tissue to provide substrates for milk production to compensate for deficiencies in lactation feed intake. Even so, in many first lactation sows the rate at which they catabolise their own body reserves is not fast enough to prevent reductions in milk nutrient output. The literature suggests that those sows that are forced to mobilise maternal tissue at or near the maximum rate are most at risk of reproductive failure post-weaning (see Thaker & Bilkei, 2005). This effect is particularly noticeable in late lactation when the quality (& possibly number) of oocytes to be released at the post-weaning ovulation is determined. This study asked two questions:

1. How nutrient intake can be increased in late lactation when the sow would normally already be on an *ad libitum* or high allowance regimen.
2. Will any additional nutrient intake in late lactation actually be partitioned to maternal tissue (hence benefitting oocyte development & quality) or will it simply enhance late lactation output.

Methodology:

This study used 36 sows allocated to one of three treatments. Two treatment groups of sows were fed 4 kg/day of a standard lactating sow diet throughout a 24 day lactation while a third positive control group were fed 6 kg/day throughout lactation. One treatment group receiving 4kg/day of feed was also given a daily supplement of 1 kg/d of a top dressing (comprising a mixture of glycerine, sugars, starches, oils & quality proteins) for the last 7 days of the lactation. To assess the impact of the feed intake & dietary supplement on the sow's lactation, milk samples were collected from each sow on days -7, -3 & -1 pre-weaning. After weaning all sows were checked twice daily for oestrus in the presence of a boar. At detection of oestrus sows were slaughtered & oocytes harvested from their ovaries. The size of the presumptive ovulatory follicle pool was counted and the oocytes aspirated from these follicles were matured *in vitro* to assess their developmental competence and ability to progress through the early stages of embryonic development. Specifically, aspirated oocytes were matured *in vitro* for 44 hours (IVM), at which point the number and proportion of oocytes at each stage of meiosis were determined and recorded. Those oocytes reaching metaphase II were fertilised *in vitro* (IVF) and the stage of embryonic development achieved after 7 days of *in vitro* culture recorded.

Key Findings/Conclusions:

Contrary to the available literature, this study demonstrated that either:

- 1) oocyte developmental competence, as measured by blastocyst formation *in vitro*, is impaired by high level feeding during late lactation
- 2) or alternatively, that blastocyst development is not impaired by restrictive feeding.

We conclude that either

- 1) feeding level in late lactation does not affect litter size via changes in oocyte development,
- 2) or that the current measure of oocyte development is not appropriate.

The major benefit of additional nutrients for the lactating sow in late lactation appears to be enhanced milk output.

Potential Users of Information (including value assessment):

Unfortunately, this study failed to identify a commercial outcome. The main users of these findings will be reproduction research scientists.