

# Improving the oocyte quality of gilts by feeding high fibre diets

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## INTRODUCTION

In female pigs, including high levels of sugar beet pulp in pre-mating diets has been shown to alter circulating concentrations of gonadotrophins and improve oocyte quality (Ferguson *et al* 2007). Sugar beet pulp is not readily available in Australia, therefore, this study examined the effects of feeding gilts either a standard finisher diet (Control) or one of two high fibre diets (Wheat Bran (50%) or Lupins (35%) as the fibre source) on oocyte developmental competence and circulating concentrations of reproductive hormones.

## HYPOTHESIS

Both high fibre diets will increase the proportion of oocytes which reach metaphase II *in vitro* and alter circulating luteinising hormone (LH) and oestradiol.

## EXPERIMENTAL DESIGN & METHODS

- 54 Large White cross terminal line pre-pubertal gilts (133 days of age) were selected and allocated to one of three treatment groups (Control, High fibre 1 – Bran, or High fibre 2 – Lupin).
- At 154 days of age puberty was stimulated using a combination of PG600 and daily boar contact.
- On day 18 of the first oestrous cycle, blood samples were taken every 15 minutes for 10 hours.
- On day 19, gilts were slaughtered and ovaries and reproductive tracts were collected and taken back to the laboratory.
- Follicles were measured and reproductive tract and ovaries were weighed.
- The 15 largest follicles across both ovaries were aspirated and placed into *in vitro* maturation media.
- After 44 hours, oocytes were stained and assessed for nuclear maturation.



## RESULTS

- At slaughter, lupin gilts were significantly heavier than bran fed gilt while control fed gilts had significantly higher P2 backfat than both lupin and bran fed gilts.
- Mean days to puberty after PG600 injection was not significantly different between treatments.
- There were no significant differences in ovary morphology, follicle distribution or uterine weight.
- Lupin fed gilts had a higher proportion of oocytes at MII than both control and bran fed gilts,  $88.89 \pm 4.8$  versus  $71.55 \pm 4.64$  and  $65.43 \pm 4.8$  respectively (Figure 1).
- There was no effect of diet on circulating concentrations of oestradiol, mean or basal LH, or the number of LH pulses.

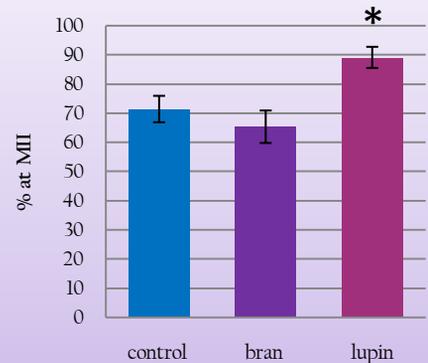


Figure 1. Percentage of oocytes at MII for each of the three treatments

## CONCLUSIONS

This study has demonstrated the effect of fibre on oocyte quality in gilts differs between fibre sources. The improvement in oocyte nuclear maturation in the absence of any change in reproductive hormones, suggest a gonadotrophin independent effect of lupins on ovarian function. Further studies are required to determine the mechanism through which dietary lupins influence oocyte developmental competence, and if lupin-based diets will improve embryo survival and litter size.

## REFERENCE

Ferguson, E. M., Slevin, J., Hunter, M. G., Edwards, S. A. and Ashworth, C. J. (2007) Beneficial effects of a high fibre diet on oocyte maturity and embryo survival in gilts. *Reproduction* 133, 433-439