



# REDUCING SUMMER INFERTILITY AND IMPROVING LITTER SIZE WITH SOW DIET

USING DIETARY BETAINES SUPPLEMENTATION TO ALLEVIATE  
SUMMER INFERTILITY AND IMPROVE LITTER SIZE

## Project Participants

Through the Pork CRC and The University of Adelaide, Dr William van Wettere

## Problem

Exposure to high temperatures, particularly during summer, in the pre- and peri-implantation period (up to 21 days post-insemination) of pregnancy can impair embryo development, inhibit maternal recognition of pregnancy, and reduce embryo and foetal survival. Insufficient supplementation of methyl groups in the diet can also impair reproduction and result in embryo abnormalities and loss. Reduced reproductivity results in reduced productivity and profitability for producers.

## Background

Foetal demand for methyl groups in the diet is high. Cell function and replication can be impaired if methyl groups are not supplied in sufficient amounts to the foetus. Inadequate supplementation of methyl groups can result in the accumulation of the amino acid homocysteine, which is known to be responsible for embryo abnormalities and loss.

Betaine is a commonly used dietary supplement which has the potential to increase temperature tolerance and reduce the negative effects of heat stress on pigs. It can also provide a dietary source of methyl groups to help improve reproductive performance and ovulation rate.

In previous studies, it has been demonstrated that betaine supplementation in summer gestation diets helps to improve reproductive performance. It has also been shown to increase ovulation rate in summer-mated gilts prior to mating.

## Value for Producers

Betaine supplementation in gestation diets for older parity sows and to gilts prior to mating can increase litter size and reduce the number of non-pregnant gilts and sows post-insemination. By adding betaine to the diets of breeding pigs, producers can improve their reproductivity on-farm and increase overall productivity and profitability.



## Research

The aim of this study was to determine whether betaine supplementation:

- in gestation diets during summer and winter reduces pregnancy losses and increases litter size;
- in gestation diets during winter increases litter size and reduces pregnancy loss in older parity sows; and
- during the rearing, pre-mating and gestation periods of gilts mated during summer improves puberty response to boar stimulation and improves pregnancy outcomes.

Three commercial studies were completed to determine whether supplementing the diets of breeding gilts and sows with betaine and/or folate plus vitamin B12 would improve overall reproductive performance. Three gestation diets were provided in addition to a control diet with no supplementation: a diet with 3 grams per kilogram betaine (equating to 7.5 to 9.0g/sow/day); a diet with 20 mg/kg folic acid and 150 micrograms/kg of vitamin B12; and a diet with the three levels of supplements combined.

## Results

Betaine reduced the proportion of sows returning to oestrus post-insemination and increased litter size in parity four and higher sows. It also reduced the proportion of non-pregnant gilts on day 24 post-insemination. However, if fed to gilts prior to mating, betaine should not be removed from the diet until further research is conducted to establish if there is a negative effect on embryo development and pregnancy maintenance.

Plasma homocysteine levels were also decreased at day three of gestation due to betaine. This reduction in homocysteine levels may have been partially responsible for the observed improvements in pregnancy outcomes.

The addition of folic acid and vitamin B12 decreased the chance of early pregnancy failure by four per cent and increased the litter size of parity 2 and 3 sows. Folic acid and vitamin B12 supplementation decreased plasma homocysteine by 2.2 and 2.8 micrometres, respectively, on days 3 and 107 of gestation, whilst betaine supplementation decreased plasma homocysteine on day 3 only.

## Recommendations

The key recommendation from this research is that betaine should be added to the gestation diets of older parity sows at a dose of 7.6-9.0 g/day.

## More Information

- For a copy of the report, contact Rachael Bryant at [rachael.bryant@australianpork.com.au](mailto:rachael.bryant@australianpork.com.au)
- For technical information, contact Rebecca Athorn at [rebecca.athorn@australianpork.com.au](mailto:rebecca.athorn@australianpork.com.au)