



Australasian Pork Research Institute Ltd APRIL

PROJECT SUMMARY

Project Number and Title: A2-101 *Protected vitamin and mineral premixes maintain performance of commercial pigs at reduced inclusion rates*

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Project Participants: Robert Hewitt, Andres Corso, Sally Tritton, Wayne Bradshaw (Jefo)

Aims and Objectives: This project aimed to investigate the ability to utilise encapsulation technology to reduce the levels of included vitamins and minerals and maintain pig performance, on the presumption there would be reduced degradation prior to reaching absorption sites within the small intestine. A secondary aim was to evaluate the ability of an encapsulated vitamin and mineral premix to alter indices of inflammation, given the strong roles vitamins and minerals can play in the immune response of pigs.

Experimental design: This study involved two identically designed experiments, one in weaner pigs and one in finisher pigs. The experiments were a 2 x 2 factorial design with the first factor being the level of standard commercial loose-carrier premix, 100% or 70% of normal commercial inclusion rates, and the second factor being the inclusion of an encapsulated vitamin and mineral supplement at 0 or 0.6 kg/t (minimum level recommended by manufacturer). Weaner pigs (n=560, ~20 days of age, 6.42 ± 0.05 kg) were fed common first stage weaner diets (14.85 MJ DE/kg, 0.89 g SID Lys/MJ DE) that differed in inclusion rate of standard and encapsulated premix for 28 days, with growth performance and blood analysis of markers of inflammation and antioxidant capacity measured. Finisher pigs (n=264, ~15 weeks of age, 55.6 ± 0.35 kg) were fed common finisher diets (13.50 MJ DE/kg, 0.64 g SID Lys/MJ DE) that differed in inclusion rate of standard and encapsulated premix for 42 days. Growth performance and blood analysis of markers of inflammation and antioxidant capacity were measured in both studies.

Key Findings:

1. No significant differences in performance in both weaners and finishers were observed when the standard vitamin and mineral premix was reduced to 70% of normal inclusion rates, although there was a tendency for poorer production during some periods measured.
2. Including the encapsulated premix maintained, but did not enhance, finisher pig performance when fed at 70% of the normal inclusion rate.
3. In weaners, when an encapsulated vitamin and mineral supplement was offered on top of the standard commercial rate of a loose-carrier vitamin and mineral premix, pigs were 5% heavier (0.6-0.8 kg) at 28 days after weaning (P=0.044).
4. A significant reduction in calprotectin concentration was seen in weaners receiving the encapsulated premix on top of the standard level of a loose-carrier vitamin and mineral premix.

5. In finishers, feeding 100% of the commercial level of vitamins and minerals tended to reduce calprotectin concentration, whilst the inclusion of the encapsulated premix resulted in a statistically significant reduction in calprotectin.
6. Reducing the inclusion rate of the standard premix tended to increase the level of inflammation in both studies, as indicated by calprotectin concentrations.
7. The lack of any performance gains in finishers, despite a reduction of inflammation using the encapsulated vitamin and mineral supplement, suggests a greater degree of robustness and ability to cope with some level of inflammation.

Applications to Industry: The use of a supplementary level of an encapsulated premix to protect degradation and chelation of “free” vitamins and minerals appears warranted, resulting in reduced inflammation in the weaner pig and improved post-weaning performance. Blanket reduction of the quantity of standard vitamin and mineral premix is not recommended, with tendencies for reduced performance and a tendency for the inflammatory marker calprotectin to be increased in the reduced level of premix. If a reduction in vitamin and mineral premix is undertaken, extra care should be taken to ensure that those nutrients possessing anti-inflammatory and/or antioxidant characteristics are consumed at adequate levels.