

Minimum inclusion levels of copper and zinc proteinate maintain performance and reduce faecal excretion in growing and finishing pigs

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Hernández *et al.* (2005) found that total dietary levels of 25 ppm copper (Cu) and 40 ppm zinc (Zn), in the sulphate or proteinate form (Bioplex®), reduced the concentration of Cu and Zn in faeces by 80 and 60% respectively and maintained the growth of growing pigs, compared to a diet containing 160 ppm of both Cu and Zn. These results indicated reduced levels of supplemental Cu and Zn might be possible. In the present study we therefore measured the impact of increasing inclusion levels (IL) of Cu together with low (treatments 1-4) or high (treatments 5-8) IL of Zn in the Bioplex® form on performance and faecal levels.

The experiment was designed as a 2x4 factorial arrangement of treatments, with the respective factors being two IL of Bioplex® Zn (40 and 80 ppm) and four of Bioplex® Cu (0, 10, 30 and 50 ppm). A control treatment was included (treatment 9), which used sulphates at levels of Cu and Zn similar to the high Bioplex® treatment. The study used 216 Large White x Landrace pigs from 25-107 kg LW housed in three pens of eight pigs/treatment. Pigs were fed *ad libitum*. Individual LW was measured weekly and faecal samples were collected from the same random sub-sample of four pigs/pen on days 21 and 49 of the experiment. Analysis of variance, using the pen as a unit for average daily gain (ADG), voluntary feed intake (VFI) and feed conversion ratio (FCR) and the pig for faecal levels, was used to examine main effects and all interactions on ADG, VFI, FCR as well as Cu and Zn faecal levels. Growth performance was analyzed over the entire experimental period, and faecal levels were analyzed using repeated measures analysis of variance.

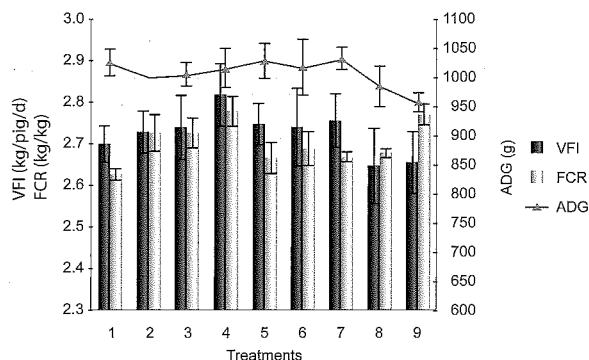


Figure 1. Pig performance (\pm SEM)

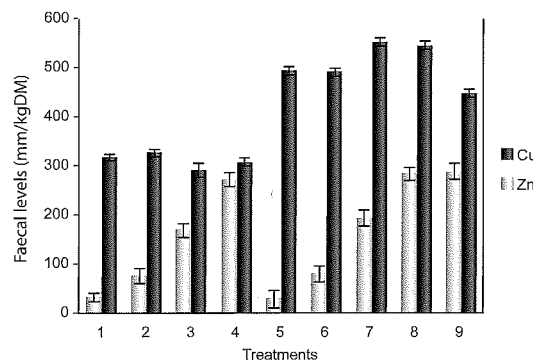


Figure 2. Faecal mineral levels (\pm SEM)

Over the entire experiment, there was a trend for better ADG in pigs on treatments 1, 5 and 7 (0 ppm Cu and 40 ppm Zn; 0 ppm Cu and 80 ppm Zn; and 30 ppm Cu and 80 ppm Zn, respectively) than that for the pigs fed inorganic Cu and Zn ($P < 0.1$). There was also an advantage to FCR when diets contained Bioplex® Cu and Bioplex® Zn, especially when Zn was included at 80 ppm ($P < 0.1$) (Figure 1). A significant reduction in the levels of Cu (90%) and Zn (40%) in faeces was achieved when the IL in the diet decreased from 50 to 0 ppm Cu, and from 80 to 40 ppm Zn, both in the Bioplex® form (Figure 2). These results indicate that IL of 0 ppm Cu and 40 ppm Zn in the Bioplex® form significantly reduced the amount of Cu and Zn excreted without a detrimental effect to pig performance. However in commercial practice pigs are challenged and marginal levels could compromise performance. Further experimentation to establish minimum levels under commercial conditions is warranted.

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References

HERNANDEZ, A., MULLAN, B.P., TURNLEY, K., D'SOUZA, D.N. and PLUSKE, J.R. (2005). In 'Manipulating Pig Production X', pp 91, ed J.E. Paterson. (Australasian Pig Science Association: Werribee)