**Does removing Zinc Oxide affect post-weaning blood chemistry?**

***Application***: This study shows that removing Zinc Oxide (ZnO) from post-weaning diets does not negatively affect C-reactive protein (CRP), Haptoglobin (Hp), Tacrolimus (TAC) or Cortisol levels in the blood.

***Introduction***: There is an urgent need to seek alternative strategies to cope with the absence of ZnO in piglet diets. The European swine industry has been banned from using ZnO due to its effect on the environment. Modifications of Crude Protein (CP) and Crude Fibre (CF) have been suggested as nutritional measures to reduce the risk of post-weaning diarrhoea (PWD) in the absence of ZnO. This work sought to evaluate the impact of different post-weaning diets varying in levels of CP, CF and the addition of dietary supplements on piglet post-weaning performance.

***Materials and Methods***: 720 pigs, housed in mixed-sex pens (10 pigs/pen, 12 pens/treatment) and weaned at 28 days of age, were offered one of six treatments (T) constructed of a Starter 1 diet (16.25 MJ/kg DE, 1.65 % Lys) for 13 days. Treatments were: **T1**, conventional diets (20% CP, 2.11% CF) with ZnO (2500mg/kg); **T2**, conventional diets, no additional ZnO; **T3**, conventional diets with antibiotic (Apramycin,100 mg/kg), no additional ZnO; **T4**, 18% CP diets (3.5% CF), no additional ZnO; **T5**, 16% CP diets (3.5% CF), no additional ZnO; **T6**, 18% CP diets (2.49% CF) and supplemental amino acids (commercial product), no additional ZnO. All treatments were formulated at the same Energy/Lysine ratio. On day 0 and 7 blood samples were taken from two average piglets per pen (one male and one female). Samples were collected in 2 ml lithium heparin tubes, centrifuged at 7000 rpm for 15 min, and frozen at − 22 °C pending analysis. Data were analysed in R studio using the nlme package to perform GLM models. Body weight was included as a covariate and where appropriate, batch was included as a random factor in the models. The alpha level of significance was set at *P < 0.05*.

***Results***: Cortisol concentrations were significantly lower in the T1 treatment compared to T3 at day 7 (*P < 0.05*). Tendencies were observed on C-reactive protein (CRP; *P = 0.057*) and Haptoglobin (Hp; *P = 0.067*) on day 0 and 7, respectively. Both of these were a result of low concentrations of CRP and Hp in the T4 treatment compared to T2 (CRP), and T4 to T6 (Hp).

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| --- | --- | --- |
|  | Day 0 | Day 7 |
|  | CRP (mg/L) | Hp (g/L) | TAC (mmol/L) | Cortisol (µg/dL) | CRP(mg/L) | Hp(g/L) | TAC (mmol/L) | Cortisol(µg/dL) |
| T1 | 8.17 | 0.261 | 0.216 | 5.16 | 7.54 | 1.08 | 0.170 | 1.37a |
| T2 | 13.7 | 0.294 | 0.239 | 4.54 | 8.36 | 0.721 | 0.186 | 1.58ab |
| T3 | 12.7 | 0.375 | 0.228 | 3.72 | 16.1 | 1.01 | 0.178 | 2.13b |
| T4 | 6.52 | 0.110 | 0.210 | 3.51 | 9.87 | 0.540 | 0.177 | 1.54ab |
| T5 | 11.6 | 0.357 | 0.214 | 3.52 | 14.0 | 0.843 | 0.185 | 2.09ab |
| T6 | 10.1 | 0.220 | 0.250 | 4.52 | 15.5 | 1.24 | 0.171 | 1.97ab |
| SEM | 1.78 | 0.1040 | 0.0161 | 0.540 | 4.950 | 0.2130 | 0.0110 | 0.206 |
|   | *Probabilities* |
| Treatment | 0.057 | 0.521 | 0.380 | 0.188 | 0.626 | 0.067 | 0.862 | **0.029** |

Table 1. The effect of dietary treatment on plasma C-reactive protein (CRP), Haptoglobin (Hp), Tacrolimus (TAC) and cortisol concentration in the blood of piglets at Day 0 or 7 of age (mean ± SEM).

a,b Means within in a column with different superscripts differ significantly (P < 0.05).

***Conclusions***: The nutritional interventions used in this study had little effect on biomarkers of inflammation and oxidative stress. There was only a significant effect on cortisol, however, it is worth bearing in mind that cortisol is a highly variable measurement (Larzul et al, 2015).

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***References***: Larzul, C., Terenina, E., Foury, A., Billon, Y., Louveau, I., Merlot, E. and Mormède, P., 2015. Animal. (9), 1929-1934.