AAs from 100% SID Lys:Leu to 130% SID Lys:Leu ($P < 0.0001$) at all protein concentrations. Conclusion: Diarrhoea outbreaks dropped by at least 50% by increasing the inclusion of crystalline AA by 30% compared with the "Ideal-protein" regardless of the protein concentration and is comparable with the effect of using pharmaceutical levels of zinc oxide (2,500 ppm), documented in other studies.

P55. A nutritional emulsifier improves growing-finishing pig performance

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Energy is a major cost factor in swine diets. Due to their high energy density, fats and oils are important sources of energy in feed formulation. Improving the digestibility of these raw materials is of much interest, especially from an economical point of view. Nutritional emulsifiers are able to improve the digestibility of fats and oils and therefore improve energy efficiency. Implementing these feed additives can result in more cost-effective diets without losing on growth. Two hundred and seventy pigs (n = 270), mixed-sex PIC CA 25 × 410 sire, were allocated to three groups: i) control group (CG), where pigs had continuous access to a corn-cassava-soy based diet (2400 kcal/kg) and ii) emulsifier group (EGR), where pigs had continuous access to a energy reduced diet (2350 kcal/kg) supplemented with a glyceryl polyethyleneglycol ricinoleate (GPGR) based nutritional emulsifier. The third group (EGT) of pigs received the control diet supplemented with the GPGR based nutritional emulsifier on top. At the start of the trial, pigs (63 days of age, 17.4 kg on average) were divided over 18 pens (6 per treatment) each containing fifteen animals. After a 77-day trial period growth parameters were analysed. Data were subject to ANOVA and mean comparison using Tukey's Test. SAS University edition was used in the analyses. The nutritional emulsifier had a significant positive effect on BW and % pigs > 700 g ADG (from birth) when applied on top (EGT). The nutritional emulsifier had a near significant positive effect on FCR when applied on top (EGT). The energy reduced diet group (EGR) did not show a negatively impacted growth compared to the control.The supplementation of a GPGR based nutritional emulsifier positively impacts growth of growing-finishing pigs when applied on top and has a compensating effect when applied in energy reduced diets.

P56. The digestibility of energy and nutrients and the efficiency of phytase to degrade phytate is influenced by pig body weight

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Phytase effects are usually evaluated in 20- to 40-kg pigs. It was hypothesized that pig body weight (BW) does not influence the positive effects of increasing dietary phytase on phytate degradation and nutrient digestibility. Eighteen ileal-cannulated pigs were allotted to a triplicated 6 × 3 Youden square design (6 diets; three 7-d collection periods). This design was repeated 4 times. Initial BW in each phase: 29.3, 53.6, 85.1, and 114.4 kg with 7-d resting period between phases. Six corn-soybean meal-based diets were formulated by including 0, 250, 500, 1,000, 2,000, or 4,000 phytase units/kg feed, assuming 0.16% total-Ca and 0.11% digestible-P release by phytase. Faecal (d 5) and ileal digesta (d 6–7) were collected in each period. Data were analysed as the interaction between phase and phytase level, and using contrast statements (linear and quadratic) per main effect. Regardless of BW, increasing phytase increased (quadratic; $P < 0.05$) apparent ileal digestibility (AID) of most amino acids (AA, + 2.2%) and apparent total tract digestibility (ATTD) of Ca: + 52%, P: + 234%, K: + 4%, and Mg: + 83%, but decreased (quadratic; $P < 0.05$) AID and ATTD of gross energy (GE,-1.4%). In all phases, but to a different extent (interaction; $P < 0.05$), phytate decreased (quadratic; $P < 0.05$) −98,-95,-91,-90%, whereas inositol increased (quadratic; $P < 0.05$) + 101, + 90, + 50, + 12 fold in ileal digesta as phytase increased in phase 1–4, respectively. Regardless of phytase level, increasing BW increased (linear or quadratic; $P < 0.05$) AID of GE (+7%) and AA (+5%), and ATTD of GE (+4%), K (+10%), and Mg (+80%), but decreased ATTD of Ca (-27%), Na (-19%), and P (-9%). Likewise, ileal phytate increased (quadratic; $P < 0.05$) 2.3-fold, whereas ileal inositol decreased (linear; $P < 0.05$) 5-fold as BW increased. In conclusion, regardless of pig BW, increasing dietary phytase increased phytate degradation and inositol release in the small intestine, and consequently increased mineral and AA digestibility. However, nutrient digestibility and phytase efficiency to degrade phytate was influenced by pig BW.

P57. Phytate breakdown, nutrient digestibility, plasma metabolites, and bone ash of pigs fed increasing phytase levels for a long adaptation period

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Effects of phytase on pig nutrient digestibility are not consistent after a 5–7 d adaptation period. The hypothesis was that after a long 18-d adaptation period, phytase effects on nutrient and energy digestibility, plasma P and inositol, and bone ash of pigs are more consistent. Thirty-six ileal-cannulated pigs (body weight: 11.0 ± 0.6 kg) were allotted to 6 corn-soybean meal-based diets including 0, 250, 500, 1,000, 2,000, or 4,000 phytase units/kg feed in a completely randomized design. Phytase was assumed to release 0.16% total Ca and 0.11% digestible P in all diets. Blood (d −1 and 23), faeces (d 19–20), ileal digesta (d 21–22), and the 3rd and 4th metatarsals (d 23) were collected. Data were analysed using contrast statements (linear and quadratic) in SAS. Results indicated that increasing phytase level increased apparent ileal digestibility (AID) of Trp (+10%; quadratic; $P < 0.05$), Lys (+7%) and Thr (+8%; linear; $P < 0.05$). Increasing dietary phytase also increased AID and apparent total tract digestibility (ATTD) of Ca (+35%) and P (+164%; quadratic; $P < 0.05$) and increased ATTD of K (+13%) and Na (+8%; linear; $P < 0.05$), but did not influence ATTD of Mg or gross energy. Plasma P (+57%) and bone ash (grams; +78%; quadratic; $P < 0.05$) and plasma inositol (+28%; linear; $P < 0.05$) also increased with increasing phytase levels. Ileal concentrations of inositol phosphate (IP)-6 (95%) and IP-5 (94%; quadratic; $P < 0.05$) decreased as dietary phytase increased, whereas ileal inositol increased (37-fold; linear; $P < 0.05$) as dietary phytase increased. In conclusion, after 18-d adaptation period, increasing dietary phytase increased phytate degradation and inositol release in the small intestine, and consequently improved digestibility of 3 limiting amino acids, Ca, P, K, and Na, which further increased concentrations of bone ash and plasma P and inositol. This suggests that in phytase studies