from the corpus and antrum regions of the stomach, respectively. The samples were rinsed with PBS and fixed in RNAlater solution. Relative gene expression of a set of key genes involved in gastric acid secretion (ATP4, GAST), mucosal defence (MUC5AC, OLFM4, PIGR), appetite (GHRL), inflammation (CXCL8) and intrinsic factor production (GIF) were assessed by QPCR and analysed by SAS. There was no differential gene expression observed between the pigs fed organic acid-treated grain and the control group in the OXY and PYL ($P > 0.05$). In conclusion, the inclusion of organic acid mould inhibitor has no influence on the expression of genes involved in gastric acid secretion, mucosal defence and appetite in the stomach of grower pigs.

P101 pharmacokinetics of vitamin E and a in the serum after a meal

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The objective of this study was to evaluate the serum status of vitamin E and A in the pig to determine if circulating levels change after the consumption of a meal, thus allowing for better understanding of vitamin absorption and recirculation after the consumption of a meal. Eight finishing gilts (98 ± 5 kg) were fasted for 12 hours. An initial blood sample was taken via jugular stick before they were given a set amount of feed for one hour amounting to 4% of pig's body weight and comprised of a common corn-soybean meal-based diet with vitamin and mineral levels that met or exceeded NRC (2012) requirement estimates. Further blood samples were taken at hours 1, 2, 3, 4, 6, and 12 after the initial blood sample was collected. Serum was analysed via ultra-high pressure liquid chromatography at Iowa State University Veterinary Diagnostic Laboratory. Results were analysed via SAS 9.4 utilizing PROC IML to obtain contrast coefficients accounting for unequal time points and PROC GLIMMIX with repeated measures to obtain LSMeans and analyse contrast statements with gilt as the experimental unit and time as a fixed effect. There were linear and quadratic effects ($P < 0.05$) over time for the vitamin serum concentrations. Vitamin E peaked at hour 4 (hour 0 = 2.2 ppm; hour 4 = 2.5 ppm hour 12 = 1.8 ppm), whereas vitamin A peaked at hour 6 (hour 0 = 0.24 ppm; hour 6 = 0.25 ppm hour 12 = 0.22 ppm). These results suggest that there is active absorption and recirculation of the vitamins throughout the pig for 4 and 6 hours for vitamins E and A, respectively. This information provides insight on the absorption of these vitamins and can also be used to time blood sampling if pigs are not on an ad libitum diet.

P102. Dietary calcium supplementation reduces phosphorous absorption and causes a shift from transcellular to paracellular Ca absorption in pigs

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An increase in dietary calcium (Ca) content reduces the intestinal absorption of Ca and phosphorus (P) in pigs, but the interaction with phytase varies between studies and mechanisms involved remain to be elucidated. We hypothesized that the inhibitory effect of Ca is greater in phytase-supplemented diets and involves both passive and active transport routes of Ca absorption. Sixty growing male pigs were used in a 2x3 factorial arrangement with 0 and 500 FTU/kg microbial phytase and 2.0, 5.8, and 9.6 g/kg Ca. After 21 days, digesta were quantitatively collected from stomach, proximal and distal small intestine (SI) and proximal and distal large intestine (LI) to assess its contents of total and soluble Ca and P and phytate degradation. Expression of genes (RT-qPCR) related to Ca and P absorption were determined in jejunal and colonic mucosa. Data were analysed by Anova with phytase level and Ca contents as fixed effects. Using TiO2 as indigestible marker, we found that in phytase-free diets, P was primarily absorbed in distal SI, Ca in proximal SI and LI. Microbial phytase enhanced phytate degradation, solubility of P and digestibility of both Ca and P, primarily in proximal SI. Increasing dietary Ca content reduced these characteristics, in particular in phytase-supplemented diets. Expression of P-transporters remained unaffected by dietary treatments, suggesting that the observed effects were mediated by the passive (paracellular) route. Expression of Ca transporters (CaBP-D9k, TRPV5 and TRPV6) was reduced by both dietary Ca and phytase in colon and by phytase (TRPV5) or both (TRPV6) in jejunum. In jejunum, expression of claudin 2 and 12, two paracellular Ca channel proteins, was enhanced by Ca and phytase, respectively. In conclusion, increasing dietary Ca reduced primarily passive P absorption via reduction of phytate degradation and P solubility, and caused a shift from transcellular to paracellular Ca absorption.

P103. Synchronisation of calcium and phosphorous supply influences phosphorous digestion and post-absorptive utilisation in growing pigs

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Dietary calcium (Ca) and phosphorous (P) are essential for bone mineralisation, but Ca may hamper P absorption from the digestive tract via reduction of phytate degradation and P solubility. We hypothesized that a separation of intestinal solubilisation and passage of Ca and P improves P digestion. Two experiments were conducted, each with 40 pigs (30–55 kg) to determine the influence of limestone particle size (Exp. 1) and synchronisation of Ca and P supply (Exp. 2) on digestion and utilisation of Ca and P. In Exp. 1 pigs received one of ten diets in a 2x5 factorial arrangement with two phytase levels (0 and 500 FTU/kg) and a low Ca control diet as such, or supplemented with 1.6% limestone with particle size < 0.1, 0.3–0.6, 1.2–2, or 2–3 mm. In Exp. 2, pigs received two diets in the morning and two in the afternoon, with adequate Ca and P in all diets (control) or Ca and P supplied in separate meals with a delay of two or ten hours. Results were analysed with ANOVA. In Exp. 1 increasing limestone particle size enhanced apparent total tract digestibility (ATTD) of P by 3–4% units ($P = 0.005$). Phosphorous retention increased with increasing limestone particle size in phytase-free diets but decreased in phytase-supplemented diets (P interaction < 0.001), the latter suggesting a (transient) post-absorptive deficiency of Ca. In Exp. 2 separate supply of Ca and P enhanced the ATTD of P by 4% units ($P = 0.002$) with greater effect when the low Ca high P diet was provided as the first morning meal ($P = 0.022$). The retention of absorbed P was enhanced when the high Ca low P diet was supplied after two hours. Results confirm that a delay in Ca supply can improve P digestion, but adequate synchronisation of post-absorptive Ca and P supply is required for optimal utilization.

P104. Basal endogenous amino acid losses in the digestive tract are determined by experimental conditions, a meta-analysis

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