hydrolysis was conducted using a two-step assay in which pepsin and pancreatin were used to mimic gastric and small intestinal digestion. The amount of total P released by enzymatic digestion was analyzed by the ascorbic acid method. All assays were repeated 6 times. Data of *in vitro* P digestibility were analyzed using the GLM procedure in SAS. A simple linear regression analysis was conducted between *in vitro* P digestibility data and *in vivo* standardized total tract digestibility (STTD) of P, which was calculated based on apparent total tract digestibility in pigs from their respective sources from a previous experiment. Chicken meal had lower ($P < 0.01$) *in vitro* P digestibility (42.98%) compared with chicken by-product meal (62.24%), and there were no differences ($P > 0.10$) between poultry meal (33.52%) and poultry byproduct meal (32.21%). The average *in vitro* P digestibility of 3 sources of meat and bone meal was 33.21 ± 0.24%, and the average of 2 meat meal sources was 35.99 ± 1.56%. Animal protein meals with greater Ca:P tended to have a lower *in vitro* digestibility of P (*in vitro* P digestibility, % = -30.14 × Ca:P + 91.18; $R^2 = 0.89$). There was also a high correlation between *in vitro* P digestibility and *in vivo* STTD of P (STTD of P, % = 1.00 × *in vitro* P digestibility + 1.33; $R^2 = 0.91$). The mathematical model showed that when P digestibility is overestimated by 10% compared to its actual value in an ingredient, pigs fed P deficient diets may have a 30 g less average daily gain than pigs fed diets formulated with more accurate values from the *in vitro* assay. When P digestibility of ingredients is underestimated by 10% compared to its actual value, the cost of the feed may increase by $0.55/pig. These results suggest that the 2-step *in vitro* P digestibility assay can be used to reasonably predict *in vivo* P digestibility of animal protein by-products fed to swine.

Key Words: animal protein by-products, in vitro enzymatic hydrolysis, phosphorus digestibility

222 Effects of increasing chloride from potassium chloride on 7 to 12 kg nursery pig growth performance.

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A total of 300 nursery pigs (DNA Line 241 × 600, initially 7 kg) were used in a 14-d trial to determine effects of increasing dietary Cl concentrations on nursery pig growth performance. Pigs were weaned at 21 d of age. Upon entry to the nursery, pigs were grouped in pens of 5 consisting of either a 2:3 or a 3:2 ratio of barrows:gilts, and fed a common starter diet (0.33% Na and 0.76% Cl) for 7 d. On d 7 after weaning, considered d 0 in the trial, pens were blocked by BW within each sex ratio and randomly assigned to treatments, with 10 pens/treatment. Experimental treatments consisted of a control diet containing 0.33% Na and 0.55% Cl provided by 0.78% added salt and 5 diets with 0.33% Na and added potassium chloride to provide 0.09, 0.21, 0.32, 0.45, or 0.55% Cl. Dietary K was not held constant across dietary treatments. Growth performance (ADG, ADFI, G:F) was recorded at the pen level and analyzed using linear mixed models that accommodated the split-plot nature of the experimental design and recognized pen as the experimental unit for treatment. Linear and quadratic orthogonal polynomials were evaluated. Additionally, the 0.78% added salt control and 0.55% Cl treatment were compared. From d 0 to 14, ADG, ADFI, and G:F improved (quadratic, $P < 0.05$) as dietary Cl concentration increased from 0.09 to 0.32% with no further benefit observed thereafter. Pigs fed the control diet (0.33% Na and 0.55% Cl from added salt) showed no evidence for a difference in ADG, lower ($P < 0.05$) ADFI and marginally increased ($P = 0.069$) G:F than those fed 0.55% Cl from KCl. In conclusion, the greatest growth performance was achieved with a dietary Cl concentration of 0.32% in pigs from 7 to 12 kg.

	Cl, %						
Item	0.09	0.21	0.32	0.45	0.55	0.78% added salt	SEM
ADG, g[1]	273	348	372	349	356	351	0.676
ADFI, g[2,3]	436	491	507	477	504	469	0.046
G:F[1]	0.628	0.712	0.734	0.733	0.708	0.749	0.069

[1] Cl linear: $P<0.001$; quadratic: $P<0.001$; [2] Cl linear: $P<0.05$; quadratic: $P<0.05$. [3] Added salt diet vs. 0.55% Cl diet: $P<0.05$.

Key Words: salt, chloride, nursery pig

223 Impact of Added Copper and Chlortetracycline on Growth Performance of Nursery Pigs.

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A study was conducted to determine the impact of Cu and chlortetracycline (CTC), fed alone or in combination, on prevalence and quantification of Cu-associated antimicrobial resistance in fecal enterococci of weaned piglets. Only the effects on growth performance are reported herein. A total of 320 nursery pigs (DNA 200 × 400, initially 7.4 ± 0.06 kg) were used in a 28-d trial. A common non-medicated diet was