67.9% at 0, 500, 1000 and 2000 FTU/kg, respectively. Increasing phytate-P level exponentially increased ($P < 0.01$) digestible P content. High soluble limestone reduced digestible P in NC and low phytase dose groups, and 2000 FTU/kg PhyG compensated the negative effect. In conclusion, phytase dose response, phytate P level and limestone solubility are the factors to be considered when determine P, Ca and Na matrix in pigs.

### P75. Effect of a novel consensus bacterial 6-phytase variant on inositol hexa-phosphate degradation profile in growing pigs

Deepak Velayudhan [a,*], Trine Christensen [b], Solvej Knudsen [b], Leon Marchal [a,c], Yueming Dersjant-Li [a], Hans Stein [d]

[a] Danisco Animal Nutrition and Health (IFF), Oegstgeest, Netherlands
[b] Danisco Animal Nutrition and Health (IFF), Edwin Rahrs Vej 38, Denmark
[c] Animal Nutrition Group, Wageningen University & Research, Wageningen, Netherlands
[d] Department of Animal Sciences, University of Illinois, Illinois, US

[*]Corresponding author: Deepak Velayudhan.
E-mail: Deepak.Evelayudhan@iff.com

This study evaluated the effect of a novel consensus bacterial 6-phytase variant (PhyG) on phytic acid (inositol hexa-phosphate, IP6) degradation profile and apparent ileal digestibility (AID) of phosphorus (P) in growing pigs. It was hypothesized that complete IP6 degradation with higher phytase doses improves P digestibility. A negative control (NC) diet with standardized total tract digestible P and total Ca that were 0.16% and 0.15% below the NRC requirements was formulated. Net energy and standardized ileal digestible amino acids content were 33 kcal/kg and 0.02 percentage units below requirements. Five additional diets were prepared by adding 250, 500, 1,000, 2,000 or 4,000 FTU/kg of PhyG to NC. All diets were based on corn, soybean meal and canola meal. Eighteen ileal-cannulated pigs (17.8 ± 1.7 kg) were allotted to a 6 × 3 incomplete Latin square design with six diets and three periods. In each period after 7-day acclimation, ileal digesta were collected continuously for a total of 9 h on days 8 and 9. Data were analysed using the Fit Model platform of JMP 14.0 with diet as fixed effect and period as random effect. Phytase dose response was tested using exponential curve fitting. Increasing PhyG dose exponentially ($P < 0.0001$) reduced ileal IP6 content and increased IP6 degradation. At 500, 1000, 2000 and 4000 FTU/kg of PhyG, the IP6 disappearance was 80.6, 92.1, 93.7, and 96.4%; and IP (sum 3–6) disappearance was 62.0, 76.0, 86.5, and 93.0%, respectively. This indicates reduced lower IP ester accumulation with increasing phytase dose. As a result, AID P increased exponentially from 36.1% in NC to 53.6, 54.6, 69.5, 71.3, and 75.6% in diets with 250, 500, 1000, 2000, and 4000 FTU/kg, respectively. In conclusion, PhyG efficiently breaks down IP6, increasing phytase dose completely breakdown lower IP esters and increase P digestibility in pigs.

### P76. Meta-analysis: The effect a novel consensus bacterial 6-phytase variant on inositol hexa-phosphate degradation and phosphorus digestibility in young pigs

Deepak Velayudhan [a,*], Hans Stein [d], Arun Kumar [e], Trine Christensen [b], Solvej Knudsen [b], Tinke Stormink [a], Leon Marchal [a,c], Yueming Dersjant-Li [a]

[a] Danisco Animal Nutrition and Health (IFF), Oegstgeest, Netherlands
[b] Danisco Animal Nutrition and Health (IFF), Edwin Rahrs Vej 38, Denmark
[c] Animal Nutrition Group, Wageningen University & Research, Wageningen, Netherlands
[d] Department of Animal Sciences, University of Illinois, Illinois, US
[e] School of Agriculture and Food Science, The University of Queensland, Gatton, Australia

[*]Corresponding author: Deepak Velayudhan.
E-mail: Deepak.Evelayudhan@iff.com.

This meta-analysis evaluated the effect of a novel consensus bacterial 6-phytase variant (PhyG) on degradation rate of inositol hexa-phosphate (IP6) and total tract digestibility (ATTD) of calcium (Ca) and phosphorus (P) in pigs. It was hypothesized that complete IP6 degradation with higher phytase doses improves mineral digestibility. The impact of limestone solubility and phytate-P levels in diets on IP6 degradation was also determined. Database was constructed using 3 studies (PIC or large white breeds; average body weight of 24.6 kg at sampling), contributing 254 data points. All studies had a negative control (NC) diet with reduced Ca and digestible P (total or partial removal of inorganic P). Pigs were fed corn or corn-wheat based diets with soybean meal and canola meal differing in phytate-P (2.2 to 3.3 g/kg) and total Ca (5.1 to 7.5 g/kg). Limestone solubility (at 5 min) varied from 51.8 to 92.0%. The NC was supplemented with PhyG at 250, 500, 1000, 2000 or 4000 FTU/kg. Ileal digesta were collected by ileal T-cannulation (9 replicates/treatment) or slaughter technique (8 replicates/treatment). Faecal samples were collected for 4 days. Data were analysed using Fit Model platform of JMP 14.0. The effect of limestone solubility and phytate-P on IP6 degradation was analysed by multivariate analysis. PhyG improved ($P < 0.05$) ATTD P and Ca, with up to 44.4 and 26.7 percentage points at 4000 FTU/kg, respectively, vs. NC. PhyG addition exponentially improved ($P < 0.05$) ileal IP6 degradation by 64.3 percentage points at 4000 FTU/kg. A negative correlation was observed for limestone solubility ($r = -0.60$, $P < 0.001$) and phytate-P content ($r = -0.30$, $P < 0.001$) on IP6 degradation. In conclusion, PhyG efficiently improved IP6 degradation and ATTD P and Ca and increasing phytase dose mitigates negative effects of high soluble limestone and high phytate-P in pig diets.

### P77. Dietary variables affecting efficacy of a combination of Bacillus spp. direct-fed-microbial and a protease on growth performance in pigs: meta-analysis

Ester Vinyeta [a,*], Deepak Velayudhan [a], Ceinwen Evans [b], Leon Marchal [a,c]

[a] Danisco Animal Nutrition (IFF), Oegstgeest, The Netherlands
[b] Danisco Animal Nutrition (IFF), Marlborough, WIltshire, United Kingdom
[c] Animal Nutrition Group, Wageningen University & Research, Wageningen, The Netherlands

[*]Corresponding author: Ester Vinyeta.
E-mail: Ester.VInyeta@iff.com.

A meta-analysis was conducted to determine the effect of dietary variables on a combination of multi-strain Bacillus spp. direct-fed-microbial (DFM) with a protease enzyme (PRO) to improve growth (ADG) and feed efficiency (FE) in grower and/or finisher pigs, from 20-120 kg BW. It was hypothesized that fibre content and protein quality have a positive or negative correlation, respectively with the efficacy of DFM-PRO. The database was created with data of 22 pig studies, with 1475 datapoints. The datasets were obtained from 11 locations globally. The basal diets were corn- or wheat-soybean meal based with variable inclusion of corn-DDGs, wheat middlings, rice bran and variation in the levels of digestive lysine (0.58–1.37%), phytase enzyme (from 500 to 1000 FTU/kg), soluble fibre (1.1–2.8 %) and insoluble fibre (5.3 to 14.7 %). All diets were formulated to meet NRC requirements. Data were analysed using Fit Model platform of JMP 14.0. Multivariate stepwise regression analysis was used to evaluate the effect of main dietary variables on the response criteria (ADG and FE). Logistic regression model was used to predict the effect