

There is growing interest in considering non-proteinogenic functions of some amino acids (AA) in weaned pigs, because of potential health beneficial effects. We hypothesized that threonine and tryptophan above nutrient requirement to weaned pigs would positively affect gut health parameters. A total of 120 pigs weaned at day 28 were allocated to five dietary treatments. A standard diet with 241 g crude protein/kg DM was used as the control diet (C). Dietary treatments were created by supplementation of additional 20% threonine (C+THR), 20% tryptophan (C+TRP), or 20% of both AA (C+TT) to the control diet. Finally, a low protein diet with 203 g crude protein/kg DM was included as a negative control (LP). A linear mixed model was applied, with Diet and Day as fixed effects. Piglets received the experimental diets for four weeks following weaning. Faeces consistency was evaluated daily using a 4-scale visual scoring system (1, 2 = normal, 3, 4 = diarrhoea). Blood was collected at day 4, 14, 21 and 28, and samples of proximal colon tissue was obtained from C, LP and C+TT pigs at slaughter on day 28. Average daily gain ($P=0.30$), feed intake ($P=0.67$), and the overall probability for diarrhoea ($P=0.15$) were not affected by diet. However, the number of antibiotic treatment days was higher for C+TRP (8.9 days) compared with C+TT group (5.0 days; $P=0.01$). The concentration of, diamine oxidase and D-lactate (intestinal epithelial permeability markers) in blood was unaffected by diet but diamine oxidase increased ($P<0.05$) from day 4 to day 28. A larger area of neutral mucin-producing cells was observed in C+TT as compared to the C diet ($P=0.04$). In conclusion, supplementation with threonine and tryptophan may have beneficial effects on mucin-production in the large intestine and lower the number of days, between 0-28 days post-weaning, where antibiotics are used.

P182. The combination of spray dried plasma and reduced crude protein in diets decreases circulating cytokines of weanling pigs

Hannah Bailey^{a,*}, Joy Campbell^b, Hans Stein^a

^a University of Illinois, Urbana, United States

^b APC, Inc., Ankeny, United States

*Corresponding author: Hannah Bailey.

E-mail: hbailey3@illinois.edu

The hypothesis that spray dried plasma (SDP) complements low crude protein (CP) in diets by improving growth performance, decreasing diarrhoea, and reducing inflammation of pigs was tested in a 2-wk experiment with 160 pigs (5.89 ± 0.39 kg). Four isocaloric diets were formulated: 2 diets with 23% CP without or with 6% SDP and 2 diets with 18.5% CP (standardized ileal digestible indispensable amino acids were reduced ~15%) without or with SDP. In both diets, SDP replaced soy protein concentrate. There were 8 pens/diet and 5 pigs/pen. Growth performance was recorded; diarrhoea was assessed every other day; blood samples were collected on d7 and d14; and intestinal tissue and mucosa were collected on d14. Data were analysed as a 2×2 factorial using PROC-MIXED of SAS. Pigs fed 23% CP had greater ($P<0.05$) average daily gain (ADG), average daily feed intake (ADFI), gain to feed ratio (G:F), and final body weight than pigs fed 18.5% CP. Pigs fed 6% SDP had greater ($P<0.05$) ADG, ADFI, G:F, and final body weight than pigs fed 0% SDP. Pigs fed 18.5% CP had less ($P<0.05$) diarrhoea than pigs fed 23% CP, whereas SDP did not influence diarrhoea. Ileal villus height and colonic mucosa width increased if SDP was included in the 23% CP diet, but not in the 18.5% CP diet (interaction, $P<0.05$). Ileal mucosa interleukin-12 was reduced if 6% SDP was combined with 23% CP, but increased if 6% SDP was combined with 18.5% CP (interaction, $P<0.05$). Circulating interleukin-2 decreased and interferon-gamma, interleukin-6, and interleukin-18 tended to decrease if 6% SDP was combined with 18.5% CP, but not with 23% CP (interaction, $P<0.05$ and $P<0.10$, respectively). In conclusion, the combination of SDP and reduced CP in diets did not influence growth performance or

diarrhoea incidence, but decreased circulating cytokines indicating reduced inflammatory response in weanling pigs.

P183. Mixed doses of glutamate and glutamine contribute to improving the gut health and immunity of post-weaning piglets

Diana Luise^{a,*}, Tristan Chalvon-Demersay^b, Federico Correa^a, Livio Galosi^c, Giacomo Rossi^c, William Lambert^b, Clara Negrini^a, Paolo Bosi^a, Paolo Trevisi^a

^a University of Bologna, DISTAL, Viale G. Fanin 44, 40127 Bologna, Italy

^b Metex Noovistago, 32 rue Guersant, Paris 75017, France

^c School of Biosciences and Veterinary Medicine, University of Camerino, 62024 Matelica, Italy

*Corresponding author: Diana Luise.

E-mail: diana.luise2@unibo.it

This study aimed to test the effect of different dietary combinations of glutamate (Glu) and glutamine (Gln) on gut functionality and the health of post-weaning piglets. 120 weaned piglets (24 ± 2 days of age, d0) were divided into 6 groups: CO = standard diet; 100%Glu = CO plus 6 kg/ton Glu; 75%Glu + 25%Gln = CO plus 4.5 kg/ton Glu and 1.5 kg/ton Gln; 50%Glu + 50%Gln = CO plus 3 kg/ton Glu and Gln; 25%Glu + 75%Gln = CO plus 1.5 kg/ton Glu and 4.5 kg/ton Gln; 100%Gln = CO plus 6 kg/ton Gln. The trial lasted 21 days. Blood was collected at d8 and d21 for haematological analysis. At d8, jejunal mucosa was collected for histological and gene expression analysis. Data were fitted by GLM model including diet, litter of origin and sex. From d7 to d14, the CO had the lowest average daily gain (ADG) ($P=0.05$). Within AA groups, from d0 to d21, ADG and gain to feed (G:F) ratio decreased linearly with the increase of Glu percentage in the supplementation ($P=0.05$). The faecal score was drier in the AA groups vs. CO ($P=0.002$) and the Glu:Gln ratio had a quadratic effect ($P=0.005$; lowest in 50%Glu + 50%Gln) from d0-d7. In the jejunum, the AAs groups had a lower number of intraepithelial lymphocytes than CO ($P<0.016$) and the 25Glu+75Gln group had the lowest value ($P=0.05$). The jejunal gene expression of zonula occludens ($P=0.025$) and of glutathione peroxidase2 ($P=0.07$) was higher in the 100% Gln compared with the mixed AAs groups. At d8, blood neutrophil% and lymphocyte% had a quadratic effect (50%Glu+50%Gln had highest neutrophil%/lymphocyte%) and monocyte% decreased linearly with Gln ($P=0.05$).

Overall, a favourable effect of mixing Glu and Gln (25%+75% - 50% + 50%) was observed on the parameters of immune and barrier function of the gut, resulting in drier faeces and improvement of growth of piglets mainly in the first period post-weaning.

P184. Stimulation of the gut functionality of post-weaning pigs with the administration of ETEC F4/F18 bivalent vaccine

Paolo Trevisi^a, Diana Luise^{a,*}, Federico Correa^a, Laura Amatucci^a, Sara Viridis^a, Clara Negrini^a, Francesco Palumbo^{a,b}, Mario Vecchi^c, Maurizio Mazzoni^d, Pedro Jose Sanchez^c, Paolo Bosi^a

^a Department of Agricultural and Food Sciences, University of Bologna, Viale G. Fanin 46, Bologna, 40127, Italy

^b Agroscope, Rte de la Tioleyre 4, 1725 Posieux, Svizzera

^c Elanco Animal Health, Italy

^d Department of Veterinary Medical Sciences, University of Bologna, Via. Tolara di Sopra 50, 40064 Ozzano Emilia, Italy

*Corresponding author: Diana Luise.

E-mail: diana.luise2@unibo.it

The aim of the study was to determine the effect of the administration of the oral vaccine against enterotoxigenic Escherichia coli F4 and F18 on