693 Effects of enzyme additions to diets with corn- and sorghum-based distillers dried grains with solubles on growth performance and nutrient digestibility in nursery and finishing pigs. C. Feoli*[1], J. D. Hancock[1], T. L. Gugle[1], S. D. Carter[2], and N. A. Cole[3], [1]*Kansas State University*, *Manhattan*, [2]*Oklahoma State University*, *Stillwater*, [3]*USDA/ARS*, *Bushland, TX*.

Two experiments were conducted to determine the effects of enzyme additions on the nutritional value of diets with corn- and sorghum-based distillers dried grains with solubles (DDGS). For Exp. 1, 180 weanling pigs were fed the same starter diet for 10 d and then used in a 27-d growth assay. There were six pigs/pen and six pens/treatment with an average initial BW of 7.5 kg. Treatments were a corn-soy-based control and diets with 30% corn-based (Hudson, SD) and sorghum-based DDGS (Russell, KS) without and with enzymes (a cocktail of beta-glucanase, xylanase, alpha-amylase, and pectinase to supply 150, 4,000, 1,000, and 25 units of activity, respectively, per kg of diet). Pigs fed the control diet had greater ADG and digestibility of DM, N, and GE ($P < 0.003$) than pigs fed the DDGS treatments. Addition of enzymes improved ADG and decreased ADFI for pigs fed corn-based DDGS (DDGS source x enzyme interaction, $P < 0.08$). However, addition of enzymes improved G:F ($P < 0.08$) and digestibility of DM ($P < 0.04$) regardless of DDGS source. For Exp. 2, 330 finishing pigs (avg BW of 64 kg) were used in a 65-d growth assay. There were 11 pigs/pen and six pens/treatment. Treatments were the same as in Exp. 1 but 40% DDGS were used for the finishing experiment. Pigs fed the control diet had greater ADG and ADFI and digestibility of DM, N, and GE ($P < 0.008$) than pigs fed the DDGS treatments. Pigs fed the corn-based DDGS treatments had greater G:F, digestibility of DM, N, and GE, and iodine value of jowl fat than pigs fed the sorghum-based DDGS treatments ($P < 0.04$). Enzymes improved digestibility of DM, N, and GE ($P < 0.007$), especially for diets with sorghum-based DDGS (DDGS source x enzyme interaction, $P < 0.10$). In conclusion, rate of gain and nutrient digestibility were decreased with addition of DDGS to diets for nursery and finishing pigs but adding enzymes partially restored those losses.

Key Words: Pig, Distillers Dried Grains, Enzyme Supplementation

694 A multi-substrate enzyme blend for weaned pigs fed corn- or wheat-barley- based diets and its relationship with water acidification. Y. Han*[1], A. Humphreys[2], P. Lessard[3], and M. Vignola[4], [1]*Nutreco Canada Agresearch*, *Guelph, ON, Canada*, [2]*Nutreco Canada West*, *Winnipeg, MB, Canada*, [3]*Nutreco Canada East*, *St. Hugues, QC, Canada*, [4]*Nutreco Canada Agresearch*, *St-Roumuald, QC, Canada*.

Different non-starch polysaccharides (NSP) exist in corn- or wheat-barley- based diets. This study evaluated the efficacy of a proprietary enzyme blend for both diet types. Two enzyme blends (A; B) targeting multiple NSP substrates were prepared based on *in vitro* studies. The blends were used in two pig studies conducted at two research locations. Exp. 1 used 900 weaned pigs (BW 6.2kg) allocated to 36 pens (25 pigs/pen, 9 pens/treatment, 4 treatments total) at a Manitoba facility. The same phase 1 (0.5kg/pig) and 2 (1.5kg/pig) diets were given to all pigs. In phases 3 and 4, a wheat-barley based control diet was supplemented with a commercial xylanase, Blend A, or Blend B at 0.75, 0.5, or 0.5 kg per tonne, respectively. The trial lasted for 46 days. Exp. 2 was conducted at a Quebec facility, with 918 weaned pigs (BW 5.6kg) allocated to 54 pens (17 pigs /pen, 9 pens/treatment, 6 treatments total). The same phase 1 and 2 diets were given to all pigs. In phases 3 and 4, a factorial study of 3 (enzymes) × 2 (with or without water acidification) was conducted. A corn-based control diet was supplemented with a commercial enzyme (xylanase/glucanase, 1.0kg/tonne) or Blend B (0.5kg/tonne). A water acidifier was used at 500ml per1000kg water. The trial lasted for 42 days. In Exp. 1, Blend B improved overall feed efficiency (FE, $P < 0.03$) compared with the Control (4.7%), the commercial xylanase (5.7%) or Blend A (5.1%) respectively. In Exp. 2, both enzymes significantly improved ADG (7%, $P < 0.01$) and FE (4%, $P < 0.001$) at week 3. The overall performance was similar in all treatments ($P > 0.05$). The acidifier only improved FE (2%, $P < 0.046$) at week 5. There was no interaction between acidification and enzymes ($P > 0.05$). These results demonstrated the potential to use one common enzyme blend for both diet types in weaned pigs, and the response was more pronounced in wheat-barley based diets than in corn-based diets.

Key Words: Weaned Piglets, Enzymes, Multi-Substrate

695 Gastrointestinal ecology of piglets fed diets containing non-starch polysaccharide hydrolysis products and egg yolk antibodies upon challenge with *Escherichia coli* (K88). E. Kiarie*, B. A. Slominski, D. O. Krause, and C. M. Nyachoti, *University of Manitoba*, *Winnipeg, MB, Canada*.

Gastrointestinal ecology (GE) of piglets fed diets containing non-starch polysaccharide hydrolysis products (HP) and egg yolk antibodies (EYA) against K88 fimbriae upon oral challenge with enterotoxigenic *E. coli* K88 (ETEC) was studied. The HP were generated by incubating a mixture of ethanol-extracted wheat, soybean meal, canola meal and flax with a blend of carbohydrase enzymes. Forty, 21-d old pigs housed in pairs were assigned one of four diets: control (C; devoid of feedstuffs used to generate HP), C + 5 g of HP/kg (HP), C + 5 g of EYA/kg (EYA) or C + 5 g of EYA + 5 g of HP/kg (EYA + HP) in a completely randomized design to give 5 pens per diet. Piglets were fed the experimental diets for 9 d adaptation period. On d 10 all piglets were orally challenged with ETEC. The incidence and severity of diarrhea was determined on a pen basis using a fecal scoring system (1 = no diarrhea to 5 = liquid diarrhea) at 0 h (1 h before challenge), 6, 24, and 48 h post-challenge. At 24 and 48 h post-challenge pigs (1 pig/pen on each occasion) were sacrificed to collect digesta and intestinal tissue. Compared to pigs fed the C diet, pigs fed additives showed low ileal adherent ETEC counts (4.7 vs. 5.5 log10 cfu/g; $P = 0.01$), low digesta ammonia concentration (104 vs. 132 mg/l; $P = 0.002$) and high villi height to crypt depth ratio (2.3 vs. 1.9; $P = 0.05$) which coincided with less (2 vs. 4; $P = 0.01$) scours within 48 h post-challenge. Feeding HP and EYA in combination resulted in higher ($P = 0.0001$) ileal lactic acid than when fed singly whilst pigs fed diets containing HP showed lower gastric pH ($P = 0.03$) and higher ileal adherent lactobacilli counts ($P = 0.01$) than pigs fed the C diet. In conclusion, the results show that HP and EYA modified piglet GE in the presence of ETEC which may explain the mechanisms through which these additives attenuate ETEC-induced secretory diarrhea in piglets.

Key Words: Egg Yolk Antibodies, Piglet Gastrointestinal Ecology, Non-Starch Polysaccharides Hydrolysis Products

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