

240 calf-fed steers ( $287 \pm 15$  kg) with 10 steers per pen and 6 replications per treatment. Dietary treatments included SYT-EFC, CON, a 50:50 BLEND of SYT-EFC and CON, and CON with an added enzyme supplement (NZ) in WDGS-based diets. In Exp. 1, a corn trait X byproduct interaction was observed for ADG and G:F ( $P = 0.05$  and  $0.02$ , respectively). Steers fed SYT-EFC with SB had greater ADG and G:F than steers fed CON with SB, which had the lowest ADG and G:F. Based on corn grain concentration, there was a 14.9% improvement in G:F when SYT-EFC was fed compared to CON in SB diets. For diets containing WDGS, there were no differences ( $P \geq 0.35$ ) in final BW, DMI, ADG, or G:F; however, a 3.0% numerical improvement in G:F was observed for steers fed SYT-EFC compared to CON. No interactions were observed for any carcass characteristics ( $P \geq 0.07$ ); however, marbling score, fat depth, and calculated yield grade were greater ( $P < 0.01$ ,  $P = 0.01$ , and  $P = 0.03$ , respectively) for steers fed SYT-EFC compared to CON. Fat depth and calculated yield grade were greater ( $P = 0.03$  and  $P = 0.02$ , respectively) for steers fed SYT-EFC and BLEND compared with CON. In Exp. 2, final BW, ADG, and G:F were greater ( $P \leq 0.03$ ) for steers fed SYT-EFC, BLEND, and NZ compared to CON. On a corn grain basis, an 8.4% improvement in G:F was observed due to SYT-EFC versus CON. Hot carcass weights were greater ( $P < 0.01$ ) for SYT-EFC, BLEND, and NZ compared to CON. These data suggest that feeding SYT-EFC improves G:F of feedlot cattle, and the corn is 3.0 to 14.9% better than control corn hybrids.

**Key Words:**  $\alpha$  amylase, corn hybrid, feedlot cattle

#### 106 Effects of supplemental soy peptide on growth performance and gut health of nursery pigs.

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The objective of this experiment was to evaluate the effect of soy peptide (Yunong, China) on growth performance, intestinal morphology, and oxidative stress in nursery pigs. A total of 40 pigs (20 barrows and 20 gilts at  $5.33 \pm 0.10$  kg BW) were randomly allotted to 4 treatments in a randomized complete block design. Sex and initial BW were used as blocks. Pigs were fed a basal diet supplemented with soy peptide at the level of 0, 5, 10, or 15 g/kg based on 3 phases (7, 10, and 10 d, respectively). Soy peptide, which was produced by soybean meal fermentation, contained a greater amount ( $P < 0.05$ ) of small-sized peptides ( $< 37$  kDa, 100.0%) compared with those of conventional soybean meal (44.7%). Body weight and feed consumption were recorded on d 7, 17, and 27. Increasing supplementation of soy peptide improved gain:feed (0.560 to 0.663, quadratic,  $P < 0.05$ ) in phase 1 and tended to increase ADG (380 to 453 g/d, quadratic,  $P = 0.056$ ) and ADFI (522 to 571 g/d, quadratic,  $P = 0.084$ ) in phase 2. Increasing levels of soy peptide tended to increase villus height in the duodenum (517.6 to 572.5  $\mu$ m, quadratic,  $P = 0.083$ ) and the jejunum (442.6 to 504.9  $\mu$ m, quadratic,  $P < 0.05$ ). Proliferation activity

measured by Ki-67 staining in the duodenum showed a higher percentage of positive reactions in the pigs fed soy peptide than those fed a basal diet (10.6 to 18.2%,  $P < 0.05$ ). Increasing dietary soy peptide decreased tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) in serum (72.8 to 52.4 pg/mL, linear,  $P < 0.05$ ). Supplementation of soy peptide reduced TNF- $\alpha$  in the jejunum (1.24 to 0.46 pg/mg,  $P < 0.05$ ). Pigs fed soy peptide had lower malonaldehyde in the jejunum compared to those fed a basal diet (0.52 to 0.23,  $\mu$ mol/g protein,  $P < 0.05$ ). In conclusion, soy peptide supplemented at 5 to 10 g/kg to nursery diets improved growth performance and gut health of pigs in association with enhanced villus development, reduced inflammatory cytokine levels, and reduced oxidative stress products.

**Key Words:** growth performance, gut health, soy peptide

#### 107 Evaluating the inclusion level of medium chain fatty acids to reduce the risk of PEDV in feed and spray-dried animal plasma.

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Research has confirmed that chemical treatments, such as medium chain fatty acids (MCFA) and commercial formaldehyde, can be effective to reduce the risk of porcine epidemic diarrhea virus (PEDV) cross-contamination in feed. However, the efficacy of MCFA levels below 2% inclusion is unknown. The objective of this experiment was to evaluate if a 1% inclusion of MCFA is as effective at PEDV mitigation as a 2% inclusion or formaldehyde in swine feed and spray-dried animal plasma (SDAP). Treatments were arranged in a  $4 \times 2 \times 6$  plus 2 factorial with 5 chemical treatments: 1) PEDV positive with no chemical treatment, 2) 0.325% commercial formaldehyde, 3) 1% MCFA, and 4) 2% MCFA; 2 matrices: 1) complete swine diet and 2) SDAP; 6 analysis days: 0, 1, 3, 7, 14, and 21 post inoculation; and 1 treatment each of PEDV negative untreated feed and plasma. Matrices were first chemically treated, then inoculated with PEDV, and stored at room temperature until being analyzed by RT-qPCR. Data were analyzed by the GLIMMIX procedure of SAS. The analyzed values represent threshold cycle (CT), at which a higher CT value represents less detectable RNA. All main effects and in-

**Table 107.**

Matrix	Chemical treatment					Pooled SEM
	Negative	Positive	MCFA 1%	MCFA 2%	Formaldehyde	
Feed	undetectable	34.2	41.4	42.8	37.2	0.98
SDAP	undetectable	32.2	32.4	31.6	37.6	

teractions except for day  $\times$  form were significant ( $P < 0.02$ ). Feed treated with MCFA, regardless of inclusion level, had fewer ( $P < 0.05$ ) viral particles than feed treated with formaldehyde. However, the SDAP-treated with either 1% or 2% MCFA had similar ( $P > 0.05$ ) concentrations of detectable PEDV RNA as the untreated SDAP, while the SDAP treated with formaldehyde had fewer viral particles ( $P < 0.05$ ). The complete feed had a lower ( $P < 0.05$ ) quantity of PEDV RNA than SDAP (34.2 vs. 32.2 for feed vs. SDAP, respectively) ( $P < 0.05$ ). Analysis day also decreased ( $P < 0.05$ ) the quantity of detectable viral particles from d 0 to d 21, (33.2 vs. 39.0, respectively). In summary, time, formaldehyde, and MCFA all appear to enhance RNA degradation of PEDV in swine feed and ingredients, but their effectiveness varies within matrix. The 1% inclusion level of MCFA was as effective as 2% in complete feed, but neither was effective at reducing the magnitude of PEDV RNA in SDAP.

**Key Words:** feed matrix, medium chain fatty acids, PEDV

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**108 Liquid feeding fermented DDGS to weanling pigs: improvement of growth performance with added enzymes and microbial inoculants.** M. Wiseman<sup>1,\*</sup>, D. Wey<sup>1</sup>, C. F. M. de Lange<sup>2</sup>, <sup>1</sup>Department of Animal Biosciences, University of Guelph, Guelph, ON, Canada, <sup>2</sup>University of Guelph, Guelph, ON, Canada.

Controlled fermentation of coproducts can improve energy availability and gut function through synergistic soluble fiber hydrolysis. This study assessed effects of extended DDGS fermentation on performance and digestive function of newly weaned piglets fed corn and soybean meal based liquid diets. Enzymes (67.2 IU  $\beta$ -glucanase and 51.4 IU xylanase/g DDGS; AB Vista) and silage inoculant (360,000 CFU *Pedio-coccus pentosaceus* 12,455 and *Propionibacterium jensenii* 30,081/g DDGS; Lallemand Inc.) were added to dry DDGS at the time of liquid feed preparation and delivery (UNFER) or allowed to ferment with DDGS (1 to 7 d at 40°C; 16% DM; FER). Diets were composed of a common base supplement for each of three phases (P; d 0 to 7, 7 to 20, 20 to 42), mixed with DDGS (7.5 (P1), 16.25 (P2), and 25 (P3) % of DM) and water (25% DM). Pigs were separated into two rooms according to initial body weight (BW<sub>i</sub>; heavy (HBW, 7.6  $\pm$  0.8 kg) or light (LBW, 5.8  $\pm$  0.6 kg)). The study was a randomized block design with results presented as lsmeans  $\pm$  SEM (FER vs. UNFER, respectively). Owing to a BW<sub>i</sub> by diet interaction ( $P < 0.05$ ), data were analyzed separately for the two BW<sub>i</sub> groups (4 pens/BW<sub>i</sub> and dietary treatment, 14 pigs/pen). To obtain uniform final BW, LBW pigs were fed P3 diets until d 48. On d 42, pH and organic acid concentration were determined in ileal digesta pooled from 2 pigs/pen. Complete liquid FER diet ( $n = 9$ ) had higher content of lactic acid (42.6  $\pm$  17.4 vs. 17.6  $\pm$  1.4 mM) and acetic acid (55.3  $\pm$  37.1 vs. 3.9  $\pm$  0.7 mM) than the UNFER diet ( $n = 3$ ). Overall, there were no differ-

ences ( $P > 0.10$ ) in ADG (424 vs. 424  $\pm$  14 g/d for HBW and 404  $\pm$  15 vs. 386  $\pm$  12 g/d for LBW) and DMI (605 vs. 581  $\pm$  16 g/d for HBW and 540  $\pm$  19 vs. 509  $\pm$  16 g/d for LBW). For d 42 to 48, LBW pigs fed FER had greater ADG (941  $\pm$  60 vs. 773  $\pm$  52 g/d,  $P < 0.05$ ), resulting in higher end BW (25.8  $\pm$  0.5 vs. 24.5  $\pm$  0.4 kg,  $P < 0.05$ ). In digesta, total organic acid concentration and pH did not differ between treatments ( $P > 0.10$ ). Digesta fermentation patterns (% of total organic acids), however, differed with FER increasing n-butyric acid (15.0 vs. 1.0  $\pm$  3.8%,  $P = 0.04$ ) and tending to lower lactic acid (30.0 vs. 47.1  $\pm$  6.9%,  $P = 0.06$ ) within HBW, while within LBW, FER tended to increase acetic acid (53.7  $\pm$  7.4 vs. 31.1  $\pm$  6.4%,  $P = 0.07$ ). FER benefited LBW pigs late in the nursery period, altering the gut metabolome, possibly due to soluble fiber hydrolysis and improved gut development in pigs potentially compromised by low weaning BW.

**Key Words:** DDGS, liquid feeding, nursery pigs

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**109 Impact of sex on composition and quality of fresh loins, bellies, and fresh and processed hams.**

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The objective was to characterize the effect of sex across production focus on primal quality of pigs slaughtered in marketing groups designed to reduce variability. Pigs ( $N = 7672$ ) from a lean growth [ $n = 1468$  barrows (LB);  $n = 2151$  gilts (LG)] or superior meat quality [ $n = 1895$  barrows (QB);  $n = 2158$  gilts (QG)] production focus were slaughtered over two seasons. Data were analyzed as a 2  $\times$  2 factorial design. Unequal magnitudes of differences of sexes within production focus drove interactions. Random effects included barn ( $N = 8$ ), marketing group ( $N = 3$ ), and season ( $N = 2$ ). Variability between sexes was measured using a Levene's test. Carcass composition, subjective loin quality, and gluteus medius color were collected on all carcasses. In-plant loin quality and belly quality analyses were conducted on 52.0% and 47.5% of carcasses, respectively. Loins and hams from select carcasses ( $N = 862$ ) were collected for slice shear force (SSF) analysis and processed ham characteristics. Barrows (95.01  $\pm$  2.41 kg) had a heavier HCW than gilts (94.17  $\pm$  2.40 kg;  $P < 0.0001$ ) but did not differ ( $P = 0.09$ ) in variability. Fat depth was greater ( $P < 0.0001$ ) and more variable ( $P < 0.01$ ) in barrows (16.83  $\pm$  0.76 mm) than gilts (14.65  $\pm$  0.76 mm). However, LB had a 13.86% greater fat depth than LG ( $P < 0.01$ ), and QB had a 15.65% greater fat depth than QG ( $P < 0.01$ ). Gilts (68.46  $\pm$  2.49 mm) had a greater loin depth than barrows ( $P < 0.01$ ; 67.22  $\pm$  2.49 mm) with no differences ( $P = 0.60$ ) in variability between sexes. Gilts (58.16  $\pm$  0.58%) had a greater percent lean ( $P < 0.01$ ) with less variability ( $P < 0.01$ ) than barrows (56.66  $\pm$  0.58%). Lean percentage was increased 1.28 units in LG com-