249 Effect of spray-dried plasma and fructooligosaccharide on nursery performance and small intestinal morphology of weaned pigs. J. D. Spencer*, K. J. Touchette, H. Liu, G. L. Allee, M. D. Newcomb, M. S. Kerley, and L. W. Pace, *University of Missouri, Columbia.*

A study was conducted to evaluate the effect of spray-dried plasma and fructooligosaccharide (FOS) on early nursery pig performance and small intestinal morphology. A total of 96 weaned pigs (18 d and 6.1 kg) were allotted by weight in a RCBD (4 pigs/pen) to a 2×2 factorial arrangement with two levels of plasma (0 and 3.5%) and two levels of FOS (0 and .1%). Diets were fed for 14 days and were formulated to contain 1.56% lysine and 0.86% sulfur amino acids. All diets contained 1.75% spray-dried blood meal, 15% lactose, and 5% added fat. On day 10, one pig from each pen was killed and small intestinal samples of approximately 2-3 cm in length were collected. At each of the three sites (duodenum, jejunum, and ileum) ten villi and the respective crypt depths were measured. In the first week postweaning, dietary inclusion of plasma increased ADFI (P<.05) with no effects on ADG or feed efficiency, while inclusion of FOS did not affect pig performance. In the second week, plasma increased ADG (P<.05) and ADFI (P=.08) with no effect on feed efficiency, while FOS did not affect pig performance. Diet had no effect on crypt depth. Both plasma and FOS increased villus height (P<.01). Pigs fed FOS had a higher villus:crypt ratio (VCR, P<.07). A plasma by small intestine site interaction was shown for VCR (P=.05). Plasma did not effect VCR in the duodenum, but VCR was increased in the jejunum (P <.001) and ileum (P <.05). These data show that plasma improves ADFI and ADG in early nursery performance, and both plasma and FOS increase villus height and villus:crypt ratio in the small intestine.

Key Words: Plasma, Fructooligosaccharide, Intestinal morphology

250 Added L-Carnitine fed during gestating increases birth weight of pigs. R. E. Musser[1]*, R. D. Goodband[1], K. Q. Owen[2], S. A. Blum[2], M. D. Tokach[1], and J. L. Nelssen[1], [1]*Kansas State University, Manhattan and* [2]*Lonza Inc., Fair Lawn, NJ.*

A total of 307 sows was used to determine the effects of adding 50 ppm of L-Carnitine in gestation and lactation diet on sow and litter performance. The control diet, (1.83 kg/d), contained .65% lysine, .95% Ca and .85% P. The experimental diet consisted of 1.6 kg/d of the control diet with an additional top dressing of .23 kg of control diet that provided 50 ppm of L-Carnitine. Sows fed added L-Carnitine had greater BW (55.5 vs 46.6 kg; P =.0001) and last rib fat depth (2.6 vs 1.7 mm; P =.0160) gain in gestation than control sows. Addition of 50 ppm L-Carnitine in gestation increased both total litter (15.5 vs 14.6 kg; P =.0354) and pig (1.58 vs 1.49 kg; P =.0008) birth weight. No differences were found in the variation in birth weights between dietary treatments. Split-plot analysis was used to determine the overall treatment effect on litter weaning weights. Added L-Carnitine in gestation increased litter weaning weights (45.11 vs 41.35 kg, P =.023); however, no differences were observed from added L-Carnitine fed during lactation. Added L-Carnitine in gestation increased sow IGF-I concentration on d 60 (71.3 vs 38.0 ng/ml, P =.0071)and d 90 (33.0 vs 25.0 ng/ml, P =.0390). Feeding L-Carnitine through gestation increased sow BW and last rib fat depth, and increased litter birth and weaning weights.

Key Words: L-Carnitine, Gestation, Birth weight

251 Effects of tannin on porcine jejunal brush border membrane-bound enzyme activities. M. Z. Fan*, O. Adeola, and E. K. Asem, *Purdue University, West Lafayette.*

Effects of hydrolysable tannin on the activities of porcine jejunal enterocyte brush border membrane-bound alkaline phosphatase (*EC* 3.1.3.1), aminopeptidase N (*EC* 3.4.11.2), and sucrase (*EC* 3.2.1.48) were examined. Jejunal mucosa was scraped from three 26-kg pigs and enterocyte brush border membrane vesicles, with an average enrichment of 21-fold in sucrase specific activity, were prepared by Mg^{2+}–precipitation and differential centrifugation. The brush border membrane vesicles were treated with tannin by mixing 100 uL (1 mg protein) batches of vesicle suspension with 20 uL of vesicle resuspension buffers containing increasing amounts of the tannin to achieve the treatment concentration gradients (0, .05, .10, .25, .50, 1.00, and 2.50%). The mixture (120 uL) was incubated at 4°C for 60 min and was then diluted to contain .25 mg protein/mL prior to enzyme assays. *P*-Nitrophenyl phosphate (2 *mM*), L-alanine-*P*-nitroanilide hydrochloride (28 *mM*), and sucrose (28 *mM*) were respectively used in alkaline phosphatase, aminopeptidase N, and sucrase assays (37°C). All enzyme assays were conducted under the conditions of linear enzyme reaction. Inhibition kinetics were analyzed according to *Michaelis-Menten* equation. As a percentage fraction of the control (no tannin), the maximal inhibition of enzyme activity (I_{max}) was 24.4% for alkaline phosphatase, 54.8% for aminopeptidase N, and 61.2% for sucrase ($P < .05$). These results imply that the adverse effects of extractable polyphenols in feeds on the digestive utilization of dietary carbohydrates and proteins in the pig are partly due to their direct interference with the normal functions of the small intestinal brush border membrane-bound digestive enzymes.

Key Words: Tannin, Jejunal brush border enzymes, Pigs

252 Growth performance and digestive and metabolic responses of gilts penned individually or in groups. R. S. Gomez*, P. S. Miller, H. Y. Chen, and A. J. Lewis, *University of Nebraska, Lincoln.*

Two experiments were conducted to identify factors involved in the growth retardation of pigs housed in groups. In each experiment, 60 gilts were allotted to two treatments in a randomized complete block design. Twelve gilts were penned individually with one feeder, one waterer and a space allowance of 1.5 m^2/pen. Forty eight gilts were divided into12 groups of four and penned together with four feeders, four waterers and a space allowance of 6 m^2/pen. In Exp. 1 there were 60 growing gilts (initial and final BW of 17.9 and 50.8 kg, respectively) and in Exp. 2 there were 60 finishing gilts (initial and final BW of 46 kg 118.3 kg, respectively). In Exp. 1, there was a trend ($P < .10$) for greater ADG, final BW, and average backfat thickness for gilts penned individually. Apparent digestibilities of DM and CP tended ($P < .10$) to be greater and plasma concentrations of nonesterified fatty acids (NEFA) were greater ($P < .05$) for gilts penned individually. Plasma concentrations of urea and glucose were similar between treatments. In Exp. 2, ADG was greater ($P < .05$) and there was a trend ($P < .10$) for greater ADFI, final BW, loin weight, and primal cut weight for gilts penned individually. Apparent digestibilities of DM, CP, and energy, and the plasma concentrations of urea, glucose and NEFA were similar for both treatments. The growth retardation of group-penned growing gilts was related to reductions in the apparent digestibilities of DM and CP and increases in plasma concentrations of NEFA. However, in finishing gilts, growth retardation was not related either to changes in digestive processes or plasma metabolite concentrations.

Key Words: Gilts, Growth retardation, Groups