

**176 Effects of modified tall oil, chromium nicotinate, and L-carnitine on growth and carcass traits of finishing pigs.** P. R. O'Quinn<sup>\*1</sup>, A. T. Waylan<sup>1</sup>, R. D. Goodband<sup>1</sup>, J. L. Nelssen<sup>1</sup>, J. A. Unruh<sup>1</sup>, J. C. Woodworth<sup>1</sup>, M. D. Tokach<sup>1</sup>, and K. Q. Owen<sup>2</sup>, <sup>1</sup>Kansas State University, Manhattan, <sup>2</sup>Lonza, Inc., Fair Lawn, NJ.

Research at Kansas State University has shown improvements in fresh pork color from the combination of chromium nicotinate (CrNic) and L-carnitine and from the combination of modified tall oil (MTO) and elevated levels of vitamin E. Therefore, this study used 80 gilts (initially 45 kg) to examine the effects of MTO, CrNic, and L-carnitine on growth and carcass traits of finishing pigs. Pigs were blocked by weight and ancestry and allotted to one of eight treatments arranged as a 2 x 2 x 2 factorial with main effects of MTO (0 or .5%), CrNic (0 or 50 ppb), and L-carnitine (0 or 50 ppm). The corn-soybean meal diets were fed in two phases: 45 to 73 (1.00% lysine) and 73 to 107 (.75% lysine) kg and contained 3% and 2% soybean oil, respectively. Soybean oil was replaced by MTO in the four diets containing MTO. From 45 to 107 kg, pigs fed MTO had increased ADG ( $P = .03$ ) and ADFI ( $P = .10$ ), and pigs fed CrNic had improved G/F ( $P = .02$ ) when compared to other treatments. There were no main effect interactions ( $P > .15$ ) for the overall growth trial, and L-carnitine did not affect ( $P > .40$ ) growth performance. L-carnitine decreased visual color of the longissimus muscle in diets without MTO, but improved color in diets containing MTO (MTO\*L-carnitine,  $P = .10$ ). Dressing percentage was increased by CrNic in diets without MTO, but decreased in diets containing MTO (MTO\*CrNic,  $P = .07$ ). Average backfat and longissimus muscle area were not affected ( $P > .15$ ) by treatment. There was a CrNic by MTO interaction ( $P < .05$ ) for belly firmness; CrNic increased firmness in diets without MTO and decreased firmness in diets with MTO. However, MTO increased belly firmness ( $P < .01$ ) regardless of other factors. These data suggest benefit from adding MTO and/or low levels of CrNic on growth of finishing gilts, but little benefit was seen on carcass traits from adding modified tall oil, chromium nicotinate, or L-carnitine.

**Key Words:** Modified tall oil, Chromium nicotinate, L-carnitine

**177 Effect of dietary chromium-L-methionine on glucose metabolism of growing pigs.** E. B. Kegley<sup>\*1</sup>, T. M. Fakler<sup>2</sup>, and C. V. Maxwell<sup>1</sup>, <sup>1</sup>University of Arkansas, Fayetteville, <sup>2</sup>Zinpro Corp., Eden Prairie, MN.

This study evaluated the effect of chromium as chromium-L-methionine (CrMet) on glucose tolerance and insulin sensitivity in pigs. Pigs were fed a control diet or the diet supplemented with 400  $\mu\text{g}$  Cr/kg of diet as CrMet. Twenty-eight crossbred barrows ( $28.3 \pm 2.23$  kg initial BW; 55 to 61 d of age) were stratified by weight and housed in pens (7 pigs/pen; 2 pens/dietary treatment) and fed their respective diets for a period of 36 or 37 days prior to the metabolic challenges and blood sampling. On d 35 and 36, pigs in one pen/dietary treatment were fitted with an indwelling jugular catheter. Approximately 30 h after catheterization, pigs were fasted for 16 h and an intravenous glucose tolerance test followed by an intravenous insulin challenge test was conducted. Pigs fed diets supplemented with CrMet had a faster ( $P < .03$ ) glucose clearance rate from 10 to 15 min after the glucose infusion (500-mg glucose/kg of BW). Pigs supplemented with CrMet had lower ( $P < .06$ ) plasma glucose concentrations before and during the glucose tolerance test. Plasma insulin concentrations were lower ( $P < .02$ ) before glucose infusion for pigs fed the diet supplemented with CrMet. Pigs supplemented with CrMet also had lower ( $P < .07$ ) insulin:glucose ratios after glucose infusion. There was a dietary treatment by time interaction ( $P < .02$ ) on glucose concentrations after the insulin infusion (.1 IU insulin/kg of BW). Pigs supplemented with CrMet had lower ( $P < .05$ ) plasma glucose concentrations from 45 to 120 min after the insulin infusion. The return to basal glucose concentration was slower for pigs fed diets supplemented with CrMet. These data indicate that dietary supplementation of CrMet alters glucose and insulin metabolism in growing pigs.

**Key Words:** Pigs, Chromium, Glucose Tolerance

**178 Dietary chromium tripicolinate increases sow productivity under commercial conditions.** C. D. Hagen<sup>1</sup>, M. D. Lindemann<sup>\*2</sup>, and K. W. Purser<sup>3</sup>, <sup>1</sup>Iowa Select Farms, Iowa Falls, IA, <sup>2</sup>University of Kentucky, Lexington, <sup>3</sup>Prince Agri Products, Inc., Quincy, IL.

Twelve 4,000-sow units in a common geographic location were selected to examine the effects of supplemental Cr from chromium tripicolinate (CrPic) on productivity of sows in commercial conditions. All units were under the same general management, served by the same feed mill and utilized similar breeding stock, facility design, equipment and animal management practices. Units were randomly allotted to one of the dietary treatments (0 or 200 ppb Cr from CrPic) based on historical litter size during a 3-month pretest period. The month subsequent to the 3-month pretest period was utilized as a start-up month, followed by a 6-month loading period of supplementation, and, then, sow performance was evaluated over a 12-month test period. During the loading period, performance did not differ ( $P > .13$ ) for the treatment groups. During the test period, the use of supplemental CrPic improved reproductive performance. The statistical evaluation revealed that the percent of sows bred within 7 days postweaning was improved with CrPic addition (90.6 vs 87.8%;  $P = .08$ ), as were pigs born alive (10.42 vs 10.05;  $P = .02$ ) and pigs weaned (9.08 vs 8.75;  $P = .02$ ) per litter. Reductions in wean to first service interval (6.4 vs 5.9 d;  $P = .20$ ) and in sow death rate (9.4 vs 10.9%;  $P = .09$ ) with CrPic were also noted. The addition of a parity term to the statistical model revealed standard parity effects on all sow performance parameters but there were no parity X treatment interactions ( $P > .33$ ). However, because the model took into account the large parity effects, the  $P$ -values for the aforementioned traits were also strengthened.  $P$ -values for the CrPic effects then became: sows bred within 7 days,  $P < .001$ ; pigs born live and weaned/litter,  $P < .001$ ; wean to first service interval,  $P = .01$ ; and sow mortality,  $P = .06$ . In commercial conditions, the use of a biologically available form of Cr can positively affect total sow productivity.

**Key Words:** Chromium, Pigs, Litter size

**179 Effects of dietary lysine intake during lactation on reproductive performance, blood borne metabolites and hormones in primiparous sows.** H. Yang<sup>\*1</sup>, J. E. Pettigrew<sup>2</sup>, L. J. Johnston<sup>1</sup>, G. C. Shurson<sup>1</sup>, J. E. Wheaton<sup>1</sup>, M. E. White<sup>1</sup>, Y. Koketsu<sup>1</sup>, A. F. Sower<sup>1</sup>, and J. A. Rathmacher<sup>3</sup>, <sup>1</sup>University of Minnesota, St. Paul, <sup>2</sup>Pettigrew Consulting International, Louisiana, MO, <sup>3</sup>Iowa State University, Ames.

Effects of dietary lysine concentrations during lactation on metabolic state, protein metabolism, reproductive hormones and performance were investigated in 36 primiparous sows. Sows were assigned randomly to one of three diets containing .4% (Low), 1.0% (Normal) or 1.6% (High) total lysine from intact protein sources. All diets contained 2.1 Mcal NE/kg and exceeded NRC (1988) requirements for all other nutrients. Actual lysine intakes over an 18-d lactation were 16, 36 and 56 g/d for sows fed Low, Normal, and High, respectively. Increasing lysine intake during lactation did not affect fractional breakdown rate of muscle on d 4 of lactation, but decreased it on d 15 ( $P < .05$ ). Sows fed Low had a reduced number of LH pulses on d 12 and 18 ( $P < .05$ ) and serum estradiol (E2) concentration on d 18 of lactation compared to Normal and High. However, LH pulses and E2 concentration were similar between Normal and High ( $P > .35$ ). Increasing lysine intake increased concentrations of serum urea nitrogen (SUN) and postprandial insulin ( $P < .05$ ) during lactation, but had no effect on plasma glucose concentration ( $P > .20$ ). Sows fed High had higher serum IGF-1 on d 6 and 18 than sows fed Normal ( $P < .05$ ). LH pulses were correlated with serum insulin concentration 25 min after feeding ( $P < .1$ ) and pre- and postprandial SUN concentration ( $P < .05$ ). Our results indicate that decreasing lysine intake from Normal to Low increased muscle protein degradation and decreased concentrations of insulin, SUN and estradiol and LH pulsatility; increasing lysine intake above Normal increased insulin, SUN and IGF-1, but did not increase secretion of estradiol and LH. Furthermore, nutritional impacts on reproduction may be mediated in part through associated effects on circulating SUN and insulin.

**Key Words:** Lysine, Primiparous Sow, Luteinizing Hormone