# Graduate Student Oral Competition–MS

**12 The effects of orally supplemented vitamin $D_3$ on serum 25(OH)$D_3$ concentrations and growth of pre-weaning and nursery pigs.** J. R. Flohr*[1], M. D. Tokach[1], S. S. Dritz[1], S. C. Henry[2], M. L. Potter[2], L. M. Tokach[2], J. P. Goff[3], R. L. Horst[4], J. C. Nietfeld[1], D. M. Madson[3], S. M. Ensley[3], R. D. Goodband[1], J. L. Nelssen[1], J. R. Bergstrom[1], J. M. DeRouchey[1], *[1]Kansas State University, Manhattan, [2]Abilene Animal Hospital, Abilene, KS, [3]Iowa State University, Ames, [4]Heartland Assays Inc., Ames, IA.*

A total of 270 pigs from 29 litters (PIC 327 × 1050, initially 1 to 2 d of age) were used in a 52 d study to determine the effects of oral vitamin $D_3$ supplementation on growth performance, serum 25(OH)$D_3$, and bone mineralization of pigs pre- and post-weaning. After farrowing, pigs were weighed and allotted into matched sets of 3 in a randomized complete block design, and were allotted to 1 of 3 treatments. Pigs were initially weighed over 2 different days (d 0 or 2), allowing pigs to be placed on test 1 or 2 d after birth. Pigs received a single oral dose of 1 mL peanut oil without vitamin $D_3$ (control), or 1 mL peanut oil with 40,000 IU, or 80,000 IU vitamin $D_3$. One matched set per litter, which was the closest to the average weight of the litter, was bled before dosing and on d 10, 20, 30, and 52 to measure 25(OH)$D_3$ concentrations. On d 20, pigs were weaned, and allotted by treatment to pens in the nursery and fed common diets from d 20 to 52.Vitamin $D_3$ was included in sow and nursery diets at 1,378 IU/kg. Bone ash and histology were determined on d 19 (6 pigs/treatment) and on d 35 (6 control and 6–80,000 IU pigs). Overall, no differences were observed in growth performance ($P > 0.30$), but pigs dosed with vitamin $D_3$ were 132 g and 227 g heavier at the end of the lactation and nursery phases respectively. No differences were found for bone ash concentration ($P > 0.09$) and no pathologic lesions were identified by microscopic evaluation of bone. Increasing oral vitamin $D_3$ increased serum 25(OH)$D_3$ concentrations on d 10 and 20 (quadratic, $P < 0.01$), and on d 30 (linear, $P < 0.01$). An oral dose of vitamin $D_3$ after birth increased serum 25(OH)$D_3$ through 30 d of age, but did not influence pig performance, bone ash, or bone histological measurements.

**Table 1.**

| | | Vitamin $D_3$ | | | | |
|---|---|---|---|---|---|---|
| Item | Control | 40,000 IU | 80,000 IU | SEM | Linear | Quadratic |
| BW, kg | | | | | | |
| d 20 | 5.91 | 6.04 | 6.05 | 0.18 | 0.44 | 0.69 |
| d 52 | 17.80 | 18.02 | 18.02 | 0.36 | 0.65 | 0.79 |
| Serum 25(OH)$D_3$, ng/mL | | | | | | |
| d 2 | 3.6 | 3.5 | 3.6 | 1.2 | 0.99 | 0.99 |
| d 10 | 14.7 | 57.3 | 68.5 | 1.2 | < 0.01 | < 0.01 |
| d 20 | 8.0 | 28.1 | 35.8 | 1.2 | < 0.01 | < 0.01 |
| d 30 | 10.4 | 17.8 | 22.5 | 1.2 | < 0.01 | 0.36 |
| d 52 | 13.9 | 15.0 | 15.4 | 1.2 | 0.36 | 0.82 |
| Bone Ash[1], % | | | | | | |
| d 19 | 35.5 | 32.6 | 30.8 | 2.0 | 0.09 | 0.82 |
| d 35 | 31.5 | N/A | 33.0 | 2.0 | 0.55 | N/A |

[1]Means represent inorganic ash % of sampled ribs.

**Key Words:** 25(OH)$D_3$, growth, nursery pig, vitamin D

**13 Hepatic mitochondrial efficiency in lines of mice differing in feed intake.** T. W. Murphy*[1], J. M. McDonald[2], and M. K. Nielsen[1], *[1]University of Nebraska, Lincoln, [2]Newsham Choice Genetics, West Des Moines, IA.*

Selection was practiced for high (MH) and low (ML) heat loss using direct calorimetry to create lines of mice differing in feed intake per unit BW (FI/BW). Selection occurred for both criteria in each of 3 replications (R); an unselected control (MC) was also maintained in each replicate. A total of 25 generations of selection was practiced; the 9 lines are presently maintained without selection. As a percentage of MC, mice of MH and ML lines differed in heat loss and FI/BW by 56 and 34%, respectively, when selection ceased. The 155 male mice measured in the present study came from R1-R3 and multiple generations. The purpose of this study was to determine hepatic mitochondrial efficiency in mice at maintenance across the genetic lines. Additionally, line comparisons of BW, FI/BW, liver weight per BW (LW/BW), and body composition were analyzed. Following measurement of FI and BW over a 3-wk period, mice were euthanized, and their livers were extracted and weighed. Livers were homogenized and mitochondria were isolated in buffer for measurement of oxygen consumption, and hence mitochondrial activity, using a Clark-type oxygen electrode. There were no line differences ($P > 0.20$) in oxygen consumption (μmol $O_2$/min) during states 2 or 4 of respiration, but mitochondria of ML mice tended to respire at a greater rate ($P < 0.06$) than that of MH mice during state 3. With this difference, mitochondria of ML mice expressed greater ($P < 0.02$) respiratory control ratio (RCR = state 3/state 4) by 35% than that for MH mice, revealing greater degree of uncoupling, thus less efficient electron transport in MH mice. There were no line differences ($P > 0.25$) in ADP:Oxygen ratio. There was no difference in BW between MH and ML mice ($P > 0.25$), however MC mice were heavier ($P < 0.03$). Difference in FI/BW ($P < 0.001$) was large with MH mice consuming 38% more than ML mice. No line differences in LW/BW were found. Selection had an effect on fat percentage ($P < 0.05$) with ML mice being 26% fatter than MH mice. State 3 respiration rate and RCR differed between mice of MH and ML lines as expected based on the line differences in feed intake, however LW/BW did not.

**Key Words:** mice, mitochondria, feed intake

**14 Dietary cation-anion difference alters feed intake of group housed replacement gilts.** S. J. Gasca*[1], A. E. Schumacher[1], J. P. Holt[1], P. M. Walker[1], and R. Hall[2], *[1]Illinois State University, Normal, [2]Animal Feed and Nutrition, Franklin, IN.*

Group housing for gestating sows is becoming increasingly prevalent, necessitating the development of efficient and easily-managed group feeding systems. The use of self-feeders could be an ideal, low cost, low maintenance option for producers utilizing group-housed gestation systems; however, over-consumption of feed may be a problem. Dietary Cation-Anion Difference (DCAD) previously has been shown to reduce feed intake. This study observed the effects of DCAD on feed intake, nutrient digestibility, BW, backfat, urine pH and blood pH changes of group housed replacement gilts. A 135-d study was designed consisting of 3 trials involving 30, 6 to 9 mo old gilts/trial, to assess the effects of DCAD implementation in the diets of replacement gilts. DCAD was implemented in treatment diets consisting of one of 3 levels (mEq/kg diet): 50 (Control), −225 and −450. Gilts were blocked by BW and randomly assigned within block to treatment pens. Diets were randomly assigned to treatment pens (2 pens/diet) containing 5 gilts/pen. Feed and fecal samples were collected and analyzed