
263 Effect of betaine supplementation during summer on sow lactation performance and subsequent farrowing performance.

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The objective of this trial was to evaluate the effects of betaine supplementation during lactation in hot summer months on piglet growth and sow subsequent reproductive performance. The betaine feeding portion of the trial was conducted between December, 2014 and March, 2015 with subsequent litter data completed by July, 2015 in Rancagua, Chile. Dietary treatments were randomly allotted to concurrent farrowing rooms of sows. Sows were fed corn-soybean meal based diets supplemented with either 0% ($n = 267$, CON) or 0.3% of betaine-HCl (70.7% betaine, $n = 251$ sows, BET), from 2 d before their farrowing due date until weaning (avg. lactation length = 21.0 d). Betaine supplemented sows had a 2.96% greater average daily feed intake (ADFI) during lactation than control sows ($P = 0.009$). Treatment by parity interactions were significant for ADFI and bodyweight (BW) loss ($P = 0.004$ and $P = 0.046$, respectively). Parity 2 BET supplemented sows had greater ADFI (6.40 versus 6.13 kg/d) and 5.13 kg less BW loss than parity 2 CON sows ($P < 0.001$ and $P = 0.024$, respectively). The analysis of lactation ADFI for 4 lactation periods (1–5, 6–11, 12–16 and 17–21 d) indicated that ADFI was greater for BET sows from 6–11 d (6.57 vs. 6.27 kg/d, $P < 0.001$), 12–16 d (7.19 vs. 6.94 kg/d, $P = 0.006$), and 17–21 d (7.49 vs. 7.27 kg/d, $P = 0.024$). After the addition of piglets allowed to nurse as a linear covariate ($P < 0.001$), CON and BET sows had similar litter gain of 52.76 and 51.85 kg, respectively ($P = 0.35$). Wean to estrus intervals (WEI) were shorter for BET supplemented sows than CON sows (4.22 vs. 4.57 d, respectively; $P = 0.001$). There were shifts in the distribution of WEI between sows fed CON and BET supplemented diets ($P = 0.035$) with 2.0, 28.7, 11.4, 4.6 and 1.8% of the CON sows versus 3.6, 33.0, 10.7, 1.5 and 1.0% of the BET sows with WEI of 3, 4, 5, 6, and 7 d. No treatment differences were found for subsequent conception rate (CON: 96.38 versus BET: 94.84%, $P = 0.43$) and farrowing rate (CON: 90.95 versus BET: 90.61%, $P = 0.90$). No treatment differences were found for subsequent litter size (total born, born alive, $P > 0.25$). Betaine supplementation increased daily feed intake and reduced WEI during summer months in sows.

Key Words: sow, lactation, betaine, wean to estrus interval, feed intake

264 Effect of altered lysine:energy ratio during gestation on wean pig growth performance.

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To determine the effects of altering dietary Lysine: energy ratio in gilt diets during gestation on wean pig performance, a total of 51 gilts were randomly assigned to 3 feeding regimens: Control, 2.21 kg/d from breeding to d 112 (1.93 g Lys/Kcal ME; 3276 Kcal ME/kg); Bump feeding (Bump-f), the control diet at 2.21 kg/d from breeding to d 89 and 2.61 kg/d from d 90 to 112; Phase feeding (Phase-f), 2.21 kg/d from breeding to d 89 (1.81 g Lys/Kcal ME; 3275 Kcal ME/kg) and 2.61 kg/d from d 90 to 112 (2.46 g Lys/Kcal ME; 3290 Kcal ME/kg). During lactation sows received the same diet (3368 Kcal ME/kg, 0.88% SID Lys). Thirty-nine sows successfully farrowed at least 7 piglets and remained in the study (Control $n = 9$, Bump-f $n = 13$, Phase-f $n = 14$ sows). Litters were equalized to 10 piglets within 72 h of birth by cross fostering within the same treatment. At weaning (20 ± 2 d), 8 pigs/sow were placed into 2 pens such that initial BW variation was $< 10\%$ /pen. All pigs received a commercial pig starter crumble diet for the first week postweaning and an early grower mash diet in wk 2, 3, and 4. Feed intake and BW were measured weekly. Data were analyzed using the Proc MIXED procedure in SAS. Maternal diet did not affect average BW at weaning (6.2 ± 0.2 kg) or the postweaning growth performance. Final BW was 14.9 ± 0.5 kg and overall ADG, ADFI and gain: feed from weaning until d 47 was 321 ± 15 g/d, 467 ± 18 g/d, and 0.690 ± 0.020 g/d, respectively. During the transition from crumble diet to mash diet, all pigs suffered a setback in daily gain (-66.1 , -26.1 , and -17.5 ± 26.92 g/d in Control, Bump-f, and Phase-f pigs, respectively) but this was not affected by maternal feeding regimen in gestation. There was an increase ($P < 0.001$) in ADG and ADFI and a decrease ($P < 0.001$) in gain: feed over the 4 wk postwean period but gain: feed was not different between wk 3 and 4. In gilts, constant feeding, bump feeding or bump feeding with altered lysine: energy during gestation may result in equivalent piglet growth performance in the first 4 wk postwean.

Key Words: Lysine, Phase-feeding, Bump-feeding

265 Evaluating the impact of maternal dietary vitamin D supplementation on sow performance, serum 25OHD₃, and subsequent pig performance.

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A total of 104 sows (PIC 1050; mean parity 2.2 ± 0.3) in 4 farrowing groups (25–27 sows per group) were used to determine the effects of gestational and lactational vitamin D supplementation on sow performance and serum 25OHD₃. Sows

were allotted to 1 of 4 dietary treatments (800, 2000, or 9600 IU of D₃, or 50 µg of 25OHD₃ [equivalent to 2000 IU/kg D₃, DSM Nutritional Products Inc., Parsippany, NJ] per kg of diet) in a CRD. There were 25 to 27 sows per treatment. Maternal performance was not impacted by treatments. Increasing dietary D₃ increased (linear, $P = 0.001$) sow serum 25OHD₃. Sows fed 50 µg/kg of 25OHD₃ had greater ($P < 0.001$) serum 25OHD₃ than sows fed 800 or 2000 IU/kg, but decreased ($P < 0.004$) serum 25OHD₃ compared to sows fed 9600 IU/kg. At weaning, increased maternal D₃ increased piglet serum 25OHD₃ (quadratic, $P = 0.033$), and pigs from sows fed 50 µg/kg of 25OHD₃ had greater ($P = 0.001$) serum 25OHD₃ compared to pigs from sows fed 800 IU/kg D₃, but lower ($P = 0.001$) than pigs from sows fed 9600 IU/kg of D₃. A subsample population of pigs ($n = 448$; PIC 327 × 1050; initially 6.6 ± 0.3 kg; 21 d of age) from 52 litters (2 of 4 farrowing groups) were used in a split-plot design (maternal treatment = whole plot; nursery treatment = subplot) to determine the influence of maternal and nursery dietary vitamin D on postweaning growth. Once weaned, pigs were allotted to pens based on maternal treatment, maintaining pre-weaning BW differences, and pens were randomly assigned to 2 nursery diets (2000 IU D₃/kg or 50 µg 25OHD₃/kg). There were 12 and 9 pens/treatment in nursery and finishing, respectively. Pen was the experimental unit. Growth performance was not influenced by nursery vitamin D. In the nursery, pigs from sows fed increasing D₃ had increased (quadratic, $P < 0.003$) ADG and ADFI. Throughout finishing, ADG and G:F increased (quadratic, $P < 0.05$) with increasing maternal D₃. Pigs from sows fed 50 µg/kg 25OHD₃ had increased ($P = 0.002$) ADG compared to pigs from sows fed 800 IU/kg D₃. Overall, increasing maternal D₃ increased serum 25OHD₃ concentrations, but more D₃ (on an equivalent IU basis) is needed to achieve similar serum 25OHD₃ responses compared to feeding 25OHD₃. Pigs from sows fed 2000 IU/kg D₃ grew faster after weaning compared to pigs from sows fed 800 or 9600 IU/kg D₃ and pigs from sows fed 25OHD₃ had greater ADG compared to pigs from sows fed 800 IU/kg D₃.

Key Words: 25OHD₃, sow, vitamin D

266 Development of precision gestation feeding program using electronic sow feeders and effects on gilt performance. R. Q. Buis^{*1}, D. Wey¹, C. F. M. de Lange², ¹*Department of Animal Biosciences, University of Guelph, Guelph, ON, Canada*, ²*University of Guelph, Guelph, ON, Canada*

Computer controlled electronic sow feeders (ESF) allow precision feeding (PF) of individual gestating sows housed in groups. A study was conducted to evaluate PF gestating gilts using the NRC (2012) nutrient requirement model. The NRC (2012) model was adjusted to estimate daily energy requirements of gestating gilts, based on a constant daily lipid deposition target of 105 g/d, observed BW at breeding, assumed

litter size of 12.5 and mean birth weight of 1.4 kg. Eighty gilts were assigned at d2–8 post breeding to 1 of 2 dietary treatments, moved into group-housed ESF pens, and remained there until d101–107 of gestation. For half the gilts (PF), the feeding level and blend of 2 iso-caloric diets (NE 2518Kcal/kg; 0.80 vs. 0.20% SID Lys for high and low protein, respectively; diets HP and LP) were adjusted daily for each animal to accurately meet estimated energy and Lys requirements. The remaining gilts (CON) received constant amounts of feed throughout gestation: 1.32 and 0.88 kg/d of HP and LP diets, respectively (mean SID Lys 0.56%). Total feed allowance per sow (d3–105) was similar for both groups (PF vs. CON; 201 vs. 203 kg; $P = 0.66$), while sows on PF used 6 kg less of the HP diet. Between treatments (PF vs. CON), d3–105 gains of BW (60.9kg vs. 64.7kg, $P = 0.18$) and back fat (3.7 mm vs. 3.2 mm, $P = 0.47$) did not differ. Yet when ADG for early (d 5–32), mid (d 33–67) and late (d 68–103) gestation were compared, gilts on PF tended to gain less in early gestation (0.31 vs. 0.41 kg/d; $P = 0.096$), while ADG was similar during mid (0.71 vs. 0.73 kg/d; $P = 0.704$) and higher for PF during late (0.82 vs. 0.66 kg/d; $P < 0.01$) gestation. During the subsequent 21d lactation period, no treatment effects on performance were observed (litter size at birth 12.2 vs. 12.2; mean birth BW 1.52 vs. 1.47 kg/pig; litter growth rate 2.47 vs. 2.47 kg/d); voluntary ADFI was higher for PF (4.98 vs. 4.56 kg/d; $P = 0.045$) and ADG tended to be higher for PF (–0.78 vs. –0.98 kg/d; $P = 0.10$). In this study, PF gilts did not affect overall gestation BW and back fat gain. However, in PF gilts the pattern of sow BW gain followed more closely the gain of products of conception. Gilts on PF ate more and tended to lose less weight during the subsequent lactation, which may benefit long term reproductive performance.

Key Words: electronic sow feeders, gestating gilts, precision feeding

267 What is “gut health” and how do you quantify/measure it? A. J. Moeser^{*}, *North Carolina State University, Raleigh.*

In recent years, the term “gut health” has become an increasing used buzzword, but what does it mean? Is gut health reflected by growth and feed efficiency responses, functional measurements of intestinal permeability, or morphological measurements? It’s time to define what gut health means. Gut health can be defined as the optimal and efficient balance between the assimilation of water and nutrients into the body and the maintenance and rapid restoration of intestinal defense barriers, facilitating optimal health and survival of the host. The objectives of this presentation will be to: 1) further define key components of gut health, 2) review current research approaches and techniques to measure it and disadvantages and limitations of each technique, and 3) discuss how a combination of approaches and models can be used to provide a comprehensive assessment of gut health, with an emphasis on