Table 386.

Treatment:	1	2	3	4	5	6	
d 0 to 70:	Meal	Pellet	Meal	Pellet	Rotated	Rotated	
Item, d 70 to 118:	Meal	Pellet	Pellet	Meal	Rotated	Rotated	SEM
ADG, kg[1]	0.96	0.97	0.96	0.96	0.96	0.97	0.012
ADFI, kg	2.36[a]	2.26[c,y]	2.30[b,c,x]	2.28[b,c]	2.30[b]	2.29[b,c]	0.024
G:F	0.407[c]	0.430[a]	0.421[b]	0.422[b]	0.420[b]	0.423[b]	0.002
Pigs removed/pen	0.50[b]	1.92[a]	1.06[b]	0.93[b]	0.85[b]	0.92[b]	0.265

[a,b] Superscripts within a row are different ($P < 0.05$)
[x,y] Superscripts within a row tend to be different ($P < 0.10$)

NRC (2012). Maternal Pd was calculated as the difference between total Pd and pregnancy-associated Pd. Feeding level and day of gestation affected whole body Pd and maternal Pd ($P < 0.01$), but there was no interaction ($P > 0.70$). Whole body Pd showed both linear and quadratic relationships with day of gestation ($P < 0.05$). For the five respective N-balance periods across the two feeding levels, whole body Pd was 87.1, 74.2, 90.5, 97.1, and 107.9 (SEM=7.1) g/d. Across the five N-balance periods, total (as well as maternal) Pd increased by 33.0±1.6 g/d as a result of the increased feed intake. Maternal Pd declined linearly ($P < 0.001$) with day of gestation and across the two feeding levels was 78.8, 51.1, 65.7, 57.1, and 39.2 (SEM=7.1) g/d for the five respective N-balance periods. In summary, the feeding level effect on total and maternal Pd was constant throughout gestation. The gradual decline in maternal Pd with day of gestation is in contrast to NRC (2012), and has important implications for the factorial estimation of amino acid requirements of gestating gilts. Further investigation into the physiological control of the dynamic changes in maternal Pd throughout gestation is warranted.

Key Words: gestating gilts, maternal protein deposition, nitrogen retention

385 **Effects of different feeding level during three periods of gestation on sow and litter performance.**
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The present study investigated the effects of different feeding level during 3 periods of gestation on sow and litter performance. A total of 113 multiparous sows (Landrace × Large White) were blocked by sow body weight (BW) and backfat (BF) after breeding and randomly allotted to 1 of 4 dietary treatments. All sows were fed the same corn-soybean meal diet with the amount of 1.0 × maintenance energy intake (100 × $BW^{0.75}$ kcal ME/d) throughout the gestation period except 3 periods of 7 d dietary treatments imposed on d 28, d 56 and d 84 of gestation. During these 3 periods, sows were fed 1 of 4 different feeding levels based on maintenance feed intake: 1) 0.5 × maintenance level; 2) 1.0 × maintenance level; 3) 1.5 × maintenance level; 4) 2.0 × maintenance level. Results showed that with the increase of dietary feeding level, sow BW change (-5.57, -0.74, 2.81 and 8.20 kg, respectively, $P < 0.0001$), BF change (−0.02, 0.98, 0.74 and 0.82 mm, respectively, $P = 0.05$), average daily gain (ADG; −0.77, −0.10, 0.39 and 1.14 kg, respectively, $P < 0.0001$) and gain to feed ratio (G:F; −0.81, −0.05, 0.16 and 0.34 kg/kg, respectively, $P < 0.0001$) during the 1st period (d 27 to 34) increased linearly. The results for sow BW and BF change, ADG and G:F during the 2nd (d 55 to 62) and 3rd periods (d 83 to 90) were consistent with the 1st period. Additionally, sow BW change (17.81, 25.37, 31.38 and 37.85 kg, respectively, $P < 0.0001$) and BF change (−0.13, 1.17, 1.43 and 2.61 mm, respectively, $P = 0.0002$) from d 27 to d 109 increased linearly with the increase of dietary feeding level during 3 periods of gestation. In contrast, sow BW change (14.67, 9.24, 7.32 and 2.78, respectively, $P < 0.0001$) reduced linearly and BF change (−0.72, −1.18, −0.74 and −1.59 mm, respectively, $P = 0.10$) and average daily feed intake (ADFI; 6.97, 6.79, 6.80 and 6.51 kg, respectively, $P = 0.10$) tended to reduce linearly during lactation period. However, there were no significant differences in litter performance in terms of number of live born and weaned piglets, litter weights at birth and weaning. In conclusion, introduction of different feeding level for 3 short periods during gestation did not affect litter performance, but greatly affected sow BW and BF change during gestation and lactation periods, which may have carry-over effects on subsequent reproductive performance.

Key Words: feeding level, litter performance, sow performance

386 **Evaluating strategic pellet feeding regimens on finishing pig performance, stomach morphology, and carcass characteristics.**
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A total of 2,100 pigs (PIC 327 × 1050; initially 31.2 kg BW) were used in a 118-d trial to determine the effects of pellet feeding regimens on finishing pig growth performance, stomach morphology, and carcass characteristics. Pigs were allotted to 1 of 6 dietary treatments (14 pens/treatment with 25 pigs/pen). The same corn-soybean meal–based diets containing 15% dried distillers grains with solubles were used for all treatments. The 6 treatments were: 1) continuous meal feed; 2) continuous pelleted feed; 3) meal from d 0 to 70 and pellets

from d 70 to 118; 4) pellets from d 0 to 70 and meal from d 0 to 118; 5) pellets and meal rotated every 2 wk starting with meal; 6) pellets and meal rotated every 2 wk starting with pellets. On d 110, 4 pigs from each pen were harvested and a combined ulcer and keratinization score was determined for each stomach. Overall, there were no differences ($P > 0.10$) for ADG. Pigs fed meal throughout had the greatest ($P < 0.05$) ADFI, while pigs fed pellets throughout had the lowest, and all other treatments were intermediate. Pigs fed pelleted diets throughout had the greatest ($P < 0.05$) G:F, while pigs fed meal throughout had the lowest G:F, and all other treatments were intermediate. Feeding pellets throughout increased ($P < 0.05$) the number of pigs removed per pen above all other treatments. When pelleted diets were fed for the last 58 d, or for the entire trial, the incidence of ulceration and keratinization increased ($P < 0.05$) while pigs fed meal for the last 58 d had lower incidence, and all other treatments were intermediate. There were no differences ($P > 0.10$) for any carcass characteristics measured. In conclusion feeding pelleted diets improved G:F but increased removals and stomach ulceration; however, rotating pellets and meal provided an intermediate G:F response without the increase in stomach ulceration.

Key Words: finishing pig, pellet, ulcer

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387 **Effect of β-glucan from microalgae on the growth performance and gut health of nursery pigs.**
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This study was to determine the effect of β-1,3-glucan contained in algae biomass (Algamune, Algal Scientific Corp.) on the growth performance and gut health of nursery pigs. Pigs (80 gilts and 80 barrows at 6.02 ± 1.62 kg BW) were randomly allotted to 4 treatments (2 × 2 factorial arrangment) with 10 pens (5 barrow and 5 gilt pens) per treatment and 4 pigs per pen and feed experimental diets for 5 wk based on 3 phases (1, 2, and 2 wks for phase 1, 2, and 3, respectively). Two factors were Algamune (0.02%) and antibiotics (CTC100 and Denagard10 for Phase 1, Mecadox10 for Phase 2 and 3). Feed intake and body weight were measured weekly. Eight pigs from each treatment (1 per pen, and 8 pens per treatment) were selected for tissue sample collection. Data for each response were analyzed using MIXED procedure in SAS software (SAS Inst. Inc., Cary, NC). During the entire 5 wk period, use of antibiotics increased ($P < 0.05$) ADG (324 to 393 g/d) and ADFI (498 to 582 g/d). There were no overall effects of Algamume on ADG and ADFI during the entire 5 wk period but Algamune tended to increase ($P = 0.072$) ADG (266 to 323 g/d) when antibiotics were not supplemented during phase 2 (wk 2 to 3). Supplementation of Algamune also tended to increase ($P = 0.061$) ADFI (738 to 840 g/d) when antibiotics were not supplemented during phase 3 (wk 4 to 5). However, these effects of Algamune were not observed when antibiotics were supplemented in the feed. Both antibiotics and Algamune increased ($P < 0.05$) villus height in the duodenum of pigs at 5 wk of the study. Correctively, β–glucan extracted from microalgae could help growth and feed intake of pigs by helping gut health when antibiotics are not used.

Key Words: antibiotics, β–glucan, gut health, nursery pigs

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388 **Effect of altered dietary Lysine: energy ratio in gestation on gilt performance and piglet survivability.**
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Based on the new NRC (2012) model, the increase in protein requirement in late gestation is to a greater extent than the increase in energy requirement suggesting a need for phase-feeding. To determine the effects of phase feeding Lysine: energy to gilts on piglet birth weight and survivability, 27 gilts were randomly assigned to 1 of 3 gestation feeding regimens: Control, 2.21 kg/d from breeding to d112 (0.46g Lys /MJ ME); Bump feeding (BF), the control diet at 2.21 kg/d from breeding to d89 and 2.61 kg/d from d90 to 112; Phase feed (PF), 2.21 kg/d (0.43g Lys/MJ ME from breeding to d89) and 2.61 kg/d (0.59g Lys/MJ ME from d90 to 112). All diets contained 13.5 MJ ME/kg. Gilt weights and back fat were monitored regularly. Cord blood was collected at birth for cortisol determination, birth weights were recorded and weekly piglet growth was monitored. Piglets were assigned to three weight categories according to birth weight (light weight <1.2, average 1.21-1.6, heavy >1.61kg). Data were analyzed using the MIXED procedure in SAS. Litter birth weight variation was assessed using a Chi-squared test. During gestation and lactation, there were no differences in mean body weight or mean back fat between the treatment groups , but there was a tendency ($P = 0.07$) for higher feed intake during lactation in the Control sows compared to BF and PF gilts (4.35, 3.25 and 3.53 ± 0.3 kg/d, respectively). Pigs born alive was higher ($P = 0.03$) in Control sows than the BF or PF sows 13.5, 10.5, and 11.9 ± 0.9, respectively).There was no difference in mean birth weight (1.43 ± 0.07 kg) but more PF piglets ($P = 0.04$; $\chi 2=6.6$) had birth weights in the average category and a trend to more bump piglets ($P = 0.09$; $\chi 2=4.9$) in the heavy category. PF piglets had higher ($P = 0.05$) cord blood cortisol than Control and BF piglets (88.2, 56.3, and 64.1 ± 9.3 ng/mL, respectively). There was no difference in piglet body weight from birth to weaning; however, body weight change from birth to d 7 showed a positive correlation with cord cortisol ($r = 0.30$, $P = 0.003$)

Phase feeding Lysine: energy and bump feeding resulted in more piglets born at a desirable birth weight; however, only phase feeding resulted in higher levels of cord cortisol, which are associated with a higher probability for survival.

Key Words: late gestation, phase-feeding, piglet survival