temperatures were measured daily beginning on 0 DPI. Blood was collected on 0, 3, 7, and 14 DPI for determination of differential complete blood cell counts, serum PRRSV load, and haptoglobin and cytokine concentrations. Infection with PRRSV increased ($P < 0.01$) rectal temperatures and suppressed ($P < 0.01$) the growth of pigs from 0 to 14 DPI. In the uninfected group, growth performance of pigs fed LSBM was generally greater than pigs fed HSBM. However, in the PRRSV-infected group, pigs fed HSBM had improved ($P < 0.05$) ADG compared with pigs fed LSBM from 7 to 14 DPI. Average daily gain of pigs fed LSBM and HSBM from 0 to 14 DPI was 608 and 576 g/d for uninfected pigs and 314 and 374 g/d for PRRSV-infected pigs, respectively. At 14 DPI, PRRSV-infected pigs fed HSBM had higher ($P < 0.05$) hematocrit values and a tendency for lower ($P = 0.06$) serum PRRSV load compared with pigs fed LSBM. Serum haptoglobin and tumor necrosis factor-α concentrations were lower ($P < 0.05$) at 3 and 14 DPI, respectively, in PRRSV-infected pigs fed HSBM than in pigs fed LSBM. In conclusion, increasing the dietary SBM concentration modulated the immune response and improved the growth performance of weanling pigs during a PRRSV infection.

Key Words: pig, PRRS, soybean meal

085 **Impacts of high nursing intensity on sow performance during a subsequent lactation.** J. Guo[1,*], G. Voilque[1], Y. Sun[1], A. E. DeDecker[2], M. T. Coffey[2], S. W. Kim[1], *[1]North Carolina State University, Raleigh, [2]Murphy-Brown LLC, Rose Hill, NC.*

One hundred fifty gilts were used to determine the effects of nursing intensity on performance of sows during the subsequent lactation. The experiment was based on a 2 × 2 factorial arrangement with varied litter sizes (10 and 13 piglets: L10 and L13) and durations of lactation (21 and 27 d: D21 and D27) in parity 1. Sows rebred successfully were used in parity 2, during which litter size was set to 10 piglets, and all piglets were weaned at d 21 of lactation. Sow and litter weights were recorded at farrowing and weaning for both parities. Colostrum (within 24 h of parturition) and milk (at d 17 of lactation) samples were collected. Data were analyzed with General Linear Model procedure in SAS software (SAS Inst. Inc., Cary, NC). In parity 1, litter weight gain of L10 was less ($P < 0.05$) than L13 and sows in L10 tended ($P = 0.095$) to have less BW loss than sows in L13, correspondingly due to difference in litter size. Duration of lactation did not affect ($P > 0.10$) sow weight loss. The ADFI of sows did not differ ($P > 0.10$) among treatments for both parities. In parity 2, sow culling rate increased in D21 (35.7%) than D27 (24.4%) and also in L13 (38.9%) than L10 (25.9%) due to conception, heat intolerance, and lameness. Sow weight loss during subsequent lactation was the lowest ($P < 0.05$) in L13 and D27 (0.69 kg) compared to the other three treatments (7.27, 7.27, and 10.74 kg). Sows in L13 had less ($P < 0.05$) backfat loss than L10 in parity 2 (0.5 vs. 2.7 mm). Litter weight gain as well as pig weight gain did not differ ($P > 0.10$) among treatments in parity 2. Litter size and the duration of lactation during parity 1 did not affect ($P > 0.10$) the composition of colostrum and milk in parity 2. Collectively, the performance of sows and litters were not negatively affected by nursing intensity of a previous parity. Interestingly, sows with a high nursing intensity in parity 1 maintained their body condition better than sows with a lower nursing intensity during the subsequent parity.

Key Words: duration of lactation, litter size, nursing intensity, sows

086 **Effects of withdrawing high-fiber ingredients before market on finishing pig growth performance, carcass characteristics, intestinal weights, and carcass fat quality.** K. F. Coble[1,*], J. M. DeRouchey[1], M. D. Tokach[1], R. D. Goodband[1], S. S. Dritz[1], T. A. Houser[1], B. Goehring[1], M. J. Azain[2], *[1]Kansas State University, Manhattan, [2]Rhodes Center for Animal & Dairy Science, Athens, GA.*

A total of 288 pigs (initially 38.4 kg) were used in an 88-d study to determine the timing of high-fiber ingredient removal from the diet before marketing to optimize growth performance, carcass characteristics (yield), and carcass fatty acid composition. Two diet types were used: 1) corn–soybean meal control diet (9.3% NDF) and 2) high-fiber diet (19% NDF) containing 30% dried distillers grains with solubles (DDGS) and 19% wheat middlings. Pens of pigs were randomly allotted to 1 of 6 dietary feeding strategies with 8 pigs per pen and 6 replications per treatment. The 6 strategies consisted of the corn–soy control or high-fiber diet fed throughout or the high-

Table 086.

		High fiber withdrawal before market, d					Probability, $P <$		
							Control vs.	Duration	
Item	Control	20	15	10	5	0	0 withdrawal	Linear	Quad
ADG, kg	1.00	0.98	1.00	0.99	0.99	0.99	0.61	0.71	0.65
ADFI, kg	2.79	2.85	2.93	2.92	2.95	2.90	0.07	0.33	0.20
G:F	0.348	0.340	0.340	0.339	0.336	0.335	0.01	0.29	0.15
HCW, kg	92.2	91.1	91.4	91.0	90.7	89.3	0.11	0.29	0.47
Yield, %	72.7	72.5	72.5	72.2	72.0	71.1	0.01	0.01	0.03
Jowl IV	66.8	72.6	73.3	73.2	73.8	74.5	0.01	0.01	0.65

[1]SEM was 0.014, 0.043, 0.003, 1.31, 0.201, and 0.350, respectively.

fiber diet fed 20, 15, 10, or 5 d before harvest, after which pigs were switched to the control diet. Diets were not balanced for energy. Overall, pigs continuously fed the high-fiber diet tended ($P < 0.07$) to have increased ADFI and decreased ($P < 0.01$) G:F compared to pigs fed the control diet. Withdrawal strategy did not significantly influence growth performance. Carcass yield decreased ($P < 0.01$) in pigs fed the high-fiber diet compared with those fed the control and increased (quadratic; $P < 0.03$) as days of withdrawal increased. Jowl iodine value (IV) increased ($P < 0.01$) in pigs fed the high-fiber diet compared with those fed the control and decreased (linear; $P < 0.01$) as withdraw time increased (due to reduction in DDGS before market). Pigs continuously fed the high-fiber diet had heavier ($P < 0.01$) full large intestine weight than pigs fed the control. Full large intestine weight decreased (linear; $P < 0.02$) as withdrawal time increased. In summary, pigs fed the high-fiber diet had decreased G:F and carcass yield and switching pigs to a corn–soy diet restored carcass yield when done for the last 15 to 20 d before harvest.

Key Words: finishing pig, withdrawal, yield

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087 **Energy values of bermudagrass, forage sorghum, and sweet sorghum to pigs and the use of carbohydrases to enhance energy utilization.** A. A. Passos[1,*], C. Andrade[1,2], M. Veal[1], C. E. Phillips[3], M. T. Coffey[3], S. W. Kim[1], *[1]North Carolina State University, Raleigh, [2]Sao Paulo State University, Piracicaba, Brazil, [3]Murphy-Brown LLC, Rose Hill, NC.*

This study was to determine DE and ME of ground bermudagrass, forage sorghum, and sweet sorghum fed to pigs and the supplemental effects of carbohydrases (Allzyme SSF, Alltech, Nicholasville, KY) on energy utilization of these feedstuffs. The study had 4 sets of quadruplicated 2 × 2 Latin square design using 32 barrows (38.7 ± 11.9 kg). Each Latin square consisted of 2 treatments and 2 periods. Each period was 14 d (10 d adjustment and 4 d collection). Particle size was 400 to 600 μm for forages and corn. Basal diet contained 94% corn with 4% amino acids, minerals, and vitamins. Test diets contained 85% BA + 15% Bermuda grass, forage sorghum, or sweet sorghum. For the basal diet and each test diet, carbohydrases were supplemented (0 or 200 mg/kg). Pigs received experimental diets twice daily (0700 and 1700 h) at a fixed amount based on BW of pigs ($0.09 \times BW^{0.75}$ kg). On d 10, chromium oxide (0.5%) was added to the evening meal as an external marker to indicate initiation of fecal collection. Fecal and urine samples were collected during 4 consecutive days. Gross energy of feed, urine, and feces was measured using a bomb calorimeter (IKA, Wilmington, NC) to calculate DE and ME. Basal diet contained 3427 kcal DE/kg and 3354 kcal ME/kg, which were not affected by enzyme supplementation. Bermudagrass contained 856 kcal DE/kg and 810 kcal ME/kg, which tended to be increased by enzyme supplementation to 1154 kcal DE/kg ($P = 0.099$) and 1129 kcal ME/kg ($P = 0.081$). Forage sorghum contained 1057 kcal DE/kg and 1042 kcal ME/kg, which were not affected by enzyme supplementation. Sweet sorghum contained 1035 kcal DE/kg and 1011 kcal ME/kg, which were not affected by enzyme supplementation. In conclusion, pigs could utilize nutrients in bermudagrass, forage sorghum, and sweet sorghum to obtain energy indicating that these feedstuffs could potentially be used in feeding pigs. Use of Allzyme SSF benefited pigs providing more energy from bermudagrass. This study provides energy values for alternative feedstuffs that can be used in a least cost formulation software to feed pigs.

Key Words: bermudagrass, enzyme, forage sorghum, pigs, sweet sorghum

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088 **Impact of reduced crude protein diets on lactating sow nitrogen utilization and piglet performance.** L. A. Huber[1,*], C. F. M. de Lange[2], U. Krogh[3], D. Chamberlin[4], N. L. Trottier[4], *[1]University of Guelph, Guelph, ON, Canada, [2]Department of Animal and Poultry Science, University of Guelph, Guelph, ON, Canada, [3]Aarhus University, Foulum, Denmark, [4]Michigan State University, East Lansing.*

Forty lactating multiparous Yorkshire sows were used to determine if reducing dietary crude protein (CP) and supplementing with crystalline amino acids (CAA) increases piglet performance and maternal N utilization during early and peak lactation. Sows were assigned to 1 of 4 diets: 1) 16.0% CP (as-fed; analyzed contents; HCP), 2) 15.7% CP (MHCP), 3) 14.3% CP (MLCP), or 4) 13.2% CP (LCP); diet HCP was formulated using soybean meal and corn as the only Lys sources. Across diets standardized ileal digestible (SID) content of Lys was 0.86%, based on analyzed content and estimated SID. Other essential AA were included to exceed requirements. Sow and piglet BW were measured on d 1, 3, 7, 14, 18, and 21 of lactation. Sow N balances were conducted between d 3 and 7 (early) and d 14 and 18 (peak). Milk N output was calculated from estimated milk yield and analyzed true protein concentration. Sow BW change and litter ADG did not differ between diets (mean: −248 and 2259 g/d, respectively) nor did sow average daily DM intake (mean: 4.05 and 6.12 kg/d; early and peak lactation, respectively) or fecal N digestibility (mean: 88.6%). Nitrogen intake decreased as dietary CP decreased (114.3, 106.0, 107.4, and 99.0 ± 5.29 g/d and 169.5, 168.3, 161.2, and 145.1 ± 5.29 g/d for HCP, MHCP, MLCP, and LCP in early and peak lactation, respectively; linear (L) $P < 0.05$ and quadratic (Q) effects of diet CP content: $P > 0.10$). In early lactation, N retention (N intake– N excretion with feces and urine) and milk N output were not affected by diet ($P > 0.10$), and N retained as percentage of N intake tended to increase as dietary CP decreased (L: $P = 0.09$). In peak lactation, N retention decreased (122.5, 123.8, 121.2, and 109.0 ± 4.88 g/d for HCP, MHCP, MLCP, and LCP, respectively;