diets did not affect pig growth performance. In Exp 2, nursery pigs (n = 1296; BW = 5.48 ± 0.40 kg) were assigned to one of 3 dietary treatments including diets containing no yeast (CON), 1.0 g/kg Evosure™ (EVO), or 0.4 g/kg yeast product 3 (Y3). This experiment was conducted over a 42-d period with three diet phases. In Phase 1, feeding EVO resulted in 7.7% greater ADG (0.26 vs. 0.24 kg/d, P = 0.05) and 5.7% greater G:F (0.88 vs. 0.83, P = 0.03) compared with feeding CON. In Phase 2, pigs fed EVO showed 5.2% greater ADG relative to those fed CON (0.42 vs. 0.40, P = 0.02) and Y3 (0.42 vs. 0.40, P = 0.02). The BW at the end of Phase 2 was greater in pigs fed EVO than those fed CON (10.31 vs. 10.06 kg, P = 0.03) and Y3 (10.31 vs. 10.11 kg, P = 0.05). Pig ADG was not affected by dietary treatments in Phase 3, but feeding EVO resulted in lower ADFI (P < 0.05) and higher G:F (P < 0.03) compared with feeding CON and Y3. Feeding Y3 did not affect pig growth performance in this experiment. Results from these two experiments suggest that feeding Evosure™ to nursery pigs improves their growth performance relative to negative control and three other yeast products.

Key Words: growth performance, nursery pigs, yeast

330 **A novel procedure for predicting energy digestibility in feedstuffs fed to pigs.** S. A. Lee*, C. S. Park, B. G. Kim, *Konkuk University, Seoul, South Korea.*

A general 3-step in vitro system using conical flasks has been widely employed to simulate the digestion and absorption procedure of pigs. Much time and effort is needed in this conventional procedure. Using a Daisy^{II} incubator, in vitro digestibility of nutrients in a great number of samples may be measured relatively easily and efficiently. The objective of this study was to develop a novel in vitro system using the Daisy^{II} incubator for estimating energy digestibility of feedstuffs for pigs. The in vivo energy digestibility values of 11 feed ingredients including almond meal, barley, 2 different sources of corn gluten feed, corn gluten meal, lupin hulls, lupin kernel, rice bran, soybean meal, wheat, and wheat bran and 12 diets containing the aforementioned ingredients were determined in a previous experiment employing a Latin square design with 12 animals and 12 periods. The ingredient and diet samples were incubated under the condition of enzymes (pepsin, pancreatin, and a multi-enzyme complex: Viscozyme) with the conventional 3-step (2, 4, and 18 h of incubation respectively) in vitro system. Additionally, the Daisy^{II} incubator was tested as an in vitro digestion system with 3 replicates of each sample. Equations for predicting in vivo energy digestibility were generated using in vitro dry matter disappearance (IVDMD) as an independent variable. To determine optimum incubation time for each digestion step, multiple digestion periods were tested and nonlinear regression models with incubation time as an independent variable were employed. The IVDMD based on the conventional in vitro procedure ($IVDMD_{Flask}$) provided fairly reasonable estimates of the energy digestibility: DE:GE = 0.01 + (0.0093 × $IVDMD_{Flask}$, %) with P < 0.001 and r^2 = 0.96. However, the IVDMD using the Daisy^{II} incubator system ($IVDMD_{Daisy}$) with 2, 4, and 18 h of stepwise incubation resulted in less accurate estimates for in vivo energy digestibility (r^2 = 0.54). A modified in vitro procedure using Daisy^{II} incubator with 2, 14, and 18 h for the step 1, 2, and 3, respectively, resulted in fairly reasonable estimates of in vivo energy digestibility: DE:GE = 0.02 + (0.0093 × $IVDMD_{Daisy}$, %) with r^2 = 0.88, P < 0.001. In conclusion, $IVDMD_{Daisy}$ can be used for prediction of the energy digestibility of a large number of feedstuffs and may replace $IVDMD_{Flask}$.

Key Words: Daisy^{II} incubator, in vitro dry matter disappearance, swine

NONRUMINANT NUTRITION: NUTRITIONAL TECHNOLOGIES AND FEEDING STRATEGIES

331 **The effects of withdrawing high-fiber ingredients before market on growth and carcass characteristics in commercial finishing pigs.** K. F. Coble*, J. M. DeRouchey, S. S. Dritz, M. D. Tokach, R. D. Goodband, *Kansas State University, Manhattan.*

It is well recognized that feeding high-fiber diets have negative effects on carcass yield and these effects can be mitigated by withdrawing the high fiber diet before market. However, the optimal time period for withdrawing high-fiber ingredients before marketing has not been determined. A total of 1089 pigs (initially 44.5 kg) were used in a 96-d study. The two diet types fed were a corn-soybean meal control diet with low NDF (9.3%) and a high-fiber diet with high NDF

Table 331.

							Probability, P < [1]		
		High-fiber withdrawal before market, d					Control vs.	Duration	
Item	Control	24	19	14	9	0	0 withdrawal	Linear	Quad
ADG, kg	0.92	0.89	0.88	0.88	0.87	0.88	0.01	0.28	0.79
ADFI, kg	2.64	2.60	2.59	2.61	2.60	2.62	0.68	0.53	0.66
G:F	0.348	0.340	0.340	0.339	0.336	0.335	0.01	0.07	0.79
HCW, kg	99.1	95.8	96.6	96.2	95.5	94.8	0.01	0.05	0.08
Yield, %	74.85	74.10	74.62	74.54	74.43	73.93	0.19	0.73	0.27

[1] SEM was 0.010, 0.035, 0.003, 0.909, and 0.496 for ADG, ADFI, G:F, HCW, and yield, respectively.

(19%) that contained 30% dried distillers grains with solubles (DDGS) and 19% wheat middlings. Four withdraw strategies were evaluated by feeding the high-fiber diet until 24, 19, 14, or 9 d before harvest, at which time pigs were switched to the control diet and comparing them to the corn soybean meal or high fiber diet fed for the entire 96 d period. Diets were not balanced for energy. Pens of pigs were randomly allotted to 1 of 6 dietary feeding strategies with 25 to 27 pigs per pen and 7 pens per treatment. Overall (d 0 to 96), pigs fed the high-fiber diet through the entire study had decreased ($P < 0.01$) ADG and G:F compared with those fed the control diet. For pigs initially fed the high-fiber diet and then switched to the control, G/F tended (linear; $P < 0.07$) to improve as withdrawal period increased from 0 to 24 d. Pigs fed the high-fiber diet throughout had decreased ($P < 0.01$) HCW than those fed the control diet. Percentage yield using the farm live weight was not significantly influenced by high-fiber diet withdrawal period; however, HCW increased linearly ($P < 0.05$) as withdrawal period increased. In summary, feeding pigs diets high in fiber decreased ADG, G:F, and HCW; however, switching pigs from a high to low fiber diet before market improved HCW.

Key Words: finishing pig, fiber withdrawal, performance

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332 **Effect of precision feeding strategy on growth performance and nitrogen excretion of growing-finishing pigs.** I. Andretta[1], C. Pomar[2]*, J. Rivest[3], J. Pomar[4], P. A. Lovatto[1], J. Radünz Neto[1], *[1]Universidade Federal de Santa Maria, Santa Maria, Brazil, [2]Agriculture and Agri-Food Canada, Sherbrooke, QC, Canada, [3]Centre de Développement du Porc du Québec, Quebec, QC, Canada, [4]Universitat de Lleida, Lleida, Spain.*

The objective of this study was to assess the impact of moving from conventional to precision feeding systems on animal performance and nitrogen excretion in growing-finishing pig operations. Sixty randomly selected pigs (initial BW: 41.2 ± 3.9 kg) were used in an 84 d performance trial with pigs fed according to 1) a 3-phases feeding program (3P), providing within each phase a fixed proportion of premixes A (high-nutrient density) and B (low-nutrient density) calculated at the beginning of each phase to satisfy the LYS requirements of the 80th percentile pig of this group; 2) a multiphase group feeding program (MPG), in which pigs received the same blend of premixes A and B calculated at the beginning of each day to satisfy the LYS requirement of the 80th percentile pig of this group; and 3) a precision feeding program (MPI), in which pigs were fed individually with daily tailored diets. Feed intake was recorded daily and BW weekly and these data used in a factorial method to estimate the daily nutrient requirements of each pig of the trial. Lean and fat body composition were assessed at the beginning of the trial and every 28 d by dual-energy X-ray absorptiometry (DXA). Neither ADFI (3.05, 3.07, and 3.05 kg/d), ADG (1.11, 1.11, and 1.10 kg/d), G:F (0.38, 0.37, and 0.37), average daily protein gain (161, 155, and 154 g/d), nor final BW (134, 135, and 136 kg) were affected ($P > 0.05$) in pigs fed according to the 3P, MPG, and MPI feeding programs, respectively. On average, 3P pigs ingested 23.8 g/d of standardized ileal digestible (SID) LYS and excreted 48.1 g/d of nitrogen. Compared to 3P pigs, MPG and MPI pigs reduced ($P < 0.05$) SID LYS intake by 17% and 27% and nitrogen excretion ($P < 0.05$) by 12% and 22%, respectively. Precision feeding is an effective approach for reducing LYS intake and nitrogen excretion in growing-finishing pig operations.

Key Words: nutrition, nutrient requirements, precision feeding.

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333 **Characterizing the feed intake pattern of immunologically castrated male pigs following administration of the second anti-GnRF injection.** A. J. Elsbernd[1,]*, C. F. M. de Lange[2], J. F. Patience[1], *[1]Iowa State University, Ames, [2]Department of Animal and Poultry Science, University of Guelph, Guelph, ON, Canada.*

The commercial introduction of an anti-GnRF product (Improvest, Zoetis Inc., Florham Park, NJ) has prompted increased interest in developing optimum feeding programs for immunologically castrated male pigs (IC). One characteristic of IC is a rapid increase in feed intake following administration of the second immunization injection. Understanding the nature of the change in feed intake is central to the development of optimum feeding programs for IC. The objective of this experiment was to compare the feed intake of IC versus physical castrated male pigs (PC) and characterize the dynamic changes in feed intake of IC following the second injection. One hundred fifty pigs (PIC 359×C29) of each of the two genders were housed in pens of 5 pigs providing 1.0 m^2 per pig on partially slatted floors. Feed and water were available ad libitum. Per pen feed intake was recorded for 2-d intervals starting on the day of the second injection and continued for 14 d. Weekly feed intake was recorded for the following 2 wk. Initial body weight for the IC and PC pigs was 97.2 ± 1.8 kg and 101.2 ± 1.2 kg, respectively. During the week immediately before the second injection, feed intake of IC averaged 2.91 kg/d compared to 3.52 kg/d for PC ($P < 0.05$). There was little change in IC feed intake for d 1–2 (2.83 kg/d) and d 3–4 (2.89 kg/d), or in PC feed intake (3.36 and 3.50 kg/d) for the same periods, such that IC feed intake remained at 83–84% of PC ($P < 0.05$). However, IC daily feed intake increased rapidly commencing at d 5–6 (86% of PC). This increase continued, such that IC intake was similar to that of PC intake during d 9–10 (3.36 vs. 3.46 kg/d; $P > 0.05$) and d 11–12 (3.66 vs. 3.52 kg/d; $P > 0.05$), but exceeded that of PC starting on d 13–14 (3.55 vs. 3.31 kg/d; $P < 0.05$). Interestingly, average daily feed intake of IC relative to that of PC continued to increase during week