

## Nonruminant Nutrition: Sows and piglets

**T292 Meta-analysis of the influence of live yeast addition on feed intake in lactating sows.** Eric Chevaux<sup>\*1</sup>, David Guillou<sup>1</sup>, and Ernest Keith<sup>2</sup>, <sup>1</sup>Lallemand Animal Nutrition, Blagnac, France, <sup>2</sup>Lallemand Animal Nutrition, Milwaukee, WI.

Increasing the lactating sow feed intake is generally considered beneficial, but high inter-individual variability of the measurements makes difficult designing the trials on this subject. A meta-analysis of 10 trials (1111 sows, 8 genetics lines, parity 1–8, lactation duration 19–31 d) was undertaken, comparing “control” diets (n = 12) to diets supplemented with the same strain of live yeast *Saccharomyces cerevisiae* boulardii CNCM I-1079 (LY) at 1.0 or 2.0 × 10<sup>9</sup> cfu/kg (n = 12), to increase the chance to detect feed intake differences. In these trials, individual feed intake of sows (ranging 3.9 to 8.5 kg/d) was measured; trials were performed in commercial farms or close situation, in Europe or North America. Measurements of litter weight at weaning and number of piglets weaned could be retrieved from all 10 trials, but not changes of sow weight or P2 backfat thickness. Data were analyzed by ANOVA (SPSS 19.0) incorporating a random effect of trial, the treatment effect being considered weighted or not for experimental power or measurement variability. Effect of location of the experiment, year (1999 to 2013), lactation length, or duration of pre-treatment with live yeast were incorporated in the model, then excluded because of lack of significance (P > 0.20). Litter size, litter weight at weaning, parity or backfat thickness were included as covariate, and then discarded from final model as neither significance nor correlations were found. Live yeast added to sows diets stimulated appetite overall (Table 1), leading to a significant increase of feed intake ranging between +200 (weighted by number of replicates) and +300 g/d (un-weighted). Feed intake difference higher than the mean standard error of measurement was found in 6 trials out of 10. Nonetheless, factors affecting the magnitude of yeast effect could not be elucidated with only 10 trials in the compilation. Subsequently, the present results deserve being confirmed with new studies including accurate measurements of sows DMI and body condition.

**Table 1 (Abstr. T292).** DMI (kg) per treatment according to the statistical model

| Weighted          | Control | LY    | SEM   | P-value |
|-------------------|---------|-------|-------|---------|
| None              | 5.714   | 5.997 | 0.346 | 0.03    |
| 1/Var             | 5.725   | 5.985 | 0.340 | <0.01   |
| No. of replicates | 5.608   | 5.805 | 0.345 | 0.01    |

**Key Words:** sow, DMI, live yeast

**T293 Effects of palm kernel expellers on productive performance, nutrient digestibility, and white blood cells of lactating sows.** J. Kim<sup>\*1</sup>, Y. Jang<sup>1</sup>, S. Kim<sup>1</sup>, W. Kim<sup>1</sup>, K. Jang<sup>1</sup>, K. Kim<sup>1</sup>, B. Kim<sup>1</sup>, S. Park<sup>1</sup>, I. Park<sup>1</sup>, Y. H. Kim<sup>2</sup>, J. C. Park<sup>2</sup>, J. Seo<sup>3</sup>, Y. Kim<sup>4</sup>, S. Seo<sup>1</sup>, M. Song<sup>1</sup>, <sup>1</sup>Chungnam National University, Daejeon, Republic of Korea, <sup>2</sup>National Institute of Animal Science, Cheonan, Republic of Korea, <sup>3</sup>Pusan National University, Miryang, Republic of Korea, <sup>4</sup>Chonbuk National University, Jeonju, Republic of Korea.

A preliminary study was conducted to investigate the effects of palm kernel expellers on productive performance, nutrient digestibility, and changes in white blood cells (WBC) of lactating sows. A total of 14 sows (200 ± 12 kg BW; 2.5 parity) were randomly assigned to 2 dietary treatments: a diet based on corn and soybean meal (CON) and CON + 20% palm kernel expellers (PKE). Sows were fed the treatments for 28

d (weaning) after farrowing. Blood was collected from each sow and randomly selected 4 piglets in each sow before farrowing or on d 3, 7, or 14 of lactation. Sows were fed respective treatments containing 0.2% chromic oxide from d 15 to 21 of lactation. Fecal samples were collected daily for the last 3 d after the 4-d adjustment period. Measurements were performances and WBC changes of sows and litter, nutrient digestibility of sows, and daily diarrhea of litter. Data were analyzed using the PROC GLM procedure of SAS. The statistical model for every measurement except frequency of diarrhea included dietary effect and parity as a covariate. The chi-squared test was used for the frequency of diarrhea. Sows fed PKE had greater ADFI (7.38 vs. 7.10 ± 0.06 kg/d; P < 0.05) and lost less BW (–6.85 vs. –8.54 ± 0.51 kg; P < 0.05) and backfat depth (–0.42 vs. –0.71 ± 0.09 mm; P < 0.05) than those fed CON. However, there were no differences on digestibility of dry matter, nitrogen, and energy and weaning to estrus interval of sows fed either CON or PKE. Piglets from sows fed PKE gained more BW (203 vs. 181 ± 7.62 g/d; P = 0.08) and had less frequency of diarrhea (6.80 vs. 8.56%; P = 0.07) than those from sows fed CON. However, no difference was found on preweaning mortality of piglets from sows fed either CON or PKE. Sows fed PKE had lower number of WBC (9.57 vs. 11.82 ± 0.83 × 10<sup>3</sup>/μL; P = 0.09) before farrowing than those fed CON, but no difference on d 3 and 7. Similarly, piglets from sows fed PKE had lower number of WBC (7.86 vs. 9.80 ± 0.62 × 10<sup>3</sup>/μL; P < 0.05) on d 14 of lactation than those fed CON, but no difference on d 3 and 7. In conclusion, PKE increased ADFI and decreased changes of BW and backfat depth of lactating sows compared with CON, but no differences were found on other measurements.

**Key Words:** lactating sow, palm kernel expellers, performance

**T294 Effects of the level of bovine plasma in pregnant gilts on the birth weight of the litter.** Bárbara V. Freitas<sup>\*</sup>, Simone M. M. K. Martins, Jose A. R. Ulloa, Gustavo A. Campos, and Lúcio F. Araújo, University of São Paulo, Pirassununga, São Paulo, Brazil.

Plasma is considered an important ingredient in animal feed for high quality, functional protein. In piglets, it has been associated with causing a reduction in inflammation and immune stimulation. The use of the ingredient is growing in sows during the pregnancy to improve weight and homogeneity at birth and the body condition of the sow at the end of lactation, reducing the number of “days open” before conception. The study aimed to evaluate the effect of different plasma levels in the diet of gilts on the birth weight of piglets. Twenty-four pregnant, primiparous females (Topigs Norsvin) aged 215 ± 9.46 d and weighing 127 ± 8.0 kg were used. The compositions of the diets were based on corn and soybean meal, in accordance with NRC recommendations (2012). The experimental design was completely randomized, with 4 treatments: 0, 0.5, 1.0 and 2.0% of plasma added to the feed. Six repetitions per treatment were used and the experimental unit was one primiparous pregnant sow. During the gestational period, from 1 to 3 d after insemination, the gilts consumed a mean 1.200 kg of feed per day, from 4 to 79 d, a mean of 1.800 kg per day and from 80 to 110 d, a mean of 2.800 kg of feed per day. Blood plasma was added to the diet formulation according to treatment. After birth, all the live piglets, placentas, stillbirths, and mummies were weighed. The mean weight of the complete litter, including mummies and stillbirths, was 16.85 kg, 17.36 kg, 17.63 kg and 18.52 kg for the treatments 0, 0.5, 1.0 and 2.0% of added plasma, respectively. The characteristics of total litter weight, live births weight, fetal membrane weight and number of live-born, stillborn and mummy-

fied piglets were not affected by the inclusion of plasma in the diet of sows. The characteristics of the total litter weight, live births weight, fetal membrane weight and number of live-born piglets were analyzed using PROC REG (SAS, 2012), while stillborn and mummified piglets were analyzed using PROC GLIMMIX, Poisson distribution (SAS, 2012). Level of significance  $P < 0.05$ .

**Key Words:** primiparous pregnancy, gestation, blood plasma.

**T295 Effect of dietary supplementation of oregano essential oils to sows on oxidative stress status, lactation feed intake and reproductive performance.** Chengquan Tan<sup>1</sup>, Jiangtao Ao<sup>1</sup>, Guang Long<sup>1</sup>, Haiqing Sun<sup>1,2</sup>, and Jian Peng<sup>\*1</sup>, <sup>1</sup>*Department of Animal Nutrition and Feed Science, College of Animal Science and Technology, Huazhong Agricultural University, Wuhan, Hubei, China,* <sup>2</sup>*YangXiang Joint Stock Company, Guigang, Guangxi, China.*

The aim of the current study was to evaluate the effects of supplementing sow diets with oregano essential oils (OEO) during gestation and lactation on oxidative stress status, lactation feed intake and reproductive performance of sows. Sixty multiparous large white sows were randomly assigned to 1 of 2 dietary treatments within 24h after service to weaning: control (C) or C+ 300mg/kg of OEO (OEO). Serum samples collected from sows on d 10, 60, 90 and 109 of gestation and d 1, 3, 7 and 21 of lactation were used to determine reactive oxygen species (ROS), glutathione peroxidase (GSH-Px) and oxidative stress markers [malondialdehyde (MDA), 8-hydroxy-deoxyguanosine (8-OHdG)] levels. Data were analyzed using GLM procedure. The average daily gain (ADG) of suckling piglets was subjected to analysis of covariance with the piglet weight after cross-foster as the covariate. Variations of oxidative stress parameters were using the procedure for repeated measurements, which included the effects of treatment, physiological stage and replicate. Differences between means were significant at  $P < 0.05$  and trends identified when  $P > 0.05$  but  $\leq 0.10$ . The results showed that serum levels of ROS, MDA and 8-OHdG were higher ( $P < 0.05$ ) during gestation (d 90, 109) and lactation (d 1, 3) than early gestation (d 10). Sows fed OEO diet elevated serum concentration of GSH-Px on d 60 of gestation ( $P = 0.08$ ), and d 1 ( $P = 0.07$ ) of lactation than C group, while serum concentrations of MDA on d 1 of lactation ( $P < 0.01$ ), 8-OHdG on d 109 of gestation ( $P = 0.09$ ), d 1 ( $P = 0.06$ ) and d 3 ( $P = 0.10$ ) of lactation and ROS on d 1 ( $P = 0.10$ ) and d 3 ( $P = 0.10$ ) of lactation were lower in sows treated with OEO dietary than C group. Dietary OEO treatment increased sow feed intake in the third week of lactation (6.46 vs 6.03 kg/d,  $P = 0.07$ ), accordingly, had higher ADG (252.36 vs 233.61 kg/d,  $P < 0.01$ ) of suckling piglets of entire lactation than C group. In conclusion, our results demonstrated that there was an increased systemic oxidative stress during late gestation and early lactation of sows. Nevertheless, OEO dietary supplementation attenuated oxidative stress in sows.

**Key Words:** oxidative stress, oregano essential oil, sow

**T296 Sow productivity at farrowing was not affected when 50% of a co-product combination was included in the gestation diet.** Elizabeth Magowan<sup>1</sup>, Paul McMullen<sup>1</sup>, Aishling O'Connell<sup>2</sup>, Rosanna Wregor<sup>2</sup>, and Wallace Henry<sup>\*3</sup>, <sup>1</sup>*Agri-Food and Biosciences Institute, Hillsborough, United Kingdom,* <sup>2</sup>*JMW Farms, Tynan, United Kingdom,* <sup>3</sup>*Rektify Limited, Gilford, United Kingdom.*

This study, aimed to compare the performance of sows offered a diet containing a high level of co-products during gestation (d5–112). A control (cereal/soy) gestating diet was compared with one containing 50%

of a co product (a blend of potato skins, whey permeate, and residual grains and effluent from the production of an alcoholic beverage). A total of 176 sows (88/treatment), penned in groups of 8, were group fed over 11 time periods (each group was balanced for weight, parity and condition score). Individual sows were used as the experimental unit when assessing effects on litter performance. Lactation feed intake was measured for 10 pairs of sows per treatment. The DE, CP, lysine and CF content of the diets were formulated to be 2.77 and 2.96 Mcal/kg, 17.7 and 14.4%, 0.7 and 0.7%, 9.1 and 7.4% for the co product and control diets respectively. Sows were offered feed once a day during gestation using a feed curve that offered sows 8.60 Mcal/d from d 7–34, 6.69 Mcal/d from d 35–83 and 8.60 Mcal/d from d 84–112 of gestation. Sows were fed ad lib during lactation they farrowed. Changes in sow condition score and weight and litter performance were measured. Sow dirtiness was scored on a 0–3 point scale. Statistical analysis used ANOVA with period as a blocking factor. There was no difference in sow parity (3.85), weight (204 kg) or condition scoring (2.9) on d 5 of gestation. Due to the lower energy content of the co product diet, total sow intake was numerically higher when it was offered (245 vs. 229 kg). There was no effect of diet on sow weight at farrowing (266 kg), condition score (3.2), litter size (13.6), number born alive (12.7), dead (0.73) or mummified (0.17). When the co-product diet was offered, sows were dirtier ( $P < 0.001$ ) (2.09) compared with when the control diet was offered (1.03). The average daily lactation feed intake of sows was statistically similar when the co product diet (5.97 kg/d) was offered compared with when the control diet was offered (6.62 kg/d). In conclusion, the inclusion of 50% of the blended co product had no significant impact on sow weight, condition score or productivity at farrowing.

**Key Words:** dry sow, co-product, performance

**T297 Effect of supplying a nucleotide product (Harv-con NT) to sow diets on the reproductive performance and the health status of the offspring.** I-Fen Hung<sup>\*1</sup>, Fuguei Li<sup>2</sup>, Shigeng Zou<sup>3</sup>, and Merlin D. Lindemann<sup>1</sup>, <sup>1</sup>*University of Kentucky, Lexington, KY,* <sup>2</sup>*Interflavor Ltd., Zhongshan City, Guangdong, China,* <sup>3</sup>*WENS Group, Yunfu City, Guangdong, China.*

Nucleotides have demonstrated their ability to improve several biological responses during stress periods, including parturition. This experiment was conducted in a commercial farm (WENS Groups) in China. Around d 87 of gestation, sows ( $n = 316$ ) were assigned to 2 dietary treatments based on their housing unit: 1) the standard farm gestation diets provided by WENS Group or 2) the standard diets top dressed with 3.5 g/sow/d of a nucleotide product (Harv-con NT, NT; Interflavor Ltd., China). Approximately 1 week before expected parturition, sows were moved to farrowing facilities and assigned to 2 dietary treatments: (1) the standard farm lactation feed; or (2) the standard diet top dressed with 8 g/sow/d (on the day of moving to 7 d post-farrowing) and 12 g/sow/d (7 d post-farrowing till weaning) NT in the lactation diet, which resulted in a  $2 \times 2$  factorial arrangement. The data were analyzed using GLM program of SAS with the housing unit as the experimental unit, 4 units per treatment. Supplying NT to sow diets during late gestation had no effect on the total litter size at birth as expected (11.5 vs. 11.9,  $P = 0.19$ ), but reduced the “healthy” pig litter size (9.9 vs. 10.8,  $P = 0.01$ ) as determined by the farm. Litter weight of the healthy pigs at birth was not affected by the treatments (14.4 vs. 14.4,  $P = 0.88$ ), thus the individual birth weight was increased in NT sows (1.4 vs. 1.3kg,  $P = 0.01$ ). In the units with diarrhea, less diarrhea was observed in litters from sows fed NT in gestation compared with those from Control sows (25 vs. 69%,  $P = 0.07$ ). Also, more sows in the gestation NT treatment returned to heat within 7 d post weaning compared with control sows

(95 vs. 82%,  $P = 0.01$ ). Neither NT treatment in gestation or lactation had an effect on colostrum and d13–17 milk nutrient composition (i.e., fat, protein, and lactose) or immunoglobulin profile. In conclusion, adding NT to the sow diets during late gestation increased healthy pig birth weight and ratio of returning heat within 7d post weaned. It also reduced diarrhea incidence during the suckling period in the units that experienced diarrhea. However, supplying NT to the sow diets during lactation had no effects on these observations. Supplying NT to sow diet during gestation or lactation had no effects on milk composition as well.

**Key Words:** nucleotide, sow, piglet

**T298 The effect of coated sodium butyrate supplementation in sow and nursery diets on reproductive performance and nursery pig performance.** Young Dal Jang\*, Merlin D. Lindemann, H. James Monegue, and James S. Monegue, *University of Kentucky, Lexington, KY*.

The experiment was conducted to evaluate the effect of coated sodium butyrate (CSB) supplementation to peripartal and lactating sows and nursery pigs on reproductive performance and nursery growth performance. In Exp. 1, a total of 43 gestating sows (d 81–90 of gestation) were allotted to 0 ( $n = 15$ ), 500 ( $n = 16$ ), and 1,000 ( $n = 12$ ) ppm of CSB (CM3000, Hangzhou King Techina Feed Co., Ltd., China) based on breed, parity and BW, and then fed treatment diets until weaning. In Exp. 2, a total of 72 weanling pigs were selected from the 0 ( $n = 5$  sows) and 1,000 ( $n = 4$  sows) ppm CSB treatments in Exp. 1 and allotted within the sow treatment to 0, 500, and 1,000 ppm of CSB in nursery diets for 3 replicates with 4 pigs per pen as a split plot design (SPD) for a 35-d growth study. All pigs were injected with ovalbumin at weaning and d 14 postweaning as an immune challenge. All data were analyzed by ANOVA using GLM procedure of SAS as a completely randomized design in Exp. 1 and a SPD in Exp. 2. In Exp. 1, there was no difference on sow BW, litter size, litter weight, lactation feed intake or milk composition. However, colostral IgG ( $P = 0.06$ ; 2,447, 3,337, and 2,723 mg/dl for 0, 500, and 1,000 ppm of CSB treatments, respectively) and IgA ( $P = 0.09$ ; 406, 540, and 464 mg/dl) concentrations tended to increase quadratically as CSB supplementation levels increased. In Exp. 2, pigs from the 1,000 ppm CSB sow treatment had greater BW ( $P < 0.01$ ; 23.1 vs. 21.6 kg), ADG ( $P < 0.01$ ; 0.462 vs. 0.418 kg/d), ADFI ( $P < 0.01$ ; 0.776 vs. 0.684 kg/d) and F:G ratio ( $P = 0.07$ ; 1.67 vs. 1.64) than those from the 0 ppm CSB sow treatment at d 35 postweaning. For the nursery treatments, ADG ( $P < 0.05$ ; 0.428, 0.428, and 0.463 kg/d for 0, 500, and 1,000 ppm CSB, respectively) and ADFI ( $P = 0.06$ ; 0.707, 0.717, and 0.767 kg/d) during the 35-d period increased linearly as CSB supplementation levels increased whereas F:G ratio had a quadratic response ( $P = 0.10$ ; 1.64, 1.68, and 1.64). In summary, CSB supplementation increased colostral IgG and IgA concentrations of sows when supplemented in the sow diet and improved growth performance of nursery pigs under an immune challenge when supplemented in the nursery diet.

**Key Words:** coated sodium butyrate, reproductive performance, sow

**T299 Nucleotide supplementation improves growth performance of weaned piglets.** Gabriela de Mello Miassi\*<sup>1</sup>, Luan Sousa Santos<sup>2</sup>, Livea Maria Gomes<sup>1</sup>, Patrícia Nardin Berto<sup>1</sup>, Mayra Dib Saleh<sup>1</sup>, Alessandro Borges Amorin<sup>3</sup>, Marcos Livio Panhoza Tse<sup>1</sup>, and Dirlei Antonio Berto<sup>1</sup>, <sup>1</sup>*Faculdade de Medicina Veterinária e Zootecnia, FMVZ/UNESP, Botucatu, São Paulo, Brazil*, <sup>2</sup>*Faculdade de Ciências Agrárias e Veterinárias, FCAV/UNESP, Jaboticabal, São Paulo, Brazil*, <sup>3</sup>*Instituto de Ciências Agrárias e Tecnológicas, ICAT/UFMT, Rondonópolis, Mato Grosso, Brazil*.

This study was conducted to evaluate effects of dietary supplementation of nucleotide (disodium 5 guanylate and disodium 5 inosinate) on the growth performance and plasmatic lipid profile of weaned piglets. Eighty-four weaned piglets of 21 d of age ( $6.04 \pm 0.25$  kg average initial BW) were allotted to 4 dietary treatments with 7 pens per treatment and 3 pigs per pen, in a randomized complete block design. The treatments were dietary supplementation with 0% (control); 0.2%; 0.4% or 0.6% nucleotide of diet during 34 d. Performance was determined from 21 to 36, 21 to 48 and 21 to 55 d of age. Blood samples were collected to determinate lipid profile (triglycerides, total cholesterol, HDL cholesterol and LDL+VLDL cholesterol) on 21 and 55 d of age. Data were submitted to ANOVA using PROC GLM of SAS and the effects of supplementation levels of nucleotide were studied through regression analysis. During the first period (21 to 36 d of age) no differences were detected on the performance. During the second period (21 to 48 d of age) a quadratic effect ( $P < 0.01$ ) of the levels of nucleotide was verified on average daily feed intake and average daily weight gain, with optimal response to the levels of 0.31% and 0.32%, respectively. During the whole experimental period (21 to 55 d of age) there was a quadratic effect of the levels of nucleotide ( $P < 0.01$ ) on average daily weight gain with optimal response to the level of 0.31%. There was no significant effect on triglycerides, total cholesterol, HDL cholesterol and LDL+VLDL cholesterol. The overall results suggest that dietary nucleotide supplementation at 0.32% improves the performance of weaned piglets.

**Key Words:** disodium 5 guanylate, disodium 5 inosinate, pig

**T300 Effect of nucleotide supplementation in high soybean meal inclusion diets on weight gain and inflammatory process in weanling pigs.** David Solà-Oriol<sup>1</sup>, Wellington Coloma<sup>1</sup>, Elisabet Borda\*<sup>2</sup>, and José Francisco Pérez<sup>1</sup>, <sup>1</sup>*Animal Nutrition and Welfare Service, Department of Animal and Food Sciences, Universitat Autònoma de Barcelona, Bellaterra, Spain*, <sup>2</sup>*R&D Animal Nutrition, Bioibérica, Palafròlles, Spain*.

Soybean protein ingredients (SB as soybean meal; SBM and soya protein concentrates; SBP) are widely used in pig diets; however they may also promote acute intestinal inflammation and affect gut mucosal integrity and performance. Several beneficial effects of nucleotide supplementation on gut immune function, inflammation and diarrhea has been reported, which could reduce the negative effects SB in piglets. The aim of the present work was to study the effect of including nucleotides (Nucleoforce Piglets, Bioibérica, SA) in diets containing different levels of SB on acute inflammation process and early performance of weaned piglets. Two hundred forty 28-d-old piglets [Pt  $\times$  (LD  $\times$  LW)] were distributed into 24 pens (10 pigs/ pen) according to the initial BW following a RCBD. Two pre-starter diets differing in the SB content as protein source (Low or High) formulated to contain 10.3 MJ/kg of NE, 19.5% CP and 1.28% Lys were supplemented with or without nucleotides (500 mg/kg) following a  $2 \times 2$  factorial arrangement. High SB diet contained 15% of extruded soybeans, 6.82% SBM and 5.62% SBP; while Low SB diet was obtained by partly replacing SB ingredients with fish meal (8.44%) and animal plasma (2.5%) according to their protein content. Feed was offered ad libitum in mash form. Individual animal weight and feed disappearance were recorded at d 28 and 42 of live. Blood samples were collected on d 7 to determine TNF $\alpha$  as inflammation marker. Data was analyzed with ANOVA following a  $2 \times 2$  factorial arrangement with GLM procedure of SAS. Higher BW (9.59 vs 9.09 kg;  $P = 0.03$ ), ADFI (205 vs 167 g/d;  $P = 0.002$ ) and ADG (140 vs 103 g/d;  $P = 0.04$ ) was observed for Low SB diet than high SB diet, independently of the nucleotide supplementation. An interaction

between SB inclusion in the diet and nucleotide supplementation was observed ( $P = 0.04$ ) reflecting that nucleotides promote a decrease of TNF $\alpha$  in High SB group (95.1 vs 67.4 pg/mL) but not in Low SB group (60.3 vs 70.1 pg/mL) without and with nucleotides, respectively. It is concluded that nucleotide supplementation in diets containing high inclusion of soybean meal and soybean protein products reduces acute inflammation process.

**Key Words:** soybean meal, nucleotide, inflammation

**T301 Effects of palm kernel expellers on growth performance, nutrient digestibility, and blood profiles of weaned pigs.** Y. Jang<sup>\*1</sup>, J. Kim<sup>1</sup>, S. Kim<sup>1</sup>, W. Kim<sup>1</sup>, K. Jang<sup>1</sup>, K. Kim<sup>1</sup>, B. Kim<sup>1</sup>, S. Park<sup>1</sup>, I. Park<sup>1</sup>, Y. H. Kim<sup>2</sup>, J. C. Park<sup>2</sup>, J. Seo<sup>3</sup>, Y. Kim<sup>4</sup>, S. Seo<sup>1</sup>, M. Song<sup>1</sup>,  
<sup>1</sup>Chungnam National University, Daejeon, Republic of Korea,  
<sup>2</sup>National Institute of Animal science, Cheonan, Republic of Korea,  
<sup>3</sup>Pusan National University, Miryang, Republic of Korea, <sup>4</sup>Chonbuk National University, Jeonju, Republic of Korea.

A study was conducted to investigate the effects of palm kernel expellers on growth performance, nutrient digestibility, and blood profiles of weaned pigs. A total of 88 weaned pigs (6.94  $\pm$  0.76 kg BW; 28 d old) were randomly allotted to 2 dietary treatments (4 pigs/pen; 11 replicates/treatment): a typical nursery diet based on corn and soybean meal (CON) and CON + 20% of palm kernel expellers (PKE). Pigs were fed for 6 wk using a 3-phase feeding program with declining diet complexity and with phases of 1, 2, and 3 wk, respectively. Blood was collected from randomly selected 2 pigs in each pen before weaning and on d 7 after weaning. Pigs were fed dietary treatments containing 0.2% chromic oxide from d 29 to 35 after weaning. Fecal samples were collected from randomly selected 2 pigs in each pen daily for the last 3 d after the 4-d adjustment period. Measurements were growth performances, nutrient digestibility, blood profiles, and incidence of diarrhea. Data were analyzed using the PROC MIXED procedure of SAS. The statistical model for every measurement except frequency of diarrhea included dietary effect as a fixed effect and sex as a random effect. The chi-squared test was used for the frequency of diarrhea. The PKE tended to increase ADG (246 vs. 215 g/d;  $P = 0.06$ ), increased ADFI (470 vs. 343 g/d;  $P < 0.05$ ), and decreased G:F (0.522 vs. 0.628 g/g;  $P < 0.05$ ) during phase 2 compared with CON, but did not affect growth performance during phase 1 and 3. During overall experimental period, PKE tended to increase ADG (383 vs. 362 g/d;  $P = 0.05$ ) and increased ADFI (549 vs. 496 g/d;  $P < 0.05$ ) compared with CON, but did not affect G:F. However, no differences were found on digestibility of dry matter, nitrogen, and energy between CON and PKE. The PKE tended to reduce frequency of diarrhea (15 vs. 25%;  $P = 0.08$ ) for the first 2 wk after weaning compared with CON. Similarly, PKE tended to decrease white blood cells (8.19 vs.  $9.56 \times 10^3/\mu\text{L}$ ;  $P = 0.07$ ), red blood cells (2.92 vs.  $3.25 \times 10^6/\mu\text{L}$ ;  $P = 0.09$ ), and packed cell volume (11.1 vs. 12.6%;  $P = 0.06$ ) on d 7 after weaning compared with CON. In conclusion, PKE had no negative effects on growth performance, nutrient digestibility, and blood profiles of weaned pigs.

**Key Words:** growth performance, palm kernel expellers, weaned pig

**T302 Beneficial effects of a prebiotic supplement on growth and performance of weaned piglet.** Edi Vianello, Anne-Kathrin Blässe\*, and Bernhard Eckel, Dr. Eckel GmbH, Niederzissen, Germany.

Weaning is a crucial phase in piglet rearing as the change from milk to solid feed in combination with external stressors such as regrouping may be related to an impaired gut and animal health. Villus atrophy and

a limited activity of digestive enzymes can lead to an accumulation of undigested feed in the lower intestinal segments followed by increases in the count of pathogenic bacteria such as *E. coli* and subsequent diarrhea. Prebiotics are non-digestible feed components that selectively stimulate the growth of positive bacteria such as lactobacilli and may thus reduce pathogens. The present study investigated the potential of a specific prebiotic acid and salt mixture including formic and lactic acid and their salts as well as butyrate and gluconate (PreAcid, Dr. Eckel GmbH, Niederzissen, Germany) in increasing piglet growth and performance. Twenty weaned crossbred piglets each [Pietrain x (Large White x German Landrace)] with an initial BW of  $8 \pm 1$  kg were randomly allocated to a control group and a treatment group. The animals were individually fed a diet based on wheat, barley and soybean meal for a period of 6 wk and the treatment group received the basal diet supplemented with 1% PreAcid. Statistical analyses were performed using SAS (fixed factors: mother, sex, treatment, group). Energy efficiency (6,139 kcal/kg weight gain vs 6,330 kcal/kg weight gain,  $P < 0.05$ ) and energy conversion (39 g/kcal vs 38 g/kcal,  $P < 0.05$ ) were significantly improved by the treatment. In conclusion, the present trial demonstrated that the inclusion of the specific prebiotic acidifier in diets for weaned piglets increased feed efficiency indicating an improved energy utilization.

**Key Words:** prebiotic, piglet, growth performance

**T303 Effect of dietary melatonin supplementation on growth performance and behavior, and their correlations in weaned pigs.** Kyeongsu Chae<sup>\*1</sup>, Junseung Choi<sup>2</sup>, Jonggun Kim<sup>1</sup>, and Kwang-Youn Whang<sup>1</sup>,  
<sup>1</sup>Department of Biotechnology, Graduate School, Korea University, Seoul, Korea, <sup>2</sup>Dodram Swine Service, Gyeonggi, Korea.

Some behaviors such as roaming and fighting observed in weaned pigs have been considered to be unhelpful to growth performance. Melatonin (MEL) secreted from the pineal gland has a sedative effect on human behavior. In this study, MEL was supplemented in the weaned pig diets to determine the effect of MEL on growth performance and behaviors, and correlation between them. Two hundred twenty-five 21-d-old pigs were allotted into 4 treatments (9 or 10 pigs per pen) with 6 replications and fed diets containing MEL at doses of 0, 25, 50 and 100 mg/kg of diet (M0, M25, M50 and M100) for 35 d. By using closed-circuit television cameras, the behavior of pigs was recorded to score resting (RT), roaming (RM), feeding (FD) and fighting (FT) states for 24 h on d 3, 10, 17, 24 and 31. The BW and feed intake were measured every week to calculate ADG and feed efficiency (FE). The data were analyzed by ANOVA, followed by the Duncan's new multiple range test. Correlations between growth performance and the behaviors were analyzed with reference to the Pearson correlation coefficients. The BW was higher in M25 group (not different from M0) than M50 and M100 groups on d 28 ( $P < 0.05$ ) but there was no difference at the end of experiment. The ADG was higher in M25 group than the other groups during d 21–28 ( $P < 0.05$ ). There were no differences in ADFI and FE throughout the experiment. The RT was lower and RM was higher in M50 group (not different from M0) than M25 and M100 groups on d 10 ( $P < 0.05$ ) but there were no differences on the other days. The MEL did not alter FD and FT throughout the experiment. Correlations between growth performance and behavior were found in M0 group but not in MEL-treated groups (M25, M50 and M100) during d 7–14. Therefore, it is concluded that MEL at dose of 25 mg/kg of diet may affect BW in weaned pigs on d 28 according to the improved ADG during d 21–28 but MEL does not affect ADFI and FE. This study also suggests that MEL affects RT and RM within 14 d. However, the behaviors affected by MEL are not correlated with growth performance.

**Key Words:** pig, melatonin, behavior