

854 Factors affecting bacterial score and bulk tank somatic cell count of dairy farms in the central region of Thailand. J. A. Rhone*¹, S. Koonawootrittriron², and M. A. Elzo¹, ¹University of Florida, Gainesville, ²Kasetsart University, Bangkok, Thailand.

The objectives of the study were to determine the effects of year-season, farm location, and farm size on bacterial score and bulk tank somatic cell count (BTSCC). Collection of data was at the farm level; individual animal records were unavailable. There were a total of 58,575 bacterial score and 24,109 BTSCC count records from 1,034 farms. The BTSCC data was transformed using natural logarithms. The BTSCC and bacterial score traits were analyzed as single trait mixed and log linear models, respectively. Fixed effects were: 1) year-season, where year = 2004 to 2006, and season = winter (November to February), summer (March to June), and rainy (July to October), 2) farm size (number of cows milked per day of farms), small: < 10 cows; medium: 10 to 19 cows; and large: > 20 cows, and 3) farm locations (4 districts: Kaeng Khoi, Muaklek, Pak Chong, and Wang Muang). Random effects were farm and residual effects. Farm effects were assumed to be uncorrelated. Important effects were year-season, farm district by farm size interaction for log bacterial score (LBS), and month nested within year and farm district by farm size interaction for log BTSCC. The 2006 summer was lower ($P < 0.05$) than all other seasons and the rainy season was higher ($P < 0.05$) than either adjacent season for LBS. Small size farms in Muaklek and Pak Chong had lower ($P < 0.05$) LBS values than medium and large farms. There were no differences among farm sizes in Kaeng Khoi and Wang Muang for LBS. Small size farms in Muaklek, Pak Chong, and Wang Muang had lower ($P < 0.05$) log BTSCC values than both medium and large size farms. There was no difference ($P < 0.05$) among farm sizes for log BTSCC in Kaeng Khoi. The lower values of LBS and log BTSCC in most small size farms suggests they had better health and sanitary management than medium and large size farms.

Key Words: Bacterial Score, Bulk Tank Somatic Cell Count, Thailand

855 Effects of supplementing finger millet straw with concentrates differing in partitioning factor on microbial biomass synthesis in crossbred dairy cows. W. Jackson*¹, S. Sudha², U. Krishnamoorthy², R. Bhaskaran², and P. Robinson¹, ¹University of California, Davis, ²Karnataka Veterinary, Animal & Fisheries Sciences University, Bangalore, Karnataka, India.

Improving utilization of crop residues by obtaining maximum microbial biomass from ruminally digestible organic matter (OM) is beneficial to lactating cows. The 'Partitioning Factor' (PF) is an index of distribution of truly degraded substrate between microbial biomass and fermentation waste products as measured by *in vitro* digestion, where a high PF indicates more efficient microbial biomass synthesis. In this study, effects of supplementing finger millet straw (FMS) with concentrates differing in PF on DM intake, nutrient digestibility and N metabolism were studied in mid-lactation cows. A high PF concentrate (HPFC) and a low PF concentrate (LPFC) were formulated to be iso-metabolizable energy and iso-N, but to differ in PF. Six crossbred cows were divided into 2 groups based on BW in a switchover design consisting of 2 periods of 4 weeks. A 5 day metabolism study was conducted at the end of each period. Diets consisted of *ad libitum* FMS as the sole source of forage, and concentrate supplements to meet requirements (ARC, 1984). FMS was fed daily at 8:30 h and concentrate was fed in 2 portions at 5:30 h and 14:00 h. The ME (MJ/kg DM) and CP content (g/kg DM) of the HPFC and LPFC concentrates were 12.7, 168 and 13.4, 188, respectively, and the PF was 3.78 and 3.65. Intake (kg/d) of DM, OM and CP for the HPFC and LPFC groups were 12.72, 11.61, 0.54 and 12.40, 11.59 and 0.53, respectively, but they did not differ between treatments. OM digestibility (g/kg DM consumed) of 624 vs. 659, as well as the N retained (8.0 g/d) was also similar. Urinary allantoin excretion (UAe, mmol/d) in HPFC was higher ($P=0.05$) than in LPFC (170 vs. 131), but calculated microbial N supply to the duodenum was similar between groups (125 and 112 g/d). Total N content (g/d) in urine was higher ($P=0.0003$) in the HPFC (57.0) vs. the LPFC (43.0) group, and BW gain (g/d) for the groups was 320 and 30 ($P=0.09$). A concentrate with a higher PF tended to have a higher efficiency of microbial biomass synthesis in an FMS based high forage diet.

Key Words: Efficiency of Microbial Biomass Synthesis, Allantoin, Microbial Nitrogen

Nonruminant Nutrition: General Topics

856 Temporal changes in biochemical indices of sulfur amino acid (SAA) metabolism in the folate deficient piglet. Z. Zhang* and J. D. House, University of Manitoba, Winnipeg, MB, Canada.

The impact of folate deficiency on temporal changes in markers of SAA metabolism was determined in weanling pigs. Pigs (5.3 kg; $n=6$ /treatment) were fed a basal semi-purified diet (20.5% casein; 3474 kcal ME/kg) containing either 0 (folate deficiency, FD) or 0.6 (folate control, FC) mg/kg folate, using a pair-feeding design. Feed intake was measured daily, and body weight and plasma were collected weekly for 6 weeks. Animals were killed at the end of 6 weeks, and tissue samples harvested. Plasma folate and vitamin B-12 were determined by Quantaphase ? Folate/B12 Radioassay. Total homocysteine (Hcy) and cysteine (Cys) were quantified by reverse-phase HPLC. Hepatic serine hydroxymethyltransferase (SHMT) was measured by a binding assay using radioactive isotope L-[¹⁴C(U)]-Serine. SHMT was statistically analyzed by PROC GLM with randomized complete block design. The mixed model was applied to analyze all the other parameters with repeated observations. In addition to average daily

feed intake, average daily gain and feed efficiency were not affected by folate deficiency throughout the experiment. Plasma folate in FD pigs was decreased from the end of the second week (FC=72.7 nM; FD=29.1 nM; SE=8.4; $p<0.001$) till the sixth week (FC=67.2 nM; FD=15.1 nM; SE=9.1; $p<0.001$). Plasma vitamin B-12 in FD pigs tended to increase over the depletion. At 6 weeks, plasma vitamin B-12 was significantly elevated by folate deficiency (FC=229 pM; FD=1074 pM; SE =198; $p<0.01$). Increases in plasma Hcy in FD pigs were detected on the fifth (FC=16.6 μ M; FD=37.0 μ M; SE=5.9; $p<0.05$) and the sixth (FC=16.6 μ M; FD=71.3 μ M; SE=5.9; $p<0.0001$) weeks. By contrast, decreases in plasma Cys in FD pigs were found on the fifth (FC=187.0 μ M; FD=146.5 μ M; SE=9.3; $p<0.01$) and the sixth (FC=226.6 μ M; FD=159.6 μ M; SE=5.9; $p<0.0001$) weeks. SHMT was not affected by folate deficiency ($p>0.05$). These results provide evidence that folate depletion perturbs vitamin B-12 and SAA metabolism in the young pig.

Key Words: Folate, Homocysteine, Pig

857 Effects of diet conditioning (steam at low and high temperatures, expanding, and extruding) prior to pelleting on growth performance in nursery pigs. K. K. Lundblad^{*1,2}, S. Issa², J.D. Hancock², M. Sørensen^{3,4}, K. C. Behnke², E. Prestløkken¹, L. J. McKinney², and S. Alavi², ¹Felleskjøpet Fôrutvikling, Trondheim, Norway, ²Kansas State University, Manhattan, ³University of Life Sciences, Aas, Norway, ⁴AKVAFORSK, Aas, Norway.

A total of 180 weanling pigs (avg BW of 5.6 kg) was used in a 36-d experiment to determine the effects of diet conditioning on growth performance. The diets were wheat-fishmeal-soybean meal-based and formulated to 1.6% lysine for d 0 to 13 and 1.35% lysine for d 13 to 36. Treatments were: 1) a control diet fed in mash form; 2) low-temperature steam conditioning (50°C for 20 sec before pelleting); 3) high-temperature steam conditioning (90°C for 20 s before pelleting); 4) expander conditioning (75°C for approximately 20 s in a preconditioner and 105°C for 20 s in the expander barrel before pelleting); and 5) extrusion processing (92°C for 150 s in a preconditioner and 120°C for approximately 50 s in the extruder barrel). The diets were fed to six pigs/pen and six pens/treatment with feed and water consumed on an ad libitum basis. For d 0 to 13, G:F of pigs fed the hydro-thermally processed treatments was greater than for pigs fed the mash control ($P < 0.01$) and ADG was greater for pigs fed diets that were extruder vs expander conditioned ($P < 0.06$). Overall (d 0 to 36), ADG was not different among pigs fed the dietary treatments ($P > 0.40$). However, G:F was greater for pigs fed hydro-thermally processed diets vs the mash control ($P < 0.01$) and for pigs fed extruder vs expander conditioned diets ($P < 0.03$). Means for pigs fed the dietary treatments (1 to 5 as stated above) were 287, 289, 288, 287, and 328 g/d for d 0 to 13 ADG and 945, 1,038, 1,104, 1,067, and 1,169 g/kg for d 0 to 13 G:F, respectively. Overall means were 425, 439, 429, 430, and 445 g/d for ADG and 760, 810, 802, 802, and 860 g/kg for G:F, respectively. In conclusion, hydro-thermal processing (and especially extrusion) of diets improved growth performance (and weanling pigs).

Key Words: Pelleting, Expanding/Extrusion, Pig

858 Effects of diet conditioning (steam at low and high temperatures, expanding, and extruding) prior to pelleting on growth performance in broiler chicks. K. K. Lundblad^{*1,2}, S. Issa², J. D. Hancock², M. Sørensen^{3,4}, K. C. Behnke², E. Prestløkken¹, L. J. McKinney², and S. Alavi², ¹Felleskjøpet Fôrutvikling, Trondheim, Norway, ²Kansas State University, Manhattan, ³University of Life Sciences, Aas, Norway, ⁴AKVAFORSK, Aas, Norway.

A total of 150 broiler chicks (1 d old and average BW of 41 g) was used in a 21-d experiment to determine the effects of diet conditioning on growth performance. The diets were wheat-fishmeal-soybean meal-based and formulated to 1.35% lysine. Treatments were: 1) a control diet fed in mash form; 2) low-temperature steam conditioning (50°C for 20 sec before pelleting); 3) high-temperature steam conditioning (90°C for 20 s before pelleting); 4) expander conditioning (75°C for approximately 20 s in a preconditioner and 105°C for 20 s in the expander barrel before pelleting); and 5) extrusion processing (92°C for 150 s in a preconditioner and 120°C for approximately 50 s in the extruder barrel). The diets were fed to five chicks/cage and six cages/treatment with feed and water consumed on an ad libitum basis. Average daily gain (ADG) and average daily feed intake (ADFI) were greater for chicks fed diets that were simply steam conditioned vs expander and extruder conditioned. Also, expander conditioning resulted in greater ADG and ADFI than extruder conditioning

($P < 0.004$). Gain to feed ratio (G:F) was not different among chicks fed the various treatments ($P > 0.21$). Means for chicks fed the dietary treatments (1 to 5 as stated above) were 32, 34, 37, 32, and 28 g/d for ADG, 47, 47, 52, 47, and 38 g/d for ADFI, and 681, 723, 712, 681, and 737 g/kg for G:F. In conclusion, there was no advantage to using elaborate conditioning technologies (expanding and extrusion) vs. steam conditioning prior to pelleting diets for broiler chicks.

Key Words: Pelleting, Expanding/Extrusion, Chicks

859 Effects of feed form and fiber inclusion in the diet on nutrient utilization in twenty one-day-old broilers. E. Jiménez-Moreno¹, J. M. González-Alvarado^{1,2}, A. de Coca-Sinova¹, R. Lázaro¹, and G. G. Mateos^{*1}, ¹Universidad Politécnica de Madrid, Spain, ²Universidad Autónoma de Tlaxcala, México.

We evaluated the effects of feed form and the inclusion of fiber in the diet on total tract apparent retention of nutrients (TTAR) and AME_n of diets in 21-d-old chicks fed low-fiber diets. The experimental design was completely at random with twelve treatments arranged factorially with two feed forms (mash and pelleted) and six diets that consisted in a combination of three sources of fiber (OH; oat hulls, RH; rice hulls, and SFH; sunflower hulls) and two levels of fiber source inclusion (2.5 and 5%). In addition, a control diet based on rice (57.7%), soy protein concentrate (24%), fish meal (7.6%), fat (5.05%), and celite (2%) that contained 3,200 kcal AME_n /kg, 1.4% total lysine, and 1.6% crude fiber was formulated and offered either in mash or pellet form. The diameter of the pellet was 2-mm. The fiber source was included (wt/wt) at expenses of the whole diet. Each treatment was replicated six times (12 chicks caged together). At 21 d of age TTAR of DM, organic matter (OM), soluble ash, and nitrogen (N), and AME_n of the diets were determined. Fiber inclusion increased TTAR of all dietary components studied ($P \leq 0.001$). However, pelleting of the diet did not improve digestibility of any dietary component ($P \geq 0.10$). Chicks fed SFH had lower TTAR of DM, OM, and N than chicks fed OH, with chicks fed RH intermediate ($P \leq 0.05$). The TTAR of soluble ash was greater with SFH than with RH ($P \leq 0.01$). An interaction fiber source x level of fiber inclusion in the diet was observed for TTAR of DM ($P \leq 0.05$) and AME_n ($P \leq 0.001$); an increase in RH from 2.5 to 5% decreased TTAR of DM and AME_n , but no effect was observed with OH or SFH. We conclude that feed form has not effect on digestibility but that the inclusion of a fiber source improves utilization of nutrients. Therefore, young broilers fed low-fiber diets might benefit with the inclusion of additional fiber in the diet.

Key Words: Pellet, Hulls, Nutrient Digestibility

860 Effects of inclusion of several fiber sources on digesta pH of broilers. E. Jiménez-Moreno^{*1}, J. M. González-Alvarado^{1,2}, A. González-Serrano¹, R. Lázaro¹, and G. G. Mateos¹, ¹Universidad Politécnica de Madrid, Spain, ²Universidad Autónoma de Tlaxcala, México.

A trial was conducted to evaluate the effect of the inclusion of 3% of a fiber source in the diet on pH of the digesta in the gastrointestinal tract (GIT). The experimental design was completely at random with four dietary treatments. The control diet contained 58% rice, 7% fish meal, 22% soy protein concentrate, and 3% sepiolite, and contained 3,095 kcal AME_n /kg, 1.31% total lysine and, 1.53% crude fiber. The three additional experimental diets were similar to the control diet but

sepiolite was substituted (wt/wt) by oat hulls (OH; insoluble and high in lignin fiber source), sugar beet pulp (SBP; soluble and low in lignin fiber source), or microcrystalline cellulose (CEL; insoluble fiber source with no lignin). Each treatment was replicated five times (1 chick per cage). The mean particle size of the diets was 472, 567, 771, and 682 μm for control, CEL, OH, and SBP diets, respectively. The pH of the crop, proventriculus, gizzard, duodenum, jejunum, ileum, ceca, and rectum digesta was recorded at 25 d of age. Fiber inclusion modified the pH of all the organs and segments of the GIT but the effects varied with the GIT segment considered and the fiber source used ($P \leq 0.05$). Inclusion of OH reduced pH of gizzard digesta but not crop or proventriculus pH. Inclusion of SBP increased pH of crop digesta but reduced proventriculus and gizzard pH. The inclusion of CEL had little influence on digesta pH of proximal GIT (from crop to gizzard). Also, the inclusion of fiber had little effect on pH of distal GIT (beyond the gizzard). The only effect of interest observed was that SBP tended to increase the pH in this part of the GIT whereas CEL inclusion had the opposite effect. We conclude that the inclusion of OH or SBP in low-fiber diet for broilers reduces digesta pH in the gizzard but that CEL had no effect. Therefore, the inclusion of OH or SBP to low-fiber diet might improve motility and health of the GIT.

Key Words: Digesta pH, Fibers Sources, Broiler

861 Adhesion ability of probiotic lactobacillus strains and their effect on piglet performance. S. Qiao*, X. Li, and H. Yu, *National Key Lab of Animal Nutrition, China Agricultural University, Beijing, China.*

Four *Lactobacillus* strains, *Lactobacillus gasseri* S1031, *Lactobacillus reuteri* I2021, *Lactobacillus acidophilus* I021 and *Lactobacillus fermentum* I5007 were isolated from mucosa of stomach, duodenum, jejunum and colon, respectively, of healthy weaning pigs and screened by in vitro selection from over 7000 native *Lactobacilli* colonies according to probiotic bacteria criteria including resistance to heat, low pH, copper and bile salts in addition to antagonism to pathogenic agents. A complex *Lactobacilli* preparation made of the four *Lactobacillus* strains with approximately 2.0×10^8 CFU per ml was fed to 36 piglets weaned at 28 ± 2 d (7.65 ± 1.09 kg BW). The piglets fed complex *Lactobacilli* preparation showed better ADG ($P < 0.05$) than that fed carbadox. Earlier studies have shown that adhesion is a prerequisite for the colonization of bacteria and strains with the highest adhesion ability have the greatest effect on the health and performance of the host. Therefore, the adhesion ability of the four *Lactobacillus* strains on Caco-2 cells was observed by light and electron microscope, and that on the porcine intestinal mucus was examined by the scintillation counter using [methyl- ^3H] thymidine labeled bacteria. *Lactobacillus fermentum* I5007 displayed the best adhesion ability among the four strains. In competitive exclusion assay using *Salm. typhimurium* and *E. coli* K88ac, *Lactobacillus fermentum* I5007 showed an excellent probiotic ability. Furthermore, 288 piglets weaned at 28 ± 2 d (7.65 ± 1.09 kg BW) were used to compare the effects of *Lactobacillus fermentum* I5007 preparation and complex *Lactobacilli* preparation on the piglet performance. The complex *Lactobacilli* preparation was prepared using the four *Lactobacillus* strains with approximately 2.0×10^8 CFU per ml. While, *Lactobacillus fermentum* I5007 preparation was prepared with approximately 2.0×10^8 CFU per ml. The piglets fed *Lactobacillus fermentum* I5007 preparation showed better ADG ($P < 0.05$) than that fed the complex *Lactobacilli* preparation.

Key Words: *Lactobacillus*, Probiotic, Adhesion Ability

862 Supplementing rice protein concentrate to a milk-based diet enhances growth performance in weaned pigs. Z. P. Hou¹, Y. L. Yin^{*1,2}, R. L. Huang¹, T. J. Li¹, P. Zhang¹, X. Wu¹, and G. Y. Wu^{1,3}, ¹*Key Laboratory of Subtropical Agro-ecology, Institute of Subtropical Agriculture, The Chinese Academy of Sciences, Changsha, Hunan, China,* ²*Nanchang University, Nanchang, Jiangxi, China,* ³*Texas A&M University, College Station.*

Milk products, including dried skim milk and dried whey, are typical feed ingredients for young pigs because of their high palatability and digestibility values. However, these protein sources are currently expensive and, therefore, their use is limited. The objective of this study was to determine whether rice protein concentrate (RPC) can replace milk protein without affecting piglet growth performance. The basal milk replacer powder used in the present study consisted of 60% dried whey, 26% skimmed milk, 6.2% a-casein, 3.6% lactose, 1.65% glucose, 1% calcium lactate, 1% dihydrocalcium phosphate, 0.1% vitamin premix, 0.2% mineral premix, 0.1% lysine, 0.1% methionine, and 0.05% antibiotic. Forty-four piglets weaned at 7 d of age (BW 2.83 ± 0.22 kg) were assigned randomly to one of the four treatments, representing the substitution of 0 (control), 5, 10, and 15% dried whey with RPC in milk replacer powder. Piglets had free access to their respective diets for 3 wk. The results indicate that there was no difference ($P < 0.05$) in ADG, ADFI or feed/gain ratio among the treatment groups in wks 1 and 2. During wk 3, feed intake and ADG by piglets fed the 10% RPC diet were 13% and 22% higher ($P < 0.05$), respectively, than those for control piglets, whereas growth performance did not differ ($P > 0.05$) between piglets fed the 5 and 10% RPC diets. Growth performance of piglets fed the 15% RPC diet tended to be lower than that of piglets fed the 10% RPC diet ($P > 0.05$). These results indicate that an optimal replacement of 10% dried whey with RCP in the diet for weaned piglets did not compromise their growth performance.

Key Words: Weaned Pigs, Rice Protein Concentrate, Piglet Growth

863 Effects of different carbohydrates on the growth performance of weaned pigs. X. G. He^{*1,2}, H. J. Xu^{1,2}, X. F. Kong^{1,2}, W. Y. Chu², R. L. Huang², Z. Y. Deng¹, S. W. Kim^{3,4}, G. Y. Wu^{1,4}, and Y. L. Yin^{1,4}, ¹*Nanchang University, Nanchang, Jiangxi, China,* ²*Institute of Subtropical Agriculture, The Chinese Academy of Sciences, Hunan, Changsha, China,* ³*Texas Tech University, Lubbock,* ⁴*Texas A&M University, College Station.*

This experiment was conducted to evaluate the effects of different carbohydrates on the growth performance of weaned pigs, with the goal of choosing appropriate carbohydrates to formulate diets for weaned piglets. One hundred twenty Duroc x Landrace x Yorkshire pigs weaned at 28 d of age were randomly assigned to one of the five treatments (24 pigs/treatment), representing supplementation with 6% corn (control), lactose, sucrose, glucose, or cornstarch to a maize-soybean meal-based diet. Pigs had free access to their respective diets and drinking water. At the end of a 28-d experimental period, blood samples were collected from pigs before they were euthanized to obtain the duodenum and jejunum. The results indicate that the ADG of pigs fed the glucose diet was higher ($P < 0.05$) than that for the sucrose group. The feed:gain ratio of pigs fed the lactose group was lower ($P < 0.05$) than that for the other four groups. The activities of lactase in the duodenum and jejunum of pigs fed the lactose diet were higher ($P < 0.05$) than that for the control, sucrose, glucose, and cornstarch groups. Intestinal maltase activities in the lactose and

cornstarch groups were similar ($P>0.05$) but were higher ($P<0.05$) than those for the other 3 groups of piglets. Intestinal sucrase activities in the control, sucrose and cornstarch groups were higher ($P < 0.05$) than those for the glucose and lactose groups. Serum concentrations of glucose and calcium were higher ($P<0.05$) in the sucrose group than that in the cornstarch group. In conclusion, glucose could be used to substitute lactose completely or partly in the diet for weaned pigs but sucrose or cornstarch cannot be used effectively as a single source of carbohydrate.

Key Words: Carbohydrate, Weaned Pigs, GrowthPerformance

864 *Pediococcus pentosaceus* FBB61 reduces oxidative damage by ochratoxin A in rats. A. Piva¹, V. Pizzamiglio*¹, E. Grilli¹, M. R. Messina¹, P. P. Gatta¹, G. Casadei², M. Bognanno³, and F. Galvano³, ¹DIMORFIPA, University of Bologna, Bologna, Italy, ²Northeastern University, Boston, MA, ³STAFADepartment, Mediterranean University of Reggio Calabria, Reggio Calabria, Italy.

Ochratoxin A carcinogenicity and cytotoxicity are associated with free radical mediated oxidative cell damage. Aim of the present study was to investigate the effects of a chronic in-feed supplementation of *Pediococcus pentosaceus* FBB61 to counteract the toxic effects induced by chronic exposure to ochratoxin A contaminated diet in rats. Sprague Dawley male rats (initial body weight 83.9±8.2 g) were divided in 4 dietary treatments (10 animals/group, individually housed) fed a commercial standard pellet diet (control, CTRL) supplemented with *P. pentosaceus* FBB61 (10⁶ CFU/g of feed, PP) or ochratoxin A (200 ppb, OTA) or both the previous treatments (PP+OTA). After 4 weeks rats were sacrificed by an over-dose of ether. Liver, kidneys and brain of each rat were rapidly removed, plasma samples were collected and immediately frozen (-80 °C). Aliquots of tissue homogenate were used to evaluate non-proteic thiol groups (RSH) and lipid hydroperoxide (LOOH) levels, as markers of oxidative damage. Data were analyzed with one-way ANOVA. No differences ($P > 0.05$) were observed in growth performance. PP-fed rats showed higher ($P < 0.001$) RSH value in liver and brain and lower ($P < 0.001$) LOOH values in liver and kidney than all other treatments. PP-fed rats improve oxidative status of liver than control group. Higher levels of RSH and lower levels of LOOH in liver of PP+OTA-fed rats than of OTA-fed rats suggest that supplementation of PP was able to reduce OTA induced oxidative damage.

Table 1.

	CTRL	SD	PP	SD	OTA	SD	PP+OTA	SD
RSH (nmol/mg of protein)								
Liver	111.9	2.2 ^c	129.6	3.8 ^d	74.2	2.2 ^a	94.4	0.9 ^b
Kidney	106.8	2.1 ^c	109.4	4.3 ^c	85.2	2.6 ^a	102.8	2.2 ^b
Brain	88.7	1.8 ^b	90.8	2.5 ^c	82.9	1.7 ^a	84.8	2.5 ^a
LOOH (µmol/mg of protein)								
Liver	0.34	0.01 ^b	0.29	0.01 ^a	0.54	0.01 ^d	0.37	0.01 ^c
Kidney	0.34	0.01 ^b	0.33	0.01 ^a	0.51	0.02 ^d	0.39	0.01 ^c
Brain	0.24	0.01 ^a	0.24	0.01 ^a	0.52	0.01 ^c	0.32	0.01 ^b

CTRL: standard diet; PP: *P. pentosaceus* FBB61; OTA: ochratoxin A; PP+OTA: both PP and OTA; SD: standard deviation. n=10 Different letters in row indicate $P < 0.05$

Key Words: Ochratoxin A, Rats, *Pediococcus pentosaceus* FBB61

865 Apparent ileal digestibility of nitrogen, amino acids and energy of soybean meals from different origins in twenty one-day-old broilers. A. Coca-Sinova, D. G. Valencia, E. Jiménez-Moreno, J. M. González-Alvarado, R. Lázaro, and G. G. Mateos*, Universidad Politécnica de Madrid, Spain.

An experiment was conducted to compare the apparent ileal digestibility (AID) of nitrogen (N), amino acids (AA), and energy (E) of five different soybean meals (SBM) in 21 d old broiler chicks. Four of the SBM samples were collected from local traders, and had a chemical composition within the range accepted by the feed compound industry. Three of them were from Brazil (45.2 to 47.2% CP) and the other was from Argentina (46.1% CP). The fifth batch of SBM was obtained from Owensboro crushing plant (KY, USA). It was a high protein SBM (48.8% CP) obtained after dehulling by using a proprietary processing method (SoyMAX trademark) that reduced to a minimum the trypsin inhibitors content of the meal, without damaging AA digestibility. The experimental design was completely randomized with 5 treatments and 6 replicates (6 chicks each) per treatment. The experimental diets were based on sucrose, corn starch, and oil and the only source of protein was the SBM tested. All the diets contained approximately 3,100 kcal ME/kg, 20% CP, and 1.24% total lysine. Celite (2%) was included in the diets as an additional source of acid-insoluble ash. All chicks were fed a commercial diet from 1 to 16 d of age and then their respective experimental diets from 17 to 21 d of age. At 21 d of age, digesta was collected from the distal ileum (2 cm anterior to the ileocaecal junction) and N, AA, and E digestibilities were determined. Treatment means were compared using a protected t-test. SoyMAX inclusion increased AID of DM, N, Met, and Cys ($P \leq 0.001$), as compared to the average of the remaining SBM samples. The AIDE was higher for the diet with SoyMAX than for the average of the remaining diets (3,156 vs. 3,012; $P \leq 0.001$). We conclude that SoyMAX had higher N, AA, and E digestibility than the commercial batches of South American SBM tested. Therefore, the inclusion of SoyMAX in prestarter diets might benefit poultry efficiency.

Key Words: Ileal Digestibility, Amino Acids, Soybean Meal Origin

866 Fecal near-infrared reflectance spectroscopy (NIRS) calibrations for predicting intake of donkeys. N. Kidane*, J. Stuth, and D. Tolleson, Texas A&M University, College Station.

Fecal-near infrared reflectance (fecal-NIRS) has been used as a method for predicting of DMI, and organic matter intake (OMI) of ruminants. Information about the capability of NIRS method for predicting intake of equines (donkeys) is lacking. The objective of the study was to determine the potential of fecal-NIRS calibration for predicting the DMI and OMI of donkeys. One hundred diet-fecal pair samples were generated from in vivo feeding trials conducted for 10 weeks (plus 1 wk adaptation) in the Horse Center, at Texas A & M University. Ten female donkeys (*Equus asinus*), with an average body weight of 196.3±50.6 kg, were fed 100 different diets blended from 13 natural forage and crop residues. Donkeys were fed twice a day (0700-1900 hr), and daily feed intake, refusal, and fecal output were measured for each diet. Ground fecal samples were scanned in reflectance mode (400-2500 nm) using a Pacific Scientific model 6500 monochromator. Calibrations were developed using modified partial least square regression (MPL) model. The SE of calibration (SEC) for the DMI and OMI were 3.45 g/kgw^{0.75} and 3.21 g/kgw^{0.75}, with R² values of 0.89, and 0.84, respectively. Independent sample set (n=50) was used to validate the performance of each equation. The SE of prediction

for DMI and OMI were 4.36 g/kgw^{0.75} and 3.28 g/kgw^{0.75} with corresponding r² values of 0.84 and 0.87, respectively. Both calibration and validation results indicated that NIRS equations were successfully

developed, and could be used as a tool for predicting the intake of donkeys.

Key Words: Intake, Near Infrared Reflectance spectroscopy, Equine

Nonruminant Nutrition: Natural Phytobiotics for Health of Young Animals: Applications and Mechanisms

867 Natural phytobiotics for health of young piglets and poultry: Mechanisms and application. W. Windisch*¹ and A. Kroismayr², ¹University of Natural Resources and Applied Life Sciences, Vienna, Austria, ²BIOMIN GmbH, Herzogenburg, Austria.

In order to establish alternatives to antibiotic growth promoters (AGPs), phytogetic substances, especially essential oils, are of increasing interest actually. Herbs, spices, plant extracts and essential oils may have positive effects on performance of animals. For example, phytogetic substances derived from Oregano (*Origanum vulgare*), especially the major active substances thymol and carvacrol, are known to exert antimicrobial and bactericidal actions in vitro. Phytogetic substances can also lead to higher secretion of digestive enzymes and mucus, thus presumably stimulating transport rates of nutrients from intestinal lumen towards blood. As an additional effect phytogetic substances may protect intestinal tissue from microbial attack. In order to gather more information about mode of action of phytogetic feed additives, especially with respect to similarity to AGPs, a commercial essential oils blend was tested with a negative control group as well as a standard AGP (Avilamycin) in a 50days model study employing 120 weaner piglets. A subgroup of 3 x 12 animals was sacrificed at trial day 22 to collect chyme and tissue samples for analysis of chyme microbiology including microbial products, gut morphology, and mRNA expression of apoptotic and inflammatory markers in gut tissues. The study showed that the impact of essential oils on performance and aforementioned parameters was very similar to those of the antibiotic growth promoter (Avilamycin). Essential oils enhanced immune status of piglets and improved nutrient digestibility. Generally speaking, phytogetic feed additives can be considered to act similarly to other substances with growth promoting action (e.g. antibiotics, probiotics, organic acids) with the overall effect of promoted zootechnical performance.

Key Words: Phytobiotics, Essential Oils, Piglets

868 The use of bioactive herbal saccharides in China. X. Piao*¹, S. Yuan¹, S. W. Kim², D. Li¹, and D. Ou¹, ¹China Agriculture University, Beijing, China, ²Texas Tech University, Lubbock.

Immune disorders are common phenomena in human and animals due to immature immune system and stress, and thus they might be more susceptible to infection when exposed to a variety of micro-organisms. Bioactive saccharides like polysaccharide and/or oligosaccharide found in herbs are considered to be important components playing roles in immunomodulatory action and antioxidant activity. The structure and bio-activity of saccharides is, however, not fully understood. In this review, immune and antioxidant activities of the saccharides from Chinese herbs are introduced, including polysaccharids (*astragalus*, *ganoderma lucidum*, *phoma herbarum*, *lycium barbarum*, *lentinus edodes*, *angelica Sinensis*, *coriolus versicolor*, *misgurnus anguillicaudatus*, *spirulina platensis*, *cladonia furcata*, pumpkin polysaccharide) and oligosaccharide (mannan-, galacto-mannan-, isomalto-,

fructo-, and xylo-oligosaccharide). Growing interests in herbal saccharides mainly arise from the emerging knowledge about their roles in: 1) enhancing T-cell mediated immune response and humoral immune response; 2) inhibiting the growth of tumour; 3) scavenging effects on active oxygen; 4) protective effects on the acute hepatic injury; 5) promoting wound healing and proliferation of endothelial cells in vitro; 6) decreasing total cholesterol and triglyceride; and 7) improving the impaired glucose tolerance. Considering these possible benefits but without drug residues and low side effects, the bioactive herbal saccharides can be a potential immunomodulating agent to improve health and immune function for life.

Key Words: Saccharide, Immunity, Antioxidant

869 Effect of a phytogetic feed additive on reproduction performance of sows. A. Kroismayr*^{1,4}, C. Hsun², M. Racousier³, and T. Steiner⁴, ¹University of Natural Resources and Applied Life Sciences, Vienna, Austria, ²BIOMIN America Inc, San Antonio, Texas, ³Universidad Mayor, Santiago, Chile, ⁴BIOMIN GmbH, Herzogenburg, Austria.

Growing concern about antibiotic growth promoters in animal nutrition has created efforts to use different plant compounds as possible natural alternatives. Phytogetics are a heterogeneous group of feed additives originating from fruits, herbs, spices or other plants. The aim of this study was to evaluate the effect of a defined phytogetic feed additive (Biomin® P.E.P. 1000), which contains essential oils derived from oregano, anise and citrus peels, on reproductive performance of sows. A feeding trial was conducted under guidance of Universidad Mayor, Santiago, Chile. In this study, eighty cross-bred (PIC 337x Camborough 22) sows were assigned to two dietary treatments with 40 sows per treatment. A gestation diet was fed restrictively (3 kg/d) from day 15 to day 3 before farrowing. Subsequently, a lactation diet was offered ad libitum until weaning. Diets based on corn, soybean meal and wheat by-products were either supplemented or not supplemented (Control) with a phytogetic feed additive (Biomin® P.E.P. 1000, 2 kg/t). Addition of phytogetics to the diets substantially increased feed intake in the lactation period. The average feed intake in lactation amounted to 7.070 and 7.238 kg (P>0.05) for the control and trial group, respectively. It is generally accepted that a higher feed intake in lactation together with improved digestion results in an increased supply of nutrients and energy for the piglets in the milk. Inclusion of phytogetics in diets of sows positively affected litter performance as well. Compared to the control group, phytogetics improved growth performance of piglets, resulting in higher body weights of piglets at weaning (6.15 vs. 5.90 kg, P>0.05). Average daily gain was 220 and 230 g (P>0.05) in the control and trial group, respectively. Compared to the control group, piglets in the trial group were 4 and 6% heavier at birth (15.52 vs. 14.93 kg, P>0.05) and weaning (65.81 vs. 61.83, P>0.05), respectively.

Key Words: Sows, Phytogetics, Essential Oils