were influenced by genetic background of hybrids ($P < .05$). Differences between fresh and ensiled samples for composition generally were not influenced by hybrid genotype or presence of the Bt transgene ($P > .05$). Findings suggest that levels of fumonisin B_1 mycotoxin increased during the ensiling process and further that fermentation end products may be influenced by genetic background of corn hybrids and infestation with European corn borer larvae. Also, the presence of the Bt transgene in corn hybrids did not influence compositional measures and fermentation end products for corn silage.

Key Words: transgenic-plants, fumonisin, *Bacillus-thuringiensis*

1120 Fermentation of non-pasteurized whey with probiotic Lactobacilli for calf feeding. M. Montero*[1], F.I. Juarez[1], B.I. Escudero[2], and H.S. Garcia[2], [1]*CIRGOC-INIFAP,* [2]*UNIDA-Instituto Tecnológico de Veracruz.*

The Lactoperoxidase system (LPS) was used on natural whey to reduce microbial counts. Four different probiotic Lactobacilli species were inoculated and the whey fermented. Analyses of pH, titratable acidity, fat and protein content and total soluble solids were performed, along with total plate count and coliform count. Whey was obtained from nine small rural cheese plants near the city of Veracruz which manufacture cheese from raw milk. The LPS was activated using ratios of sodium thiocyanate:hydrogen peroxide of 1:1, 1:2, 2:2 and 2:1, using as ratio 1:1 the equimolar concentrations of 0.25 mM of the two reagents. Results were analyzed by one-way ANOVA. Non-pasteurized whey was inoculated with L. acidophilus, L. casei, L. reuteri or Bifidobacterium sp., fermented at ambient temperature and populations were monitored for 72 h. Results showed a variation coefficient between 13 and 4% in composition of the different wheys, with elevated coliform count (ca. 3.3 x 106 cfu/ml). There was no difference between the thiocyanate:peroxide ratios used to activate the LPS, and only a reduction of 1 log cycle of the coliform count was achieved at best. The probiotic strains reached maximum populations (near 107 cfu/ml) between 18 and 36 h; however these populations started to decrease after 48 h and almost disappeared after 72 h. Coliform count drcreased to 1 x 103 at 24h and disappeared after 36h. It is concluded that fermented raw whey could be used for calf feeding studies before 48 h post-inoculation.

Key Words: probiotics, lactoperoxidase, whey

Swine Species

1121 Comparing profiles of piglet mortality when administering medium-chain triglycerides, colostrum, oxygen and additional heat. H. Y. Zhang, B. Szkotnicki, M. Z. Fan, V. Osborne, and R. R. Hacker*, *University of Guelph, Guelph, ON. Canada.*

The objective of this study was to reduce piglet mortality during the first 7 d of life by administering medium chain triglycerides (MCT; Ultimate Nutrition, Inc. USA) and bovine colostrum (Col; Zenith Technology Ltd., NZ.) products with supplemental oxygen and/or additional heat. Sows were moved to farrowing crates by d 109 of gestation, and fed a 14% CP corn-soybean meal diet. The farrowing room was maintained at 21C or above and the creep heat zone was maintained above 35C with a 175W IR heat lamp. One hundred and eight sows and respective litters were assigned to an oxygen group (O_2; piglets administered 10-min of 40% oxygen), a heat group with 175W IR heat lamp positioned directly behind the sow (H; the farrowing zone maintained above 31C), or a control group (C). After farrowing, all piglets were randomly force-fed 6 ml of one of following treatment products: (1) water (W), (2) MCT, (3) Col, or (4) MCT plus Col (Mcol). The analysis of variance for 7 d weight gain (WG) was performed with the GLM procedure of SAS. LSD for percentage was used in analyzing the difference in total mortality over the 7 d of life between groups and treatments. The results confirm our earlier discovery that O_2 improved piglet survival whether within litter or between litters ($P<0.01$). The H reduced piglet mortality by 20% when compared with C ($P>0.05$). Piglet mortality to 7 d of age with BW under 800 g was different ($P<0.01$) for the C (83.3%), vs. H (16.7%), and for O_2 (12.5%). MCT and Mcol did not assist in reducing piglet mortality, but Col itself reduced piglet mortality ($P<0.05$). All piglet treatment products did not influence WG, but H achieved an increase ($P<0.05$) over the C group. It can be concluded that O_2 is the most effective means for improving piglet survival; an additional heat lamp positioned at the rear of the sow during farrowing is an efficient and practical means for saving small piglets.

Key Words: Oxygen, Heat, Medium-chain triglycerides, Colostrum, Temperature, Piglets, Mortality

1122 Use of a natural carbon-mineral supplement in swine diets: effects on pig growth. S. W. Kim*, F. Ji, and J. J. McGlone, *Texas Tech University.*

A natural, carbon-mineral source (NCM) is a feed supplement that is mined and minimally processed (Promax#, HumaTech, Inc., Houston, TX). Carbon compounds include humic acid, fulvic acid, and other organic compounds and minerals include bioavailable iron and other trace minerals. One hundred twenty pigs, weaned at d 21 of age, were used to determine the effect of NCM on growth performance of pigs from the nursery to growing period. At weaning, pigs were allotted to one of three treatments. Treatments were control, 0.5% NCM supplementation, and 1.0% NCM supplementation. Each treatment had eight replications and each pen-replicate had five pigs. During the nursery period, pigs were fed based on a three-phase feeding program. Phase 1 was 1-wk post-weaning, phase 2 was 2-wk after phase 1, and phase 3 was another 2-wk after phase 2. Body weight and feed intake were measured weekly. All pigs had free access to diets and water. After a 5 wk nursery period, pigs were moved to a grower facility and two pen-replicates were combined to 4 pen-replicates per treatment. Body weight and feed intake were measured twice during the growing period. Two-phase feeding program was applied to growing pigs. Phase 4 was 48 d after phase 3 and phase 5 was another 15 d after phase 4 until pigs reached 60 kg body weight. There was no difference in average daily gain and feed intake during the phase 1 and 2. However, pigs fed a diet containing 0.5% NCM had a greater ($P<0.05$) ADG during phase 3 than pigs in other treatments. Average daily feed intake was the same among treatments during phase 3. Gain/feed was greater ($P<0.05$) in pigs fed a diet containing 0.5% NCM than other treatments during phase 3. There was no difference in average daily gain of pigs among treatment during phase 4 and 5. However, pigs fed the control diet consumed a greater ($P<0.05$) amount of feed during phase 5 than pigs in other treatments. Gain/feed was greater ($P<0.05$) in pigs fed a diet containing 0.5% NCM during phase 5 than pigs fed the control diet. This study demonstrated that supplementing NCM at 0.5% level may improve ADG during the late nursery period and efficiency during the late growing period. Further evaluations are required over longer periods.

Key Words: Pigs, Natural carbon mineral, Growth peformance

1123 Effects of bromocriptine on immune response of pregnant gilts and foetuses and on foetal development. M. Lessard*, M. Dupuis, and C. Farmer, *Dairy and Swine R and D Centre, Lennoxville, Quebec, Canada.*

To evaluate the effect of prolactin (PRL) on foetal development and on the immune response of pregnant gilts and their foetuses, an inhibitor of PRL synthesis, bromocriptine (BR), was given to 48 crossbred pregnant gilts. These were equally distributed into four groups: controls (CTRL), or 10 mg of BR given per os three times daily for 20 days from day 50 (BR50), 70 (BR70) or 90 (BR90) of gestation. Ovalbumin (OVA) was injected s.c. to all gilts on days 53 and 72 of gestation and serum samples were taken on days 50, 60, 70, 90 and 109. Interferon-γ (IFN-γ) production from blood mononuclear cells isolated from the CTRL and BR50 gilts and stimulated with concanavalinA (ConA) was measured on days 50, 70, 80 and 109 of gestation. Five gilts per treatment were slaughtered on day 110 of gestation and foetal weights were recorded. The spleen and thymus of six foetuses per litter were excised to characterize different lymphocyte populations by flow cytometry and spleens were weighed. The lymphocyte proliferative response to ConA was measured in the spleen of three foetuses per litter from the BR70, BR90 and CTRL groups. No difference was observed in the antibody titers to OVA between the four groups ($P > 0.1$). Production of IFN-γ was greater ($P < 0.04$) in the BR50 than in the CTRL group. Foetal body weights were lower ($P < 0.05$) in the BR50 and BR90 compared to

the CTRL group. Weights of spleens also tended to be lower ($P < 0.07$) in BR50 and were lower ($P < 0.005$) in BR90 foetuses than in CTRL foetuses. Lymphocyte populations in spleens and thymuses of foetuses were not affected by BR ($P > 0.1$). The proliferation of splenocytes in CTRL foetuses tended to be greater ($P < 0.16$) than that in BR90 foetuses. Inhibition of PRL synthesis in pregnant gilts therefore reduces both foetal body and spleen weights and tends to impair the capacity of foetal splenocytes to proliferate, especially when the inhibition is at the end of gestation.

Key Words: Pigs, Gestation, Immunology

1124 Puberty induction and the effect on gilt growth characteristics. H.J. Willis*[1], M.J. Zuidhof[2], A.I. Whelan[1], and G.R. Foxcroft[3], [1]*Swine Research and Technolgy Centre (AAFRD), 6909 - 116 Street, Edmonton, AB T6H 4P2,* [2]*Poultry Research Centre (AAFRD), 7000 - 113 Street, Edmonton, AB T6H 5T6,* [3]*Swine Research and Technology Centre, Rm 410 Ag/For Centre, Univ. of Alberta, Edmonton, AB T6G 2P5.*

Over 80 percent of replacement gilts are purchased and arrive on-farm at 95-105 kg, 145 to 150 d of age and with 10 to 13 mm of backfat. Increased growth rate, decreased backfat and reduced appetite have been implicated in an increase in culling rate due to locomotor problems and reproductive failure, and consequent decrease in sow longevity in the herd. There is reason to believe that early onset of puberty may decrease postpubertal growth rate and ultimate body size, which may decrease maintenance feed costs and reduce culling rate due to locomotor problems. The purpose of the study was to determine whether inducing early puberty in gilts results in a reduced rate of growth and a smaller mature body size, without compromising reproductive function. At 70 d of age, 40 F1 Manor Hybrid, littermate gilts were balanced across treatments based on growth rate and weight and placed in pens of 5. Gilts were randomly assigned to either 1) receive twice daily boar exposure to induce puberty, beginning at 130 d of age (STIM), or 2) receive no boar exposure for the duration of the experiment (CON). Starting at d 80, individual daily feed intakes were recorded and weekly weight, backfat depth (P2) and loin muscle depth measurements were recorded until d 210. Pubertal and subsequent heats were recorded in both groups of animals. Data was analyzed by ANOVA using the GLM procedure of SAS and age at maximum growth and weight at maturity were estimated using the Gompertz model. There was a significant ($P<0.05$) difference between age at puberty (149.84 vs 164.93 d), exposure to puberty interval (19.84 vs 34.93 d) and weight at puberty (100.01 vs 111.11 kg) between STIM versus CON gilts, respectively. There was no difference between P2 and loin depth at puberty, calculated age at maximum growth or calculated weight at maturity between treatments. Puberty can be induced using appropriate boar stimulus much earlier than current industry practices. The ultimate benefits of this trial to the industry could be 1) increased production efficiency, 2) improved animal welfare and 3) reduced culling rates of sows.

Key Words: Swine, Puberty, Growth

1125 Reducing odor in swine production: Effect of enzymes and probiotics on ammonia production. F. Ji* and S. W. Kim, *Texas Tech University.*

Thirty pigs were used to determine the effects of an enzyme complex and a probiotics complex on ammonia reduction from swine manure. A 3 x 3 Latin square design was used for this experiment. Three treatments were control, enzyme treatment, and probiotics treatment. An enzyme complex (EasyBio System) mainly consists of alpha-1,6-galactosidase, beta-1,4-mannanase, and beta-1,4-mannosidase with other minor components. A probiotics complex (EasyBio System) mainly consists of Bacillus Sp., Aspergillus Oryzae, and Lactobacillus Acidpillus with other minor components. The enzyme complex was supplemented to the diet at 0.1% level and the probiotics complex was supplemented at 0.2% level. A metabolic chamber was used as a model to control the environment. A group of ten pigs was assigned to one of three animal groups. Each group was moved to a pen (1.2 x 2.4 m) in a ventilated environmental chamber (3.0 x 3.0 x 2.4 m) for 3-d during which aerial ammonia was measured. The temperature inside of the chamber was maintained at 24C and the fan was working continuously during the experimental period. A gas monitor with the sensors for ammonia was used to measure the changes of ammonia during the 3-d collection period with 5 min intervals. Feed intake of pigs during the 3-d collection period was measured. The initial and final body weights were measured before and after moving pigs to the chamber. Feed intake and initial body weight were used as covariates in analyzing the data. Data were collected for 66 h. Last 48-h was regarded as a data collection period and the first 18-h was regarded as an acclimation period. During the last 48-h pigs fed a diet with the probiotics had a lower ($P < 0.01$) ammonia production than pigs fed a control diet (79% of control). Pigs fed a diet with the enzyme had the same ammonia production when it is compared with the control (99% of control). During the last 24-h, however, enzyme treatment reduced ($P < 0.01$) ammonia production to 93% of control. During the whole experimental period, the regression equation for control group was different ($P < 0.05$) from the regression equation for probiotics group indicating that the ammonia production from probiotics pigs are lower ($P < 0.05$) than that from control pigs.

Key Words: Pig, Odor, Probiotics

1126 Productive performance and specific immunoglobulin G response in sows and their offspring fed a live strain of *Saccharomyces cerevisiae*. L. E. Zapata*[1], A. M. Martinez[1], M. A. Coba[1], V. G. Perez-Mendoza[2], M. L. Angeles[2], A. M. Anaya[2], F. Diaz[1], and J. A. Cuaron[2], [1]*CNID-Microbiologia, INIFAP,* [2]*CNI-Fisiologia y Mejoramiento Animal, INIFAP.*

Productive performance and variation of serum and lacteal relative concentrations of immunoglobulin G (IgG) was studied in breeding sows inmunostimulated by a killed virus pseudorabies (PRV) vaccine injected at d-70 of gestation to a PRV-free population. From d-30 of gestation and through weaning, 50 sows were randomized to 2 treatments: Control and the addition of 3 kg/ton of feed of live *Saccharomyces cerevisiae*, strain SC47 (S47). Sow blood serum samples were collected on d-70 (prior vaccination) and on d-109 of gestation. Lacteal secretion samples were hand collected from random udder sections of each sow at farrowing and on d-14 of lactation. At birth, 4 piglets per sow were randomly selected and blood samples were taken at 0, 6, 17 and 42 hours and on days 6, 15 and 47. Productive performance was measured. Immunoglobulin G concentrations were analyzed using a PRV antibody test. Results were analyzed by ANOVA and repeated measures. Sow feed intake, weight change during lactation, litter size and litter birth weight were not affected ($P>.05$) by treatment, but S47 improved ($P<.01$) litter weaning weight (53.6 vs. 46.5 kg). Colostrum and milk protein and fat were not affected ($P>.1$), but protein and energy yields were greater, because of a larger milk output after S47 addition to the diet. Live S47 addition to the sow#s diet resulted in increased anti-PRV-IgG concentrations in serum (collected on d-109) and colostrum ($P<.05$). The greater IgG concentration in S47 treated sow#s colostrum induced a higher ($\times.2$) IgG level ($P<.001$) in piglet#s serum after birth, which decreased by d-6 of lactation. It is concluded that live S47 in gestation and lactation sow feed induces greater litter weaning weight and increased specific immunity, as depicted in this case by the anti-PRV-IgG.

Key Words: Sow, Specific immunity, Performance

1127 Analysis of the fecal microflora of lactating sows consuming *Saccharomyces cerevisiae*. A. M. Martinez*[1], C. Juste[2], J. Dabard[2], M. Sutren[2], C. Bridonneau[2], F. Beguet[2], C. Lay[2], J. Dore[2], and E. Auclair[3], [1]*CNID-Microbiologia, INIFAP, Mexico,* [2]*Unite d'Ecologie et de Physiologie du Systeme Digestif, INRA, France,* [3]*Lesaffre International, Marcq-en-Baroeul, France.*

A total of 16 sows were used to study the effect of a live culture of *Saccharomyces cerevisiae*, strain SC47 (S47), on the diversity of predominant bacteria in feces by classical microbiological methods and 16S-rDNA based approaches. Starting at d-76 of gestation, and through weaning, sows were randomized to 2 treatments: Control (CTR) and the addition of 3 kg/ton of feed of lyophilized S47. Feces were collected at weaning and were analyzed for total anaerobic bacteria, *enterobacteriaceae*, *streptococci*, *lactobacilli*, and yeast. Identification of bacterial groups of 96 colonies isolated from dominant bacteria in anaerobic chambers was done by colonial and cellular morphologies and was expressed as % of morphotypes; PCR amplicons of the V6-V8 region of bacterial 16S-rDNA were analyzed by temperature gradient gel electrophoresis (TTGE). Performance and microflora data were analyzed by ANOVA, PCR-TTGE profiles were compared using Pearson correlation coefficients. No differences were observed in productive performance ($P>.32$), but lower counts of total bacteria were measured in feces of sows fed S47 (9.9 vs 8.9 UFC/g). The composition (% of morphotypes)

of dominant bacteria grown in anaerobic chambers were similar (P>.12) between treatments (CTR vs S47): for *bacteroidaceae*, 10 vs 6.1; *eubacteria*, 35.6 vs 37.1; *clostridia*, 1.1 vs 0.7; *peptostreptococci*, 7.4 vs 6.1; *lactobacilli*, 32.8 vs 38.6; *enterobacteriaceae*, 0.3 vs 0 and other non identified, 12.4 vs 11.5. The TTGE profiles of fecal 16S-rDNA showed differences, with some bands in common, indicating that each individual has a specific bacterial community but some dominant bacterial species are present in all individuals. A comparative analysis of banding patterns showed higher similarities (mean; range) within treatments for sows receiving S47 (94%; 89-98) or CTR (91%; 78-97) than between treatments (88%; 81-95). Inclusion of live S47 yeast in sow#s feed did not affect performance, but did show an alteration of fecal microflora. However, a complete 16S-rDNA gene sequence is required to make a precise phylogenetic assigment of each organism that was changed by treatment.

Key Words: Microbiota, *Saccharomyces cerevisiae*, Sows

1128 A good quality meat and bone meal is an effective protein source for piglets if diets are formulated to true ileal digestibility of amino acids. C. Urbano[1], C. H. Dobler[1], and J. A. Cuaron*[2], [1]*Agroporcina del Centro y PAIEPEME, A.C., Mexico.*, [2]*CNI-Fisiologia y Mejoramiento Animal, INIFAP, Mexico*.

High quality, low immunogenicity feed ingredients is preferred in diets for piglets at weaning, their use is frequently over-valued. This trial was designed to challenge the response of 20±1-d-old weaned piglets to Plasma Protein (PP), a hydrolyzed meat protein (HM) and a good quality meat and bone meal (MB) in Phase 1 and 2 diets. The use of HM and MB was to totally replace PP (at 7, Phase-1 and 3%, Phase-2 diets) in pelleted feed, industrially processed to current Mexican standards. Digestibility for all ingredients was calculated from appropriate prediction equations. The experiment was followed in a commercial operation affected by several diseases (including those of the respiratory syndrome and PRRS), to challenge overall immunological response. A total of 390 piglets (5.76±1 kg initial weight) in 10 experimental units per treatment were used. Performance was measured up to d-63 post-weaning in weekly intervals. Results showed no differences (P>.3) in average of daily feed intake or body weight gain (ADG) in any given period, including a compensatory response after a morbid episode. Least squares means after 63d were, for ADG: PP, 0.478; HM, 0.513 and MB, 0.533 kg/d or feed efficiency: PP, 0.448; HM, 0.495 and MB, 0.477 kg of gain/kg of feed consumed. Morbidity occurred after d-17 post-weaning and a difference (P<.1) in mortality rate was detected by d-28: PP, 6.07; HM, 2.40 and MB, 3.70%. The difference disappeared by d-63, being an average of 4.6%. The early mortality was noted during serum conversion (from passive to active immunity) to PRRS, suggesting that prevention of immune-challenges (claimed for PP by low antigenicity) could be lowering speed of development of the active immunity capacity. Meat and bone meal is a lower price ingredient with the advantage of an available phosphorus provision, therefore greater return could be expected for swine producers. Results clearly show that a good quality MB could be as effective or more than PP, as long as diets are formulated on a digestible amino acid basis. This supports confidence and prevalence of a good quality MB in diets for other stages of growth.

Key Words: Animal-by-products, Piglets, Feed-formulation

1129 Difference between estimated energy intake and requirements during gestation in sows from a commercial herd. H. Guimont*, R. Bergeron, and J. F. Bernier, *Université Laval, Ste-Foy, Québec, Canada*.

Controlling energy gain during gestation in sows is critical to optimize reproductive performance and feed intake during lactation. The objective of this study was to determine in a commercial farm, if energy intake of individual sows matched closely their energy requirements estimated with INRAOs factorial model. One hundred and nine sows housed in individual stalls were followed for one gestation. Individual volumetric dispensers delivered feed in a common trough with individual dividers. DE intake was estimated from repeated calibration (7 on average) of dispensers and weekly feed analysis. Sow BW was measured at breeding, and at 110 d of gestation. Backfat thickness at P2 was determined by ultrasound at breeding and at 27, 61, 82, 102 and 112 d of gestation. Activity was measured by direct observation (scan sampling) for 2 h after feeding on two consecutive days at 30, 60 and 100 d of gestation. Litter weight was recorded to estimate DE requirement for gestation. Maintenance DE requirement was calculated from average BW. Energy requirement for sow tissue gain was estimated from BW and P2 thickness. Residual DE intake was calculated by subtracting DE requirements from DE intake. Breeding BW and P2 averaged 228.4±42.6 kg and 18.5±3.6 mm, while farrowing BW and P2 averaged 289.4±34.8 kg and 21.4±4.4 mm, respectively. Residual DE intake averaged 1.4 MJ/d but was highly variable. Residual DE intake was more closely linked to DE requirements (r=-0.92) than DE intake (r=0.26). Maintenance, gestation and tissue gain represented 76.6, 5.1 and 18.3% of DE requirements, but their correlation (r) with residual DE intake were -0.37, -0.01 and -0.61, respectively. Residual DE intake was not closely related to time standing (r=0.13) or lying (r=-0.18). These results show that, on this farm, estimated energy requirements of gestating sows corresponded, on average, to their intake. However, individual variation was strong and discrepancies between requirement and intake appear to be related to the estimation of tissue gain.

Key Words: sow feeding, gestation, energy requirements

1130 From farm to table: Effects of a microbial feed additive, Pediococcus acidilactici MA18/5M, along the production chain of cooked ham. J. Combes[1], H. Durand*[2], E. Chevaux[2], G. Deschodt[3], and Y. Le Treut, [1]*University of Tours, France,* [2]*Lallemand Animal Nutrition, Toulouse, France,* [3]*Fleury Michon, Pouzauges, France,* [4]*Invivo, Saint-Gregoire, France*.

Feed additives have been used primarily to improve animal performances and health. Since recent years, growing consumers# concerns about product quality, food safety and environmental issues have paved the way for a new generation of additives. A lactic acid bacterial strain, Pediococcus acidilacticci MA 18/M, was developed as a microbial feed additive for swine. In the process of European Registration, the identity, safety and efficacy of the product have been thoroughly documented. However, as far as efficacy is concerned, the trials were focused in performance parameters only (i.e. Daily Weight Gain and Feed Conversion Rate). In order to address new market demands, a trial involving all the levels of production, from farm to slaughter up to cooked ham producer was designed. A herd of 430, 15 weeks-old pigs were split into two comparable groups : one (control) was fed a standard fattening diet without any growth promoter ; the other (Pa) received the same feed supplemented with 10E9 CFU of P. acidilactici per Kg. The following parameters were measured : 1) On farm : weight gain, feed consumption. 2) At slaughterhouse : carcass weight, lean meat ratio, fresh ham weight, cutting yield, meat pH. 3) In the processing plant : meat composition, drip and cooking losses, fatty acids profile. In addition, a panel of experts assessed the sensorial quality of both fresh meat and cooked ham. On farm, the Pa group performed significantly better than the control, with a Daily Weight Gain of 849 vs 828 g/d. Lean meat ratio (59.1 vs 58.4%) and meat pH (5.91 vs 5.86) were also significantly improved, and the different technological yields were numerically increased. The losses during storage and cooking were numerically lower in the Pa group ; the fatty acid profile displayed a trend to higher poly-unsaturated/saturated ratio. Finally, the panel of expert gave significantly higher (p<0.05) quotations for flavour, taste and visual aspects of fresh meat as well as processed ham. These data confirm the positive effects of a well equilibrated gut flora, not only on the zootechnical point of view but also all along the downstream chain.

Key Words: Microbial feed additive, Lactic acid bacteria, Meat quality

1131 Effect of micronization on indicators of nutritional quality of peas for pigs. Z. Zhang*[1], C.M. Nyachoti[1], S.D. Arntifield[1], W. Guenter[1], S. Cenkowski[1], and I. Seddon[2], [1]*University of Manitoba, Winnipeg, MB,* [2]*Manitoba Agriculture and Food, Winnipeg, MB*.

Two in vitro studies were conducted to assess the impact of micronization of peas on lysine availability (LA), starch gelatinization (SG), and water extract viscosity (WEV) as indicators of nutritional quality. In Study 1, a pea variety (cv Croma) and four tempering moistures were used to determine the optimal moisture level for micronization of peas. In Study 2, four varieties of pea: AC Advantage (ACA), Radley (RAD), Carneval (CAR), and an unknown (UNK) variety were used to assess the effect of storage conditions on the nutritive value of micronized peas.

In both studies, 5 kg of each sample were tempered for 18 h to a designated moisture level (i.e. 21, 24, 27, or 30% in Study 1 and 25% in Study 2). The micronized peas were collected at temperature range of 110 to 115C. In Study 2, the samples were stored at either 4C or room temperature for 0, 2, 4, and 6 wk. A 50 g sample of raw, tempered (Study 1 only), or micronized pea was used for LA, SG, and WEV analysis. The results in Study 1 indicated that WEV of micronized peas was significantly reduced ($P < 0.05$) by 48 or 54% and SG temperature was significantly increased by 6.1 or 6.6% as the tempering moisture was increased from 21 to 30%. However, at a tempering moisture greater than 24%, LA tended to decline thus suggesting that 24% moisture is optimal for micronizing peas without compromising its nutritive value. The results in Study 2 indicated that micronization conditions used in this study had no effect ($P > 0.10$) on LA in all 4 pea varieties regardless of storage conditions, except for RAD. Compared to raw peas, WEV of micronized peas at wk 0 was significantly reduced by 16, 24, and 16% ($P < 0.05$) for ACA, RAD, and CAR. SG temperatures were significantly increased by 5.4, 6.2. 7.4.and 10.8% ($P < 0.05$) for ACA, RAD, CAR, UNK, respectively. Overall, the results in two studies suggested that the nutritive value of peas for pigs could be enhanced through proper micronization technology.

Key Words: peas, micronization, nutritive values

1132 Evidence for oocyte penetration rate as an effective indicator of proven boar fertility. Ana Ruiz-Sanchez*[1], Rose O'Donoghue[1], and George Foxcroft[1], [1]*Department of Agricultural, Food and Nutritional Science, University of Alberta.*

The principal objective was to compare *in vitro* fertilization (IVF) techniques with routine semen evaluation characteristics as effective indicators of in vivo fertility. Six experimental boars (B-1, R-1, G-1, R-2, G-2 and Y-2) were collected twice a week during a period of 8 months, beginning at 7 months of age. The first sperm rich fraction of all ejaculates was evaluated using standard laboratory procedures for motility, morphology and concentration, diluted to 1.5 billion morphologically normal sperm in 50mL BTS extender, and used to breed approximately 60 gilts. At least seven times during the breeding period, specific aliquots from the first sperm-rich fraction were evaluated using established IVF procedures. Oocyte penetration rate (percentage of matured oocytes penetrated by at least one spermatozoon) was different among boars (P<0.0001) and positively correlated with conception rate (r^2=0.30; P<0.0005) and farrowing rate (r^2=0.21; P< 0.004). Because of a boar x time interaction for sperm motility (P<0.001) and percentage normal sperm (P<0.05) on the day of collection, these characteristics were not useful indicators of persistent differences in proven fertility among boars. In particular, compared to other boars, oocyte penetration rate for Boar G-1 was lower (45.5 v 89.9, 76.4, 77.3, 87.9, and 97.31 %; P<0.0001) and was associated with lower conception rate (75.1 v 92.3, 83.3, 93.1, 98, and 92.8 %; P<0.0001) and farrowing rate (73.7 v 92.3, 81.5, 92, 98, and 91.1 %; P<0.0001). However, ranges of motility of raw semen (90 to 80 %) and percent normal sperm (97 to 82 %) for boar G-1 was acceptable and similar to other boars. In conclusion, oocyte penetration rate may be more useful for predicting sperm quality and boar fertility than routine semen evaluation methods. Implementation of this in vitro technology should allow swine producers to detect the high fertility boars for use in more efficient AI programs.

Key Words: semen quality, In vitro fertilization, boar fertility

1133 Effects of removing pigs from pens and floor space allocation on growth performance post-removal in finishing pigs. J. M. DeDecker*[1], M. Ellis[1], B. F. Wolter[1], B. P. Corrigan[1], S. E. Curtis[1], E. N. Parr[2], and D. M. Webel[2], [1]*University of Illinois, Urbana, IL/USA,* [2]*United Feeds, Inc., Sheridan, IN/USA.*

Finishing pigs were removed from pens at different rates to determine the effects of pig removal and floor-space allowance on growth performance for the final 19 d of finishing. Thirty-two pens of crossbred pigs (n = 1664; 52 pigs/pen) were used in a randomized block design to evaluate four pig removal treatments: 1) 0% removed [Control], 2) 25% removed, 3) 50% removed, and 4) 50% removed and floor space/pig reduced to equal that of Control. Pens of pigs (mean BW = 114.9 ± 5.1 kg) were randomly allocated to treatment, and the heaviest animals were removed. Group size and floor space/pig for treatments 1, 2, 3, and 4 were: 52 and 0.65 m^2, 39 and 0.87 m^2, 26 and 1.30 m^2, and 26 and 0.65 m^2, respectively. Each pen contained a 6-place feeder (212 cm total trough space); however, only 3-places were accessible to pigs in Trt. 4. Pens of pigs with a 25 and 50% removal rate (Trt. 2 and 3) compared to Control had increased ADG (P < 0.001) and ADFI (P < 0.001), but similar (P > 0.05) gain:feed. Pens of pigs with a 50% removal rate and reduced floor space (Trt. 4) had higher (P < 0.01) ADG than Control, but similar (P > 0.05) ADG compared to the pens of pigs with a 50% removal rate (Trt. 3). No differences (P > 0.05) were observed among treatments for either morbidity or mortality. In summary, these results suggest that removing 25 or 50% of the heaviest pigs from within finishing pens increased the growth rate of remaining pigs and that the improvement in performance may only partly be due to increased floor space.

Treatment	1	2	3	4	SEM
ADG, g	668^c	836^a	813^{ab}	762^b	22.7
ADFI, g	2826^b	3145^a	3054^a	2891^b	44.5
G:F	0.22	0.27	0.24	0.26	0.013

^{a,b,c} Means with different superscripts differ P < 0.05

Key Words: Pigs, Pig removal, Floor space

Dairy Foods Chemistry

1134 Changes in fatty acid composition during yogurt processing and their effects on yogurt and probiotic bacteria in milk procured from cows fed with different diets. R. I. Dave*, N. Ramaswamy, and R. J. Baer, *Dairy Science College, South Dakota State University.*

Milk was collected from cow#s fed with four diets consisting control (C), C with 2% fish oil (FO), C with 1% each of fish oil and extruded soybeans (FOES), and C with 2% extruded soybeans (ES). Milks were processed and fermented with starter culture comprised of yogurt (*S. thermophilus* and *L. delbrueckii* ssp. *bulgaricus*) and probiotic (*L. acidophilus* and bifidobacteria) bacteria. Changes in fatty acid composition of yogurt mix and yogurt during manufacture and storage were monitored. Also, changes in viable numbers of starter bacteria were monitored in fresh yogurt and after 30 d storage. Milk fat of cows fed with C, FO, FOES, and ES diets was 3.31, 2.58, 2.94, and 3.47%, respectively. Milk, yogurt mix and yogurt from cows fed with FO or FOES diets showed 4-fold increase (P < 0.05) in the concentration of conjugated linoleic acid (CLA) and an increase (P < 0.05) in omega-3 fatty acids. Also, the same diet group products had increased concentration of transvaccenic acid (TVA). Unsaturated fatty acids were higher in the milk from cows fed with FO, FOES and ES diets compared to the C diet. The processing of milk (incorporation of milk powder and heat treatment at 85C for 30 min) did not have any effect (P > 0.05) on fatty acids composition, especially CLA, TVA or omega-3 fatty acids. Further, changes in fatty acids composition (as a result of change in diet) did not show any significant effects on the viable numbers of starter bacteria. Also, yogurt bacteria were > 10^7/ g and probiotic bacteria were > 10^5/ g at the end of 30 d storage periods. Fermentation with yogurt and probiotic bacteria and storage did not alter (P > 0.05) the CLA, TVA or omega-3 fatty acids. Thus, probiotic yogurt made from milk with increased CLA and TVA be produced by changing the diets of cows, and it could offer health benefits to consumers.

Key Words: probiotics, CLA, yogurt