

of treatment on pH, and although the effect of time was significant ($P < 0.05$) there was no discernable pattern over time. There was a positive correlation between DS and weeks in use ($P < 0.001$; $r = 0.764$) and a negative correlation between DS and DM ($P < 0.001$; $r = -0.633$). There was no difference between treatment samples in either presence or load of *Staphylococci* sp or in the number of samples per treatment that contained *Streptococci* spp, but SF had more samples with a high load ($P < 0.01$). More samples from SF contained Coliform spp ($P < 0.05$), due to a higher number of samples with a low and medium bacterial load. It is likely that the higher bacterial presence in SF is due to lack of manure removal at the feedface.

Key Words: Dairy, Housing, Hygiene

M193 Effect of metabolizable protein and energy intake on amino acid metabolism in growing dairy calves. A. G. Rius^{*1}, J. Cyriac¹, B. J. Bequette², and M. D. Hanigan¹, ¹*Virginia Polytechnic Institute and State University, Blacksburg*, ²*University of Maryland, College Park*.

The objective of this study was to examine the relationship between dietary energy and protein on free amino acids (AA) metabolism. Twenty-four newborn Holstein heifer calves were assigned to each of four treatments: 24/17 (24% CP, 17% fat fed at 350 g/d); 32/17 (32% CP, 17% fat fed at 764 g/d); 31/24 (31% CP, 24% fat fed at 782 g/d);

and 31/24+ (fed at 1177 g/d) in a complete randomized block design. Diets were fed for 63 d. Blood samples were collected at wks 1, 5, and 9. Heifers were sacrificed at the end of the study and analyzed for body composition. Within 5 min of slaughter liver and muscle samples were collected. Plasma, liver and muscle AA concentrations were determined by gas chromatography-mass spectrometry. Data were analyzed using the GLM procedure of SAS. Calves fed 32/17 had the greatest lean gain as compared to the 24/17 and 31/24 diets and also had a higher N as a percent of EBW (reported elsewhere). There were no significant effects of treatment on total essential amino acid concentrations in muscle ($P = 0.342$) or liver ($P = 0.721$). In muscle, there was a tendency for a significant treatment effect for aspartate ($P = 0.103$) 128.3, 79.9, 99.1, 122.1 $\mu\text{mol/L}$ (SEM = 20.1), leucine ($P = 0.127$) 107.8, 131.6, 98.7, 97.6 $\mu\text{mol/L}$ (SEM = 14.7), serine ($P = 0.106$) 369.6, 241.2, 269.1, 290.1 $\mu\text{mol/L}$ (SEM = 51.9), and methionine ($P = 0.066$) 16.8, 35.0, 28.6, 31.5 (SEM = 6.7) $\mu\text{mol/L}$ for the 24/17, 32/17, 31/24 and 31/24+ treatments, respectively. There was a significant treatment effect for liver alanine ($P = 0.021$) 3330.1, 2463.8, 1848.4, 1901.4 $\mu\text{mol/L}$ (SEM = 485.2) and serine ($P = 0.003$) 1915.7, 1517.6, 1124.2, 1184.2 $\mu\text{mol/L}$ (SEM = 205.2), and a trend for glutamate ($P = 0.061$) 5735.2, 4851.6, 4240.6, 3860.3 $\mu\text{mol/L}$ (SEM = 678.8) and histidine ($P = 0.082$) 436.2, 508.8, 344.3, 388.8 (SEM = 58.8) for the 24/17, 32/17, 31/24 and 31/24+ treatments, respectively. Overall, the 32/17 treatment supported the greatest methionine concentration in muscle whereas treatment 24/17 supported the greatest concentrations of alanine and serine in liver.

Key Words: Calf, Amino Acid, Energy

Nonruminant Nutrition: General Nonruminant Nutrition

M194 Evaluation of antimicrobial effects on monogastric gut microflora by plant waste products. S. Stella, D. Tedesco^{*}, C. Barbieri, L. Garavaglia, and D. Cattaneo, *University of Milan, Italy*.

EU is focusing on effective alternatives to antibiotics in order to reduce the incidence of potential pathogenic bacteria in the gastrointestinal tract of monogastrics. The aim of the present study was to evaluate the effects of plants and their post-processing derivative waste products, recognized as safe for human or animal health (SAFEWASTES, EU project n. 513949), on growth and viability of gut intestinal microbiota in weaning piglets. A total of 28 plant by-products have been tested. Five strains of *Escherichia coli*, *Clostridia* and *Lactobacilli* were isolated from faecal samples of healthy piglets (60–70 days of age), by inoculation of specific culture media. Aliquots of 0.1 mL of bacterial suspension of each selected strain (10^8 CFU/mL) were inoculated onto the surface of agar plates containing the specific culture media. The effects of plant extracts on gut bacteria have been studied using the paper disc agar diffusion (Kirby-Bauer) method. Samples were solubilized into deionized water or ethanol (10 mg/mL) and sterilized by filtration. Sterile paper discs were moistened with extract solution and dried before use. A test paper disc moistened with the extract, a positive control (a disc with Ampicillin or Apramycin) and a negative control (a disc moistened with sterile deionized water or ethanol) were placed under aseptic conditions onto the surface of inoculated culture medium. After incubation, plates were observed in order to find the presence of growth inhibition areas. Four of the 28 tested substances showed an inhibitory effect on *E. coli* strains, without influence on *Clostridia* growth. It was not observed any negative effect on commensal microbiota beneficial to the host. None of tested substances showed an inhibitory effect on *Lactobacilli* growth. On the basis of

this preliminary screening, further investigations will be performed in order to confirm the antimicrobial activity of these potential feed additives also in in vivo trials with target species.

Key Words: Plant Waste Products, Gut Microflora, Antimicrobial Effects

M195 Microlocalization of digestion-resistant aromatic lignin and cellulosic compounds in feeds at cellular and subcellular levels with the synchrotron: A novel approach. P. Yu^{*}, *University of Saskatchewan, Saskatoon, SK, Canada*.

The objective of this study was to micro-localize the distribution of digestion-resistant aromatic lignin and cellulosic compounds in feeds at cellular and subcellular levels using advanced synchrotron-powered FTIR microspectroscopy (SFTIRM) as a novel approach. The SFTIRM is a newly emerging and non-destructive analytical technique and can reveal molecular chemistry (structural-chemical make-up) of biological samples at highly spatial resolutions (3–10 μm) without destruction of the feed internal structures. The experiment was performed at the National Synchrotron Light Source in Brookhaven National Laboratory (NSLS-BNL, US Department of Energy, New York). The exemplified feeds used for this pilot study were corn (cv. Pioneer) and barley (cv. Harrington). The results show that with SFTIRM, the images of the aromatic lignin and cellulosic compounds could be generated to be able to show the distribution and intensity across the feeds tissues. The digestion-resistant aromatic lignin compound only presented in the pericarp region and no lignin has been found in seed coat, aleurone layer and endosperm. The cellulosic compounds presented most in the

pericarp region, less in the seed coat, aleurone layer, and endosperm. The agglomerative hierarchical cluster analysis (CLA) and principal component analysis (PCA) showed the distinct differences of the chemical make-up between the two feeds (corn vs. barley) and between the different structures (pericarp vs. aleurone) within a feed. Even in the same structural regions (such as aleurone layer, and endosperm), the structural make-up were different between the corn and barley. This may explain why digestive behaviors are different between the barley and corn. The implication of this study is that with extremely bright synchrotron light, we can localize and characterize internal feed digestion-resistant compounds in a chemical sense with cellular dimensions.

Key Words: Digestion-Resistant Compounds, Structural Chemistry, Synchrotron

M196 Effects of feeding lactic acid bacteria-based direct-fed microbial complex on growth performance, diarrhea appearance and blood characteristics in pigs. J. S. Yoo^{*1}, Y. J. Chen¹, J. H. Cho¹, B. C. Park², and I. H. Kim¹, ¹Dankook University, Cheonan, Choongnam, Korea, ²CJ Feed Inc, Incheon, Gyeonggi, Korea.

This study was conducted to investigate the effects of direct-fed microbial (DFM: *Lactobacillus casei*, *L. plantarum casei*, *L. salivarius casei*, *Saccharomyces cerevisiae*) complex on the growth performance and fecal score in nursery pigs and growing pig. In exp.1, a total of 96 nursery pigs with an average initial BW of 15.00±1.67 kg were used in five weeks experiment trial. There were six pens per treatment with four pigs per pen. Dietary treatments included 1) NC(basal diet; antibiotics free diet), 2) PC(NC diet with 0.1% antibiotics; chlortetracycline 0.05% +neomycin 0.05%), 3) NDFM0.1(NC diet with 0.1% DFM) and 4) NDFM0.2 (NC diet with 0.2% DFM). During the entire experimental period, ADG was increased in PC, NDFM0.1 and NDFM0.2 treatments compared with NC treatment($P<0.05$). ADFI was also increased in PC treatment compared with NC treatment($P<0.05$). Gain/feed was increased in NDFM0.1 and NDFM0.2 treatments compared with NC treatment($P<0.05$). Diarrhea appearance was decreased in PC and NDFM0.2 treatments compared with NC treatment at 5 weeks. In exp. 2, total of 72 growing pigs with an average initial BW of 24.64±2.46 kg were used in 28 days experiment trial. There were six pens per treatment with three pigs per pen. Dietary treatments included 1) NC(basal diet; antibiotics free diet), 2) PC(NC diet with 0.1% antibiotics; chlortetracycline 0.05% +neomycin 0.05%), 3) DFM0.1 (NC diet + 0.1% DFM) and 4) DFM0.3 (NC diet + 0.3% DFM). During the entire experimental period, ADG was increased in NC treatment compared with NDFM0.1 and NDFM0.3 treatments. However, there was no significant treatment effects ($P>0.05$). Also, there was no significant difference in ADFI among the treatments. Blood characteristics(RBC, WBC and IgG) tended to be improved, however, no significant differences were observed($P>0.05$). In conclusion, feeding DFM affected growth performance, diarrhea appearance and blood characteristics in nursery and growing pig.

Key Words: Direct-Fed Microbial(DFM), Growth Performance, Pig

M197 Cupric methionate affect nutrients digestibility and fecal pH and Cu concentration. Y. Huang^{*1}, Q. Wang¹, Y. Wang¹, J. H. Cho¹, Y. J. Chen¹, J. S. Yoo¹, Y. K. Han², and I. H. Kim¹,

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This study was conducted to investigate the effects of organic and inorganic copper on performance in growing pigs. A total of 100 pigs with an average initial weight of 21.46±1.13kg were assigned to five treatments. Dietary treatments include 1) CON (basal diet, 0 ppm Cu), 2) T1 (basal diet with 67 ppm Cu as cupric sulfate, CuSO₄), 3) T2 (basal diet with 134 ppm Cu as cupric sulfate, CuSO₄), 4) T3 (basal diet with 67 ppm Cu as cupric methionate, CuMet), 5) T4 (basal diet with 134 ppm Cu as cupric methionate, CuMet). During the entire experimental period, ADG, ADFI and GF ratio had no significant differences. Dry matter digestibility of T1, T2, T3 and T4 treatments was improved ($P<0.05$) compared with the CON. Nitrogen digestibility was improved in T3 treatment compared with control treatment ($P<0.05$). Compared with T1 treatment, fecal pH value was increased in CON, T3 and T4 treatments ($P<0.05$). Fecal Cu concentration was significantly lower in CON, T3 and T4 treatments than this of T1 and T2 treatments ($P<0.05$). Diarrhea appearance was decreased when pigs fed T2, T3 and T4 diets compared with CON. In conclusion, diets supplemented with 67 or 134 ppm Cu as CuMet may be effective for improving nutrient digestibility and fecal pH value in grower pigs and fecal Cu concentration may be decreased by CuMet supplement.

Key Words: Cupric Methionate, Nutrients Digestibility, Growing Pigs

M198 Gain of weight in rabbits of initiation using two commercial diets. M. C. Rubio Robles*, J. M. Beltrán, M. Millán, B. E. Romero, and J. A. Saucedo, *Universidad Autonoma de Sinaloa, Culiacan, Sinaloa, Mexico.*

With the objective to determine the gain of weight in rabbits of initiation using Purina commercial food and the district; 12 domestic rabbits were used, of 21 days of age, with a weight average of 276.66±1.3 g.; Two treatments, identified were used like: treatment "A" commercial food the district (Protein 18 %, Fat 2 %, Crude Fiber 14 %, Ash 10 %, And L. N. 44 %, Humidity 12 %) and treatment "B" Purina commercial food (Protein 14,50 %, Fat 2 %, Crude Fiber 18 %, Ashes 10 %, Calcium 1 %, Phosphorus 0,55, And L. N. 43.50 %, Humidity 12 %). Each treatment consist of two repetitions with three rabbits each one; for each repetition; were provided to them food of their respective treatments during 15 d that were the period of the study, it was collected and it weighed the food leftover to know the daily consumption by treatment, also provided new food to them; the weight of the animals was made at the beginning and aim of the study, having itself for the treatment A a weight average of 273.33±2.16 g. and for treatment B 280±1.26 g. Being a final weight for the treatment A from 398.33±1.63g. and 395±2.09 g. for treatment B. In all the period, the gain of weight average by animal, went for the treatment A of 125 g. whereas Treatment B gain in average 115 g. with which it is appraised that the treatment A had in average by animal 10 g. (8%) but gain of weight that the B. with respect to the food consumption the treatment A was of 730 g. and 760g for treatment B, being a nutritional conversion from 5,84 for the treatment A and 6,61 for treatment B. concluding that the animals that fed with the treatment A: commercial food the district had one better answer with a 8% but gain of weight, a food consumption 3,95% less and 11,65 % better nutritional conversion with respect to the Purina commercial food.

Key Words: Rabbit, Weight, Commercial Food

M199 Effects of Bio-Mos[®] on growth and survival of channel catfish challenged with *Edwardsiella ictaluri*. B. C. Peterson^{*1}, S. Quiniou¹, B. B. Manning², and T. C. Bramble³, ¹USDA/ARS, Stoneville, MS, ²MSU, Stoneville, MS, ³Alltech Biotechnology, Nicholasville, KY.

A major problem in the catfish farming industry has been high disease loss to enteric septicemia of catfish (ESC), caused by the bacterium *Edwardsiella ictaluri* (*E. ictaluri*). Methods to control this disease include antibiotic therapy, vaccinations, and management strategies such as taking the fish off feed. Alternative methods such as feeding yeast-derived mannans in the form of Bio-Mos[®] may prove beneficial in improving growth performance and immune function. Research was conducted to examine the effects of Bio-Mos[®] on growth and immune function in channel catfish. One hundred fish (45.8 ± 1.2 g) were randomly assigned to two treatments with five replicates each: 1.) Control (36% CP catfish diet) and 2.) Bio-Mos[®] (36% CP catfish diet with Bio-Mos[®] supplemented at 2 g/kg). The fish were fed for 6 wks and then challenged with *E. ictaluri*. Mortality was recorded daily for 3 wks. Levels of lysozyme activity were determined pre- and post-challenge. At the end of the 6 wk growth study, weight gain and FE was similar between treatments. Survival was higher ($P < 0.05$) in fish fed Bio-Mos[®] compared to Controls (90 ± 7.3% vs 55 ± 6.4%). Plasma levels of lysozyme activity were similar ($P > 0.10$) between treatments. The results of this study suggest that Bio-Mos[®] can be supplemented into catfish diets without negatively affecting growth or FE. The results also show that Bio-Mos[®] improves resistance to *E. ictaluri* without significantly altering lysozyme activity. Supplementing Bio-Mos[®] into diets may provide another strategy to control ESC in channel catfish.

Key Words: Bio-Mos[®], Disease, Catfish

M200 The effect of plant tannins and yucca extracts on in vitro ruminal fermentation and methane gas production. B. R. Min^{*1}, W. E. Pinchak¹, R. C. Anderson², and R. Puchala³, ¹Texas Agricultural Research Center, Vernon, TX, ²USDA/ARS, College Station, TX, ³E (Kida) dela garza American Institute for Goat Research, Langston, OK.

The overall objective was to quantify in vitro, the effect sources of tannin and yucca extract at 2 dose levels on rate of gas production, ruminal fermentation and protease enzyme activity. Pine bark was used as a non-extracted plant tannin source for negative control. In vitro gas and methane production were measured from 0 to 6 h rumen incubation periods. In vitro rate of gas and potential gas production were linearly decreased ($P < 0.01$) in a dose dependent manner for quebracho (QT), mimosa (MT), chestnut tannins (CTT), and pine bark (PB) addition. In the presence of QT ($P < 0.03$), MT ($P < 0.02$), CTT ($P < 0.02$), yucca ($P = 0.06$), and PB ($P = 0.11$), methane production was linearly decreased. Cumulative hourly total in vitro ruminal gas production was similar between control, yucca and PB after 6 h rumen fermentation at 5 mg extracts/ml, but cumulative ruminal

gas production was lower for QT ($P < 0.01$), MT ($P < 0.001$), and CCT ($P < 0.001$) after 3 - h fermentation from control treatment. Total average VFA concentration was not affected by CCT and yucca extracts treatments, but total VFA was linearly decreased for QT ($P < 0.04$), MT ($P < 0.01$) and PB ($P < 0.01$) tannins treatments. Acetate and propionate (A/P ratio) molar ratios for QT ($P < 0.01$), MT ($P < 0.01$), yucca ($P = 0.11$), and PB ($P = 0.001$) decreased linearly in a dose dependent manner. Hydrolysis of azocasein, used to estimate ruminal protease enzyme activity, was decreased linearly for all tannins and yucca extracts. It is concluded that addition of commercial tannins and yucca extracts changed in vitro rumen fermentations and VFA profiles. Addition of tannins and yucca extracts, except chestnut tannins, decreased A/P ratios, indicated that plant tannins and yucca extracts may be nutritionally benefit in terms of increased VFA efficiency with either dose level of those plant extracts.

Key Words: Methane Gas, Rumen Fermentation, Tannins

M201 Evaluation of the efficacy of a commercial purified phyllosilicate to reduce the estrogenic effects of zearalenone in gilts. B. Malone¹, C. Bond¹, C. Maue¹, Z. Scheitegger¹, and D. Zaviezo^{*2}, ¹Trilogy Analytical Laboratory, Washington, MO, ²Special Nutrients, Miami, FL.

An experiment was conducted to study the efficacy of a very low inclusion of commercial purified phyllosilicate (Myco-Ad A-Z) in preventing the deleterious estrogenic effects of zearalenone (ZEA) in prepubertal gilts. Eighteen 20-d old recently weaned Yorkshire Cross gilts individually housed were randomly distributed into 3 dietary treatments with 6 replications each. After a 4-d pretrial adaptation period, pigs were fed a commercial basal diet containing or exceeding NRC recommended nutrients levels for 30 d. The feed was experimentally contaminated with crystalline ZEA, determined to be over 99% pure. Treatments were: (1) control basal diet; (2) control + 750 ppb ZEA; and (3) control + 750 ppb ZEA + 1 kg/mt Myco-Ad A-Z. At the end of the experiment all pigs were sacrificed and the internal reproductive organs weighed. Results indicated no significant differences in body weight (wt) gain, feed intake and feed conversion ratio among treatments. Gilts fed 750 ppb ZEA contaminated diet showed significant heavier ovary + bursa wt (40%), uterus wt (93%), cervix wt (260%) and total reproductive organs wt (98%) than gilts fed the control diet. The addition of Myco-Ad A-Z to the contaminated diet resulted in gilts with a statistically significant reduction in ovary + bursa wt (12%), uterus wt (25%), cervix wt (32%) and total reproductive organs wt (24%) than those fed 750 ppb ZEA. Even though the addition of 1 kg/mt of Myco-Ad A-Z to a gilt diet contaminated with 2 to 3 times the ZEA level producing problems in the field did reduce the abnormal growth of the reproductive organs; they were still heavier than those from gilts fed the control diet. These results indicate that Myco-Ad A-Z at 1 kg/mt was effective in reducing the estrogenic effects of ZEA in prepubertal gilts.

Key Words: Myco-Ad A-Z, Zearalenone, Gilts