W19 Impaired vitamin E status in post-partum dairy cows as a complication of left displaced abomasum. G. Bobe,* K. Lytle, and M. Traber, *Oregon State University, Corvallis.*

Left displaced abomasum (LDA), a costly disease in early lactation dairy cows, is associated with hepatic lipidosis, inflammation, and increased hepatic lipid peroxidation. Alpha tocopherol (ATOC) is an antioxidant that can limit lipid peroxidation and potentially inflammation. The objective of this study was to evaluate the serum ATOC status in multiparous dairy cows with and without LDA. We hypothesized that the oxidative damage postulated to be associated with LDA depletes Vitamin E reserves and results in serum ATOC concentrations that are indicative of deficiency (<7.4 μM). Blood samples were taken at approximate prepartum d −28 (−34 to −27), −21 (−26 to −18), −14 (−17 to −11), −7 (−10 to −5), −3 (−4 or −3), −1 (−2 or −1); and d 0, 1, 3, 7, 14, 21, 28, 35, 42, and 49 postpartum. Serum concentrations of ATOC, cholesterol, haptoglobin, nonesterified fatty acids, and β hydroxybutyrate were determined in samples from cows that were visually healthy (n = 9) and those that developed LDA (n = 7). Serum ATOC concentrations decreased in healthy cows during the first wk postpartum to a nadir of 7.7 ± 0.9 μM and increased back to prepartal concentrations (~13 μM) by 28 d postpartum. By contrast, LDA cows′ serum ATOC concentrations between d 14 and 49 postpartum remained depressed compared with those in healthy cows (all $P < 0.01$). On average, LDA cows had serum ATOC concentrations <7.4 μM between d 3 and 21 postpartum. At d 14 postpartum, all LDA cows had ATOC concentrations <7.4 μM, which remained <10 μM until d 49 postpartum. Concentrations of ATOC concentrations were inversely associated with serum concentrations of haptoglobin (r = −0.35), nonesterified fatty acids (r = −0.54), and β hydroxybutyrate (r = −0.50) and positively associated with cholesterol concentrations (r = 0.54; all $P < 0.001$). These results demonstrate that LDA cows have an inadequate serum ATOC status, which may be caused by increased oxidative stress, or a result of liver damage and impaired lipoprotein secretion, a complication of hepatic lipidosis. Pre- or postoperative vitamin E alimentation may improve the recovery of cows with LDA.

Key Words: dairy cows, left displaced abomasum, serum alpha tocopherol

W20 Validation of three sampling strategies for estimating lameness prevalence in dairy herds. A. Hoffman[1], D. A. Moore*[1], J. R. Wenz[1], and J. Vanegas[2], *[1]Washington State University, [2]Oregon State University.*

Lameness is an important problem in dairy herds because it decreases production and reproductive performance, increases culling, and has a negative impact on animal welfare and longevity. Monitoring farm lameness prevalence has utility for dairy producers and veterinarians in their efforts to reduce lameness, animal welfare assessment programs, and researchers. Locomotion scoring is a method used to quantify lameness and calculate prevalence. Due to the time necessary to locomotion score each cow, a herd sampling strategy that allows one to score less cows would be useful. Such a sampling strategy must be validated for accuracy in comparison to true lameness prevalence. The purpose of this study was to assess the accuracy of 3 previously suggested methods of estimating lameness by strategic sampling of a dairy herd. Sampling strategies tested include: (1) sampling a calculated number of cows in the middle third of the milking parlor exit order, (2) sampling a calculated number of cows weighted across pens and distributed evenly within each pen, and (3) sampling all cows in a high production pen, a low production pen, and the hospital pen. All cows on 5 dairy farms in Washington and Oregon (n = 4,550) were locomotion scored to determine true herd level lameness prevalence. Additionally, milking order and order observed in pen was recorded for each cow. Individual cow data on days in milk and parity was collected from farm computer records. Information on pen grouping strategy was collected by interview with farm management. Sampling strategies were then tested using the locomotion score data set. Estimated prevalence using sampling strategy 1 and 2 were not statistically different than true herd level prevalence ($P < 0.05$), as true lameness prevalence fell within the 95% confidence interval of the sample proportions. Strategy 3 accurately estimated the lameness prevalence on one farm, but overestimated prevalence on 3 others. These data show that the sampling strategies using the middle of milking parlor exit order and a calculated sample distributed across the herd may be used to accurately estimate herd lameness prevalence.

Key Words: dairy, lameness, prevalence

W21 Effects of feeding endophyte-infected fescue seed to Holstein cows during the dry period on plasma nitric oxide (NO), xanthine oxidase (XO), and haptoglobin (Hp) status in newborn calves. S. Kahl*[1], T. H. Elsasser[1], R. L. Baldwin VI[1], A. V. Capuco[1], P. Grossi[2], and K. R. McLoad[3], *[1]USDA, Agricultural Research Service, Beltsville, MD, [2]Istituto di Zootecnica, Università Cattolica, Piacenza, Italy, [3]University of Kentucky, Lexington.*

Fescue toxicosis in cattle, caused by ingestion of endophyte-infected fescue (EIF), is associated with decreased feed intake, growth, milk production and reproductive efficiency as well as decreased resistance to heat, transportation and immune stress. Increased inflammatory response to immune challenge was also reported in steers grazing EIF. The purpose of this study was to evaluate whether in utero exposure to ergot alkaloids from EIF seed fed to cows during the dry period would affect the developmental pattern of plasma indicators of birth stress in newborn calves. Starting at 90-d prepartum, multiparous Holstein cows were fed endophyte-free fescue seed (CON; n = 9) or EIF seed as 10% of the as-fed diet (INF; n = 8). Newborn calves were separated from their dams after birth. Blood samples were collected from calves within 12 h of birth (d 0) and then at d 4, 7, 14, 21, 28, 35, and 42. No differences ($P > 0.05$) were found between CON and INF calves on d 0 in BW (41 ± 1 kg) and in plasma concentrations of urea nitrogen (PUN; 7.1 ± 0.4 mg/dL) and the acute phase protein, Hp (0.20 ± 0.04 mg/mL). However, on d 0, plasma concentrations of nitrate+nitrite (NO_x; an estimate of NO production and neonatal vascular adaptation) were lower (155 vs. 223 μmol/L; $P < 0.01$), whereas XO activities (generation of oxygen-derived free radicals) were greater (9.07 vs. 3.27 mU/mL; $P < 0.01$) in INF than in CON calves. Plasma Hp concentrations were greater ($P < 0.05$) at d 4 (0.44 vs. 0.29 mg/mL) and 7 (0.55 vs. 0.38 mg/mL) in INF than in CON calves although no differences were found thereafter. Between d 4 and 42, time related developmental changes in calf plasma PUN, NO_x and XO levels were observed ($P < 0.01$) but they were not affected by the dam's dietary treatment. These results indicate that feeding toxin-associated components of EIF seed to dairy cows altered selected plasma indicators of birth stress in newborn calves during the first week of life but had no long-term effect on the developmental pattern of these mediators.

Key Words: fescue, Holstein calves, neonatal stress

W22 Leukocyte profiles of cows with claw horn disorders. K. K. M. O'Driscoll* and B. Earley, *Teagasc, Animal & Grassland Research and Innovation Centre, Grange, Dunsany, Co. Meath, Ireland.*

Claw horn disruption (CHD) in dairy cows weakens the integrity of the hoof, results in lesions ranging in severity from mild hemorrhages to ulcers, and can cause lameness and pain. These 2 studies examined the hematology profiles of cows with sole ulcers (the most severe pathology associated with CHD), and of cows with moderate and severe hemorrhaging, with sound cows. Study 1: 12 cows clinically lame due to solar ulceration were identified using locomotion and hoof scoring. These were paired with cows (sound) of similar lactation number, DIM, BCS and liveweight, that had healthy feet. Study 2: Cows (n = 41) were locomotion and hoof scored at 111 ± 23 DIM, then assigned to 3 categories on the basis of hemorrhage score; 1 = no/minimal hemorrhage, 2 = moderate hemorrhage; 3 = severe hemorrhage. Blood samples for both studies were taken via jugular venipuncture on the morning of hoof scoring. Total leukocyte, neutrophil (N), lymphocyte (L), monocyte, eosinophil and basophil counts were determined within 3 h of blood collection from K3EDTA anti-coagulated blood (6 mL) using an automated hematology analyzer (ADVIA 2120, Bayer Healthcare, Siemens, UK). All data were analyzed using PROC MIXED in SAS v9.1. Study 1: Cows with ulcers had higher locomotion scores than sound cows (13.5 ± 0.54 vs. 6.7 ± 0.54; $P < 0.001$). There was no difference in total leukocyte counts, neutrophil, lymphocyte, or monocyte count, or of eosinophil or basophil count and percentage. However cows with ulcers had higher neutrophil % ($P < 0.05$) and tended to have a lower lymphocyte % ($P = 0.1$) than sound cows. Ulcer cows had a higher N:L ratio (1.04 ± 0.1) than sound cows (0.76 ± 0.1; $P = 0.05$). Study 2: There was no effect of hemorrhage category on locomotion score or on any hematology variable. Cows that were clinically lame with sole ulcers had a leukocyte profile indicative of systemic inflammation and stress. A similar pattern was not evident in study 2. It is possible that only CHD severe enough to cause clinical lameness, and thus a sickness response, affects leukocyte profiles.

Key Words: dairy cow, lameness, leukocyte

W23 Investigation on a bio-hygienizing additive for oral use in dairy cows: Effect on milk somatic cell count. P. Luparia*[1], M. Poggianella[1], and V. Bronzo[2], *[1]SOP srl, Busto Arsizio, VA, Italy, [2]Universita di Milano, Milan, Italy.*

The aim of the present study was to assess the efficacy of a technological feeding additive, put into the mixing wagon, on the somatic cell count in milk from a commercial farm situated in Northern Italy, housing 140 lactating cows on straw which were bedding packs renewed every 60–90 d. The commercial bio-hygienizing product (SOP GOLD COW), based on an inert material (verxite) treated with the frequential blend SQC 233, was monitored from April 2011 until September 2011, a period chosen for its critical somatic cell levels due to the seasonal increase in temperature. The most striking characteristic of this product is that it can be mixed directly with the feed in the mixer wagon, at a dosage of 2g /head (0.07 oz), once a day. The data gathered, resulted from official DHI controls (Dairy Herd Improvement test date) carried out, cow by cow, on a monthly basis and regarded the SCC level, fat %, protein % and average daily milk production. The data was elaborated using the statistical software SPSS 19.0 (IBM, SPSS, New York, U.S.A.) and compared the average SCC values with the linear score (LS) via analyses of the variance in the generalized linear model. The decrease in the SCC levels in the treated animals' milk was significant at 99% ($P < 0.01$). On monitoring the data regarding the qualitative component of the milk, the index used to evaluate the correct functioning of the rumen during this study did not show any statistically significant difference, as neither the data regarding milk production. Further investigations are planned to explore any beneficial influence of the product on the cellulosolytic ruminal bacteria populations.

Key Words: SCC, hygiene, cow

W24 Oral administration of lipopolysaccharide and lipoteichoic acid modulated innate and humoral immunity in periparturient dairy cows. S. Iqbal,* Q. Zebeli, D. A. Mansmann, S. M. Dunn, and B. N. Ametaj, *University of Alberta, Edmonton, Alberta, Canada.*

Various investigators have indicated that cell-mediated and humoral immune functions are suppressed in dairy cows around parturition. As a result, dairy cows are affected by different infectious diseases immediately after calving including infection of the mammary gland (mastitis), and uterus (metritis). The cause of infectious diseases are the presence of pathogenic gram-negative and gram-positive bacteria in the infected tissues. The objective of this study was to investigate immune responses of periparturient dairy cows repeatedly administered orally with lipopolysaccharide (LPS) and lipoteichoic acid (LTA). Thirty pregnant Holstein dairy cows were randomly assigned to one of the 2 treatment groups starting at 28 d before the expected day of parturition. Cows received orally either 2 mL of 0.85% saline solution (CTR), or 2 mL of saline solution containing 3 increasing doses of LPS from *Escherichia coli* 0111:B4 as follows: 1) 0.01 μg/kg BW on d −28 and −24, 2) 0.05 μg/kg BW on d −21 and −18, and 0.1 μg/kg BW on d −14 along with a flat dose of LTA from *Bacillus subtilis* (i.e., 120 μg/animal). Blood samples were collected on wk −4, −1, +1, and +4 around parturition and analyzed for plasma anti-LPS immunoglobulin-(Ig)A, IgG, and IgM, serum amyloid A (SAA), lipopolysaccharide binding protein (LBP), tumor necrosis factor-α (TNF-α), and Interleukin-1 (IL-1). Results indicated that cows treated with oral LPS-LTA had lower concentrations of plasma anti-LPS IgA, IgG, and IgM antibodies compared with the control group ($P < 0.01$). Furthermore, results showed a tendency for the concentration of plasma LBP to be lower in the treatment group ($P < 0.10$). Additionally, no differences were found in the concentration of plasma SAA between the control and the treated cows ($P > 0.05$). Also, cows treated with oral LPS and LTA had lower concentrations of TNF-α in the plasma ($P = 0.02$); whereas IL-1 was numerically lower, particularly during the week following parturition, although the value did not reach significance ($P = 0.60$). Altogether, results of this study indicated that repeated oral administration of LPS from *E. coli* 0111:B4 and LTA from *Bacillus subtilis* modulated systemic innate and humoral immune responses in periparturient dairy cows around parturition.

Key Words: lipopolysaccharide, lipoteichoic, innate and humoral immunity

W25 Repeated oronasal administration of lipopolysaccharide modulated selected markers of innate and humoral immune responses in periparturient dairy cows. S. Iqbal,* Q. Zebeli, D. A. Mansmann, S. M. Dunn, and B. N. Ametaj, *University of Alberta, Edmonton, Alberta, Canada.*

Dairy cows go through a decrease in their immune response around calving. This is associated with increased incidence of infectious diseases. There is a scarcity of research regarding strengthening of immune responses against common bacterial agents. In this study, we investigated the innate and humoral immune responses to repeated oronasal application of lipopolysaccharide (LPS) during the transition period in periparturient dairy cows. One hundred primiparous (P) and multiparous (M) Holstein dairy cows

with average BW of 620 and 720 kg, respectively, were randomly assigned into control (CTR; $P = 18$; M = 32) and treatment (TRT; $P = 19$; M = 31) groups. Treatment cows were administered increasing doses (0.01, 0.05, and 0.1 μg/kg BW) of LPS from *Escherichia coli* 0111:B4 oronasally (1 mL nasally and 2 mL orally) or carrier alone (3 mL of 0.85% saline) twice a week on wk −4, −3, and −2 before the expected day of parturition. Blood samples were collected from the tail vein on wk −4, −1, +1, and +4 around parturition and analyzed for plasma anti-LPS immunoglobulin-(Ig)A, IgG, and IgM antibodies, serum amyloid A (SAA), lipopolysaccharide binding protein (LBP), tumor necrosis factor-alfa (TNF-α), and interleukin-1 (IL-1). Overall, results indicated that the treatment cows had numerically greater concentrations of plasma anti-LPS IgM ($P = 0.32$) and IgG antibodies, particularly during the wk following parturition with a sharp increase in the plasma anti-LPS IgG antibodies, although the value did not reach significance ($P = 0.40$). Additionally, plasma anti-LPS IgA antibodies were slightly lowered in the treated cows compared with the control group ($P = 0.32$), and this effect was more pronounced on wk 4 following parturition ($P < 0.01$). Moreover, there was a treatment by time interaction for plasma SAA, which was lower in the treated cows ($P < 0.01$) after parturition. There was no effect of oronasal LPS on plasma TNF-α and IL-1 ($P > 0.05$). In conclusion, oronasal treatment of prepartum dairy cows with LPS modulated selected plasma markers of the innate and humoral immune responses suggesting that oronasal treatment of periparturient dairy cows with bacterial LPS might modulate their immune status.

Key Words: lipopolysaccharide, Innate immunity, humoral response

W26 Effect of polyunsaturated fatty acids (PUFA) on the infection of bovine epithelial cells with *Chlamydia psittaci*. A. Jaudszus[1], M. Grün[1], G. Jahreis[1], K. Sachse[2], and H. Sauerwein*[3], *[1]Institute of Nutrition, Department of Nutritional Physiology, Friedrich Schiller University Jena, Jena, Germany, [2]Institute of Molecular Pathogenesis, Friedrich-Loeffler-Institute (FLI), Federal Research Institute for Animal Health, Jena, Germany, [3]Institute of Animal Science, Physiology & Hygiene Unit, University of Bonn, Bonn, Germany.*

In cattle, several clinical syndromes but also subclinical infections compromising performance caused by *Chlamydia* (*C.*) infection are known around the world. The prevalence is high, the benefit of therapeutic antibiosis is limited, vaccines for cattle are not consistently available, and most efforts to control the infection thus focus on hygiene management. PUFA are known for their immune modulating effects; moreover, when considering the response of epithelial cells to infection with the obligate intracellular *C.* bacteria, PUFA are promising candidates to mitigate *C.* infection. We thus aimed to test various PUFA in a bovine epithelial cell line for their potential of reducing *C.* infection rates. Epithelial cells from embryonic bovine lung (EBL, DSMZ ACC192 provided by BgVV, Jena, Germany) were seeded at 1,5 x10^5 cells/mL and preincubated for 24 h in presence or absence of the individual PUFA (C18:3n-3, C18:3n-6, C18:2n-6, C18:1n-9, C20:4n-6, C20:5n-3, *cis*-9,*trans*-11-conjugated linoleic acid (*c*9,*t*11-CLA), and *t*10,*c*12-CLA) at 33 or 100 μM. Cells were then infected with *C. psittaci* DC15 at 4 cfu/cell in presence of PUFA. After 48 h incubation, cells immunofluorescence stained for *C.* were subjected to flow cytometric quantification (Grün et al. 2009. J Microbiol Methods 78:360–2). Prior to the experiments, culture and infection conditions were optimized; the uptake of PUFA into the cells as well as undisturbed viability of the cells in the presence of PUFA was confirmed. The portion of *C.* positive cells in the presence of PUFA was compared with the solvent (DMSO) control using 5 replicates per combination. From all PUFA tested, *c*9,*t*11-CLA and C20:4n-6 were able to reduce the infection rates. The effect of C20:4n-6 was dose-dependent and significant at 100 μM (by 42% reduced infection rate, $P < 0.01$, as determined by Student's *t*-test), whereas *c*9,*t*11-CLA caused a reduction by 29% already at 33 μM ($P < 0.05$,). At 100 μM, no further effect was observed for *c*9,*t*11-CLA. Based on our results, the spectrum of beneficial effects of C20:4n-6 and *c*9,*t*11-CLA might be extended to antichlamydial effects at least in vitro.

Key Words: chlamydia, polyunsaturated fatty acids, bovine cell line

W27 Immune status of dairy calves in the northern plains of Costa Rica: Year 1. J. A. Elizondo-Salazar*[1], J. Sánchez-Salas[1], G. Arroyo-Quesada[2], E. González-Arias[2], and A. J. Heinrichs[3], *[1]Estación Experimental Alfredo Volio Mata. Facultad de Ciencias Agroalimentarias, Universidad de Costa Rica, [2]Programa de Transferencia Tecnológica, Cooperativa de Productores de Leche R. L. Dos Pinos, [3]The Pennsylvania State University, University Park.*

The objective of this study was to characterize the immune status of dairy calves in the Northern Plains of Costa Rica. The data correspond to total serum protein (TSP) measurements obtained during the period of August and November 2010 on 57 dairy farms. Of 506 animals sampled, 267 suckled colostrum from their dams and 239 received colostrum by bottle. Dam breeds were classified into Holstein, Jersey, Holstein × Jersey crosses, and other. For the purpose of this study, failure of passive immunity was considered when TSP concentration was <5.5 g/dL. Concentration of TSP ranged from 2.8 to 11.0 with an overall mean of 6.2 g/dL. Failure of passive transfer was observed in 31.8% of calves. A higher proportion of male than female calves failed to obtain adequate immunity (35.3 vs. 31.4%, respectively), and male calves had on average lower ($P < 0.05$) TSP than females (5.9 vs. 6.2 g/dL). Calves born to Holstein x Jersey crosses had higher ($P < 0.05$) TSP concentrations than calves born to Holstein dams. Offspring born to first-calf heifers had TSP concentrations of 6.3 g/dL and, compared with other parity groups, fewer of these calves had inadequate transfer of immunity. Method of colostrum feeding did not affect TSP; however, a higher proportion of calves that suckled colostrum showed inadequate passive transfer when compared with calves that received colostrum by bottle (34.1 vs. 29.3%). The findings of this study suggest that colostrum management practices should be improved to minimize the risk of failure of passive transfer in dairy herds in the Northern Plains of Costa Rica.

Key Words: passive immunity, immunoglobulin, total serum protein

W28 Effects of Calibrin-Z on weanling pigs fed diets with naturally occurring deoxynivalenol. F. Chi[1], S. L. Johnston*[1], and D. C. Mahan[2], *[1]Amlan International Inc., Chicago, IL, [2]The Ohio State University, Columbus.*

One-hundred eighty weanling pigs were used to evaluate the effects of Calibrin-Z in diets containing naturally occurring deoxynivalenol (DON) and zearalenone in a 3 × 2 factorial arrangement of treatments (TRT). Pigs were fed a common diet from d 0 to 7. Treatment diets were fed from d 7 to 35 post-weaning (average wt d 7 = 6.76 kg). There were 6 TRT with 6 pens of 5 pigs each, pen was the experimental unit. Data was analyzed for main effects of anticipated mycotoxin effect (MXE) and Calibrin-Z concentration. Single degree of freedom contrasts were used to determine the effect of Calibrin-Z within each MXE. Defusion, (Akey, DEF) had previously been shown to decrease the effects of DON contaminated diets, so the 3 levels of MXE were: 1) low mycotoxins with DEF (LDEF); 2) high mycotoxins with DEF (HDEF); and 3) high mycotoxins without DEF (HIGH). These MXE levels were each fed with Calibrin-Z at 0 or 0.5%. Pigs were allowed to access feed and water ad libitum. The high DON TRT were manufactured with corn

and DDGS with 3.3 and 13 ppm, of DON respectively. Zearalenone was found at <1 ppm in the low DON corn and >50 ppm in the high DON corn source. There was no effect of TRT for feed intake or for gain. From d 7 to 35 gain: feed (G:F) showed no difference ($P = 0.14$) between the LDEF, HDEF, and HIGH TRT, with values of 721, 692, and 696 g /kg, respectively. Analyzing the main effect of Calibrin-Z inclusion showed that G:F was not significantly improved ($P = 0.10$) when Calibrin-Z was added at 0.5%, with values of 692 vs. 714 g/kg, without and with Calibrin-Z. There was a MXE x Calibrin-Z interaction as G:F improved most when Calibrin-Z was added to the LDEF diet. When diets within MXE with and without Calibrin-Z were compared the LDEF diet had significantly improved ($P < 0.05$) G:F from d 7–35 with Calibrin-Z addition, with values of 693 g/kg and 749 g/kg for 0 or 5% Calibrin-Z, respectively. These results show that Calibrin-Z can improve feed efficiency in pigs, even under low mycotoxin challenge.

Key Words: mycotoxin, feed efficiency, pigs

W29 Reproductive toxicity of liquid dishwashing detergent on male Swiss albino mice. A. Ata, M. S. Gulay,* S. Gungor, O. Yildiz Gulay, and A. Demirtas, *Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Burdur, Turkiye.*

The aim of this study was to investigate the possible effects of liquid dishwashing detergent on some spermatologic parameters of male Swiss albino mice. Forty healthy male Swiss albino mice (60 d old) were randomly assigned to 5 groups of 8 animals each. Animals in TR1 served as control and received tap water while TR2, TR3, TR4 and TR5 received 0.1, 0.5, 1 and 5% v/v of the liquid detergent in tab water, respectively as the only source of water. The treatments lasted for 35 d (1 spermatogenesis duration). Mice were kept in plastic cages, under standard laboratory conditions. Food and water provided ad libitum. At the end of the experiment, mice were sacrificed under Sevorane anesthesia. For spermatological examinations, right cauda epididymis was excised and placed in a pre-warmed Petri dish containing Dulbecco Phosphate Buffered solution at 37°C for 30 min. Epididymal spermatozoa were used to evaluate spermatozoon concentration, progressive motility, viable spermatozoon rates, intact spermatozoon rates and hypo osmotic swelling positive (HOS+) test. Data were analyzed by one way ANOVA. At the end of the experimental period no differences due to detergent treatment were observed in spermatozoon concentration($P >$ 0.1). However, significant differences were detected among the treatment groups for progressive motility (TR1 = 80.87 ± 2.01, TR2 = 75.37 ± 1.30, TR3 = 62.50 ± 3.60, TR4 = 52.12 ± 4.54 and TR5 = 56.00 ± 2.73%; $P < 0.01$), viable spermatozoon rates (TR1 = 84.25 ± 1.88, TR2 = 79.50 ± 1.75, TR3 = 70.50 ± 2.32, TR4 = 59.62 ± 1.77 and TR5 = 60.87 ± 1.48%; $P < 0.01$), and intact spermatozoon rates (TR = 86.12 ± 0.78, TR2 = 85.50 ± 1.16, TR3 = 83.37 ± 1.86, TR4 = 80.12 ± 1.60 and TR5 = 75.12 ± 1.05%;$P < 0.01$), and HOS+ (TR1 = 78.75 ± 1.03, TR2 = 75.37 ± 1.26, TR3 = 63.12 ± 3.99, TR4 = 44.00 ± 6.12 and TR5 = 43.62 ± 2.11%; $P < 0.01$). Therefore, the results of the current study suggested that daily oral consumption of liquid detergent exerted significant adverse effects on spermatologic parameters in swiss albino males.

Key Words: detergent, Swiss albino mouse, reproduction

W30 Valuation of antimicrobial activities of 29 kinds of Chinese herbs against *E. coli*. **L. C. Xiao[1,2], X. F. Kong[1], M. Q. Huang[1,2], X. Q. Guo[2], and Y. L. Yin*[1],** *[1]Research Center for Healthy Breeding of Livestock and Poultry and Key Laboratory for Agro-ecological Processes in Subtropical Region, Institute of Subtropical Agriculture, Chinese Academy of Sciences, Changsha, Hunan, China, [2]College of Animal Science and Technology, Jiangxi Agricultural University, Nanchang, Jiangxi, China.*

Chinese herbs, which contain many antimicrobial ingredients, are widely used to prevent and treat bacteriosis, especially infectious disease caused by antibiotic-resistant bacterium. To develop effective Chinese herbal extracts as feed additives with antimicrobial activity, the present study was conducted to determine the antimicrobial activity of Chinese herbs against E. Coli isolated from swine production. The aqueous and ethanol extracts (1 g/mL) of 29 kinds of Chinese herbs were prepared, respectively, and then their antimicrobial activities against 10 isolated strains of antibiotic-resistant E. Coli (including SEC023, SEC206, SEC298, SEC470, SEC616, SEC817, SEC911, SEC1284, C193 and C197) and 3 type strains of *E. coli* (including K88, K99 and K101) were evaluated by determining diameter of inhibition zone (IZD, mm). The data showed that the IZD of ethanol extracts from Chinese nut-gall were higher than 20 mm and of its aqueous extracts varied from 9.5 to 13.0 mm against all of the tested *E. coli* strains, as well as of extracts from Thea viridis and Thea nigra; the IZD of both ethanol and aqueous extracts from Weeping forsythia capsule varied from 10.0 to 14.0 mm, as well as from garden burnet root against SEC023, and from Cortex fraxini against SEC1284; the IZD of ethanol extracts from hawthorn fruit were higher than 10.0 mm against SEC470 (11.0), SEC817 (10.3), K101 (10.0) and SEC1284 (10.0), as well as from Granati cortex against SEC470 (13.3), SEC023 (10.3), SEC1284 (10.3), K99 (10.0) and C193 (10.0), and from Coptis root against SEC1284 (16.0), SEC470 (15.0) and SEC206 (10.0), and from Cortex fraxini against K101 (11.5), K88 (10.8), SEC206 (10.8), SEC616 (10.5), C197 (10.5) and SEC470 (10.0). These findings provided some theoretical basis for further study and application of Chinese herbal resources in animal feed.

Key Words: pigs, Chinese herbs, health

W31 Putrescine stimulates the mammalian target of rapamycin signaling pathway and protein synthesis in porcine trophectoderm cells. X. F. Kong[1,2], B. E. Tan[1,2], Y. L. Yin*[1], L. A. Jaeger[3], F. W. Bazer[2,3], and G. Y. Wu[1,2], *[1]Research Center for Healthy Breeding of Livestock and Poultry and Key Laboratory for Agro-ecological Processes in Subtropical Region, Institute of Subtropical Agriculture, Chinese Academy of Sciences, Changsha, Hunan, China, [2]Faculty of Nutrition and Department of Animal Science, Texas A&M University, College Station, [3]Department of Veterinary Integrative Biosciences, Texas A&M University, College Station.*

Impairment of placental growth is a major factor contributing to intrauterine growth retardation in domestic animal production. Growing evidence shows that the polyamines (including putrescine, spermine and spermidine) produced from arginine (Arg) or proline via catalysis of ornithine decarboxylase are key regulators of angiogenesis and embryogenesis as well as placental and fetal growth. However, the underlying mechanisms are largely unknown. The present study was conducted to test the hypothesis that putrescine (Put) stimulates the mammalian target of rapamycin (mTOR) signaling pathway and protein synthesis in porcine conceptus trophectoderm (pTr2) cells. The cells were cultured for 4 d in Arg-free DMEM containing 0, 10, 25, or 50 micromole Put and 100 micromole Arg. Cell count, protein synthesis and degradation, as well as the total and phosphorylated amounts of mTOR, ribosomal protein S6 kinase 1 (p70S6K), and eukaryotic initiation factor 4E-binding protein-1 (4EBP1) were determined. The pTr2 cells exhibited time (0 to 6 d)- and Put concentration (0 to 25 micromole)-dependent increases in the cell count. Addition of 25 micromole Put to culture medium increased the protein synthesis, amounts of total and phosphorylated mTOR and 4EBP1 proteins, as well as the phosphorylated p70S6K. The cell growth were only

modestly affected when Put synthesis was inhibited by addition of 1 to 5 mM difluoromethylornithine. Collectively, these findings indicate a novel and important role for Put in promoting growth of porcine placental cells largely via an mTOR signaling pathway, which help to explain beneficial effects of Put supplementation on improving survival and growth of embryos/fetuses in mammals.

Key Words: pigs, growth, nutrition

W32 Dietary arginine supplementation confers immunostimulatory effects on inactivated *Pasteurella multocida* vaccines immunized mice. W. K. Ren[1], Y. L. Yin*[1], L. X. Zhou[2], Y. Wang[2], and Y. Peng[2], *[1]Institute of Subtropical Agriculture, the Chinese Academy of Sciences, Changsha, Hunan, China., [2]Chongqing Key Laboratory of Forage & Herbivorce, College of Animal Science and Technology, Southwest University, Chongqing, China.*

This study was conducted to test the adjuvant effect of arginine on inactivated vaccines immunized mice. Mice immunized with inactivated *Pasteurella multocida* (*P. multocida*) vaccines alone and with dietary 0.2% or 0.5% arginine supplementation showed 100% protection after challenge with *P. multocida* serotype A (CQ2) at dose of 4.4Ã—105 cfu (2LD50). However, the antibody titers in vaccine-0.2% arginine group were much higher than those in vaccine-oil adjuvant group before challenge, meanwhile immunization with inactivated vaccines and dietary 0.2% arginine supplementation significantly increased the antibody titers at 36 h post infection, compared with the mice immunized with inactivated vaccines alone or with oil adjuvant. Furthermore, immunization with inactivated vaccines and dietary 0.2% arginine supplementation significantly increased the serum Interleukin-1 β and glutathione peroxidase levels in comparison with the vaccine and vaccine-adjuvant groups of mice. Collectively, dietary arginine supplementation performs a significant immunostimulatory effects in inactivated *P. multocida* vaccines immunized mice, and dietary 0.2–0.5% arginine supplementation was the optimal supplementation dose in mouse model.

Key Words: amino acids, mice, nutrition

W33 Prevalence of clinical and subclinical ketosis at 8 and 30 days in milk and its relationships with parity, dry period length, peak milk yield and change in body condition score in a Jersey herd in the highlands of Costa Rica. J. M. l. Sánchez* and A. Saborío, *Centro de Investigaciones en Nutrición Animal. Universidad de Costa Rica, San José, Costa Rica.*

The prevalence and grade of ketosis at 8 and 30 d in milk (DIM), as well as its relationships with parity, dry period length, peak milk yield and change in body condition score (BCS) were measured in a 203 cows Jersey herd in Oreamuno, Cartago, Costa Rica (9° 55′ North Latitude, 83° 51′ West Longitude, 2350 m of altitude).The aim was to investigate management and feeding risk factors associated with this metabolic disease. Pre and post calving feeding practices were based on intensive grazing of 30 d regrowth kikuyu (*Kikuyuocloa clandestina*) and on average cows were supplemented with 4 kg of a concentrate mix (14% CP, 1.7 Mcal of NE_L/ kg, 35% starch, 0.2% Ca) per day during the close up period, and 4 to 6 kg (20% CP, 1.9 Mcal NE_L/ kg, 48% starch, 1% Ca) in the fresh period. Average BCS at calving was 3.9 (1 to 5 scale). Prevalence of ketosis was determined by measuring blood concentration of β-hydroxybutyric acid (βHBA) at 8 ± 3 DIM in 117 animals and at 30 ± 3 DIM in 114 animals. No clinical ketosis was detected at 8 DIM, and 4.27% of the cows had subclinical ketosis (1.4 to 2.9 mmol/L) during this period. Percentages of cows with clinical (>2.9 mmol/L) and subclinical ketosis at 30 DIM were 3.51 and 9.65, respectively. Incidence of clinical and subclinical ketosis in this herd is under the average prevalence of 15% reported for confinement herds in literature. Cows developing ketosis at 30 DIM lost more body condition during the last week of gestation, than cows that did not develop this disease. During this week, body condition loss for healthy and ketotic cows was 0.09 and 0.31 points ($P < 0.05$), respectively. Cows with ketosis at 30 DIM were of greater ($P < 0.01$) parity, longer ($P < 0.05$) dry period length and greater ($P < 0.01$) peak milk yield. A logistic regression analysis showed that increments of one, 2 or 3 weeks over the 60 d dry period increases the risk of developing ketosis at 30 DIM 1.21, 1.47 and 1.79 times, respectively. Results suggest that scoring body condition during the last week of gestation could be useful to predict the risk of the animals developing ketosis at 30 DIM. Based on these results, management to avoid dry periods in excess of 60 d will help reduce the incidence of ketosis. Furthermore, feeding and management of older cows and higher producing cows to reduce the loss of body condition post calving could also reduce the incidence of ketosis.

Key Words: ketosis, β-hydroxybutyric acid, grazing cows

W34 Effects of soy isoflavones on the male reproductive regulation in Huanjiang male pigs. X. Yuan[1], L. Li[1], J. Fan[1,2], B. Zhang*[2], C. Xiao[3], and Y. Yin[1], *[1]Institute of Subtropical Agriculture, the Chinese Academy of Science, Changsha, Hunan, China, [2]College of Animal Sciences, Hunan Agricultural University, Changsha, Hunan, China, [3]Nutrition Research Division, Food Directorate, Health Products and Food Branch, Health Canada, Ottawa, Canada.*

To evaluate the effects of soy isoflavones on male reproductive regulation in Huanjiang male pigs. Fifty male black small-eared pigs were randomly divided into control group (fed a test diet), low, medium and high doses of soy isoflavones group and diethylstilbestrol group. Three different doses of soy isoflavones (125 mg/kg, 250 mg/kg, and 500 mg/kg) and 0.5 mg/kg diethylstilbestrol were evenly mixed in the feed and fed to pigs for 60 d (The purity of soy isoflavones is 80%). Analysis levels of GnRH, LH, FSH, Tes and E2 by radioimmunoassay; weigh testis and epididymis; the mRNA expression of P450scc, 3Î[2] -HSD and StAR in testicular tissue, which associated with testosterone synthesis, was measured by RT-PCR. In 250 mg/kg soy isoflavones group, testicular index increased by 44.76% than the control group, the difference was significant ($P < 0.05$); serum testosterone level increased by 51.49% than the control group, the difference was significant ($P < 0.05$); mRNA expression of StAR was up to 1.43%, a significant difference with control group ($P < 0.05$). In 500 mg/kg soy isoflavones group, testicular index decreased by 39.92% than the control group, the difference was significant ($P < 0.05$); serum testosterone level decreased by 53.69% than the control group, the difference was significant ($P < 0.05$); mRNA expression of StAR 0.49%, a significant difference with 250 mg/kg soy isoflavones group ($P < 0.05$). Soy isoflavones can affect the male reproductive hormone secretion, the growth and development of testis and epididymis, enzyme activity of testosterone synthesis, and expression of reproductive hormone genes in the brain, and in dosage-dependent ways.

Key Words: soy isoflavones, reproductive hormone, Huanjiang male pigs

W35 Estimate of serum IgG concentration using refractometry with or without caprylic acid fractionation. K. M. Morrill*[1], A. Lago[3], J. Polo[3], J. D. Quigley[3], and H. D. Tyler[2], *[1]Cornell Cooperative Extension, Westport, NY, [2]Iowa State University, Ames, [3]APC Inc., Ankeny, IA.*

The objective of this study was to develop a rapid, calf-side test to determine serum IgG concentration using a refractometer and caprylic

acid (CA) fractionation. Serum samples (n = 200) were obtained from 1 d old calves on a single California dairy, frozen and shipped to Iowa State University. Samples were allowed to thaw at room temperature (1 h). Fractionation with CA was conducted by adding 1 mL of serum to a tube containing 45, 60 or 75 μL CA and 0.5, 1.0 or 1.5 mL 0.06 M acetic acid (AcO). The tube was shaken (10 s), allowed to react for 1 min and centrifuged (3,000 × *g*) for 0, 10 or 20 min. Refractive index (nD) of fractionated and whole serum was determined using a digital refractometer (SPER Scientific model 300034). Serum IgG concentration was determined by radial immunodiffusion (RID). The nD of whole and fractionated serum were compared with IgG concentration. Mean serum IgG concentration was 19.0 mg/ml (SD = 9.7) with a range of 3.5 to 47.0 mg/mL. Whole serum nD correlated with IgG concentration (r = 0.86, n = 185). Serum treated with 1 mL 0.6 M AcO and 60 μL CA and not centrifuged before analysis resulted in the strongest relationship between fractionated serum nD and IgG (r = 0.80, n = 45). Regression equations were used to determine cut-points that would be indicative of 10, 12 and 14 mg/mL to determine the sensitivity and specificity of refractometry to identify failure of passive transfer (FPT) calves. Fractionated samples were evaluated by cut-points 1.33895, 1.3392, and 1.3395 nD. The cut-point of 1.3395 resulted in the greatest specificity (100%) and positive predictive value (100%) for fractionated samples; however, 11.1% of samples with adequate IgG were incorrectly classified as inadequate. Whole samples were evaluated by nD cut-points 1.34414, 1.34448 and 1.3448. The cut-points of 1.34448 and 1.3448 resulted in identical specificities (86.67%), while the lower cut-point had a specificity of 60.0%. These results suggest that refractometry of whole or fractionated calf serum provides a strong estimate of IgG concentration and can be used to identify FPT calves before 24 h of age.

Key Words: passive transfer, IgG, refractometer

W36 Haptoglobin is a potential early indicator of postpartal diseases. D. Sabedra[1], E. Ramsing[1], C. Shriver-Munsch[1], J. Males[1], W. Sanchez[2], I. Yoon[2], and G. Bobe*[1], *[1]Oregon State University, Corvallis, [2]Diamond V, Cedar Rapids, IA.*

Haptoglobin is an acute phase protein that is elevated in response to tissue damage and infections in dairy cows. The objective of this study was to evaluate whether serum concentrations of haptoglobin are elevated before clinical signs of diseases can be observed. Blood samples were taken from 161 Holstein cows (2 to 7 parities) at d −28 (−34 to −27), −21 (−26 to −18), −14 (−17 to −11), −7 (−10 to −5), −3 (−4 or −3), −1 (−2 or −1), 0, 1, 3, 7, 14, 21, 28, 35, 42, and 49 postpartum during spring and summer 2010 and analyzed for serum haptoglobin concentrations. Between d −28 and 100 postpartum, cows were monitored daily for signs of diseases and treated according to standard treatment protocols. Based on the severity of the observed symptoms, cows were grouped into 4 health categories: visually healthy (n = 20), mild or subclinical disease (n = 41), severe disease requiring antibiotics, glucose precursors, or both (n = 70), and died or sold within the first 100 d postpartum (n = 30). In healthy cows, serum haptoglobin concentrations were increased in the first week after calving and peaked at d 1 postpartum. Compared with healthy cows, peak concentrations were greater and duration of elevated haptoglobin concentrations was longer in sick cows ($P < 0.001$). Cows that died or were sold had the highest peak concentrations and the longest duration of elevated haptoglobin concentrations ($P < 0.001$). The increase in haptoglobin concentrations in the first wk postpartum was observed in cows with various types of diseases (metritis, ketosis, laminitis, mastitis; all $P < 0.01$). These results suggest that prolonged elevated haptoglobin concentrations in the first week postpartum precede the clinical onset of various diseases and may assist in early detection and treatment of subclinically sick cows during the first phase of lactation.

Key Words: dairy cows, disease, haptoglobin

W37 Bovine hepatic retinol binding protein gene expression and its relationship with tumor necrosis factor-α. P. Rezamand[1], K. M. Hunt[1], J. S. Watts[1], J. D. Blickenstaff*[1], B. J. Bradford[2], and L. K. Mamedova[2], *[1]University of Idaho, Moscow, [2]Kansas State University, Manhattan.*

Circulating retinol binding protein (RBP) transports retinol from the liver to target tissues, has one binding site for retinol in the *all-trans* form, and is bound to transthyretin (TTR). The objectives were to determine the temporal pattern of bovine hepatic mRNA expression of RBP during the periparturient period and whether its expression is influenced by tumor necrosis factor (TNF)-α. In experiment I, hepatic mRNA expression of RBP during the periparturient period was assessed. Liver tissues were sampled from periparturient dairy cows (n = 9) at −21, −4, +1, +7 and +21 relative to parturition. Total RNA was extracted and cDNA was generated. Transcript abundance of RBP and β-actin, as a housekeeping gene, were measured in relative quantity using rt-PCR. Data were analyzed using delta Ct values and significance was determined at $P \leq 0.05$. Cows had variable hepatic RBP expression over the transition period ($P = 0.037$), with a decline around parturition and a rebound toward prepartum levels later in lactation, resembling abundance of plasma retinol. In experiment II, Holstein dairy cows were blocked by parity and feed intake, and randomly assigned to control, recombinant bovine (rb)TNF-challenge or pair-fed control (n = 5/treatment). Cows were either injected with rbTNF (SQ injection of 2 μg/kg BW in saline) or sterile saline (control and pair-fed control) once daily for 7 d. Liver biopsy was performed on d 7 and samples were processed for mRNA expression of RBP, TNF-α and GAPDH. Although TNF challenge caused an upregulation of hepatic TNF-α expression ($P < 0.01$), it did not cause an alteration in hepatic RBP expression ($P = 0.32$). Overall, temporal pattern of hepatic RBP gene expression during periparturient period followed that of plasma retinol. Although a strong positive correlation was previously detected between bovine hepatic RBP and TNF-α transcripts, rbTNF challenge did not cause an alteration in RBP expression. These observations collectively imply that regulation of RBP at the transcription level is influenced by physiological state but may be independent from that of TTR, which is altered by pro-inflammatory stimuli (e.g., TNF-α) via induction of transcription factor nuclear factor-interleukin 6.

Key Words: gene expression, retinol binding protein, TNF-α

W38 Dried citrus pulp modulates the physiological and acute phase responses of crossbred heifers to an endotoxin challenge. N. C. Burdick*[1], J. T. Cribbs[2], J. A. Carroll[1], T. R. Callaway[3], T. B. Schmidt[4], B. J. Johnson[2], and R. J. Rathmann[2], *[1]USDA-ARS, Livestock Issues Research Unit, Lubbock, TX, [2]Texas Tech University, Department of Animal and Food Sciences, Lubbock, [3]USDA-ARS, Food and Feed Safety Research Unit, College Station, TX, [4]Mississippi State University, Department of Animal and Dairy Science, Mississippi State.*

This study examined the effect of feeding dried citrus pulp (CP) pellets on the physiological and acute phase responses (APR) of newly received crossbred heifers to an endotoxin (lipopolysaccharide; LPS) challenge. Heifers (n = 24; 218.3 ± 2.4 kg) were obtained from commercial sale barns and transported to the Texas Tech Univ. Beef Center. Heifers were separated into treatment groups receiving a Control Diet (C; n = 8), CP10 (10% CP DM basis; n = 8) or CP20 (20% CP DM basis; n

= 8) and were fed for 65 d while being systematically stepped up to a finishing ration. On d 63, heifers were fitted with indwelling vaginal temperature (VT) recording devices and jugular catheters and moved into a barn with individual stalls. On d 64, heifers were challenged i.v. with LPS (0.5 μg/kg BW) and blood samples were collected every 0.5 h from −2 to 8 and again at 24 h relative to LPS challenge (0 h). Sickness behavior scores (SBS) were also assigned following collection of each blood sample. Serum was isolated and stored at −80°C until analyzed for cortisol, interleukin-6 (IL6), interferon-γ (IFNγ), and tumor necrosis factor-α (TNFα) concentrations. Pre-LPS VT were lower in CP10 (38.44 ± 0.02°C) than C (38.74 ± 0.02°C) and CP20 treatments (38.68 ± 0.02°C; $P < 0.01$). There was an increase in VT in all treatments post-LPS ($P < 0.001$), with CP10 (38.69 ± 0.02°C) maintaining lower VT post-LPS than C (38.98 ± 0.02°C) and CP20 treatments (38.97 ± 0.02°C; $P < 0.01$). Post-LPS SBS increased ($P < 0.01$) and were greater in CP10 (1.14 ± 0.02) than CP20 (1.09 ± 0.02) and C (1.03 ± 0.02; $P < 0.01$). Post-LPS cortisol concentrations were greatest in CP10 (68.1 ± 2.1 ng/mL) heifers than C (60.9 ± 2.0 ng/mL) or CP20 treatments (59.5 ± 1.9 ng/mL; $P < 0.01$). Concentrations of IFNγ, TNFα, and IL6 increased post-LPS ($P < 0.01$) and were greater in CP20 (24.6 ± 1.1, 123.03 ± 11.1, and 2370 ± 123 pg/mL, respectively) than CP10 (16.9 ± 1.0, 91.3 ± 11.1, and 1981 ± 124 pg/mL, respectively) and C treatments (12.2 ± 0.9, 19.1 ± 10.2, and 1175 ± 104 pg/mL, respectively; $P < 0.01$). These data indicate that CP inclusion in the diet can modulate both the physiological and APR of newly received heifers to an endotoxin challenge.

Key Words: acute phase response, cattle, citrus pulp