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 prepartum 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 postpartum vitamin E supplementation 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. Hoffman1, D. A. Moore*1, J. R. Wenz1, and J. Vanegas2. 1Washington State University; 2Oregon 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*, T. H. Elsasser1, R. L. Baldwin VI1, A. V. Capuco1, P. Gross2, and K. R. McLoad3. 1USDA, Agricultural Research Service, Beltsville, MD; 2Istituto di Zootecnica, Università Cattolica, Piacenza, Italy; 3University 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 (NOx; 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) at d 4 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, NOx 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

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 hematological 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 = 0.01) 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 hematological 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-hygenizing additive for oral use in dairy cows: Effect on milk somatic cell count. P. Luparia*, 1 M. Poggiandelai, 2 V. Bronzo2, 1SOP srl, Busto Arzise, VA, Italy; 2Università 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-hygenizing product (SOP GOLD COW), based on an inert material (verxite) treated with the frequent 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


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


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
were then infected with DC15 at 4 cfu/cell in presence of c9,11-CLA, and linoleic acid (C18:2n-6, C18:1n-9, C20:4n-6, C20:5n-3, in presence or absence of the individual PUFA (C18:3n-3, C18:3n-6, as well as undisturbed viability of the cells in the presence of PUFA infection conditions were optimized; the uptake of PUFA into the cells... into control (CTR; 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. Jaudszus1, M. Grün1, G. Jahreis1, K. Sachse2, and H. Sauerwein*1, 1Institute of Nutrition, Department of Nutritional Physiology, Friedrich Schiller University Jena, Jena, Germany, 2Institute of Molecular Pathogenesis, Friedrich-Loeffler-Institute (FLI), Federal Research Institute for Animal Health, Jena, Germany, 3Institute of Animal Science, Physiological & 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 antibiotic 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 x10^6 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 (c9,t11-CLA), and 10c12-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 (Grü...
and DDGS with 3.3 and 13 ppm, of DON respectively. Zeaaronolone 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. Gula,*, S. Gungor, O. Yildiz Gula, and A. Demirtas, Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Burdur, Turkey.

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 tap 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 Sevoflurane anesthesia. For spermatologival 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 was used to evaluate spermatozoon concentration, progressive motility, viable spermatozoon rates, intact spermatozoon rates and hypoosmotic 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 HOSS+ (TR1 = 78.12 ± 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 1,2. 1Research 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, 2College 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, SEC026, 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 tropho- 

toderm cells.** X. F. Kong1,2, B. E. Tan1,2, Y. L. Yin1,2, L. A. Jaeger3, F. W. Bazer3,1, and G. Y. Wu1,2. 1Research 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, 2Faculty of Nutrition and Department of Animal Science, Texas A&M University, College Station, 3Department 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 trophoderm (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 (4EBP1) were determined. The pTr2 cells exhibited time (0 to 6 d)- and 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, Y. L. Yin, L. X. Zhou, Y. Wang, and Y. Peng, 1Institute of Subtropical Agriculture, the Chinese Academy of Sciences, Changsha, Hunan, China, 2Chongqing Key Laboratory of Forage & Herbivore, 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 (CCQ2) at dose of 4.4×105 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 interleukin-1β 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:** ketosis, β-hydroxybutyric acid, grazing cows

**W34** Effects of soy isoflavones on the male reproductive regulation in Huanjiang male pigs. X. Yuan, L. Li, J. Fan, B. Zhang, C. Xiao, and Y. Yin, 1Institute of Subtropical Agriculture, the Chinese Academy of Sciences, Changsha, Hunan, China, 2College of Animal Sciences, Hunan Agricultural University, Changsha, Hunan, China, 3Nutrition 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, 3Î2, P, FSH, Tes and E2 by RT-PCR.

In 250 mg/kg soy isoflavones group, testicular index increased by 44.76% which associated with testosterone synthesis, was measured by RT-PCR. In 500 mg/kg soy isoflavones group, testicular index decreased by 39.92% 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 increased by 51.49% than the control group, the difference was significant (P<0.05); mRNA expression of StAR 0.49%, a significant difference with control group (P<0.05). In 250 mg/kg soy isoflavones group, testicular index increased by 44.76% which associated with testosterone synthesis, was measured by RT-PCR.

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**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, A. Lago, J. Polo, J. D. Quigley, and H. D. Tyler, 1Cornell Cooperative Extension, Westport, NY, 2Iowa State University, Ames, 3APC 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 fractionation.
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 1.3395, 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


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 to −3), −1 (−2 to −1), 0, 1, 3, 7, 14, 21, 28, 35, 42, and 49 post-partum during spring and summer 2010 and analyzed for serum haptoglobin concentrations. Between d −28 and 100 postpartum, cows were monitored daily for signs of disease 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 7 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). With 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


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 (TRT). 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, +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 ≤ 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
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