836 Effects of an experimental feed additive on neutrophil-mediated killing of *Streptococcus equi* and on markers of innate immune function in horses. A. Rowson*[1], D. Sherwood[2], Y. Wang[1], S. Puntenney[1], and N. E. Forsberg[1], [1]*OmniGen Research LLC*, *Corvallis, OR,* [2]*Oregon State University*, *Corvallis*.

Effects of an experimental feed additive (OmniGen-EQ) on immune markers in horses was tested. Eighteen horses were assigned to 2 treatment groups which consisted of a control group and a treated group (9 animals/treatment). The control group consisted of 3 mares and 6 geldings which ranged in age from 2 to 17 years. The treatment group consisted of 3 mares and 6 geldings which ranged in age from 1 to 16 years. Animals on the control diet were allowed free-choice access to hay plus 1.8 kg/head/day of a supplement which contained approximately 18% crude protein, 2% crude fat and 6% crude fiber on an as-fed basis. Animals on the treated group received the same diet except for supplementation with the experimental product such that each horse received an intake of 108 g per day. Animals were individually fed supplement and maintained on treatment for 28 d. Blood samples were taken on d 0, 14 and 28 and neutrophils were isolated using Percoll gradient centrifugation. Ability of freshly isolated neutrophils to kill (phagocytose) an equine pathogen (*Streptococcus equi*) were assessed on d 28 using a pathogen killing assay. Killing assays were performed at ratios of 1 neutrophil:30 *S. equi* (1:30) and 1:60. Neutrophil RNA was isolated using Trizol and concentrations of L-selectin, interleukin-8 receptor (IL-8R) and RPL-19 mRNAs were assessed using quantitative (SYBR-green) reverse transcriptase PCR. RPL-19 mRNA was used as the background gene. Data were analyzed by ANOVA with effects consisting of Treatment, Day and Error. One horse on the control treatment died on d 25 due to colic. The additive improved neutrophil killing efficiency ($P < 0.05$) by 16 and 22% at dilutions of 1:30 and 1:60, respectively. Feeding OmniGen-EQ had no effect on neutrophil L-selectin and IL-8R mRNAs on d 14; however, concentrations of both mRNA species were increased several-fold ($P < 0.05$) after 28 d of feeding. These data demonstrate that feeding the experimental additive to horses improves markers of innate immune function.

Key Words: immunity, horse, neutrophil

837 Effects of OmniGen-AF on development of humoral immune responses in beef cattle and in rats following a vaccination program. S. B. Puntenney*, Y. Wang, A. Rowson, and N. E. Forsberg, *OmniGen Research LLC*, *Corvallis, OR*.

Two experiments were completed in which effects of OmniGen-AF on development of titer were examined. In the first study, male rats (8/trt) were assigned to a control diet (Teklad 8604) or to a diet containing OmniGen-AF (0.5% w/w) for 54 d after which all animals were given the control diet through d 87. Animals were vaccinated twice with an *E. coli* vaccine on d 10 and 24 of the study and blood was sampled from rats on d 0, 24, 37, 54, 73 and 87. *E. coli* titer within the IgG1 fraction was determined by ELISA. In the second study, Angus calves (ca. 250 kg) were assigned to one of 2 treatments (20 animals/trt): a control ration and to the same ration but supplemented with OmniGen-AF (56 g/hd/d) beginning at d 0. Animals were maintained on rations for 60 d and vaccinated with the Novartis Virashield vaccine on d 14 and again 1 mo later. A subset of animals (10/trt) was also vaccinated with the Epitopix SRP (*Salmonella*) vaccine following initial feeding with OmniGen-AF. Serum neutralization assays against the BVDV-1, BVDV-2 and IBR were completed by the Oregon State University College of Veterinary Medicine Diagnostic Laboratory. Titer directed against the SRP vaccine was assessed by Epitopix. IgG1 *E. coli* titer in rats was significantly ($P < 0.05$) elevated on d 24, 37 and 54 of the study. No differences between treatments ($P > 0.05$) were noted following withdrawal of the additive on d 54 of the study. OmniGen-AF increased development of BVDV-1 and *Salmonella* titer by almost 2-fold; however, these effects were not significant ($P = 0.112$ and 0.118, resp). BVDV-2 titer was not detectable in either treatment group. OmniGen-AF increased IBR titer significantly ($P < 0.05$). In previous studies, we reported that OmniGen-AF increased ($P < 0.05$) development of *E. coli* titer in calves vaccinated with the Pfizer J5 *E. coli* vaccine. These studies extend those observations and indicate that pre-feeding OmniGen-AF may increase humoral immune responses to vaccines. Further work is needed to determine conditions under which one might reliably derive benefit to humoral immunity.

Key Words: immunity, OmniGen-AF, vaccination

838 Passive immunity to a commercial *E. coli*-SRP vaccine in beef cattle colostrum from cows grazing native range. B. W. Wileman*[1], D. U. Thomson[1], K. C. Olson[2], and L. A. Pacheco[2], [1]*College of Veterinary Medicine, Kansas State University*, *Manhattan,* [2]*College of Animal Sciences and Industry, Kansas State University*, *Manhattan*.

E. coli O157:H7 is a contaminant of beef and associated with food-borne illnesses in humans. Initial colonization of the calf with the organism is believed to occur shortly after birth. Recently an *E. coli* SRP vaccine received conditional licensure in the United States for the control of *E. coli* O157 in cattle. The objective of this study was to determine if *E. coli* O157:H7SRP specific antibodies from vaccinated cows can be passively transferred to beef calves in native range conditions. Cows (n = 20) were randomly assigned to treatments: SRP vaccine or placebo control. Vaccines were administered 60 and 30 d before projected calving date. Samples were collected at the time of calving from cows (fecal, blood and colostrum) and calves (pre-suckle blood sample). Blood samples were obtained from calves at 6, 12, and 24 h and at 7, 14 and 21 d postpartum. Serum total protein (STP) and *E. coli* O157:H7 SRP antibody levels were measured. Dam vaccine history had no effect on the calf STP level ($P > 0.05$). However, length of time postpartum had a significant effect on the calf STP levels ($P < 0.001$). A vaccine treatment by time postpartum interaction was observed for the calf serum *E. coli* O157:H7 SRP antibody levels ($P < 0.01$). This interaction was explained by no vaccine treatment difference in calf serum *E. coli* O157:H7 SRP antibody levels pre-suckle, but a significant increase in calf *E. coli* O157:H7 SRP post-suckle titers in the calves born to SRP vaccinated cows compared with calves born to placebo cows. The results from this study show successful *E. coli* O157:H7 SRP antibody passive transfer in beef calves under natural conditions and indicates that early immunization against *E. coli* O157:H7 could play a role in preventing animals from shedding the organism at harvest. Further research is needed to study possible cross protection of this vaccine in other cattle diseases.

Key Words: immunity, colostrum, vaccine

839 Effect of colostrum supplementation on health and performance of pre-weaned and post-weaned dairy calves. B. Ozer*[1], M. Chahine[1], C. M. Matuk[1], M. E. de Haro Martí[2], and M. Nelson[1], [1]*University of Idaho*, *Twin Falls*, [2]*University of Idaho*, *Gooding*.

The objective of this study was to determine the effect of a commercially available colostrum supplement on health parameters in Holstein dairy heifers. Fifty 7 Holstein female calves raised on a commercial facility in southern Idaho were randomly assigned to one of 2 treatments which consisted of maternal colostrum (MC, n = 27) or maternal colostrum supplemented with bovine-serum based colostrum supplement (MCS, n = 30). All colostrum treatments (3.8 L) were administered using an esophageal tube within 1 h of birth. A second feeding of colostrum (2 L) was administered 8 h following first feeding. Blood samples were collected at 24 ± 3 h of age and tested for total serum protein (TSP). Pre-weaned period rectal body temperature was measured every other day. Health evaluations were conducted daily by study personnel until calves were 3 mo of age. Pre-weaned fecal (FC), dehydration (DH) and respiratory (RS) scores were recorded. TSP concentrations were significantly greater ($P < 0.01$) in calves fed MC (TSP = 6.17 ± 0.09 g/dL) compared with calves fed MCS (TSP = 5.84 ± 0.09 g/dL). Rectal body temperature did not differ between MC and MCS and averaged 39.0°C ± 0.03. No differences were detected in pneumonia, diarrhea, or mycoplasma incidence which averaged 61.7%, 10.5%, and 38.3% respectively. MCS calves had a greater ($P < 0.006$) incidence of abnormal RS score (58.5%) compared with MC (27.3%). FC and DH scores did not differ between treatments and averaged 27.6% and 12.7% respectively. Thus in this study, adding a supplement to maternal colostrum did not achieve any positive effect on performance and health parameters of dairy calves.

Key Words: colostrum, colostrum supplement, total serum protein

840 Evaluation of immunological status of newborn dairy calves when respective dams were fed a stepwise moderate energy diet or a controlled energy diet during the dry period. J. S. Osorio*[1], P. Ji[1], G. Invernizzi1,2, J. K. Drackley[1], and J. J. Loor[1], [1]*University of Illinois*, *Urbana,* [2]*University of Milan*, *Milan, Italy*.

Decreases in dry matter intake and increases in concentrations of non-esterified fatty acids and cortisol during the periparturient period have been associated with an impaired immunological status in dairy cows. Controlling energy intake during the dry period has been proposed to diminish these conditions during early lactation. The extent of these effects on the immunological status of newborn calves is unknown. Holstein cows (n = 12) were randomly assigned to a stepwise moderate energy (ME) diet (1.49 Mcal/kg) or a controlled energy (CE) diet (1.30 Mcal/kg) during the close-up period (−21 to 0 d relative to calving). All cows were fed CE during the far-off period (−50 to −21 d relative to calving). At birth, calves were separated from dams and during the first 24 h received at least 3.8 L of dam's colostrum with minimum 60 mg/dL of solids density. Blood samples were taken at birth (Pre-colostral) and 48 h (Post-colostral) using vacutainer tubes with ACD, EDTA, or serum. RNA was extracted from isolated blood peripheral neutrophils, and whole blood phagocytosis was assessed through flow cytometry (BD Biosciences LSR II). Body weight, withers height, and hip height were recorded at birth. Data were analyzed using the MIXED procedure of SAS (v. 9.2). Results indicated that dams that were fed a CE diet during the complete dry period gave birth to heavier ($P = 0.01$) calves than ME cows. Preliminary analysis of whole blood phagocytosis showed no difference in percentage of phagocytozing cells from either pre ($P = 0.88$) or post ($P = 0.72$) colostral blood samples from calves born from dams on either diet. However, the phagocytosing population of cells behaved differently between CE and ME treatments when observed from pre- to post-colostral blood samples. All phagocytosing cells were clumped in pre-colostral samples regardless of dam's diet, but only cells from calves born to dams fed CE divided into 2 populations from the post-colostral blood samples. Further analyses are being conducted to fully discern the biological meaning and significance of these results.

Key Words: calves, phagocytosis, immunology

841 Characterization of immune and metabolic responses in the blood of dry cows induced with sub-acute ruminal acidosis (SARA). A. D. Kroeker*[1], S. Li[1], S. Shekhar[1], A. Ceballos[2], E. Khafipour[1], D. O. Krause[1], J. C. Plaizier[1], and J. C. Rodriguez-Lecompte[1], [1]*University of Manitoba*, *Winnipeg, Manitoba, Canada*, [2]*Cornell University*, *Geneseo, NY*.

Subacute ruminal acidosis (SARA) increases lipopolysaccaharide endotoxin (LPS) in the rumen, due to lysis of gram-negative bacteria. This LPS can translocate into the blood during SARA, which causes inflammation. The objective of this study was to determine the systemic immune and metabolic responses in the blood of cows with 2 forms of SARA. Six dry, non-pregnant, dairy cows were used in a Latin Square with 3 periods of 4 wk. During wk 1–3 of all periods cows received the control diet containing 70% forage and 30% mixed concentrates (DM basis). During wk 4, cows either received the control diet(T1) control diet), treatment 2 (T2, alfalfa pellet-induced SARA (API_SARA), 45% mixed concentrate, 32% alfalfa pellets, and 23% other forages), or treatment 3 (T3) (GPI_SARA, 38% wheat-barley pellets, 32% other mixed concentrate, and 30% forages). Blood cell, serum chemistry, acute-phase proteins (fibrinogen, serum amyloid A (SAA), haptoglobin (Hp, and LPS binding protein (LBP), and peripheral blood leukocyte cell surface marker (CD14) parameters were evaluated. The durations of the rumen pH below 5.6 were 56.4, 225.2 and 298.7 min/d for control, API_SARA, and GPI_SARA, respectively. This shows that both forms of SARA resulted in similar depressions of rumen pH, and that SARA was induced. Treatments did not affect leukocyte and differential count, red blood cells, hemoglobin, mean corpuscular volume (PCV), mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, and clinical chemistry parameters. However, PCV decreased in T2 and T3 cows. Also, urea was lower in T2 cows 9 d after the beginning of treatment. There were increases in SAA and LBP in T3. There were no changes in the total protein to fibrinogen ratio, suggesting no inflammatory activity; however, the albumin to globulin ratio increased in T3 cows during the second period of the study. No differences were found the proportion of peripheral blood neutrophils and monocytes expressing CD14. In conclusion, our results suggest that immunological and metabolic parameters were not affected by SARA

Key Words: SARA, LPS, CD14