304 Effect of vaccination technique and antibody level on primary and secondary response in beef calves after vaccination against bovine viral diarrhea virus. M. R. Rey*[1], J. C. Rodriguez-Lecompte[1], T. Joseph[3], J. Morrison[2], A. Yitbarek[1], K. M. Wittenberg[1], M. Undi[1], and K. H. Ominski[1], *[1]Department of Animal Science, University of Manitoba, Winnipeg, MB, Canada, [2]Department of Biosystems Engineering, University of Manitoba, Winnipeg, MB, Canada, [3]Veterinary Diagnostic Services, Manitoba Agriculture, Food and Rural Initiatives, Winnipeg, MB, Canada.*

In this study, antibody response was measured in calves following vaccination against bovine viral diarrhea virus (BVDV) using either needle-free (Pulse 250) or needle-syringe (NS) vaccination techniques. The Pulse 250 needle-free (NF) injection device utilizes compressed carbon dioxide to power vaccine injections. At 2 mo of age (d 0), calves were vaccinated either via a needle-syringe injection (n = 39) or a needle-free injection (n = 47) technique, while 10 calves were left unvaccinated (Control). The vaccine administered was a 5-way modified-live respiratory virus containing BVDV types 1 and 2. On d 119 post vaccination, calves received a second immunization using the same product. Body weight was recorded and blood samples were taken on d 0, 21, 42, 119, and 140. Antibody levels in serum, as measured by S/P ratio, were analyzed by a semiquantitative BVDV enzyme-linked immunoassay (ELISA). To understand the effect of antibody level on primary and secondary antibody response in terms of population, calves in each treatment group were ranked by antibody level. Throughout the study, antibody levels against BVDV were not significantly different ($P > 0.05$) between vaccination techniques. Higher ($P < 0.05$) antibody levels in vaccinated relative to unvaccinated calves on d 42, 119 and 140 of the study, demonstrated that animal exposure to BVDV did not occur during the study. The population distribution shows that both vaccination techniques provide homogeneous BVDV antibody production and that anabolic and catabolic trends are dependent on the level of circulating antibodies present before vaccination. The data suggests that the antibody response acquired after vaccinating against BVDV is the same using a needle-syringe or needle-free vaccination technique. However, the level of circulating antibodies (either maternal or vaccination-induced) to BVDV before vaccination seems to have a critical effect on primary and secondary antibody response.

Key Words: needle-free injection, bovine viral diarrhea virus, antibody response

305 Bacteria counts in on-farm pasteurized milk for dairy calves versus season and time post-pasteurization. D. J. Wilson*[1], K. A. Rood[1], and G. M. Goodell[2], *[1]Utah State University, Logan, [2]The Dairy Authority, Greeley, CO.*

On-farm pasteurized milk to be fed to dairy calves was studied for SPC changes over time on 3 commercial farms during 4 seasons. Aseptic milk samples (n = 276) were collected before pasteurization at 63°C for 30 min, then following pasteurization as soon as milk cooled to 49°C, and 1, 2, 3, 4, 5, 6, 7, 8, 10, 12 and 24 h post-pasteurization. All milks had 2 aliquots, one incubated indoors at 4°C (winter/W), 22°C (fall/F, spring/SP) or 37°C (summer/SU), the other outdoors at seasonal temperatures. Outdoor temperature means were W 8°C, F 8°C, SP 10°C, SU 30°C. Only SU had higher outdoor temperature than the other seasons ($P <$ 0.0001, ANOVA, Tukey's). Bacterial SPC (cfu/mL) were measured from 6 milk dilutions on Petrifilm. Mean pre-pasteurized SPC was 14,634,257, post-pasteurized was 2,633. A general linear model ($R^2 =$ 0.70, $P < 0.0001$) found factors associated with Log SPC: time post-pasteurization, season, farm, time x season, season x farm. Summer had distinctly higher SPC sooner after pasteurization than other seasons; despite the interactions this significant effect was seen on all farms. Fall and SP indoor incubated samples' SPC were not >10,000 for 8 or 12 h respectively, reaching a median of 206,364 and 8,900,000, respectively by 24 h. None of the W samples or F and SP outdoor samples were >1,435 for 24 h. In contrast, SU indoor samples′ SPC were >10,000 by 2 h, 186,800 by 4 h, median 14,500,000 by 24 h. Summer outdoor samples′ SPC were >10,000 by 1 h, 104,733 by 6 h, median 44,000,000 by 24 h. Despite speculation regarding a safe threshold of bacteria count for milk fed to calves, no consensus exists, and there is no definitive health based standard. These data suggest that a reasonable goal would be to feed pasteurized milk to calves if SPC <10,000 cfu/mL. During fall and spring (unless unseasonably warm days occurred) milk could have been safely fed for at least 8 h, in winter for at least 24 h, but in summer for only 2 h post-pasteurization.

Key Words: pasteurization, milk, calves

306 *Salmonella* carriage rates in neonatal dairy calves. E. M. Chavez*[1], R. B. Harvey[2], K. Andrews[2], T. S. Edrington[2], C. M. Scanlan[3], and G. R. Hagevoort[1], *[1]Agricultural Science Center at Clovis, New Mexico State University, Clovis, [2]Food and Feed Safety Research Unit, Agricultural Research Service, USDA, College Station, TX, [3]Department of Veterinary Pathobiology, Texas A&M University, College Station.*

In recent years, it appears that the incidence and carriage rates of *Salmonella* in dairy calves, heifers, and cows have increased. *Salmonella* colonization has induced clinical disease in cattle, but more importantly, has potential implications for foodborne disease. Because the authors have noted *Salmonella* colonization in dairy calves of 6 mo and younger, the present study was conducted to determine the prevalence of *Salmonella* in neonatal dairy calves from calf ranches in the southwestern United States. In 2 studies (February and September, 2011), rectal fecal samples were collected twice weekly from calves 24 h to 4 weeks old and quantitative and qualitative cultivation techniques were used to determine *Salmonella* colonization rates. In the first study, we detected *Salmonella* in 34 of 54 samples (63%) by spiral plating with concentrations of 10^2 to 10^6 cfu/g beginning in calves as early as 24 h old. With an enrichment technique, 100% of calves were positive for *Salmonella* at least one time during sampling and 16.7% were positive at every sample time. In the second study, 9 of 30 calves were positive by spiral plating with fecal concentrations of 10^2 to 10^4 cfu/g at 24 h of age. Upon enrichment, 100% of calves were positive for at least one sampling, and 24 of 30 (80%) were positive at every sampling. *Salmonella* serotypes were not clonal as there were 7 serogroups (C_1, C_2, B, E_1, K, I, and Poly A-I) represented by isolates from both studies. Previous research in our laboratory has reported a high *Salmonella* prevalence in dairy calves from a few days old to a week of age, but this is the first time we examined calves within 24 h of parturition. To the authors' knowledge, this is the first report of dairy calves colonized with *Salmonella* within 24 h of birth. We do not have a ready explanation for this, nor do we understand the biological significance of such high GI tract concentrations of *Salmonella* in neonates. Follow-up studies are being conducted.

Key Words: *Salmonella*, neonatal, dairy calves

307 The association between colostrum bacteria counts and immunoglobulin absorption, calf growth and mortality. A. Lago*[1], J. Quigley[2], J. Polo[2], and J. Campbell[2], *[1]DairyExperts, Tulare, CA, [2]APC Inc., Ankeny, IA.*

The objective of this analysis was to evaluate the association between both total bacteria count (TBC) and coliform count (CC) in colostrum and the apparent efficiency of absorption (AEA) of immunoglobulin G (IgG), average daily gain (ADG) and mortality before weaning. Records from 172 heifer calves from 8 New England and California dairy farms were used in this analysis. Calves received 3.5 to 3.8 L of colostrum 137 ± 107 min after birth. TBC and CC in colostrum samples collected before feeding averaged $10^{5.31}$ and $10^{2.45}$ cfu/mL, respectively. Colostrum and serum IgG concentrations in serum samples collected from calves between 1 and 7 d of age were measured by radial immunodiffusion and averaged 74 ± 28 and 21 ± 9 mg/ml, respectively. Birth and weaning body weights were only available at the California site; therefore, AEA and ADG were calculated from a subpopulation of 90 calves that were tube fed 3.5 L of colostrum and were bled between 24 and 48 h of age. Multivariable General Mixed models were used for the analysis of AEA and ADG and Cox regression for the mortality outcome. Significant difference was established at $P < 0.05$. AEA was numerically lower when CC were above any of the cutpoints defined in Table 1; however, the difference only was significant when CC $\geq 10^4$ cfu/ml. ADG was not different between the bacteria counts cutpoints. Interestingly, there was a higher mortality in calves receiving colostrum with TBC above 10^6 or CC above any of the cutpoints. Serum IgG was also a significant mortality predictor. However, when including both serum IgG and colostrum TBC or CC in the mortality model, colostrum TBC or CC were still the largest predictors of death.

Table 1. Apparent efficiency of absorption (AEA) and mortality for calves fed colostrum with different total bacteria (TBC) and coliform count (CC) cutpoints

	AEA % (no.)	Mortality % (no.)
TBC $<10^6$ cfu/mL	31[a] (70)	8[a] (144)
TBC $\geq 10^6$ cfu/mL	29[a] (20)	14[b] (28)
TBC $<10^5$ cfu/mL	28[a] (23)	8[a] (110)
TBC $\geq 10^5$ cfu/mL	31[a] (67)	10[a] (62)
CC $<10^4$ cfu/mL	31[a] (83)	7[a] (161)
CC $\geq 10^4$ cfu/mL	23[b] (7)	36[b] (11)
CC $<10^3$ cfu/mL	31[a] (64)	7[a] (125)
CC $\geq 10^3$ cfu/mL	29[a] (26)	15[b] (47)

[a, b]Superscripts indicate significance at $P < 0.05$.

Key Words: calves, colostrum, bacteria

308 Adding an anti-inflammatory lactic acid bacteria to a *Bacillus*-based direct-fed microbial improves calf immune development. M. Duersteler*[1], K. N. Novak[1], C. A. Wehnes[1], M. E. Davis[1], D. R. Shields[2], and A. H. Smith[1], *[1]Danisco USA Inc., Waukesha, WI, [2]Merrick's Inc., Union Center, WI.*

A *Bacillus*-based direct-fed microbial selected for reducing bacterial pathogens increased expression of inflammatory cytokines in vitro and activated immune development in scouring calves. *Enterococcus faecium* ID7 reduced expression of inflammatory cytokines caused by *Bacillus* spores *in vitro*. The objective of this experiment was to determine the effect of adding anti-inflammatory lactic acid bacteria to a *Bacillus*-based DFM on immune development in calves. Calves (72) were randomly assigned to 3 treatments, control, *Bacillus* DFM (2×10^9 cfu/head/day) or *Bacillus* DFM plus ID7 (2×10^9 *Bacillus*, 1×10^9 ID7 cfu/head/day), administered in non-medicated 20:20 calf milk replacer until weaning at 6 weeks. Blood samples were collected at d 7 and 35. Serum was isolated for analysis of α_1-acid glycoprotein (AGP). Leukocytes were isolated for flow cytometric analysis of macrophage phagocytosis activity and immunophenotyping. The *Bacillus* DFM plus ID7 increased ($P = 0.03$) average daily gain and feed efficiency over 8 weeks compared with control calves. At d 35, AGP levels were higher ($P < 0.05$) in *Bacillus* fed calves than control and *Bacillus* plus ID7 fed calves. At d 7, macrophages from *Bacillus* plus ID7 fed calves phagocytosed more ($P = 0.03$) *E. coli* per cell than *Bacillus* fed calves and had a higher ($P = 0.02$) density of CD172a on macrophages than control calves. Calves fed *Bacillus* had a greater ($P = 0.03$) proportion of activated B cells ($AM8^+$) than control calves. Calves fed *Bacillus* plus ID7 had a greater ($P = 0.02$) proportion of activated cytotoxic T cells ($CD26^+$) than calves fed *Bacillus*. *Bacillus* plus ID7 resulted in a greater proportion of γδ T cells compared with *Bacillus* fed calves ($P = 0.04$) and $CD4^+CD8^+$ cells within the γδ T cell population compared with control ($P = 0.04$). These results indicate that adding *E. faecium* ID7 alters immune development in calves divergent from the administration of *Bacillus* alone.

Key Words: direct-fed microbial, calf, immunity

309 An evaluation of the efficacy of Metacam NSAID therapy for improving calf vigor, general health and overall performance in newborn Ontario dairy calves. C. Murray,* S. Deelen, D. B. Haley, T. Duffield, and K. Leslie, *University of Guelph, Guelph, ON, Canada.*

The objective of this research was to evaluate a newborn calf vigor assessment tool. In addition, the usefulness of pain management therapy for excessive trauma and enhancement of newborn calf vigor using meloxicam injectable solution was studied. A total of 842 heifer and bull calves from 10 commercial dairy herds were enrolled in this randomized double blind clinical field trial. At birth, calves were assessed for vigor using a scoring system and given either a 1-mL subcutaneous injection of 20mg/mL Metacam or placebo solution by the producer. A birth record was also completed including information on the calving event, colostrum administration and other details. It was hypothesized that NSAID treatment of calves born from a hard pull would reduce the risk of long-term health problems. At 1, 2, 3 and 6 weeks of age, each calf was assessed for growth and given a standardized clinical score for general health. It was found that calves born from a hard pull had less vigor than individuals from unassisted calvings ($P < 0.001$). However, newborn calf vigor score was not significantly associated with health outcomes. Calves treated with Metacam had better health until 6 weeks of age than placebo treated calves ($P < 0.01$). Better total health score was also significantly associated with increased weight gain ($P < 0.05$). Other factors associated with better total health score were feeding colostrum within 2 h compared with 7–12 h after birth ($P < 0.01$), and for calves born in the fall compared with the winter ($P < 0.001$) or spring ($P < 0.05$). Total weight gain over the 6 week period was significantly lower for calves born in winter ($P < 0.001$) or spring ($P < 0.05$), calves having less responsiveness at birth ($P < 0.001$), having a higher 6 week body temperature ($P < 0.05$) and attitude score ($P < 0.01$) and having been fed frozen/thawed colostrum compared with fresh ($P < 0.05$). Overall, some calf vigor factors and neonatal management practices may be important in long-term calf health. Metacam therapy may be appropriate to decrease long-term health effects in some calves.

Key Words: vigor, newborn calf, health

310 Innate immunological or metabolic status prior to an oral *Salmonella typhimurium* challenge is not predictive of a heightened acute phase response in weaned Jersey calves. M. A. Ballou,* M. D. Sellers, D. L. Hanson, A. R. Pepper-Yowell, C. J. Cobb, and B. S. Obeidat, *Department of Animal and Food Sciences, Texas Tech University, Lubbock*

Objective was to determine if baseline metabolic and innate immunological variables are indicative of a heightened acute phase response to an oral *Salmonella typhimurium* (ATCC14028) challenge in weaned Jersey calves. Twenty Jersey bull calves (77 ± 1 d old) were classified into 2 groups (positive responders or negative responders) based on their plasma haptoglobin (Hp) response (>2 fold increase) after they were challenged orally with *Salmonella typhimurium*. All calves survived the 10 d observation period. Seven calves were categorized as Hp positive responders, of which 4 showed clinical signs of disease (anorexia, decreased response to stimuli, and distended head) at some point during the observation period; whereas none of the negative Hp calves displayed any clinical signs of disease. Neither the percent of neutrophils positive ($P = 0.501$) for producing an oxidative burst when cocultured with an *Escherichia coli* nor the geometric mean fluorescence intensity of the positive neutrophil population ($P = 0.516$) were different between Hp groups before the challenge. Similarly, baseline neutrophil expression of L-selectin ($P = 0.825$), whole blood secretion of tumor necrosis factor-α when cocultured with lipopolysaccharide ($P = 0.273$), and plasma concentrations of Hp ($P = 0.678$) were not different between the Hp groups. Calves that had a positive Hp response following the *Salmonella typhimurium* challenge had greater rectal temperatures before the challenge (39.12 vs. 38.89 ± 0.062; $P < 0.05$). Following the challenge, Hp positive calves had greater rectal temperatures ($P < 0.01$) over the entire observation period and the neutrophils had increased oxidative burst intensities ($P < 0.05$) beginning 72 h after the challenge, which persisted through the end of the study. No other differences were observed between the Hp groups after the challenge. Rectal temperature before the *Salmonella typhimurium* challenge was the only variable that was predictive of whether calves were at an increased relative risk for a heightened acute phase response following the challenge.

Key Words: calf, health, immune

311 Outdoor group-housed calves have improved performance and heightened innate immune responses during the neonatal and weaning periods compared to outdoor single-housed calves. C. J. Cobb,* D. L. Hanson, M. D. Sellers, A. R. Pepper-Yowell, B. S. Obeidat, and M. A. Ballou, *Texas Tech University, Lubbock.*

Objective was to determine if outdoor group housing of calves influences metabolic and innate immunological responses compared with individually housed calves. Forty-nine Holstein calves (2 ± 1 d old) were randomly assigned to 2 treatments: individually housed (G1, n = 22) or 3 calves/pen (G3, n = 27). The space allowances per calf were 4.75 and 7.0 m^2 for G1 and G3, respectively. All calves received an identical high plane of milk replacer nutrition. Weaning was initiated during the 7th wk by removing the PM feeding and calves were completely weaned when they consumed 800 g dry matter (DM) daily after d 53. At d 91, calves were randomly commingled into groups of 5 outdoors. Peripheral blood was collected during the neonatal (3, 10, 21 d), weaning (45, 47, 53 d), and commingling periods (91, 94, 99 d) and was analyzed for neutrophil oxidative burst (OB) capacity when cocultured with an *Escherichia coli*, neutrophil L-selectin expression, whole blood secretion of tumor necrosis factor-α (TNF) when cocultured with lipopolysaccharide. Total DM intake was greater ($P < 0.05$) for G3 during the post-weaning period, wk 8 to 12. Average daily gain of G3 tended ($P < 0.10$) to be higher from d 21 to 52 and were higher ($P < 0.05$) from d 53 to 67. During the neonatal period, G3 calves had more activated innate immune responses as evidenced by increased ($P < 0.05$) neutrophil L-selectin expression and tendency for increased ($P < 0.10$) percentage of neutrophils producing an OB. During weaning, G3 calves continued to have more activate innate immune responses with increased ($P < 0.05$) L-selectin expression on d 45 and 47 and a greater OB intensity throughout the period. Immediately before commingling, G1 calves tended to have lower ($P < 0.10$) L-selectin expression with all immune variables being equal ($P > 0.362$) to G3 calves at d 94 and 99. Outdoor group housed calves had improved performance and heightened innate immune responses when compared with individually housed calves, which may be due to increased immunogenic stimulation.

Key Words: calf, housing, immune

312 Immune, health, and growth responses of beef calves administered modified-live virus respiratory vaccine during the presence of maternal antibody versus a traditional vaccination regimen. J. G. Powell*[1], J. T. Richeson[2], E. B. Kegley[1], K. P. Coffey[1], G. F. Erf[1], A. H. Brown[1], W. Downum[1], and D. T. Ensley[3], *[1]University of Arkansas, Fayetteville, [2]West Texas A&M University, Canyon, [3]Boehringer Ingelheim Vetmedica Inc., St. Joseph, MO.*

Crossbred beef calves (n = 253) from 3 breeding herds were used to determine the health, performance, and immune response to different pentavalent [bovine herpesvirus-1, bovine viral diarrhea virus (BVDV) types 1 and 2, parainfluenza-3 virus, and bovine respiratory syncytial virus] modified-live virus (MLV) vaccine regimens administered initially at either 62 or 188 d of age. Calves were stratified by date of birth, gender, BW, and dam age then assigned randomly to 1 of 2 vaccine regimens. Calves in the early vaccination (EV) treatment group received a pentavalent MLV respiratory vaccine containing *M. haemolytica* bacterin-leukotoxoid [Pyramid 5 + Presponse SQ, Boehringer Ingelheim Vetmedica, Inc., St. Joseph, MO] and a multivalent clostridial bacterin-toxoid on d 0 (calf age = 62 ± 17 d, mean ± SD), or calves in the traditional vaccination (TV) treatment group received the same respiratory vaccine and a multivalent clostridial bacterin-toxoid on d 126 (avg. calf age = 188 d). Calves in both treatment groups were revaccinated with the MLV respiratory and clostridial vaccines on d 147 (weaning). No calves required treatment for bovine respiratory disease during the study that ended after an 84-d post-weaning period. Interim and overall gain performances were similar ($P \geq 0.84$) between treatments. Antibody titers to BVDV type 1a were present but similar ($P = 0.50$) among treatments on d 0; yet BVDV antibody titers were greater for EV on d 21, 126, and 147. The EV calves had a greater (treatment × day, $P = 0.05$) CD25 expression index of CD8+ cells than TV calves on d 126. Differences in BVDV type 1a titers and CD25 expression indices suggest calves develop humoral and cell-mediated immunity when vaccinated at 62 d of age. Furthermore, growth performance or health were not affected by vaccine regimen, supporting early vaccination as a cost-effective alternative to traditional calfhood vaccine regimens.

Key Words: beef calves, bovine viral diarrhea virus, maternal antibody interference

313 Dietary adjuvanting prior to vaccine administration increases maternal antibody transfer to calves. A. D. Rowson, T. H. Schell, Y. Wang, N. E. Forsberg, and S. B. Puntenney,* *OmniGen Research LLC, Corvallis, OR.*

Several factors have been documented to increase the efficiency of maternal antibody transfer in neonatal calves, including colostrum quantity ingested, timing of colostrum delivery, and concentration of colostral antibodies. Perinatal vaccination protocols targeting increased IgG1 titers have been used successfully to reduce morbidity and mortality to calfhood enteric pathogens. Previous studies with OmniGen-AF pre-fed in bovine diets before vaccination have shown increased serum titer response to IBR, BRSV, and BVD-1. We hypothesized that the pre-fed additive would elicit increased colostral antibody expression to a commercial scours prevention vaccine administered to preparturient cows, potentially increasing passive transfer of maternal antibodies to calves. Multiparous Angus cows were randomly assigned by parity to a control diet or the same diet with 50g of OmniGen-AF pre-fed for 28 d before a booster vaccination with Pfizer's Scourguard 4KC. Blood samples were taken from dams 60 d post-vaccination and at calving, and from calves pre-suckle and at 7 d. A pre-suckle colostrum sample was taken following parturition. Samples were assayed by serum neutralization (SN) and indirect immuflourescence assay (IFA) for rotavirus and coronavirus. Results showed a strong effect of parity between second calf heifers versus 3rd plus parity cows ($P < 0.001$). Aged cows had significantly higher IFA serum titers at calving than non-treated controls for Rotavirus ($P < 0.007$) and higher IFA serum titers at 60 d post vaccination by 1.85× ($P < 0.02$), in colostrum by 1.7× ($P < 0.05$), with calves having 2 fold higher IFA serum titers ($P < 0.01$) for Corona virus. There were no significant differences in serum titers or colostrum antibody concentrations for 2nd calf parity cows. SN assays yielded similar results to IFA assays for all parameters. Serum and colostrum antibody titers for 2nd parity cows were approximately double that of 3rd plus parity cows. This data suggests that the feed additive may have benefit in the restoration of the ability of older animals to initiate antibody production.

Key Words: antibody, vaccination, OmniGen-AF

314 Correlation between circulating white blood cell counts and level of protective immune response against bovine viral diarrhea virus elicited by a modified live vaccine. S. M. Falkenberg*[1], J. Ridpath[1], J. R. Tait[2], B. Vander Lay[1,2], and J. M. Reecy[2], *[1]USDA-ARS-National Animal Disease Center, Ames, IA, [2]Iowa State University, Ames.*

Two trials (T1 and T2) were conducted to examine the range of responses elicited against bovine viral diarrhea virus (BVDV) by vaccination with modified live vaccine (MLV) and to determine the level of response required for prevention of clinical disease. For T1, BVDV neutralizing (BVDV VN) titers were determined on 216 spring born beef calves (177.03 ± 30.05 kg BW) 20 d after the booster vaccination (49 d from initial vaccination) with a MLV. The presence of titers against BVDV was also measured using a commercial ELISA to determine if this method gave comparable results to VN titers. Trial 2 utilized 120 fall born beef calves (141.06 ± 29.43 kg BW) that followed the same vaccination protocol in T1, but an extra sample was obtained to determine circulating white blood cell counts (WBC) when blood samples were obtained for determination of antibody response. For T2, titers against BVDV were initially determined using the commercial ELISA. In both trials all calves were stratified into low, medium and high response groups based on standard deviations from the mean. Twelve calves, for each trial, were selected to represent 3 low, medium and high response groups. After selection, serum from selected calves was collected and evaluated for BVDV response by VN. VN values for the 3 groups (n = 4; low (titer <1/4), mid range (titer 1/4 to 1/16) and high (titer >1/16). Calves were moved to BL2 containment and challenged with a high virulence BVDV strain 101 d after the initial vaccination. Blood samples were collected on d −2, 2, 4, 6, 9, 11 and 13 post challenge to determine levels of circulating white blood cells, viral shed and levels of BVDV VN titers. While, overt respiratory or enteric disease was not observed in any of the calves, challenge did result in a decrease in circulating WBC in some animals. Calves in the high response T1 group (titers greater than 1/16) did not have significant decreases in WBC, but calves in the mid and low titer groups had a decrease in circulating WBC and lymphocytes on d 4 ($P < 0.05$). Because a correlation between WBC on day −2 and a protective response elicited by vaccination for the 12 calves in T1 was observed, WBC was determined for all 120 calves at booster vaccination in T2. Similar to the 12 calves in T1, a positive correlation was observed between WBC and level of BVDV antibodies as determined by ELISA for calves in T2. Results from these 2 trials provide evidence that there is a relationship between WBC and the response to vaccination. Further investigation before vaccination is warranted to discern if vaccination changes WBC or if WBC alter response to vaccination.

Key Words: cattle, titer, vaccine

315 Omnigen-AF restores GR-1, L-selectin, and RANTES expression by immunosuppressed murine PMN challenged with lipopolysaccharide in a MyD88-dependent manner. R. J. Ortiz-Marty[1], N. E. Forsberg[2], J. D. Chapman[3], and I. K. Mullarky*[1], *[1]Virginia Polytechnic Institute and State University, Blacksburg, [2]OmniGen Research LLC, Corvallis, OR, [3]Prince Agri Products Inc., Quincy, IL.*

Bovine mastitis costs the dairy industry billions of dollars every year and presents a health challenge in dairy operations. Immunosuppressive effects of the periparturient period result in an increased risk for mastitis. During this time, cattle experience an increase in circulating cortisol, which reduces neutrophil (PMN) function and ability to clear infection. OmniGen-AF is a feed additive that restores PMN function during periods of immunosuppression in cattle. Signaling pathways involved in restoring PMN function are undetermined. We hypothesized that OmniGen-AF restores PMN function through cross-regulation of TLR signaling. To test our hypothesis, wildtype or MyD88 knockout (KO) mice were unsupplemented or supplemented with OmniGen-AF in the diet, challenged with LPS, immunosuppressed with dexamethasone, or immunosuppressed with dexamethasone and challenged with LPS. PMN were isolated through intraperitoneal lavages and analyzed for gene expression profiles. Results indicate that LPS significantly ($P < 0.05$) upregulated GR-1, L-selectin, and RANTES (genes) in PMN isolated from wildtype mice as compared with immunosuppressed mice. Interestingly, LPS did not upregulate genes in PMN from supplemented wildtype mice as compared with supplemented wildtype immunosuppressed mice. LPS differentially induced genes in PMN from MyD88 KO mice as compared with PMN from supplemented MyD88 KO mice. These results suggest that OmniGen-AF supplementation restores the response of immunosuppressed PMN to LPS challenge and that the restorative role may be MyD88-dependent. Future research needs to determine the specific TLR, transcription factors, and biochemical properties of OmniGen-AF that restore gene expression in immunosuppressed PMN.

Key Words: immunity, neutrophil, OmniGen-AF