

housed. Treatment pairs were equally placed within each row, i.e., calves in stalls 1 and 2 were fed supplemental WPC/dry fat blend control (WPC), calves in stalls 3 and 4 were supplemented SDP/dry fat blend, and calves in stalls 5 and 6 were supplemented SDC. SDC contained 13% IgG and SDP/dry fat blend was formulated to also contain 13% IgG. Both SDC and WPC were 44.3% CP and 18.1% fat. To be formulated with 13% IgG and 18.1% fat, SDP had to contain 57.3% CP, resulting in SDP-fed calves receiving an additional 200 g of CP over the feeding period versus SDC or WPC. Calves experiencing FPT ( $< 5.5$  g/dL serum total protein) were 70.4, 76.2, and 83.3% of all calves in WPC-, SDP- and SDC-fed groups, respectively. The calves were fed formula and supplemented 25 g/feeding (2x/day) of the respective supplement wk 1, 15 g/feeding wk 2, 10 g/feeding wk 3 through 5, 5 g/feeding wk 6 and 7, and 2.5 g/feeding wk 8 through 20, when slaughtered. Accounting for total solids intake, calves were started on a 25:18 (CP:Fat), increased to 871 g/day of a 21:18 by 21 d age (medicated to d 21) and 1742 g per day of a 20:18 by 53 d age. Calves received no dry feed. Data was analyzed using F-test for variances and student *t* test comparing two means. Calves fed additional SDP outgained ( $P < 0.05$ ) WPC by +2.52 kg d 1 through 53 (SDC was intermediary). SDC tended ( $P < 0.077$ ) to outgain WPC by +8.57 kg d 53 through 140 (SDP was intermediary). SDP and SDC reduced incidences of refusals ( $P < 0.05$ ). SDC tended ( $P < 0.082$ ) to reduce the number of calves treated versus SDP (WPC intermediary). SDC and SDP improved intake. SDP improved 53-d gains.

**Key Words:** calf, colostrum, plasma

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**0857 (T004) Holstein calves fed non-saleable milk that was pasteurized or raw had decreased incidence of abnormal feces and hematology measures than calves fed accelerated milk replacer.** L. E. Hulbert<sup>1</sup>, J. A. Noel<sup>2</sup>, S. C. Trombetta<sup>1</sup>, S. R. Montgomery<sup>1</sup>, G. A. Hanzlicek<sup>3</sup>, and B. J. Bradford<sup>1</sup>, <sup>1</sup>Dep. of Animal Sciences and Industry, Kansas State University, Manhattan, <sup>2</sup>Kansas State University, Manhattan, <sup>3</sup>Diagnostic Medicine Pathobiology, College of Veterinary Medicine, Kansas State University, Manhattan.

The objectives were to determine the health and blood parameters before, during, and after weaning of 114 Holstein heifers fed either accelerated milk-replacer (Mrp; 28% CP, 18% fat) or non-saleable milk ( $3.59 \pm 0.28\%$  True-Protein;  $4.12 \pm 0.37\%$  fat) that was either pasteurized (Pst) or raw (Raw; refrigerated and fed  $< 24$  h after collection). Calves were randomly assigned feeding treatments at age 0 d. Colostrum (1 L) was fed in less than 14 h after birth (Mrp and Pst = pasteurized colostrum; Raw = raw colostrum). All calves were bottle-fed  $1.8 \pm 0.20$  SD L, 3x/day; all calves were provided fresh water and grain ad libitum throughout the experiment. Calves began step-down weaning at age 5 wk and completed weaning at

age 6 wk. Blood samples were collected at ages 3, 5, and 7 wk and were analyzed for complete blood counts (CBC) using a Procyte Idexx Analyzer. In addition, whole blood was tested for bactericide capacity against live *E. coli* 51813 (%Bact). Fecal scores were observed twice daily, on a 1-to-3 scale (FS1 = normal, FS2 = loose, FS3 = scours). The Mrp-fed calves had more ( $P < 0.01$ ) observations (% obs) with FS2 than the Pst- and Raw-fed calves ( $13.2$  vs.  $7.32$  and  $8.9 \pm 0.69\%$  obs, respectively), although there were few scouring (FS3;  $0.36 \pm 0.01\%$  obs) incidences in this experiment. Likewise, Mrp-fed calves had greater hematocrit % compared to the other calves ( $P < 0.01$ ), but Pst- and Raw-fed calves had similar hematocrit % ( $32.4$  vs.  $27.9$  and  $28.4 \pm 0.55\%$ , respectively). At age 3 wk, Mrp-fed calves had greater circulating monocytes ( $P = 0.02$ ) compared to the other calves, but there were no differences between Pst- and Raw-fed calves ( $10.4$  vs.  $9.2$  and  $8.2 \pm 0.40\%$ , respectively). Although there were no differences among treatments for % Bact or other hematological measures ( $P > 0.10$ ), all calves had lower neutrophil:lymphocyte, more circulating monocytes and greater % Bact at age 7 wk compared to ages 3 and 5 wk ( $P < 0.05$ ), suggesting that the change in diet from milk or MR to grain influences innate immune and hematological measures. The increased incidence of abnormal fecal scores among Mrp-fed calves and higher hematocrit percentages needs further consideration, especially before age 3 wk. In addition, these findings suggest that raw milk may be adequate for maintaining healthy CBC and fecal score measures on a well-managed, low-disease incidence dairy.

**Key Words:** milk replacer, pasteurization, calves, hematology

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**0858 (T005) Effects of Celmanax supplementation to prepartum dairy cows on colostrum quality and the subsequent growth and health of their calves.** C. Campos-Granados<sup>1</sup>, A. Rojas-Bourrillon<sup>1</sup>, and C. C. Elrod<sup>2</sup>, <sup>1</sup>University of Costa Rica, San Jose, <sup>2</sup>Vi-COR, Inc., Mason City, IA.

The objective of this study was to assess the effects of supplementing prepartum dairy cows with a product derived from yeast culture and enzymatically hydrolyzed yeast cell wall (Celmanax (CEL), Vi-COR Mason City, IA) on colostrum quality and the subsequent health and performance of their calves. Thirty prepartum multiparous Jersey cows were blocked by parity, body condition 21 d before expected calving date and productive and reproductive performance, and randomly assigned within block to one of two treatments ( $n = 15$ ) from 21 d before expected calving date until calving. Rations were top-dressed with CEL at the rate of 0 or 40 g/d throughout the experiment. Calves were fed 3 L of colostrum from their dam within 2 h of birth and then 4 L of whole milk daily through wk 8. Total Ig in colostrum from each cow was evaluated at 25°C from the first milking with a Colostrometer, and a sample was taken for determination of IgG by ELISA.

Approximately 48 h after birth, a blood sample was drawn by venipuncture from each calf for the determination of serum protein by refractometer and IgG by ELISA. Daily feed intake, weekly weight and hip height, and the incidence of pneumonia and scours were recorded. Data were analyzed using mixed models with repeated measures over time. Total Ig in colostrum was significantly increased by CEL treatment ( $P < 0.05$ ;  $90.06 \pm 23.74$  vs.  $105.94 \pm 17.59$  mg/mL for 0 and 40 g/d, respectively) but there was no effect on colostrum yield or IgG content ( $P > 0.05$ ). There was no effect of treatment on birth weight, serum protein, or serum IgG ( $P > 0.05$ ). Average daily gain ( $382.86 \pm 61.20$  vs.  $410.94 \pm 51.22$  g/day for 0 and 40 g/day, respectively), hip height increase ( $1.45 \pm 0.33$  vs.  $1.70 \pm 0.31$  cm/week for 0 and 40 g/d, respectively), and feed consumption ( $446.67 \pm 9.92$  vs.  $439.01 \pm 6.12$  g/day for 0 and 40 g/d, respectively) were not affected by treatment ( $P > 0.05$ ). Odds ratios were calculated and the odds of a calf presenting with scours or pneumonia were 3.5 and 5.0, respectively, times more likely in the calves whose dams did not consume CEL prepartum. CEL supplementation prepartum improved colostrum quality and calf health.

**Key Words:** immunity, transition cow, calf, health, yeast culture.

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**0859 (T006) Maternal energy status during mid-gestation affects the immune response in the resultant beef offspring.**

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Fetal or developmental programming relates the effects of maternal stressors on the developing fetus and potential consequences later in life. Specifically, beef cattle may experience decreased forage availability and quality during gestation, potentially altering nutrient availability and ultimately fetal development. Immune function has major economic implications in the beef industry; however, the understanding of maternal environment on development of the immune system in beef offspring is limited. Therefore, the objective of this study was to determine the effects of maternal energy status during mid-gestation on humoral immune response and tissue morphology of immunologically relevant tissues in beef offspring during the feedlot phase. Beef cows were allotted to one of two treatments: 1) Positive Energy Status (PES;  $n = 76$ )-fed to maintain BCS 5.0–5.5; or 2) Negative Energy Status (NES;  $n = 75$ )-fed to lose 1 BCS over the ensuing 91-d mid-gestation period ( $84 \pm 11$  d). Following treatment, cows were commingled and managed as a common group through weaning. Calves were weaned, shipped, and allotted into feedlot pens according to gender, dam energy status, and stratified

by weight. A subsample ( $n = 30$ ) of calves were subcutaneously injected with 4 mg ovalbumin antigen at d 0 of antigen challenge and again on d 28 of antigen challenge, with blood collected every 7 d from d 0 through d 56 to measure antibody titers. An ELISA was used to determine serum antibody titers in response to the ovalbumin challenge. Additionally, a subsample of calves were harvested following the receiving ( $n = 12$ ) and finishing period ( $n = 12$ ) for histological examination with hematoxylin and eosin stain of lymph nodes, spleen tissue, and gut-associated lymphoid tissue. Ovalbumin data were analyzed as a repeated measures model using the PROC MIXED of SAS (SAS Inc., Cary, N.C.). No morphological differences were observed in tissues. There were no differences ( $P > 0.05$ ) in gender main effects in response to a novel antigen. An anamnestic response was observed over time ( $P < 0.05$ ), which was expected following second exposure to the antigen. There was a difference ( $P < 0.05$ ) between treatments over the sampling period with calves from PES cows having a greater antibody titer of 13.44 compared to calves from NES cows with an antibody titer of 12.38. These results suggest cows in a NES during mid-gestation produce calves with a decreased ability to produce antibodies to a novel antigen and thus a decreased humoral immune response.

**Key Words:** cattle, fetal programming, immunology

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**0860 (T007) Comparison of ivermectin and extended-release eprinomectin deworming treatment on stocker and subsequent feedlot performance and carcass characteristics of fall-born Angus heifers.**

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The objective of this study was to compare the effects of ivermectin and extended-release eprinomectin on stocker and feedlot performance as well as carcass characteristics. Sixty purebred, fall-born Angus heifers ( $277 \pm 23$  kg BW;  $4.90 \pm 0.34$  BCS) were blocked by BCS and BW, and allotted to one of two injectable deworming treatments after 35 d of grazing summer pasture: 1) ivermectin (Ivomec; IVO), or 2) extended-release eprinomectin (LongRange; LR). Concurrent fecal samples were taken at treatment initiation. Heifers were placed back on the same pasture until the pasture was no longer suitable for grazing (total of 63 d). Interim BW was taken 27 d after treatment initiation, and fecal samples, BW, and BCS were taken at grazing termination. At grazing termination, heifers were transported to a feedlot where they remained commingled and fed a finishing ration for 150 d. Upon arrival, heifers were stratified by BW within grazing treatment and allotted to either receive (Ivomec; DWRM) or not receive a deworming treatment at processing (NO). Fecal samples were collected 4 d before transport for slaughter. Carcass data were collected by the Tri-County Steer Carcass Futurity. Binary