T90 Evaluation of passive transfer of calves receiving maternal colostrum or colostrum replacer. A. P. Silva1, A. F. Toledo1, A. M. Cezar1, M. Poczyniak1, M. G. Coelho1, M. D. Silva1, M. Campos2, and C. M. M. Bittar1, 1Department of Animal Sciences, College of Agriculture Luiz de Queiroz (ESALQ), University of Sao Paulo, Piracicaba, SP, Brazil, 2Department of Clinical Research, The Saskatoon Colos- trum Company Ltd., Saskatoon, Canada.

Failure of passive immunity transfer (PIT) remains a major problem in dairy production. Therefore, commercially available colostrum replacers have emerged to mitigate this deficiency. Literature suggests that consumption of levels of IgG, beyond that needed to prevent PIT, may improve calf health and performance. Fifty calves were blocked according to sex, birth weight and date of birth and were distributed among different colostrum feeding protocols: 2MC: 2L of maternal colostrum (MC); 4MC: 4L of MC; 2MC1CR: 2L of MC + one dose of colostrum replacer SCCL (100 g IgG) all given at birth; 2CR: 2 doses of colostrum replacer (CR) SCCL (200 g IgG) given at birth; 3CR: 2 doses of CR SCCL (200 g IgG) given at birth + one dose of CR SCCL (100 g IgG) given between 6 and 8 h after birth. Calves received starter (24.6% of CP; 5.22% of CF; 13.89% of NDF and 46.57% of NFC as-fed) and water free-choice and were fed 6 L/d of milk replacer (22.44% of CP, 16.2% of CF and 14% of solids) until 56 d of age. The apparent efficiency absorption (AEA) was calculated using the following equation: AEA IgG (g) = [(serum IgG g/L 24 h − serum IgG g/L birth) × birth weight kg] / 0.09 g IgG intake (g), where: 0.09 = plasma volume of 9% of BW at birth. Protocols affected Ig intake and AEA (P < 0.01), but did not influence serum IgG or total serum protein at 48 h (P > 0.05). Increasing Ig intake with higher volumes of MC or CR decreased AEA. There were no differences on performance or health among the different colostrum feeding protocols. The ADG (kg) was also not affected by colostrum protocols (2MC = 0.29; 4MC = 0.24; 2Mc1CR = 0.25; 2CR = 0.25 and 3CR = 0.21; P > 0.05). However, calves from all protocols had low ADG, which can be explained by the milk replacer composition and the history of Cryptosporidium infection in the herd. The CR fed in the study may be an alternative to MC. However, while all treatments resulted in excellent levels of passive transfer the potential benefits of increasing the amounts of colostrum (>200 g IgG) with either MC or CR were not perceived in this short-term study.

Key Words: health, IgG, newborn

T91 Effect of feeding transition milk on growth and health of dairy calves. B. Van Soest1*, F. Cullens2, M. VandeHaar1, and M. Weber-Neilsen1, 1Michigan State University, East Lansing, MI, 2Michigan State University Extension, St. John, MI.

Transition milk (TM, defined as milk from the 2nd through 4th milkings after calving) supplies additional fat, protein and immunoglobulins to the calf compared with traditional milk replacer. Our objective was to determine if feeding TM on d 2 through 4 of life increases growth rate and overall health of calves. Starting on d 1 of life, Holstein heifer calves on a commercial farm were fed 1 of 3 diets (n = 35/diet): milk replacer (MR), transition milk (TM), and a 1:1 by weight mix of milk replacer and colostrum replacer (MR+CR, positive control). Transition milk was harvested from Holstein cows on the farm, pooled and pasteurized at 161°F for 15 s. Nutrient composition of TM was 3.79% fat, 6.10% protein, and 14% solids. MR and MR+CR were administered at 14 and 15% solids respectively. Over a 4-mo period from June through September, newborn calves were blocked by age and assigned to 1 of 3 treatments. All calves received colostrum replacer for the first 2 feedings after birth. Subsequently, calves were fed 1.9 L of MR, TM or MR+CR 3 times per day for 3 d. After treatments were complete at d 4 of age, calves were fed and managed similarly. Body weights, blood samples and daily health scores (scale of 0 to 3) were collected through weaning at 56 d of age. All but one calf achieved successful passive transfer of immunity with serum IgG values over 10.0 mg/ml. Daily BW gain for the first 3 wk of life was 0.41, 0.49, and 0.45 kg/d for MR, TM, and MR+CR groups respectively; thus, calves fed TM and MR+CR gained 0.06 kg/d more than those fed MR (P = 0.06) with no difference for MR+CR compared with TM. From birth through weaning, calves fed TM and MR+CR calves tended to gain 2.5 kg more total BW than those fed MR (34.3, 33.9, and 31.6 kg, respectively; P = 0.06). When comparing MR with TM and MR+CR, treatment did not alter health scores for ears (0.11, 0.14, and 0.12 MR, TM, and MR+CR, respectively; P = 0.55), eyes (0.03, 0.007, 0.019; P = 0.15), and feces (0.30, 0.37, 0.35; P = 34). In conclusion, feeding transition milk for 3 d after first colostrum increased growth rate of calves throughout the
Supplementation of rumen-protected choline (RPC; ReaShure, Balchem Corp., New Hampton, NY) during late-pregnancy in Holstein cows improves development of the offspring’s immune system and growth. Here we evaluated if RPC concurrently altered the systemic metabolome. Twenty-four Holstein heifers born to cows fed a basal diet [1.59 Mcal/kg DM, 15.8% CP, 2.9% methionine (% MP) and a lysine to methionine ratio of 2.6] without (control) or with RPC (last 21 d of gestation at a rate of 60 g/d) were used. Immediately after birth whole blood samples were taken and stored at −20°C. Global metabolomics profiling was performed on a Thermo Q-Exactive Orbitrap mass spectrometer with Dionex UHPLC and autosampler. All samples were analyzed in positive and negative heated electrospray ionization with a mass resolution of 35,000 at m/z 200 as separate injections. Separation was achieved on an ACE 18-pfp 100 × 2.1 mm, 2-μm column with mobile phase A as 0.1% formic acid in water and mobile phase B as acetonitrile. This is a polar embedded stationary phase that provides comprehensive coverage, but does have some limitation is the coverage of very polar species. The flow rate was 350 μL/min with a column temperature of 25°C. A total of 7745 molecular features were detected of which 356 peaks with putative identification represent 305 unique metabolites, including amino acids, benzoic acids, lipid molecules, carbohydrates, purines, pyrimidines, vitamins, and other intermediate and secondary metabolites. Statistical analysis was performed using the Mixed procedure of SAS for molecular features with putative identification represent 305 unique metabolites. In dams, supplementary B vitamins increased colostrum B8 from 35 to 298 ± 23 ng/mL and calf plasma B8 from 1.0 (95% confidence interval (CI):0.8–1.2) to 8.1 (CI:6.7–9.7) ng/mL (P ≤ 0.01). Supplementary B9B12 increased colostrum B9, from 673 to 1,094 ± 52 ng/mL, colostrum B12, from 29 to 58 ± 3 ng/mL, calf plasma B9 from 16 to 30 ± 2 ng/mL (P < 0.01) and tended to increase (P = 0.09) calf plasma B12 from 0.8 (CI:0.5–1.1) to 1.2 (CI:0.9–1.7) ng/mL (P < 0.01). Calves born from dams receiving the B9B12 supplement were heavier (50 vs. 44 ± 1 kg; P < 0.01); B8 supplement did not affect calf weight (P ≥ 0.14). The B8 supplement increased colostrum B8 from 35 to 298 ± 23 ng/mL and calf plasma B8 from 1.0 (95% confidence interval (CI):0.8–1.2) to 8.1 (CI:6.7–9.7) ng/mL (P ≤ 0.01). Supplementary B9B12 increased colostrum B9, from 673 to 1,094 ± 52 ng/mL, colostrum B12, from 29 to 58 ± 3 ng/mL, calf plasma B9 from 16 to 30 ± 2 ng/mL (P < 0.01) and tended to increase (P = 0.09) calf plasma B12 from 0.8 (CI:0.5–1.1) to 1.2 (CI:0.9–1.7) ng/mL (P < 0.01). Calves born from dams receiving the B9B12 supplement were heavier (50 vs. 44 ± 1 kg; P < 0.01); B8 supplement did not affect calf weight (P ≥ 0.14). The B8 supplement increased colostrum B8 from 35 to 298 ± 23 ng/mL and calf plasma B8 from 1.0 (95% confidence interval (CI):0.8–1.2) to 8.1 (CI:6.7–9.7) ng/mL (P ≤ 0.01). Supplementary B9B12 increased colostrum B9, from 673 to 1,094 ± 52 ng/mL, colostrum B12, from 29 to 58 ± 3 ng/mL, calf plasma B9 from 16 to 30 ± 2 ng/mL (P < 0.01) and tended to increase (P = 0.09) calf plasma B12 from 0.8 (CI:0.5–1.1) to 1.2 (CI:0.9–1.7) ng/mL (P < 0.01). Calves born from dams receiving the B9B12 supplement were heavier (50 vs. 44 ± 1 kg; P < 0.01); B8 supplement did not affect calf weight (P ≥ 0.14). Further studies are needed to evaluate if the increase in calf birth weight when a B9B12 supplement was given to cows in late gestation could be due to an epigenetic effect as reported for other species.

Key Words: biotin, folic acid, cobalamin