550 Effects of trace mineral source on oxidative metabolism, subclinical endometritis, and performance of transition dairy cows. T. Yasui*[1], C. M. Ryan[1], R. O. Gilbert[1], K. Perryman[2], and T. R. Overton[1], *[1]Cornell University, Ithaca, NY, [2]Micronutrients Inc., Indianapolis, IN.*

Multiparous Holstein cows (n = 60) were used to determine effects of trace mineral source on oxidative metabolism, subclinical endometritis, and performance of transition cows. After a 1-wk preliminary period, cows were assigned randomly to one of 3 topdress treatments from 21 d before expected calving through 84 d post calving: 1) Inorganic sources based upon sulfates of Zn, Cu, and Mn (ITM); 2) a blend (75:25) of sulfates and chelated sources of Zn, Cu, and Mn (ITM/OTM); and 3) Hydroxy Trace Minerals (HTM) of Zn, Cu, and Mn (IntelliBond; Micronutrients, Inc., Indianapolis, IN). Final concentrations of Zn, Cu, and Mn were similar among treatments and averaged 40, 10, and 27 ppm before calving and 59, 15, and 40 ppm after calving. An interaction of treatment and week existed ($P = 0.02$) for milk yield such that cows fed HTM increased milk yield faster than cows fed the other 2 treatments; a similar interaction was also present for yields of fat-corrected milk ($P = 0.03$) and lactose ($P = 0.05$). Cows fed HTM during the prepartum period tended ($P = 0.08$) to have higher body weight and had higher body weight during the postpartum period ($P = 0.04$) than those fed the other 2 treatments. Plasma antioxidant capacity was lower in cows fed HTM than ITM during both prepartum (1.84 vs. 2.09 mM; $P = 0.03$) and postpartum (1.95 vs. 2.16 mM; $P = 0.04$) periods; cows fed ITM/OTM had intermediate values. Cows fed HTM tended to have lower concentrations of plasma thiobarbituric acid reactive substances than those fed ITM during whole study period (1.95 vs. 2.11 μM; $P = 0.07$). Endometrial cytology as characterized by low volume uterine lavage at 7 d postcalving and on one day between 40 and 60 d post calving was not affected by treatment. In conclusion, supplementation with HTM sources of Zn, Cu, and Mn resulted in evidence of improved productive performance during early lactation along with modulation of plasma variables related to oxidative metabolism.

Key Words: trace minerals, oxidative status, subclinical endometritis

551 Effects of essential oils on methane production, fermentation, abundance and diversity of rumen microbial populations. A. Patra[1,2] and Z. Yu*[1], *[1]The Ohio State University, Columbus, [2]West Bengal University of Animal and Fishery Sciences, Kolkata, India.*

Five essential oils (EO), namely, clove oil (CLO), eucalyptus oil (EUO), garlic oil (GAO), origanum oil (ORO) and peppermint oil (PEO) were tested in vitro using 3 replicates at 3 different doses (0.25, 0.50 and 1.0 g/L) for their effect on methane production, fermentation, and select groups of ruminal microbes, including total bacteria, cellulolytic bacteria, archaea and protozoa. All the data were analyzed using the mixed model procedure of SAS. All the EO significantly ($P < 0.01$) reduced methane production with increasing doses, with a reduction by 34.4%, 17.6%, 42.3%, 87% and 25.7% for CLO, EUO, GAO, ORO and PEO, respectively, at 1.0 g/L compared with the control. However, apparent degradability of dry matter (DM) and neutral detergent fiber (NDF) also decreased linearly ($P < 0.01$) with increasing doses by all EO except GAO. The concentration of total volatile fatty acids (VFA) was not affected ($P > 0.05$) by GAO, EUO or PEO, but altered linearly and quadratically ($P < 0.01$) by CLO and ORO. All the EO also differed in altering the molar proportion of acetate, propionate, and butyrate. As determined by qPCR, all the EO decreased the abundance of archaea, protozoa, *Fibrobacter succinogenes*), *Ruminococcus flavefaciens* and *Ruminococcus albus*) linearly ($P < 0.01$) with increasing EO doses. Based on DGGE analysis, different EO changed the composition of both archaeal and bacterial communities to different extents. The Shannon-Wiener diversity index (*H'*) was decreased for archaea by all EO in a dose-dependent manner, but increased for bacteria at low and medium doses (0.25 and 0.50 g/L) for all EO except ORO. Due to the adverse effects on feed digestion and fermentation, a single EO may not effectively mitigate methane emission from ruminants unless used in combinations.

Key Words: essential oils, methane, microbes

552 Effect of dietary fat and Rumensin on ruminal bacteriome revisited using metagenomic analysis. M. Kim[1], M. Morrison[2,1], M. Eastridge[1], and Z. Yu*[1], *[1]The Ohio State University, Columbus, [2]CSIRO Livestock Industries, St Lucia, QLD, Australia.*

Monensin and dietary fats have been used to improve feed efficiency and to reduce methane production. However, the effect of these dietary manipulations on ruminal bacterial community (bacteriome) has not been examined in detail. The objective of this study was to examine and compare the effects of dietary addition of monensin alone (as Rumensin, 12 g/ton TMR) or monensin plus fat (4% supplemental) on ruminal bacteriome in lactating dairy cattle. Ruminal bacteriomes in the liquid and adherent fractions were analyzed using 454 pyrosequencing analysis. In total, 56,160 non-chimeric 16S rRNA gene (rrs) sequences were obtained. Most of the sequences were assigned to phyla *Firmicutes* and *Bacteroidetes*, irrespective of fractions. *Firmicutes* was more abundant in the adherent fraction than in the liquid fraction, while *Bacteroidetes* was less abundant in the adherent fraction than in the liquid fraction. Gram-positive *Firmicutes* was not affected by monensin. Two minor phyla, TM7 and SR1, were highly sensitive to monensin. In total, 13,041 species-level OTUs were identified from the 56,160 sequences across all the fractions. However, only 65 of them were represented by more than 30 sequences. Only 5 *Firmicutes* OTUs among the predominant OTUs were sensitive to monensin. On the other hand, 12 *Firmicutes* OTUs, most assigned to the family *Ruminococcaceae*, were stimulated by the combination of monensin and fat. These OTUs may be involved in lipolysis or biohydrogenation. These results suggest that some gram-positive rumen bacteria are not inhibited by monensin and that the interaction between monensin and fat can have an effect on rumen bacteriome.

Key Words: fat, monensin, rumen bacteriome

553 Effect of dietary potassium on water intake and rumen dynamics. S. E. Fraley*[1], M. B. Hall[2], and T. D. Nennich[1], *[1]Purdue University, West Lafayette, IN, [2]USDA-ARS, Madison, WI.*

Water is a critical nutrient for dairy cows, though little work has looked at the effects of water intake on rumen parameters. The objective of this study was to evaluate the effect of water intake on rumen parameters and determine effects of increased dietary K on water intake in dairy cows. Potassium carbonate was added to the diets of 9 ruminally cannulated, late lactation Holstein cows (207 ± 12 DIM) that were randomly assigned to 1 of 3 treatments in a replicated 3 × 3 Latin square design with 18-d periods. Dietary treatments (on a DM basis) were baseline

dietary K levels of 0.94% dietary K (Control), 0.75% added dietary K (LowK), and 1.5% added dietary K (HighK). Cows were fed treatment diets for a 14-d adaption period followed by a 4-d collection period. Total rumen evacuations were conducted on d 4 of the collection period. Weights of rumen contents were recorded and subsamples were dried. Rumen fluid samples were collected to determine volatile fatty acids (VFA) and NH_3 concentrations. Milk samples were collected twice daily during the collection period. Data were analyzed using PROC MIXED of SAS with linear and quadratic contrasts. Milk, milk fat and protein yields showed quadratic responses ($P = 0.001$, 0.01 and 0.001, respectively) with greatest yields for LowK. Dry matter intake had a quadratic response ($P < 0.001$) with 21.8 kg/d for LowK and 20.4 and 20.5 kg/d for Control and HighK, respectively. Water intake showed a linear relationship with HighK being the greatest (102.4, 118.4 and 129.3 L/d, $P = 0.001$). Total and wet weight of rumen contents declined linearly ($P = 0.01$ and 0.01, respectively) and dry weight tended ($P = 0.09$) to decline linearly for LowK and HighK. There was a negative linear relationship for rumen NH_3 concentrations for LowK and HighK ($P = 0.004$). Concentrations of acetate as a percentage of total VFA linearly increased for LowK and HighK ($P = 0.002$), while concentrations of propionate declined ($P = 0.003$) as percentage of total VFA. Increasing dietary K in the diets of lactating dairy cows increased water consumption and rumen ammonia concentrations, while decreasing total water weight in the rumen.

Key Words: dairy cow, potassium, water intake

554 Effects of rumensin in lactating dairy cow diets with differing starch levels. M. S. Akins*[1], K. L. Perfield[2], H. B. Green[2], and R. D. Shaver[1], *[1]Department of Dairy Science, University of Wisconsin-Madison, Madison, [2]Elanco Animal Health, Greenfield, IN.*

The objective of this study was to determine the effects of Rumensin on lactation performance in either reduced (RS) or normal (NS) starch diets. One hundred and 28 Holstein and Holstein × Jersey cows (90 ± 33 DIM) were stratified by breed and parity and randomized to 1 of 16 pens, each with 8 cows. Pens were then randomly assigned to 1 of 4 treatments in a 2 × 2 factorial arrangement of treatments. The RS and NS diets contained 20.4 and 26.9% starch (DM basis), respectively. A 4 wk covariate adjustment period preceded the treatment period with all pens receiving the NS diet with 18 g/ton Rumensin (NSR). Following the 4 wk covariate adjustment period, study animals were fed their assigned treatment diets of either NSR, NS with 0 g/ton Rumensin (NSC), RS with 18 g/ton Rumensin (RSR), or RS with 0 g/ton Rumensin (RSC) for 12 wk. Mean DMI (27.0 kg/d) was not affected by Rumensin, starch or their interaction. Inclusion of Rumensin, as well as feeding the NS diet, increased ($P = 0.01$) milk yield by 1.3 and 1.5 kg/d per cow, respectively. Feeding the NS diet compared with the RS diet increased ($P < 0.02$) milk protein percent and yield and lactose and SNF yields while decreasing ($P < 0.01$) MUN. Rumensin increased ($P < 0.05$) all measures of milk production efficiency (MPE; milk yield/DMI) as well as lactose yield and tended ($P = 0.06$) to increase SNF yield and MUN. Rumensin decreased ($P = 0.02$) milk protein percent, but did not affect protein yield, milk fat percent or yield, and lactose or SNF percentages. There was a tendency ($P = 0.08$) for a starch by Rumensin interaction for MPE such that Rumensin inclusion tended to increase MPE more for NS versus RS diets. Feeding RS diets reduced milk and protein yields, but had similar component-corrected milk yields and efficiencies when compared with NS diets. Rumensin improved MPE and lactation performance when added to both RS and NS diets.

Key Words: lactating cow, rumensin, starch

555 Feeding blood meal or two rumen-protected lysine sources in early lactation dairy cows and the effect of withdrawal on production parameters. J. E. Nocek*[1] and I. Shinzato[2], *[1]Spruce Haven Farm and Research Center, Auburn, NY, [2]Ajinomoto Heartland Inc., Chicago, IL.*

Seventy-two multiparous cows were used to examine the effects of feeding rumen-protected lysine (RPL) sources or blood meal from wk 4 through 7 postpartum and then withdrawing them. All cows entered the individual tie stalls on d 14 ± 3 postpartum and received the Control diet through d 21 ± 3. Cows were balanced across treatments based on wk 3 postpartum milk production. In addition the information obtained during wk 3 was used as a covariate in the statistical analysis. Cows were assigned to one of 4 subsequent treatments: C: Control, BM: C with blood meal, AP: C with AjiPro-L (Ajinomoto Co., Inc.), and AS: C with AminoShure-L (Balchem Corporation). Manufacturer suggested bioavailabilities were used for RPL sources. Metabolizable Lys supply calculated by CPM Dairy was 153.1, 166.1, 166.8, and 166.8 g/d, for C, BM, AP, and AS, respectively. Cows remained on their treatment for 4 weeks (4–7 wk postpartum, phase 1). From wk 8 through 11 postpartum (Withdrawal, phase 2) all cows again received the Control ration. Individual dry matter intake (DMI) and milk yield was measured daily, and milk components were measured weekly. Body weights and BCS were recorded on d 21, 49 and 77 postpartum. During phase 1, AP showed higher ($P < 0.01$) milk yield compared with C, BM and AS. FCM was increased ($P < 0.01$) in AP compared with C and AS. Milk/DMI efficiency was higher for AP than AS. Milk fat yield was higher ($P < 0.01$) for AP than AS or C, whereas protein yield was highest ($P < 0.01$) for AP compared with other treatments. Milk fat percentage was highest ($P < 0.01$) for BM compared with C, with AP and AS being intermediate. Milk protein percentage was not affected by lysine supplementation. During phase 2, ECM yield was higher ($P < 0.01$) for AP compared with C, BM and AS. However, cows in AP treatment demonstrated the most dramatic drop in milk post withdrawal (1 kg from wk 5–6 on trial) compared with BM or AS. There was no effect of treatment on body weights or BCS. These results demonstrate that not all RPL sources perform in a similar fashion in early lactation cows.

Key Words: rumen-protected lysine, milk production, early lactation

556 Evaluation of dietary betaine (BET) in heat-stressed Holstein cows in lactation. L. W. Hall*[1], F. R. Dunshea[2], J. D. Allen[1], A. Wood[1], S. D. Anderson[1], S. Rungruang[1], J. L. Collier[1], N. M. Long[1], and R.J. Collier[1], *[1]The University of Arizona, Tucson, [2]The University of Melbourne, Parkville, Vic, Australia.*

Betaine, a natural, organic osmolyte may reduce cellular work and improve efficiency and act as a chaperone, refolding denatured proteins. To test if dietary BET reduced the effect of heat stress, multiparous, lactating Holstein cows (n = 23) were blocked (n = 101.4 ± 8.6 DIM) and randomly assigned to one of 3 diets of BET; control (CON) group no BET, mid dose (MID) cows (57 mg of BET / kg BW), and high dose (HIGH) was (114 mg of BET / kg BW). Cows were fed twice daily and treatments were top-dressed at each feeding. Cows were milked 2 times/ d and milk samples and were taken daily for analysis. Milk components, yield, feed intake, and water intake records were taken daily. Temperature and respiration rates were taken 3 times/ d at 0600, 1400, and 1800. Cows were housed in environmentally controlled rooms and following acclimation for 7 d the cows were subjected to cyclic thermal neutral (TN mean THI of 56.6) for 7 d and heat stress, represented by the Thermal Humidity Index (THI) (HS mean THI of 71.5) for 10 d. Temperature data loggers were inserted vaginally to read the last day of TN and the first 2 d of HS to follow body temperature

changes. Dietary BET increased milk yield and protein % during the TN period ($P < 0.01$). There were no differences between treatments in total milk production or % protein during HS. Feed and water intake decreased during HS with betaine treated (CON vs. MID, and CON vs. HIGH) cows ($P < 0.01$) with no difference in TN. The Con diets had higher pm HS respiration rates than both MID and HIGH treatments ($P = 0.04$, $P = 0.001$), but lower HS body temperature compared with BET treatments ($P < 0.05$). Vaginal temperatures were higher in BET treated cows and were highest in MID. We conclude that BET increased milk and protein production in TN conditions and was associated with reduced feed and water intake and slightly increased body temperatures during HS at the doses tested.

Key Words: betaine, dairy cow lactation, heat stress

557 Effect of dietary phytate on phosphorus digestibility in dairy cows. P. P. Ray* and K. F. Knowlton, *Virginia Polytechnic Institute and State University, Blacksburg.*

The objective was to evaluate the effect of dietary phytate P (Pp) supply on ruminal and post-ruminal Pp digestion and net disappearance of P from lower digestive tract of lactating cows. Six ruminally and ileally cannulated crossbred lactating cows were used in 2 incomplete Latin squares with 4 21-d periods (17 d of diet adaptation, 4 d of total collection). Dietary treatments were low Pp, medium Pp, and high Pp, and a high inorganic P (Pi) diet with the same total P content as the highest phytate diet but with P mostly from inorganic sources. The diets contained 0.10, 0.18, 0.29 and 0.11% Pp and 0.43, 0.48, 0.54 and 0.52% total P on dry matter (DM) basis, with cottonseed meal used to increase Pp content. Ytterbium-labeled corn silage and Co-EDTA were used as particulate and liquid phase markers to measure omasal and ileal digesta flow. Omasal and ileal digesta were collected every 6 h on d 20 and 21 and rumen contents were collected on d 21. Samples were analyzed for total P (molybdovanadate yellow method), Pi (blue method), and Pp (high performance ion chromatography). Data were analyzed using PROC GLIMMIX in SAS. Polynomial contrasts were used to test the effect of increasing dietary Pp on intake, small and large intestinal disappearance, and fecal excretion, and to compare these measures in the high Pp and high Pi diets. Phytate P intake increased ($P < 0.05$) with increasing dietary Pp but dietary Pp did not influence ruminal Pp digestibility. Small intestinal total P disappearance decreased ($P < 0.05$) with increasing dietary Pp, but large intestinal disappearance of total P, Pi, and Pp were not affected by dietary Pp. Fecal DM increased linearly ($P = 0.002$) with increasing dietary Pp, as did fecal P excretion ($P < 0.05$). Dry matter digestibility was higher for high Pi than for high Pp ($P < 0.05$; 68.9 vs. 64.5%) but fecal DM was not affected by form of P. Fecal P excretion decreased ($P < 0.05$) when a portion of Pp was replaced with Pi (high Pi vs. high Pp) despite equal total P intake. In lactating cows phytate digestibility was not affected by phytate content but fecal P increased when P was from phytate rather than from inorganic sources.

Key Words: phytate, digestibility, dairy cow

558 Application of rumen-protected lysine to lower crude protein diets for lactating dairy cows. J. P. Pretz*[1], M. J. de Veth[2], R. S. Ordway[2], and M. J. Brouk[1], *[1]Kansas State University, Manhattan, [2]Balchem Corp., New Hampton, NY.*

The study objective was to evaluate the application of supplemental rumen-protected Lys (RP-Lys) to maintain milk production when reducing crude protein levels in diets of lactating dairy cows. Twelve lactating multiparous Holstein cows, averaging 129 DIM, 50.2 kg milk yield, 3.6% fat and 2.9% true protein were randomly assigned to one of 4 3x3 Latin squares. Each 14-d period had 11-d for adaptation followed by 3-d of data collection. Cows were offered one of 3 experimental treatment rations formulated with CPM Dairy (v3.0); Positive control (PC) — formulated to meet all nutrient requirements; Test diet (Test) — negative control diet formulated to meet nutrient requirements, except deficient in MP (approximately 200 g/d) and first limiting in Lys (approximately 10 g/d); and Test+RPL — same basal diet as negative control + RP-Lys to provide 14.5 g/d of MP-Lys. For Test+RPL, 45g of RP-Lys (AminoShure-L; containing 23.4g Lys) was top-dressed on the TMR once daily. The PC diet resulted in lower intake ($P = 0.03$) as compared with either the Test or Test+RPL diet. PC, Test, and Test+RPL cows averaged 42.6, 42.9, 43.6 kg/d of milk and 27.3, 28.4, 28.8 kg/d of DMI, respectively. Crude protein intake for the PC, Test, and Test+RPL diets were 4.83, 4.67, and 4.74 kg/d respectively. MUN decreased ($P < 0.01$) for cows on Test and Test+RPL diets as compared with PC diet (12.5, 12.5 and 14.9 mg/dL, respectively). Milk yield, milk components, milk component yields, FCM, ECM, SCM and production efficiencies (milk, ECM, SCM and FCM) did not differ ($P > 0.05$) among treatments. A post-study CPM evaluation using final chemical composition analyses of the feedstuffs and average production data from the animals predicted that diets supported more than 47 kg of milk and Lys was not limiting. Cows on the study produced slightly less milk; however, DMI was 5–8% more than predicted by initial formulations. Formulation accuracy of the MP and Lys deficient diet may have been improved if data had been available from an initial adjustment period measuring DMI, body weight, milk yield and milk composition.

Key Words: amino acids, dairy cattle, rumen-protected lysine

559 A meta-analysis of the effects of feeding yeast culture produced by anaerobic fermentation of *Saccharomyces cerevisiae*, on milk production of lactating dairy cows. G. D. Poppy*[1,2], A. R. Rabiee[3], I. J. Lean[3], W. K. Sanchez[2], K. L. Dorton[2], and P. S. Morley[1], *[1]Colorado State University, Fort Collins, [2]Diamond V, Cedar Rapids, IA, [3]SBScibus, Camden, NSW, Australia.*

The purpose of this study was to estimate the average impact of a commercially available yeast culture product on milk production and other production measures in lactating dairy cows through the use of a meta-analysis of random controlled trials. A total of 61 research publications (published journal articles, published abstracts, and technical reports) were identified through a review of literature provided by the manufacturer and search of published literature using 6 computer search engines. Thirty-six separate studies with a total of 67 comparisons met the criteria for inclusion in the meta-analysis. The fixed effect meta-analysis showed substantial heterogeneity for milk yield, ECM, 3.5% FCM, butterfat yield, protein yield and DMI. Sub-group analysis of the data set showed much less heterogeneity in peer reviewed studies versus, non-peer-reviewed abstracts and technical reports, and tended to show higher treatment effects. A random-effects meta-analysis showed an estimated weighted mean difference between treated and untreated cattle reported in peer-reviewed publications to be 1.18 kg/d (95% CI, 0.55 to 1.81), 1.61 kg/d (95% CI, 0.92 to 2.29), and 1.65 kg/d (95% CI, 0.97 to 2.34) for milk yield, 3.5% FCM and ECM respectively. Butterfat yield and protein yield for peer-reviewed studies increased 0.06 kg/d (95% CI, 0.01 to 0.10) and 0.03 kg/d (95% CI, 0.00 to 0.05). Dry matter intake was analyzed by the sub-groups early lactation (<70 DIM) and not-early lactation. The studies reported in peer-reviewed journals showed an increase in DMI between the treated and untreated cattle of 0.62 kg/d (95% CI, 0.21 to 1.02) for early lactation and a decrease DMI of 0.78 kg/d (95% CI, −1.36 to −0.21) for later lactation studies. These

findings provide strong evidence that this commercially available yeast culture product provides significant improvement in several important milk production parameters as evaluated in production settings typical for commercial dairies in North America.

Key Words: yeast culture, meta-analysis, lactating

560 Impact of feeding yeast culture under normal and SARA conditions in lactating dairy cows. S. Li*[1], E. Tesfaye[1], H. Khazanehei[1], M. Scott[2], I. Yoon[2], E. Khafipour[1], and J. C. Plaizier[1], *[1]University of Manitoba, Winnipeg, MB, Canada, [2]Diamond V, Cedar Rapids, IA.*

Eight rumen- and cecum-fistulated cows (42–90 DIM, 605 ± 60 kg BW) were used in a crossover design to examine the effects of a *Saccharomyces cerevisiae* fermentation product (SCFP) on production performance and rumen and hindgut fermentation during normal and sub-acute ruminal acidosis (SARA) conditions in lactating dairy cows. Each experimental period consisted of 4 wk of normal feeding followed by 1 wk of SARA challenge. During normal feeding, cows received a diet containing 42% concentrate, 28% corn silage and 30% alfalfa baleage (DM basis). A grain-based SARA challenge was conducted by replacing 22% corn silage in the diet with the same amount of pellets that contained 50% ground wheat and 50% ground barley. Treatment cows were supplemented with 14 g/d of SCFP (Original XPC, Diamond V) mixed with 140 g/d ground corn, and control cows received ground corn only. During wk 4 and 5 of each period, DMI and milk production were determined daily and milk samples were collected from 4 subsequent milkings; rumen pH was monitored continuously by indwelling rumen pH data loggers; rumen fluid, cecal digesta, feces, urine and blood samples were collected on Tuesdays and Thursdays. SARA challenge increased ($P < 0.01$) time that rumen pH stayed below 5.6 (11.1 vs. 311.1 min/d), decreased ($P < 0.01$) average rumen pH (6.33 vs. 5.94), DMI (21.9 vs. 20.1 kg/d) and 4% FCM (29.6 vs. 26.2 kg/d). SCFP did not affect measures of ruminal pH, DMI or FCM. An interaction between SCFP and SARA challenge was observed ($P < 0.09$) for milk fat concentration; 3.25, 2.71, 3.24, and 2.92% for Normal-Control, SARA-Control, Normal-SCFP and SARA-SCFP, respectively. The SARA challenge increased ($P < 0.05$) free LPS in rumen fluid (18,858 vs. 101,158 EU/mL), in feces (15,367 vs. 29,978 EU/mL), and tended to increase ($P = 0.08$) LPS in the cecum (18,235 vs. 30,549 EU/mL). SCFP tended to decrease ($P = 0.13$) ruminal LPS (54,438 vs. 35,043 EU/mL). The LPS-binding protein concentration in blood plasma was increased, (9.9 vs. 38.0 μg/mL, $P < 0.01$) by the SARA challenge, but was not affected by the SCFP. Results indicate that SCFP can alleviate milk fat depression and may reduce the production of ruminal LPS during grain-induced SARA.

Key Words: cow, SARA, yeast culture

561 Effects of chromium propionate supplementation during the periparturient period and early lactation on metabolism, performance, and subclinical endometritis in dairy cows. T. Yasui*[1], J. A. A. McArt[1], C. M. Ryan[1], R. O. Gilbert[1], D. V. Nydam[1], F. Valdez[2], and T. R. Overton[1], *[1]Cornell University, Ithaca, NY, [2]Kemin Industries, Des Moines, IA.*

Multiparous Holstein cows (n = 61) were used to determine effects of chromium propionate supplementation during the periparturient period and early lactation on metabolism, performance, and subclinical endometritis. After a 1-wk preliminary period, cows were assigned randomly to one of 2 treatments from 21 d before expected calving through 63 d post calving: 1) control (n = 31) and 2) chromium propionate (n = 30; Cr-Pro, KemTRACE Chromium Propionate, Kemin Industries, Des Moines, IA) administered by daily topdress at a rate of 8 mg/d of chromium. Evaluation of endometrial cytology by low volume lavage was determined on all cows at 7 d postcalving (1st lavage) and on one day between 40 and 60 d (2nd lavage) post calving. There was a tendency for increased DMI during the prepartum period in cows fed Cr-Pro (16.5 vs. 15.8 kg/d; $P = 0.07$). Cows fed Cr-Pro tended to have lower plasma NEFA during the prepartum period (184 vs. 211 μEq/l; $P = 0.08$). Effects of Cr-Pro supplementation on postpartum DMI and milk yield were not significant; however, cows fed Cr-Pro had higher somatic cell counts (275 vs. 160 × 1000/ml; $P = 0.04$) and tended to have higher urea nitrogen concentrations in milk (11.2 vs. 10.6 mg/d; $P = 0.08$) than controls. An interaction ($P = 0.05$) of treatment and day existed during the postpartum period such that cows fed Cr-Pro had lower plasma glucose concentrations immediately postpartum than controls. Cows fed Cr-Pro had lower incidence of subclinical endometritis for between 40 and 60 d using a cut-point of 10% neutrophils (30% vs. 57% of cows; $P = 0.04$). In conclusion, supplementation with chromium propionate resulted in trends for increased DMI and lower NEFA prepartum. Postpartum milk yield and DMI were not affected by treatment; however, Cr-Pro supplementation decreased the incidence of subclinical endometritis between d 40 and 60 postcalving, suggesting the potential for effects on subsequent reproductive performance.

Key Words: chromium, subclinical endometritis, transition cow