209 Dietary saturated fatty acid source and parity influence lactational performance of early lactation Holstein dairy cows. M. Hollmann* and D. K. Beede, *Michigan State University*, *East Lansing*.

Dietary coconut oil (CO), a source of saturated, predominantly medium-chain fatty acids (FA), reduced enteric methane emission, but also reduced DMI and milk yield in our earlier studies. Here, we examined lactational performance of early lactation cows fed 2 sources of saturated FA, differing in predominant chain lengths. Dietary treatments were: no added fat (CTRL); 2.7% of DM as saturated long-chain FA (Energy Booster 100; EB) or 2.7% CO; or, a 2.7% mixture of equal parts EB and CO (INT). Primiparous (PP; n = 31) and multiparous (MP; n = 36) Holstein cows 10 to 14 d postpartum were fed one of 4 treatments for 16 wk in a randomized complete block design. CTRL diet contained corn and alfalfa silages (53% of DM), dry ground corn, soybean meal, plus mineral and vitamin supplement; it was formulated to contain 26.5% NDF (83% from forages), 17.6% CP, 29.6% starch, and 3.6% fat. Milk yield and DMI were recorded daily, and blood was collected weekly. Main effects of diet, parity, time (repeated measures), and relevant interactions were tested by least-squares ANOVA. Reported values differed ($P < 0.05$). Overall, cows fed CTRL had the greatest DMI. Fat source with greater chain length increased DMI linearly for MP cows (CO: 22.7; INT: 24.7; EB: 27.0 kg/d), and quadratically for PP cows (18.5; 21.0; 20.3 kg/d). Similar interactions of treatment by parity were observed for yields of solids-corrected milk and milk components. CO reduced milk fat (3.1%) and lactose (4.73%) concentrations compared with EB (3.8% and 4.92%), pooled across time and parity. Plasma glucose concentration did not differ among fat treatments and CTRL across the 16 wk. Fat source interacted with parity; INT had the lowest glucose concentration for PP, but highest for MP. During wk 1 to 4 of study, MP had lower plasma glucose than PP (52 vs. 58 mg/dL), which coincided with greater plasma BHBA (7.0 vs. 4.8 mg/dL) and NEFA (710 vs. 380 μeq/L) concentrations in MP. Body condition loss through wk 4 was greater for CO and CTRL than for INT and EB. Overall, dietary CO reduced DMI compared with EB leading to a greater FA mobilization in early lactation.

Key Words: dairy cow, fatty acid, metabolism

210 Adaptations in the transcriptome of adipose tissue in transition dairy cattle. S. Rocco[1], G. Duncan[1], J. Loor[2], J. Vierck[1], and J. P. McNamara*[1], [1]*Washington State University*, *Pullman,* [2]*University of Illinois*, *Urbana*.

Metabolic adaptations in adipose tissue are a critical part of establishment and maintenance of lactation. Our objective was to determine changes in the transcriptome of adipose tissue during the transition period. A total of 48 cows were grouped by their sire PTAM: High Genetic (PTAM = 870 kg), or Low Genetic (PTAM = 378); and half of each group was fed either to requirements (NE) or to 90% of energy requirements (LE), other components fed to requirements. Feed intake from 21 to 1 d prepartum was 13.6 (NE) and 12.7 kg (LE) DMI/d for (SE = 1.5): from 1 to 56 DIM it was 21.2 and 17.4 kg/d (SE = 1.4). Milk production was 36.1 and 33.3 kg/d for HG and LG cows from 27 to 56 DIM ($P < 0.05$). Adipose tissue biopsies at −21, −7, 7, 28 and 56 d around parturition extracted from a subset of these animals and the transcriptome was determined using the Affymetrix Bovine Gene Array on a subset of 21 animals and a total of 28 arrays. Analysis was done using standard array statistical techniques and pathway analysis. Further analysis and pathway analysis were conducted on genes that changed at least 2-fold with a *P*-value of 0.05) Genes that code for enzymes in the anabolic pathways (lipid uptake and synthesis) were consistently decreased to only 20 to 50% of prepartum, including thyroid hormone receptor spot 14, lipoprotein lipase, ATP-citrate lyase, acetyl-CoA carboxlyase and other genes in that pathway. Genes that code for enzymes involved in lipolysis (hormone sensitive lipase, β-2 adrenergic receptors, perilipin) were either unchanged or only moderately increased. Genes involved in synthesis of cellular components and cell cycle control (PPAR gamma, ADFP, ribosomal proteins) were highly expressed and slightly elevated in early lactation. Additional canonical pathways including cell morphology, intercellular signaling, connective tissue synthesis, and disease states all showed changes during the early lactation period. These data can be used to help understand the myriad of changes as cows rapidly lose body fat and can be integrated into systems models for dairy cattle metabolism and health.

Key Words: adipose, transcriptome, lactation

211 Use of omega-3 fatty acid rich algae and their oil as a feed supplement for dairy cattle. J. A. Stamey*[1], D. M. Shepherd[1], M. J. de Veth[2], and B. A. Corl[1], [1]*Virginia Polytechnic Institute and State University*, *Blacksburg,* [2]*Balchem Corp.*, *New Hampton, NY*.

Fish oil is used as a ration additive to provide omega-3 (n-3) fatty acids to dairy cows. Fish do not synthesize n-3 fatty acids; they must consume microscopic algae or other algae-consuming fish. New technology allows for the production of algal biomass for use as a ration supplement for dairy cattle. Lipid encapsulation of the algal biomass allows n-3 fatty acids to remain inert in the rumen, avoid biohydrogenation, and be available for absorption and utilization. Our objective was to examine use of algal biomass as a source for n-3 fatty acids. Four late-lactation Holsteins were assigned to a 4 × 4 Latin Square design. Their rations were supplemented with 1X or 0.5X rumen protected (RP) algal biomass supplement, 1X RP algal oil supplement, or no supplement. Supplements were lipid encapsulated (Balchem Corp., New Hampton, NY). The 1X supplements provided 29 g/d docosahexaenoic acid (DHA) and 0.5X provided half of this amount. Treatments were analyzed by orthogonal contrasts. Supplementing dairy rations with rumen protected algal supplements did not affect feed intake, milk yield, or milk composition ($P > 0.05$). Milk fat yield was 1.0, 1.1, 1.0, and 1.0 ± 0.07 kg/d for cows fed control, 0.5X RP algae, 1X RP algae, and 1X RP oil, respectively. Short- and medium-chain fatty acid yields were not influenced by supplements ($P > 0.05$). Both 0.5X and 1X RP algae supplements increased ($P < 0.01$) daily milk fat yield of DHA (0.5 and 0.6 ± 0.10 g/d, respectively) compared with 1X RP oil (0.3 ± 0.10 g/d), but all supplements were greater ($P < 0.01$) than control (0.1 ± 0.10 g/d). Yield of trans-18:1 fatty acids in milk fat was also increased by supplementation, suggesting supplements may have influenced rumen microflora. Trans-11 18:1 yield (13, 20, 27, and 15 ± 3.0 g/d for control, 0.5X RP algae, 1X RP algae, and 1X RP oil, respectively) was greater for supplements than control ($P = 0.05$). Rumen protected algal biomass provided better DHA yield than algal oil.

Key Words: micro-algae, n-3 fatty acid, rumen protection

212 Additive effects of propionate, trans10,cis12-CLA and acetate on milk fat production and composition in dairy cows. G. Maxin*[1], H. Rulquin[1], J. L. Peyraud[1], and F. Glasser[2], [1]*INRA-Agrocampus ouest*, *Rennes, France*, [2]*INRA*, *Theix, Saint-Genes-Champanelle, France*.

Several nutrients affect dairy cow mammary lipogenesis and thus milk fat production and composition. The individual effects of these nutrients have been long studied by digestive infusions, but it is still not known whether they are additive or interactive. The present study aims to investigate the effects on milk fat secretion of 3 of these nutrients: propionate (C3), acetate (C2) and trans10,cis12-CLA, supplied alone or together to dairy cows. Six Holstein cows were used in a 6 × 6 Latin square design with 14-d periods. The treatments were: control; C2 (ruminal infusion of 1500 g/d of C2); C3 (ruminal infusion of 800 g/d of C3); CLA (duodenal infusion of 1.60 g/d of trans10,cis12-CLA); C2+C3 (ruminal infusion of 400 g/d C3 + 750 g/d C2); and CLA+C3 (ruminal infusion of 800 g/d C3 + duodenal infusion of 1.60 g/d trans10,cis12-CLA). Milk yield and composition were measured at each milking and milk fatty acids (FA) at the end of each period. Compared with control, C3 and CLA decreased milk fat content and yield by 9% and 15% on average ($P < 0.05$). C2 tended to increase milk fat content ($P = 0.08$), but did not alter milk fat yield. CLA decreased the yields of all milk FA, except trans10,cis12-CLA, which increased. C3 decreased the yields of all even-chain FA ($P < 0.05$) and increased the yields and percentages of the odd-chain FA (C5 to C17, $P < 0.05$). C2 did not modify the secretion of the FA, except C16, which sharply increased ($P < 0.01$). The interactions between C3 and C2, and C3 and CLA on all the variables measured were never significant ($P > 0.15$), whatever the nutrient individual effects. When the 2 nutrients had the same individual effects, their effects added up when infused together (e.g., CLA+C3 on milk fat content); when they had opposite effects, there was compensation (e.g., C2+C3 on milk fat content). Under our experimental conditions, C2 and C3, and C3 and trans10,cis12-CLA had thus additive effects on mammary lipogenesis.

Key Words: dairy cows, milk fat, nutrients

213 Regulation of adipose tissue metabolism by coordinated changes in gene transcription during the transition period. S. Rocco*, G. Duncan, J. Kay, R. Bose, J. Vierck, and J. McNamara, *Washington State University*, *Pullman*.

Metabolic adaptations in adipose tissue are a critical part of establishment and maintenance of lactation. Adipose tissue not only stores and releases energy but also secretes a metabolic regulators and cytokines. Previous work determined that several enzymes and pathways adapt in a coordinated fashion to support establishment and success of lactation. Our objective was to identify specific changes in gene transcription that relate to adaptations in lipogenesis and lipolysis in the adipose tissue of transition dairy cattle. A total of 48 cows were grouped by their sire PTAM: High Genetic (PTAM = 870 kg), or Low Genetic (PTAM = 378); and half of each group was fed either to requirements (NE) or to 90% of energy requirements (LE), other components fed to requirements. Feed intake from 21 to 1 d prepartum was 13.6 (NE) and 12.7 kg (LE) DMI/d for (SE = 1.5): from 1 to 56 DIM it was 21.2 and 17.4 kg/d (SE = 1.4). Milk production was 36.1 and 33. Three kg/d for HG and LG cows from 27 to 56 DIM ($P < 0.05$). Adipose tissue biopsies at −21, −7, 7, 28 and 56 days around parturition were used to measure lipolysis, lipogenesis and gene expression by RT-PCR or gene array chips. Rates of lipogenesis were lower during lactation and lower in LE cows while lipolysis rates were higher for both conditions ($P < 0.05$). The mRNA expression of the beta-2 adrenergic receptor, hormone sensitive lipase and the co-lipase, perilipin, was several-fold higher ($P < 0.05$) in animals on restricted energy. The mRNA for caveolin-1 and caveolin-2 decreased 20 to 40% ($P < 0.05$) in lactation consistent with the increase in lipolysis and HSL activity. The gene expression array showed coordinated decreases in genes regulation lipogenesis (TRPSP14, −26%; AcCoCarb, −76%; LPL, −57%; ATP-Citrate Lyase, −22% (<0.05) as examples) and no change or moderate increases in those controlling lipolysis. Lactation is supported by coordinated change in gene expression and metabolic rates in adipose over varied dietary and genetic situations.

Key Words: lactation, adipose, regulation

214 Effects of dietary protein concentration and coconut oil supplementation on nitrogen utilization and production in dairy cows. C. Lee*, A. N. Hristov, K. S. Hyler, T. W. Cassidy, and M. Long, *Pennsylvania State University*, *PA*.

The objective of this experiment was to investigate the effect of dietary protein concentration and coconut oil (CO) on N utilization in lactating dairy cows. The experiment was conducted for 10 wks with 36 cows (132 ± 7.0 DIM; 13 primiparous and 23 multiparous) including 6 cannulated cows. Following a 2–wk covariate period, cows were blocked based on DIM and milk yield (average: 38.4 ± 1.2 kg/d) and assigned to the following treatments: 16% CP (DM basis, HighCP, control), 14% CP (LowCP) and 14% CP diet supplemented with 600 g/cow/d coconut oil (LowCPCO). The HighCP and LowCP diets contained 2.5% (DM basis) Megalac. Samples (ruminal fermentation, nutrients digestibility, N losses, and milk production) were collected at wks 5, 6, 7 and 8 of the trial. Compared with LowCP and HighCP, LowCPCO decreased DMI (21.5 vs. 23.7 and 24.7 kg/d; $P < 0.003$), milk yield (34.7 vs. 36.5 and 39.7 kg/d, $P = 0.01$) and milk fat content (3.1 vs. 3.6 and 3.7%; $P = 0.001$) and yield (1.1 vs. 1.3 and 1.4 kg/d; $P < 0.001$, respectively). Milk protein content and yield were not affected by diet. Compared with HighCP, the LowCP diet decreased milk yield (39.7 vs. 36.5; $P = 0.04$). Apparent digestibilities of DM, OM, NDF, ADF and N were greater ($P = 0.03$ to < 0.001) for HighCP compared with LowCP and LowCPCO. Ruminal ammonia ($P = 0.03$), blood urea–N ($P < 0.001$) and milk urea–N ($P < 0.001$) were increased by HighCP compared with LowCP and LowCPCO. Urinary N excretion was greater ($P < 0.001$) for HighCP compared with LowCP and LowCPCO. Cows fed the LowCPCO diet had lower ($P = 0.001$) fecal N excretion compared with the other diets and the highest ($P < 0.001$) milk N efficiency (36%) followed by LowCP (32%) and HighCP (28%). In conclusion, the 14% CP diet decreased urinary N losses and increased feed N efficiency, but decreased milk yield. Coconut oil supplementation decreased feed intake and milk yield, but increased feed N utilization efficiency compared with the control and LowCP diets.

Key Words: dietary protein, coconut oil, dairy cow

215 The effect of feeding ruminally protected lysine (RPL) on production performance and plasma amino acid profile of early lactation dairy cattle. J. E. Nocek*[1] and I. Shinzato[2], [1]*Spruce Haven Farm and Research Center*, *Auburn, NY*, [2]*Ajinomoto Co., Inc.*, *Tokyo, Japan*.

Thirty-six lactating Holstein cows were used to examine the effects of ruminally protected lysine (RPL) supplementation and dosage on production performance and plasma amino acid profile of high-producing dairy cows. Multiparous cows were balanced across treatments based on their 4 week of lactation average milk production as follows: Control, 75, 150, 225 g/d of RPL. These treatments were designed to deliver 0, 12, 24 and 36 g/cow/d of supplemental intestinally available lysine, respectively. Cows started the experimental period on the fifth week post-calving and remained on treatment for 4 weeks. Prior to treatment administration, all cows received the control diet for one week, which contained 75% of forage from corn silage. Control diet was fed to all cows throughout the experimental period, however, in addition, cows

received 500 g/d of corn meal premix top dressed once daily to deliver 0, 75, 150 or 225 g/d of RPL. Blood samples were taken for each cow before daily feeding on d 0 and 28 of the study for amino acid analysis. Dry matter intake was not affected by RPL dose when expressed as a percentage of body weight. Mean milk yield was the highest ($P < 0.03$) for cows receiving 150g RPL than Control or 225g RPL, with 75g RPL not being different than others (47.7, 43.2, 42.7 and 44.6kg, respectively). FCM was higher ($P < 0.05$) for cows receiving 75g RPL compared with control. Fat % was higher ($P < 0.05$) for 75g and 225g RPL compared with Control and 150g RPL, whereas protein %, lactose, MUN, and SCC were not affected by RPL dose. Protein yields, however, were the highest ($P < 0.01$) for 150g RPL and the lowest for 225g RPL. At 28d, plasma lysine showed a numeric tendency to be the lowest for 150g and the highest for 225g RPL, with 225g RPL having a 17.6% increase ($P = 0.12$) from d 0 to 28. Under the conditions of this study, 75g or 150g RPL provided the most efficient and consistent response in production performance of early lactation dairy cows.

Key Words: ruminally protected lysine, milk production, plasma AA

216 Effect of Protein Edge on ruminal microbial protein production and performance of lactating dairy cows. S. E. Boucher*[1], H. M. Dann[1], K. W. Cotanch[1], C. S. Ballard[1], R. J. Grant[1], and K. Yagi[2], [1]*William H. Miner Agricultural Research Institute*, *Chazy, NY,* [2]*ZEN-NOH National Federation of Agricultural Co-operative Associations*, *Tokyo, Japan*.

Sixteen lactating Holstein cows (4 ruminally cannulated; mean ± SD) 95 ± 17 d in milk were used in a 4 × 4 replicated Latin square design with a 2 × 2 factorial arrangement of treatments to determine the effects of Protein Edge (PE; Agriformulations, Inc., Waddington, NY) supplementation of diets varying in rumen undegraded protein (RUP) content on ruminal microbial protein production, ruminal fermentation, and lactation performance. Protein Edge is a blend of bacterial and fungal fermentation extracts that was reported previously to increase microbial protein production in vitro. The RUP content of the diets was either 36 (LoRUP) or 40% (HiRUP) of crude protein (CPM v.3.0), and PE was added at 0.11% of dry matter (DM). Treatments were: 1) no PE, LoRUP, 2) PE, LoRUP, 3) no PE, HiRUP, and 4) PE, HiRUP. Experimental periods were 21 d with a 15-d adaptation. Microbial protein production was estimated via urinary excretion of purine derivatives. Data were analyzed using the MIXED procedure of SAS. There was no effect of PE or RUP level ($P > 0.10$) on ruminal pH (mean ± SE; 6.0 ± 0.2) or ruminal concentrations of NH_3-N (9.0 ± 0.8 mg/dL), total free AA (2.2 ± 0.22 m*M*), or total VFA (135.6 ± 3.6 m*M*). Protein Edge increased ruminal microbial protein production ($P < 0.01$) with the no PE and PE diets averaging 527 ± 20 and 557 ± 20 g of microbial N/d, respectively. Protein Edge tended ($P = 0.07$) to increase milk yield (MY; no PE = 51.5 ± 1.7 and PE = 52.3 ± 1.7 kg/d). However, there was no effect of PE or RUP level ($P > 0.10$) on DM intake (26.2 ± 0.4 kg/d), fat-corrected MY (49.4 ± 1.6 kg/d), milk component yields or content, feed efficiency (1.99 ± 0.06), or feed-N efficiency (0.34 ± 0.01). Other than a trend for a slight increase in MY, there were no effects of PE on lactation performance. However, PE may be a useful additive to increase metabolizable protein supply because PE increased ruminal microbial protein production.

Key Words: Protein Edge, microbial protein production, lactating cows

217 Use of plasma concentrations to estimate bioavailability of methionine in rumen-protected products fed to dairy cows. G. A. Broderick*[1], S. M. Reynal[2], R. A. Patton[3], W. Heimbeck[4], and P. Lodi[5], [1]*U.S. Dairy Forage Research Center*, *Madison, WI*, [2]*University of Wisconsin*, *Madison*, [3]*Nittany Dairy Nutrition, Inc.*, *Mifflinburg, PA*, [4]*Evonik Degussa GmbH*, *Hanau, Germany*, [5]*Universidad Nacional de Rosario, Argentina*, *Rosario, Argentina*.

Plasma AA level was used to estimate Met bioavailability in 2 sources of rumen-protected Met (RPM): Mepron (RPM1) and Smartamine M (RPM2). Eight cows consuming 22 kg DM/d, yielding 34 kg milk/d and fitted with ruminal cannulas were fed a basal TMR containing (DM basis) 14% alfalfa silage, 54% corn silage, 7% grass hay, 9% ground shelled corn, 13% soybean meal, 3% additives, 15.7% CP and 36% NDF. The TMR were fed at 6-h intervals in 4 equal portions each day. For the calibration phase, cows were blocked by DIM into 2 squares and randomly assigned to balanced 4 × 4 Latin squares with 3-d periods. Solutions of DL-Met were infused into the abomasa via tubes inserted through the ruminal cannulas and omasal orifice to provide 0, 8, 16 and 24 g Met/d. Amounts actually infused were measured daily. Blood samples were collected from alternate jugular veins every h over the last 6 h of the 3-d period. Blood plasma was deproteinized and stored at –20°C until analyzed. For the feeding phase, cows were re-randomized within square and assigned to 4 treatments: 0.24 g Met/d fed as 28.2 g/d of RPM1 or 31.6 g/d of RPM2, or 24 g DL-Met infused into the abomasum. Both RPM1 and RPM2 were fed 4x daily by hand mixing 1/4 the daily dose into the TMR. Design and blood sampling were the same as the calibration phase except periods were 7-d; abomasal Met infusion was for the last 72 h of each period. Plasma Met (PMet) concentrations were determined by ion-exchange chromatography with ninhydrin detection. Plasma Met concentration was regressed on Met infusion levels using Proc GLM in SAS to develop the response curve used to estimate Met bioavailability after correction for recovery of DL-Met infused during the feeding phase. The regression equation from the calibration phase was: Plasma Met (μM) = 0.498*Met infused (g/d) + 3.42 μ*M* ($P < 0.0001$; $r^2 = 0.533$). Rearranging and applying this equation yielded a mean recovery of infused Met of 95%. Mean (±SE) bioavailabilities, corrected to 100% recovery of infused Met, were 75 (±20)% for RPM1 and 88 (±23)% for RPM2. These bioavailabilities were not different ($P = 0.51$) within the precision of this study.

Key Words: methionine, rumen-protection, blood

218 Evaluation of a ruminally protected lysine product to increase milk protein production and plasma lysine concentration. S. E. Boucher*[1], H. M. Dann[1], K. W. Cotanch[1], C. S. Ballard[1], R. J. Grant[1], and I. Shinzato[2], [1]*W.H. Miner Agricultural Research Institute*, *Chazy, NY*, [2]*Ajinomoto Co., Inc.*, *Tokyo, Japan*.

Fifteen multiparous Holstein cows (mean ± SD) 122 ± 38 d in milk were used in a replicated 3 × 3 Latin square design to evaluate the efficacy of a ruminally protected Lys (RPL; Ajinomoto Co., Inc.) product to increase milk protein production and plasma Lys concentration. Experimental periods were 21 d with a 15-d adaptation. Dietary treatments were 1) control diet adequate in metabolizable protein (MP)-Lys, 2) diet deficient in MP-Lys, and 3) Lys deficient diet made adequate in MP-Lys with RPL. The RPL was assumed to contain 20% bio-available Lys and was added to the Lys deficient diet at 0.65% of dry matter (DM). The basal diets contained 50% forage and 50% concentrate. The MP-Lys contents of the Lys adequate, Lys deficient, and RPL diets were 6.5, 5.7, 6.7%, respectively, and the MP-Met content of the diets was 2.3% (CNCPS v.6.1; AMTS.Dairy, AMTS LLC, Cortland, NY). Cows were fed once and milked 3 times daily. Milk samples were collected from 3 consecutive milkings on d 18 and 19 of each period. Blood was collected on d 19 and 20 of each period at 2, 4, 6, and 8 h after feeding and compos-

ited by cow and period for AA analysis. Data were analyzed using the MIXED procedure of SAS. There was no effect of diet on DM intake (mean ± SE; 29.6 ± 0.76 kg/d), milk yield (49.9 ± 1.64 kg/d), milk fat % (3.71 ± 0.12%), milk fat yield (1.85 ± 0.07 kg/d), milk true protein (TP) % (3.19 ± 0.04%), or milk TP yield (1.59 ± 0.06 kg/d). There was an effect ($P < 0.001$) of diet on plasma Lys concentration (% of total plasma AA) with the Lys adequate diet resulting in the highest (4.27 ± 0.06%), the RPL diet was intermediate (3.74 ± 0.06%), and the Lys deficient diet was the lowest (3.52 ± 0.06%). Based on the plasma data, the Lys adequate diet and RPL increased MP-Lys supply compared with the Lys deficient diet. However, improved MP-Lys supply did not result in increased milk protein production in this experiment.

Key Words: ruminally protected lysine, milk protein, plasma lysine

219 Effect of rumen-protected lysine and methionine on lactating performance in lactating water buffalo. C. X. Zou*[1], Q. F. Tang[2], G. S. Qin[1], B. Z. Yang[1], S. L. Li[1], S. J. Wei[1], K. Liang[1], L. L. Li[1], X. W. Liang[1], and Z. S. Xia[2], [1]*Buffalo Research Institute*, *Nanning 530001, China*, [2]*College of Animal Science, Guangxi University*, *Nanning 530005, China*.

The present experiment was undertaken to determine the effects of RPLys (rumen protected lysine) and RPMet (rumen protected methionine) supplements on lactating performance in lactating water buffalo. Fifteen early lactation, healthy lactating water buffaloes were selected, according to species, last lactation milk yield, calving time and similar parity. Animals were randomly divided into 5 group, using 5 × 5 Latin square design with 5 periods and 5 treatments, i.e., the control group1 (basal diet CP = 16%), the control group2 (basal diet CP = 20%), treatment 1: basal diet CP = 16% plus RPLys 40g/d; treatment 2: basal diet CP = 16% plus RPMet 15g/d; treatment 3: basal diet CP = 16% plus RPLys30 g/d plus RPMet 6 g/d. The results showed: (1) Effect of RPLys and RPMet supplements on lactating performance in lactating water buffalo showed non-significantly difference ($P > 0.05$), but RPLys and RPMet supplements could improve lactating performance in lactating water buffalo and RPLys was the better. Compared with control group1 and control group2, RPLys supplements increased milk yield by 10% and 5.9%. (2) Effect of RPLys and RPMet supplements on dry matter intake (DM) in lactating water buffalo showed non-significantly difference ($P > 0.05$), but RPLys and RPMet supplements could reduce dry matter intake (DM) in lactating water buffalo. (3) RPLys and RPMet supplements can improve milk protein, milk total solid matter, non-fat milk solid content and lactose content in lactating water buffalo, compared with control group1, milk protein of RPLys, RPMet and RPLys+ RPMet supplements increased by 29%, 36.8% and 54.3% ($P < 0.05$), compared with control group2, Milk protein increased by 3.9%, 10.2% and 24.4% ($P < 0.05$). Only RPLys supplements could increase milk fat in lactating water buffalo, and only RPMet supplements could improve milk fat in lactating water buffalo. Therefore, RPLys and RPMet supplements could improve lactating performance in lactating water buffalo.

Key Words: RPLys, RPMet, lactating water buffalo

220 Effect of rumen protected γ-aminobutyric acid on performance and health status of early lactating dairy cows. D. M. Wang, Z. Liu, F. Yang, H. Y. Liu, C. Wang*, Y. M. Wang, and J. X. Liu, *Institute of Dairy Science, Zhejiang University*, *Hangzhou 310029, P. R. China*.

The objective of this study was to investigate the effects of rumen-protected γ-aminobutyric acid (GABA) addition on DMI, milk performance, and plasma metabolites in Chinese Holstein dairy cows. Forty-eight cows (days in milk = 60 ± 5; average milk yield = 37.3 ± 5.4 kg/d) were blocked based on days in milk, milk production, and parity and were randomly assigned to one of 4 treatments. Dietary treatments were 4 adding levels of GABA: 0 (control), 30, 60, and 90 g/day, respectively. The experimental period was 7 weeks. Milk yield and milk composition (fat, protein, and lactose) were recorded weekly, and serum parameters of antioxidant status, neuropeptide Y, and GABA were analyzed on wk 1, 4, and 7. The DMI of grass hay was significantly higher ($P < 0.05$) in the GABA-added cows than those on control. Milk yield increased ($P < 0.05$) in 30 g GABA-added cows, but leveled off in 90 g GABA-added animals. Milk protein yield was higher ($P < 0.05$) when 30 or 60 g of GABA was added but there was no difference ($P > 0.05$) between control and 90 g GABA-added animals. Milk fat content was not different among treatments ($P > 0.05$). Serum glutathione peroxidase increased for 60 g group ($P < 0.05$), and serum malondialdehyde reduced for all GABA-added group ($P > 0.05$) compared with the control. No statistical difference was observed in the neuropeptide Y between all the treatments ($P > 0.05$). In summary, addition of rumen-protected GABA at 30 g could increase feed intake, improve milk performance, and is beneficial to the dairy cow health.

Key Words: γ-aminobutyric acid, dry matter intake, milk performance