Methionine supplementation at low and adequate net energy supply in lactating dairy goats

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higher milk protein yield compared with other treatments (1.29 ± 0.02 kg; $P < 0.01$) whereas the HS100 (1.13 ± 0.03 kg) and LS105 (1.13 ± 0.02 kg) diets tended to yield more protein than LS100 (1.04 ± 0.03 kg; $P = 0.09$). Cattle fed the LS105 diet (14.5 ± 0.2 mg/dL) had higher MUN ($P < 0.05$) than LS100 (11.5 ± 0.3 mg/dL) and HS105 (11.6 ± 0.2 mg/dL) and tended to be higher than HS100 (12.3 ± 0.3 mg/dL). The data indicate when ME supply is more gluconeogenic, the efficiency of N and EAA use increases.

Key Words: amino acids, starch, nutritional models

W120 Performances and plasma energetic parameters in lactating dairy goats fed 3 levels of metabolizable methionine. P. Schmidely[1] and L. Bahloul*[2], [1]*Université Paris-Saclay, INRAE, AgroParisTech, UMR Modélisation Systémique Appliquée aux Ruminants*, *Paris, France*, [2]*Centre of Expertise and Research in Nutrition, Adisseo France S.A.S*, *Commentry, France*.

We characterized milk production and composition, and plasma parameters response to 3 levels of metabolizable methionine (MetDi) in 24 early-lactation Alpine goats (31 ± 3 DIM) genotyped for milk casein aS1. The 3 diets (14% CP, NEL = 1580 kcal/kg DM) supplemented with rumen-protected MetDi (RPM; isopropyl ester of 2-hydroxy-4-methylthio butanoic acid (HMBi, Metasmart, Adisseo) provided 90 (CTL), 100 (RPM100), and 110% (RPM110) of MetDi requirement based on cow requirement (INRA, 2007). The trial was conducted as a 3-groups randomized block design for 12 wk, with 2-wk covariate period. Goats were randomly allocated to their experimental TMR at the end of wk 2 according to their aS1 genotype (High vs Low), BW, DIM, milk yield (MY) and milk protein content (MPC). Milk and blood samples (before morning feeding and milking) were collected twice per wk and weekly, respectively. Data were analyzed using the MIXED procedure of SAS for repeated data with aS1 genotype and MetDi level as fixed factors. DMI did not differ between groups. Compared with Low aS1 goats, those with High genotype had higher MPC (+1.0 g/kg), higher milk fat content (+2 g/kg), with no difference in MY. Compared with CTL goats, RPM100 or RPM110 goats had similar MY (3.7, 3.7, 3.9 kg/d, respectively), similar fat, lactose and urea concentrations in milk. The RPM100 goats had significantly ($P < 0.07$) higher MPC (34.9 g/kg) than CTL (33.5 g/kg) goats. Compared with CTL goats, RPM100 or RPM110 goats had numerically higher protein yield: 123, 128 and 131 g/d ($P < 0.25$). MetDi supplementation × aS1 genotype interaction was not significant on MPC or protein yield. Compared with CTL goats, RPM100 or RPM110 goats had similar glucose, urea, BHB and insulin plasma concentration, but lower NEFA (0.19, 0.13, 0.16 µ*M*, $P < 0.05$). In conclusion, dietary MetDi recommendation in cows (2.5% metabolizable protein) can be used in goats whatever their aS1 genotype.

Key Words: metabolizable methionine, milk composition, dairy goats

W121 Effects of the supplementation with coated methionine on performance of dairy cows. L. R. Royo*, M. Puyalto, and J. J. Mallo, *Norel SA*, *Madrid, Spain*.

Effects of the supplementation with coated methionine on performance of dairy cows Two studies were carried out in commercial dairy farms with the aim to evaluate the effects of supplementing Methionine (Met) coated with palm stearin, on milk yield and composition. In the farm A, 160 Holstein cows (days in milk 171 ± 106, milk yield 36.3 ± 8.2 kg/d), and in the farm B, 93 Holstein cows (days in milk 181 ± 143, milk yield 38.9 ± 11.6 kg/d) were split in 2 homogeneous groups. In both farms, cows were exposed for 60 d to 2 treatments following a complete randomized design. Treatments consisted in a control (CT) group that received a basal diet (farm A: 20.1% CP, 30.5% NDF, 1.4 Mcal NE_l/kg; farm B: 21.6% CP, 36.5% NDF, 1.1 Mcal NE_l/kg; DM basis), and a Met supplemented group (BM) that received the same diets with less crude protein (CP; farm A: 18.4%; farm B: 21%) plus 40 g/d of coated Met (39% Met; providing 16 g of Met/d), commercialized as Bymet by Norel. In both farms the protein concentrate used were soy and rapeseed meal, the decrease in the CP content was set to show the economic benefits of reducing the CP. Cows were fed the ration twice daily. Milk yield was determined daily and milk composition (fat and protein) weekly. Data were summarized and analyzed using a mixed-effects model for repeated measures. In farm A, milk yield was affected ($P = 0.003$) by an interaction between treatment and week, BM cows produced greater amounts of milk during the whole study (36.8 kg/d), except in the wk 4, comparing with CT group (36.0 kg/d). In farm B, milk yield tended ($P = 0.110$) to be affected by the interaction between treatment and week, BM cows produced 39.8 kg/d and CT cows, 37.8 kg/d. Interactions between treatment and week were observed ($P = 0.01$ in farm A and B) for fat content, it was similar in both groups in farm A, but was higher in BM cows in farm B. Protein content was affected by an interaction between treatment and week ($P = 0.04$ in farm A and B), it was similar in both groups in farm A, but it tended to be lower in BM cows in farm B. It is concluded that Met coated with palm stearin can improve milk yield of cows fed a TMR with high levels of CP.

Key Words: methionine, milk, rumen

W122 Effect of calving on plasma amino acid concentration in dairy cows. M. E. Fetter*, D. M. Cunningham, F. Gambonini, T. L. Ott, and A. N. Hristov, *Department of Animal Science. The Pennsylvania State University*, *University Park, PA*.

Metabolic changes during the transition period in dairy cattle can cause decreased milk production and reproductive performance. Therefore, a better understanding of changes in plasma amino acid (AA) concentrations during the transition period will help optimize nutrition to improve welfare and production in dairy cows. The aim of this study was to assess changes in plasma amino acid (AA) profile after calving in Holstein cows. Blood samples for AA analysis were collected from the tail vein/artery of 9 multi- and 8 primiparous cows 3 wk (±7 d) before and at wk 1, 2, and 3 post-calving. Data were analyzed using the GLM procedure of SAS with sampling week, parity and parity × week interaction in the model. Concentration of the sum of essential AA (EAA) was similar between primi- and multiparous cows before calving but was on average 17.0% lower ($P = 0.009$) in multi- vs. primiparous cows postpartum. EAA concentration declined ($P < 0.001$) by 20.0% postpartum. The sum of non-essential AA (NEAA) increased linearly ($P < 0.001$) post-calving and was comparable between primi- and multiparous cows. Primiparous cows had 13.5%, 14.8% and 13.7% greater Leu ($P = 0.002$), Val ($P = 0.002$), and Ile ($P < 0.001$) concentrations, respectively, than multiparous cows. In addition, Val and Ile decreased 20.0% ($P = 0.003$) and 22.6% ($P < 0.001$) postpartum, respectively. Primiparous cows had 7.6% greater ($P = 0.04$) plasma His concentration than multiparous cows. Compared with prepartum, His decreased 13.1% ($P = 0.005$) postpartum in both primi- and multiparous cows. Met and Lys concentrations were not affected by parity ($P \geq 0.31$) but both AA decreased (22.0 and 24.5%, respectively; $P < 0.001$) after calving. Arg and Thr decreased ($P \leq 0.002$) 26.7% and 22.4% after calving but were not affected by parity. Overall, plasma concentration of EAA decreased after calving, indicating an increased demand for EAA around parturition. Lower postpartum plasma concentration of EAA in multiparous cows likely reflects an increased need for EAA to sustain greater milk production compared with primiparous cows.

Key Words: amino acid, calving, dairy cattle

W123 Methionine supplementation at low and adequate net energy supply in lactating dairy goats. S. Lemosquet[1], M. Boutinaud[1], A. Leduc[1], S. Binggeli[2], E. Chanat[1], and L. Bahloul*[3], [1]*INRAE, Agrocampus Ouest, PEGASE*, *Saint-Gilles, France*, [2]*Université Laval*, *Quebec, QC, Canada*, [3]*Center of Expertise and Research in Nutrition, Adisseo, France S.A.S*, *Commentry, France*.

The responses in milk yield (MY) and composition to methionine (Met) supply through the isopropyl ester of 2-hydroxy-4-methlythio butanoic acid (HMBi) at low (LE) and adequate levels (AE) of NE_L (E) were inves-

Table 1 (Abstr. W123).

Item	Treatment				SEM	P <		
	LE	LEMet	AE	AEMet		E	Met	E×Met
MY, kg/d	3.06	2.93	3.03	3.24	0.07	0.07	0.42	0.03
MPC, g/kg	27.7	29.3	27.8	28.7	0.4	0.57	<0.01	0.29
MPY, g/kg	83.4	85.7	84.4	92.1	1.0	0.07	0.01	0.17
MFC, g/kg	38.0	39.4	39.9	41.0	0.8	0.02	0.08	0.82
MFY, g/d	115	116	121	131	2.6	<0.01	0.03	0.07
Lactose, g/kg	43.0	42.4	43.9	43.7	0.5	0.03	0.44	0.67
Lactose, g/j	131	126	135	141	6.0	0.09	0.94	0.33
Casein, g/kg	23.5	25.0	24.1	24.6	0.4	0.79	0.01	0.21
Casein, % MPC	81.0	80.5	82.8	81.7	0.8	<0.05	0.25	0.69
Met, μ*M*	22.6	27.5	26.5	25.8	1.6	0.47	0.17	0.07
AA group 2, μ*M*	136	129	169	126	9	0.10	<0.01	<0.05

tigated with a 2 × 2 factorial design on 48 multiparous Alpine goats (85 ± 15 DIM, 55 ± 6 kg), assigned to a randomized complete block design in 4 groups during 6 weeks. All goats received fixed amounts of hay (15.5 kg of DM per group) and of concentrates distributed individually with 0.24% of DM of HMBi added in LEMet and AEMet concentrates. A covariance-variance analysis was performed using the MIXED procedure SAS with CSN1S1 genotype, E, Met and E × Met interaction as fixed effects. The mean DMI of concentrates was 1.52 ± 0.12 kg/d/goat and DMI of hay were 13.4, 14.9, 14.3 and 14.2 kg/d in LE, LEMet, AE and AEMet groups, respectively. The NE_L density of LE vs. AE diets were 1.47 vs. 1.54 Mcal/kg DM, respectively with a same MP content (86 g/kg of DM; INRA, 2007). Results are shown in Table 1. Increasing Met supply increased MY at AE supply (E × Met). It increased milk true protein content (MPC) and yield (MPY) and casein content at both E levels. It tended to increase milk fat content (MFC) and increased its yield (MFY). It tended to increase the plasma concentration of Met and decreased the concentrations of AA from group 2 (Lys, Ile, Leu, Val) suggesting a higher mammary utilization of these EAA. Increasing E supply tended to increase MPY, and increased the proportion of casein in MPC. It also increased MFC, MFY, lactose content and tended to increase its yield. Supplying Met in lactating dairy goats had the same effects on milk composition than in cows but the increased MY is only observed at NE_L requirement (AE).

Key Words: isopropyl ester of 2-hydroxy-4-methlythio butanoic acid (HMBi), goat, energy

W124 Evaluating plasma methionine in response to feeding three rumen-protected methionine products. M. S. Smith*[1], S. K. Cronin[1], J. Mateos[2], D. Martinez del Olmo[2], F. Valdez[3], and T. F. Gressley[1], [1]*University of Delaware, Department of Animal and Food Sciences, Newark, DE*, [2]*Kemin Animal Nutrition and Health, Herentals, Belgium*, [3]*Kemin Industries Inc., Des Moines, IA*.

Rumen protected amino acids offer the opportunity for precise feeding of limiting amino acids to ruminants. Plasma methionine (Met) is a strong indicator of bioavailability of rumen protected Met products and is directly influenced by intestinal absorption of Met. This study examined the comparability of a new rumen protected Met product, KESSENT M, to 2 currently marketed products. Ten multiparous Holstein cows, 280 ± 73 DIM, were used in a replicated 3 × 3 Latin square design, with 7-d experimental periods. Treatments consisted of a control diet plus 12 g/d of either KESSENT M (Kemin Animal Nutrition and Health, Herentals, Belgium), Smartamine M (Adisseo Inc., Antony, France), or Mepron (Evonik Nutrition & Care GmbH, Hanau-Wolfgang, Germany). Cows were fed ad libitum with 33% of their daily feed allotment provided every 8 h. Milking occurred at 4:30 a.m. and 3:30 p.m. daily with milk samples collected on d 5–7 of each period. During d 5–7 of each experimental period, blood samples were collected from jugular catheters at 2, 4, 6, and 8 h after the morning feeding. At the end of the experiment, samples were sent to Missouri Agriculture Experiment Station Chemical Laboratories for amino acid analysis by cation-exchange chromatography with an amino acid analyzer. There was no significant effect of treatment on DMI or production parameters. Plasma Met as a % of total amino acids minus Met was 1.5085, 1.5267, and 1.3622% for KESSENT M, Smartamine M, and Mepron, respectively. KESSENT M and Smartamine M were not found to be significantly different ($P = 0.3420$); however, KESSENT M and Mepron were significantly different ($P < 0.0001$), with KESSENT M yielding greater plasma Met Levels. There was a significant effect of time of sampling on plasma Met as a percentage of amino acids minus Met ($P = 0.002$), due to higher Met at 2 h (1.508%) than 4, 6, and 8 h (1.439, 1.447, and 1.469% respectively). Similarities in plasma Met levels between KESSENT M and Smartamine M treatments would suggest comparative bioavailabilities and bioavailability greater than that of Mepron.

Key Words: rumen-protected methionine, dairy cow