320 Prepartum energy intake affects health and lactational performance in primiparous and multiparous Holstein cows. N. A. Janovick Guretzky*, N. B. Litherland, K. M. Moyes, and J. K. Drackley, *University of Illinois*, *Urbana*.

Previous research from our group has demonstrated that control of prepartum energy intake improved transition success in multiparous cows; however, data are lacking for their primiparous counterparts and for cows in single-group dry period management. Primiparous (n=23) and multiparous (n=24) Holsteins were randomly assigned by expected date of parturition to one of three prepartum energy intakes. A high energy diet (1.62 Mcal NE_L/kg; 15% CP) was fed for either ad libitum intake (HI-E) or restricted intake (REST) to supply 150 or 80% of NRC (2001) energy requirement for dry cows in late gestation. To limit energy intake to 100% of NRC requirement at ad libitum intake (CON), a high straw (29% of DM) diet (1.30 Mcal NE_L/kg DM; 14% CP) was fed. Multiparous and primiparous cows began dietary treatments on d -65 and d -42 prior to expected parturition, respectively. Data were analyzed as repeated measures. Postpartum intake (% of BW) did not differ among treatments (P=0.16). Multiparous cows consumed more DM than primiparous cows (P=0.01), which likely influenced parity differences in energy balance postpartum (P<0.01). HI-E cows were in greater negative energy balance than CON and REST cows postpartum (P<0.01). Weekly FCM yield (kg/d) tended (P=0.10) to be higher for HI-E compared to CON or REST cows. Incidences of ketosis (P=0.03) and DA (P=0.01) were higher for HI-E than CON and REST cows regardless of parity (P>0.48). Liver total lipid (% of wet wt) tended to be higher (P=0.07) for multiparous HI-E cows than for CON or REST on d 1 and 14 after parturition. Blood glucose tended to be higher (P=0.05) prepartum for multiparous HI-E cows than for CON or REST, but BHBA was higher (P=0.03) postpartum for multiparous HI-E cows than for CON or REST cows. HI-E cows gained body condition during the dry period (initial BCS=3.3), but were not overconditioned by calving (BCS=3.5). Overfeeding energy during the dry period, even in absence of overconditioning, can adversely affect transition success.

Key Words: Primiparous cow, Energy intake, Transition period

321 Effect of dietary energy source on energy partitioning in dairy cattle in early lactation. A. van Knegsel*, H. van den Brand, J. Dijkstra, S. Tamminga, and B. Kemp, *Wageningen University*, *Wageningen, The Netherlands*.

Nutrition has been indicated to be important to limit the severity of a negative energy balance (NEB) and related metabolic disorders in dairy cattle in early lactation. The NEB related metabolic problems suggest a role for the balance in supply of lipogenic and glycogenic nutrients. Therefore, the objective of this study was to compare the effects of a mainly glycogenic and a mainly lipogenic diet on energy partitioning in dairy cows in early lactation. The roughage composition of both diets was identical. Maize and milocorn or rumen protected fat and beet pulp were the main concentrate ingredients of the glycogenic and lipogenic diet, respectively. Energy and nitrogen balance of 16 lactating dairy cows in four batches, were determined by indirect calorimetry in climate respiration chambers from week 2 to 9 postpartum (pp). Repeated analysis of variance was used for data analysis and results are presented as MEANS ± SE. There was no effect ($p \geq 0.05$) of diet on gross energy intake (3453 ± 59 kJ/($kg^{0.75}$•d)), metabolizable energy intake (2102 ± 41 kJ/($kg^{0.75}$•d)) and heat production (1110 ± 10 kJ/($kg^{0.75}$•d)). However, cows on a lipogenic diet partitioned more energy to milk than cows on a glycogenic diet (1175 ± 18 vs. 1073 ± 12 kJ/($kg^{0.75}$•d); $p \leq 0.05$) and had a higher milk fat yield (1.67 ± 0.03 vs. 1.89 ± 0.02 kg/d; $p \leq 0.05$). No difference was found in energy retained as body protein (19 ± 6 kJ/($kg^{0.75}$•d)), but energy mobilised as body fat tended to be higher in cows fed the lipogenic diet than in cows fed the glycogenic diet (190 ± 23 vs. 113 ± 26 kJ/($kg^{0.75}$•d); $p \leq 0.10$). Cows fed the glycogenic diet were in a positive energy balance from week 8 pp, whereas cows fed the lipogenic diet had still a NEB in week 9 pp. This study confirms the hypothesis that energy partitioning between milk and body tissue can be altered by feeding isocaloric diets differing in lipogenic and glycogenic nutrient content.

Key Words: Energy partitioning, Negative energy balance

322 The effect of calcium pantothenate on productive and reproductive performance in lactating dairy cows. J. Nocek[1] and M. Vazquez-Anon*[2], [1]*Spruce Haven Farm and Research Center*, *Auburn, NY*, [2]*Novus International*, *St. Louis, MO*.

Two hundred cows were balanced by parity and previous lactation 305d ME to one of two treatments to determine the effect of supplementing calcium pantothenate (CP, CRYSPAN™, beta crystalline form of calcium pantothenate, Daiichi Fine Chemical Co. Ltd.) on production and reproductive performance in lactating dairy cattle. The Control group was fed a pre- and postpartum diet to meet NRC (2001) requirements. The CP group was fed the Control diet with the addition of 6g/cow/d of CP in the TMR. Cows were housed in free stall group pens (approx. 100cows/group). The experimental period started 21 days before estimated calving date to about 160 days in the subsequent lactation. Approximately 100 cows were assigned to each treatment. The design was a split-plot in time with repeated measures, with cow as the experimental unit. Milk production was not significantly influenced by CP supplementation; however, cows receiving CP produced 0.5 kg more than Control. The 3.5% fat-corrected milk was higher (P = .01) for cows consuming CP compared to Control (38.9 vs. 37.4 kg). This difference was primarily influenced by a higher (P = .02) fat test for cows receiving CP (3.65 vs. 3.51%). This resulted in an increased fat yield (P = .01) for cows receiving CP. Protein percentage was not influenced by treatment; however, yield of protein was higher (P = .02) for cows receiving CP. Cows receiving CP had fewer (P=.10) days open (88.7 vs. 95.6) and a greater (P=.03) percentage of cows pregnant by 150 DIM (76.9 vs. 61.3%) compared to Controls. Supplementing CP in diets of lactating cows improved productive and reproductive performance.

Key Words: Calcium pantothenate, Lactation, Reproduction

Sheep Species

323 Effect of supplementation and stage of lactation on performance of grazing ewes. C. M. Mikolayunas*, D. L. Thomas, K. A. Albrecht, and Y. M. Berger, *University of Wisconsin*, *Madison*.

This study evaluated the effects of stage of lactation and supplementation on lactation performance of 95 dairy ewes grazing kura clover-orchardgrass pastures. Ewes lambed in January or April and consumed 0 or 0.82 kg/d of supplement (16% CP mixture of corn and high protein pellet) in a 2 x 2 factorial arrangement of treatments. The trial began when ewes went to pasture on May 25 and continued for 82 days. Unsupplemented ewes in both lambing groups showed a greater range

in their daily milk yields than supplemented ewes throughout the trial, probably in direct response to variations in pasture quality during the grazing season. The January lambing ewes compared to the April lambing ewes produced less (P < .001) milk (91.1 vs. 136.8 kg, respectively), milk fat (5.6 vs. 7.8 kg, respectively), and milk protein (4.7 vs. 6.3 kg, respectively) during the trial. The supplemented ewes compared to the unsupplemented ewes produced more (P < .01) milk (123.2 vs. 104.2 kg, respectively), milk fat (7.2 vs. 6.2 kg, respectively), and milk protein (5.9 vs. 5.0 kg, respectively). Supplementation had a similar positive effect on milk, milk fat, and milk protein yield in both lambing groups. Milk urea nitrogen (MUN) can be used as an indicator of the efficiency of protein utilization in sheep. Trial MUN levels across treatments tended to be higher (18 to 34 mg/dL) than recommended levels for sheep (14 to 22 mg/dL), indicating an excess of protein intake. This can be explained by the high quality pastures, which ranged in crude protein from 16 to 30%. Across all treatments, the correlation between pasture crude protein and MUN was .65. Within the supplementation treatment, the correlation was numerically higher but not significantly different than the correlation within the unsupplemented treatment (r = .78 and .52, respectively).

Key Words: Dairy sheep, Grazing, Milk urea nitrogen

324 The effect of bypass fat in the diet on milk composition of dairy ewes. M. M. Stradiotto, E. R. Siqueira, R. M. S. Emediato*, S. A. Maestá, and A. Piccinin, *São Paulo State University*, *Botucatu, São Paulo, Brazil*.

The objective of this work was to investigate the effect of dietary bypass fat on milk composition of Bergamasca dairy ewes. The experiment was carried out at the Ewe Milk Production Research Unit of the College of Veterinary Medicine and Animal Science of São Paulo State University. Eighty Bergamasca ewes were divided into two groups and fed one of two diets: A – balanced diet (concentrate + corn silage); or B – same diet as A, with bypass fat (35 g/ewe/day) added to the concentrate. Lambs were kept with their mothers on pasture during daytime and were separated at night. After the morning milking, the lambs were returned to their mothers and weaned at 45 days of age. The ewes were machine-milked for 60 days. Milk samples were collected once weekly for analysis of lactose, protein, fat and total solids. The data were analyzed by one-way analysis of variance. For the first 45 days of lactation, significant differences (P<.05) were observed for protein and lactose, with ewes fed diet B having higher means, whereas differences were not observed (P>.05) for fat and total solids. After 45 days of lactation, significant differences (P<.05) were found only for fat and lactose, which may be explained by the higher milk production of ewes fed diet B because some researchers have reported a negative correlation between production and concentration of milk constituents.

Key Words: Unsaturated fatty acids, Dairy sheep, Milk constituents

325 Effect of fermentable fiber level and protein source on feed intake and efficiency of growing lambs. A. Carneiro, A. Esquivel, D. E. Hogue, and M. L. Thonney*, *Cornell University*, *Ithaca, NY*.

When hay is expensive, by-products that contain high concentrations of fermentable NDF (FNDF) and protein can be used to formulate diets for self-feeding ewes prior to lambing and during lactation. Because lambs also have access to the self-fed ewe diet, an experiment was conducted to compare the feed intake and efficiency of lambs fed three 14.5% CP diets similar in calculated digestible dry matter but differing in calculated FNDF and source of supplemental protein (Table 1). The experiment was a randomized complete block (gender and location) with seven pens of 2 rams and six pens of 2 ewes fed a diet with 20% soy hulls for FNDF and 10% soybean meal for protein (SH); four pens of 2 rams and six pens of 2 ewes fed a high fiber diet with 34% corn gluten feed for FNDF and protein and 23% soy hulls for FNDF (HF), and six pens of 2 rams and six pens of 2 ewes fed a diet with 37% corn gluten feed for FNDF and protein (CGF). The cracked corn-based diets also contained limestone, 2% vitamin-mineral premix, and 2% vegetable oil. After weaning at 6 to 10 wk of age and a 3-d adjustment to the pens, lambs were fed the diets for 42 d. Fresh water was provided and feed was added daily to each feeder to ensure that feed was available at all times. Lambs were weighed at the start of the experiment and weekly. Linear regression of weight on d was used to compute IW, FW, and ADG. Lambs fed HF consumed more DM, but gained less per unit DMI than lambs fed SH or CGF (Table 1). ADG of lambs fed HF was not significantly decreased compared to lambs fed CGF. These results demonstrated that the high-FNDF ewe diets consumed by lambs can increase intake by 12% and reduce feed efficiency by about 14%, but with limited effect on ADG, and that protein from CGF can replace more expensive protein from soybean meal.

Table 1. Effect of fiber level and protein source on growing lambs

Item	SH diet	HF diet	CGF diet	SEM	*P* value SH vs others	*P* value HF vs CGF
Number of pens	13	10	12			
DDM, % DM	78.5	77.1	77.5			
NDF % DM	22.4	32.9	21.1			
FNDF, % DM	16.2	29.9	17.5			
IW, kg	20.6	20.8	20.6	0.51	ns	ns
FW, kg	33.4	32.5	32.7	0.68	ns	ns
Gain, g/d	305	280	289	10.7	0.10	ns
DMI, kg/d	0.992	1.069	0.953	0.0297	ns	0.007
Gain/DMI	0.307	0.263	0.303	0.0074	0.012	0.001
DMI, % BW	3.69	4.09	3.63	0.083	0.076	<0.001

Key Words: Sheep, Fiber, Protein