before tissue collection. Casein infusion increased pancreatic weight by 74% and α-amylase mRNA expression by 69% in the absence of SH, but did not influence pancreatic weight and α-amylase mRNA expression in the presence of SH (SH × casein, P < 0.10). Infusion of SH decreased (P = 0.02) pancreatic α-amylase protein expression by 67% and activity (U/g pancreas) by 63%. Casein infusion did not influence pancreatic α-amylase protein expression and activity (U/g pancreas). Casein infusion increased total α-amylase activity (kU/pancreas) by 148% in the absence of SH, but did not influence total α-amylase activity (kU/pancreas) in the presence of SH (SH × casein, P = 0.05). These data suggest that increases in small intestinal SH decrease pancreatic α-amylase expression largely by post-transcriptional events. Increases in small intestinal protein increase pancreatic weight and total α-amylase activity, whereas small intestinal SH inhibits these increases.

Key Words: calves, α-amylase, post-ruminal nutrients

335 Abomasal infusion of casein enhances abundance and activity of Na+/glucose cotransporter along the small intestine of lambs. S. J. Mabjeesh*, D. Guy, and D. Sklan, *The Hebrew University.*

The purpose of this study was to determine the effect of abomasal casein infusion on glucose uptake and abundance and activity of the Na+/glucose cotransporter (SGLT1) in brush border membrane vesicles (BBMV) prepared from mucosa in different regions of ovine small intestine. Lambs (body weight 35 ± 1.0 kg) were surgically fitted with abomasal infusion catheters and were fed diets containing equal portions of wheat hay and cracked corn. Lambs were infused with either 500 g/d water or with 500 g/d water containing 35 g casein. The infusion period lasted 10 d, after which lambs were slaughtered, exsanguinated, and eviscerated. Intake and total tract digestibility of nutrients were similar between treatments and averaged 1134, 1142 and 486 g/d, and 67, 70, 94% for dry matter, organic matter, and non-structural carbohydrates. Crude protein digestibility was higher by 15% in the casein infused lambs. Glucose uptake to BBMV ranged from 101 to 337 pmol.mg protein-1.sec-1 along the small intestine and was highest in the mid section of the small intestine. In the mid jejunum glucose uptake was higher ($P < 0.07$) in lambs infused with casein and averaged 120 compared to 68 pmol.mg protein^{-1}.sec^{-1} in the control group. SGLT1 affinity was similar in the different segments of the small intestine of lambs infused with casein and averaged 106 mM. In contrast in the control group a scattered range of values was found in the control group with lowest values in the duodenum. SGLT1 protein abundance correlated positively with glucose uptake in the BBMV in the casein treated lambs, but not in the control group. These data suggest that glucose uptake along the small intestine of lambs is directly influenced by casein or its derivatives in the small intestine via SGLT1 affinity at the brush border membrane. SGLT1 activity may be regulated by post-translational events affected by amino acids and peptides.

Key Words: Sheep , Starch digestion, Glucose transporter (SGLT1)

ASAS/ADSA Ruminant Nutrition: Transition Cow

336 An overview of dietary factors influencing dry matter intake and milk protein yield in early lactation dairy cows. A. N. Hristov*[1], W. J. Price[2], and B. Shafii[2], [1]*Department of Animal and Veterinary Sci.,* [2]*Statistical Programs, College of Agriculture, University of Idaho, Moscow, ID 83844.*

The objective of this meta-analysis was to determine the factors mostly responsible for the variation in DMI and milk protein yield (MPY) in lactating dairy cows. Diets (467) from feeding trials conducted in the U.S. and Canada involving Holstein cows less than 100 DIM published in J. Dairy Sci. (volumes 73 through 82) were analyzed for nutrient composition (CPMDairy program). The average DMI of the cows involved in this study was 22.1 kg/d (varying from 16.0 to 29.9 kg) and the average milk yield was 33.0 kg/d (varying from 20.1 to 46.0 kg). The relationships between DMI and MPY with variables representing the chemical composition of the diet and ruminal fermentability of carbohydrate (CHO) and nitrogen fractions were investigated. Principle component analysis (PCA) was used to reduce the dimension of the underlying data and identify specific sources of variability. More than 80% of the data variability was accounted for by the first three components representing starch, fiber and protein intakes. Dominant variables contributing to these axes were non-structural CHO, CHO fraction B1 and fermentable CHO fraction B1 for starch, NDF, CHO fractions B2+C and fermentable CHO fractions B2+C for fiber, and soluble and degradable protein intakes for protein. A subsequent regression analysis was carried out to investigate the relationships between these dietary attributes and the response variables DMI and MPY. A three-parameter model involving CHO fraction B1, NDF, and soluble protein intakes was deemed appropriate for DMI, accounting for 91% of the response variability. Whereas, CHO fraction B1, degradable protein, and NDF intakes were the best explanatory variables for MPY, accounting for 41% of the response variability. In conclusion, during the first 100 days of lactation, starch and NDF intakes were the most important variables in determining DMI, while starch intake was the important variable in determining MPY.

Key Words: Dairy Cows, Dry Matter Intake , Milk Protein Yield

337 Dry period protein nutrition and glucose and protein metabolism in transition cows. W.S. Burhans*[1], R.M. Slepetis[1], P.J. Reeds[2], and A.W. Bell[1], [1]*Cornell University, Ithaca, NY,* [2]*USDA-ARS CNRC, Houston, TX.*

The effect of protein nutrition during the dry period on periparturient glucose flux and protein metabolism was assessed in multiparous Holstein cows. Cows (n=12) were dried off at -67 days from expected calving date and fed a common diet (HIGH) containing 157g/kg CP, 40.9% NDF, 34.8% NFC, and 1.59 Mcal/kg NEl. At -60 d and -20 d before expected calving and +3 d after calving cows were infused with a complete mix of ^{15}N labeled amino acids (AA) and [6-^{2}H] glucose for 8 h (AA) and 4 h (glucose) respectively. Hourly blood samples were taken to determine plasma isotopic enrichment. After infusion for 8h a liver biopsy was taken for determination of protein fractional synthesis rate (FSR) from hepatic incorporation of ^{15}N AA. After the infusion 6 cows were assigned to a diet (LOW) containing 7.9 g/kg crude protein, 40.9% NDF, 46.2% NFC, and 1.56 Mcal/kg. Cows remained on HIGH or LOW diets until calving, when a common lactating diet was fed containing 175 g/kg CP, 31.1% NDF, 38.9% NFC, and 1.74 Mcal/kg. Tabulated results suggest minimal effects of dry period dietary protein concentration on periparturient glucose or AA metabolism. High dry period DMI and inclusion of additional corn starch to the LOW diet may have ameliorated potential negative effects of low dietary protein concentration. Increased glucose flux postcalving is consistent with increased glucose demand immediately postpartum. Additional work is needed to assess the significance of low dry period protein concentration when intake is low or restricted or when diets are less glucogenic.

	Far Dry	Close Dry		Lactation			*P*		
	Cov.	H	L	H	L	SEM	Prot	Time	PxT
Body weight, kg	692	754	711	660	613	18	NS	<.001	NS
DM Intake, kg	12.7	11.0	11.8	13.0	10.0	0.7	NS	NS	NS
Glucose Kd, g/kg.d	3.62	3.53	2.97	3.91	4.32	0.18	NS	<.05	NS
Glucose Kd, g/d	2472	2651	2081	2536	2637	97	NS	NS	NS
Prot Kd, g/kg.d	5.11	5.13	5.07	5.76	6.25	0.38	NS	NS	<.1
Prot Kd, g/d	3485	3813	3600	3752	3758	239	NS	NS	NS
Liver FSR	0.172	0.184	0.172	0.238	0.314	0.027	NS	<.1	NS
N bal. d2-d7				- 49	- 63	17	NS		

Key Words: Transition cow, metabolism

338 Production responses of dairy cows to dietary supplementation with conjugated linoleic acid (CLA) during the transition period and early lactation. G. Bernal-Santos*, J. W. Perfield II, T. R. Overton, and D. E. Bauman, *Cornell University, Ithaca NY.*

Thirty Holstein cows entering second or later lactation were utilized to determine whether feeding rumen-protected CLA from 21 d prepartum through 56 d (8 weeks) postpartum would affect dry matter intake (DMI), milk production, or milk composition. Cows were fed common diets as TMR both before and after parturition, and diets were top-dressed with either 116 g/d of a commercial rumen-protected fat supplement (EnerGII; Bioproducts Inc., Fairlawn, OH) as a control or 126 g/d of a rumen-protected CLA supplement (Agribrands Purina Canada, Inc., Woodstock, ON). Treatment amounts were calculated to provide the same total amount of fatty acids. The CLA supplement provided 42.8 g/d of CLA. Predominant CLA isomers (wt. %) were: trans-8 cis-10 (9.2%), cis-9 trans-11 (25.1%), trans-10 cis-12 (28.9%), and cis-11 trans-13 (16.1%). Differences in prepartum (12.1 vs. 13.1 kg/d) and postpartum (20.5 vs. 21.6 kg/d) DMI for control and CLA treatments were not significant ($P > 0.20$). Feeding CLA during the transition period and early lactation tended ($P < 0.14$) to increase overall milk yield (42.6 vs. 45.2 kg/d), and a trend ($P < 0.07$) occurred for an interaction of treatment and week because differences increased as week of lactation increased. Feeding CLA decreased ($P < 0.01$) milk fat percentage (3.87 vs. 3.46%). As a result of these offsetting changes in milk yield and milk fat percentage, differences in yields of fat (1.62 vs. 1.52 kg/d) and 3.5% fat-corrected milk (44.9 vs. 44.2 kg/d) were not significant ($P > 0.20$). Differences in the percentage (2.87 vs. 2.89%) and yield (1.20 vs. 1.27 kg/d) of true protein in milk, and the concentration milk urea nitrogen (12.8 vs. 12.7 mg/dl), were not significant ($P > 0.20$). Results suggest that feeding CLA to dairy cows during the transition period and early lactation causes a moderate decrease in milk fat content, tends to increase milk yield, and does not affect DMI.

Key Words: transition period, conjugated linoleic acid, milk fat

339 Changes in Rumen Capacity during the Periparturient Period in Dairy Cows. A.F. Park*, J.E. Shirley, J.M. DeFrain, E.C. Titgemeyer, E.E. Ferdinand, R.C. Cochran, D.G. Schmidt, S.E. Ives, and T.G. Nagaraja, *Kansas State University, Manhattan.*

Four ruminally fistulated, multiparous, pregnant Holstein cows were utilized in a randomized design to delineate ruminal adaptations as the cow transitions from gestation into lactation. Ruminal measurements were obtained 72 (late lactation), 51 (far-off dry), 23, and 9 d (close-up dry) prepartum and 6, 20, and 34 d postpartum. Net energy of lactation (Mcal/kg) and crude protein percentage of the diets were 1.57, 15.6; 1.55, 10.9; 1.57, 15.0; 1.61, 17.0 for late lactation, far-off dry, close-up dry, and early lactation, respectively. On each sampling day, rumens were evacuated prior to feeding; contents were weighed and sampled to determine fill, and then the rumen was filled with water with the cannula cap intact to prevent water from exiting via the cannula. Ruminal water holding capacity (RWC) was determined as the amount of water subsequently removed from the rumen. Dry matter intake expressed as a percent of body weight (quadratic, $P < 0.001$) declined as stage of gestation advanced but increased following parturition. Body weight and condition were highest just prior to parturition (quadratic, $P < 0.001$). RWC gradually increased from the far-off period into early lactation (linear, $P < 0.01$). Total and liquid fill were lowest during the close-up dry period (quadratic response, $P < 0.01$). Dry matter fill (quadratic response, $P < 0.001$) and dry matter fill as a percentage of RWC (quadratic response, $P < 0.01$) were lowest during the early close-up dry period. Total fill as a percentage of RWC was highest during the far-off period (quartic response; $P < 0.05$). Liquid fill as a percentage of RWC was highest during the far-off dry period and decreased as cows approached parturition (quartic response, $P < 0.05$). These data demonstrate that physical capacity of the rumen is not the causative factor of prepartum intake depression.

Key Words: Rumen capacity, Periparturient, Dairy

340 Effects of Fermentable Carbohydrate Sources on Dry Matter Intake, Milk Production, and Blood Metabolites of Transition Dairy Cows. R.S. Ordway*, V.A. Ishler, and G.A. Varga, *The Pennsylvania State University, University Park, PA.*

Thirty-four multiparous Holstein cows (780 17.2 kg BW; 3.39 0.08 BCS) were used in a completely randomized design to evaluate the effects of fermentable carbohydrate sources on dry matter intake, milk production, and blood metabolites of transition cows. Treatments were initiated 30 d prior to expected calving date and continued through calving. After parturition, animals received 50% of their respective prepartum diets and 50% of a typical lactating cow TMR until intake reached 14.5 kg DM at which time they received only the lactating cow ration until 56 d postpartum. The prepartum diet was formulated to contain 1.5 Mcal/kg NEL, 41.3% NDF, and 14.8% CP. The control diet (% DM) consisted of 42% corn silage, 10.6% SBM, 5.5% corn cobs, 10.9% cottonseed hulls, 6.4% soyhulls, 4.3% liquid molasses, 3.8% alfalfa dehydrate, 4.9% vitamin and mineral mix, 0.4% urea, 0.5% Pro Base, and 10.3% ground corn. The treatment diet consisted of replacing 2.4% of the corn with sucrose on a DM basis. Significance was declared at $P \leq .10$ using the MIXED procedure of SAS®. Prepartum glucose levels were higher (66.3 ± 1.2 vs. 69.3 ± 1.1 mg/dl) ($P<.08$) for cows fed the diet containing sucrose but were not different postpartum. Neither prepartum or postpartum NEFA, BUN, or insulin differed between treatments. DMI averaged 16.3 ± 0.61 kg/d for the last 4 weeks prepartum and 21.9 ± 0.76 kg/d for the first 8 wk postpartum. Milk yield averaged 45.7 ± 1.6 kg/d, fat averaged 3.7 ± 0.09% and protein averaged 2.7 ± 0.05% for the first 8 wk postpartum and were not different among treatments. Prepartum DMI in the current study was 20% higher compared to our last 2 trials in which diets were formulated to contain approximately a 70:30 forage to concentrate ratio. Based on our current study, replacing ground corn with sucrose did not enhance prepartum or postpartum intake or performance.

Key Words: Fermentable Carbohydrate, Nonforage Fiber, Transition Cow

341 Effect of liquid flavor supplementation on performance of dairy cows in the transition period. M. A. Shah*, E. J. Friedman, B. A. Fadl-alla, and M. R. Murphy, *University of Illinois at Urbana-Champaign.*

A nine-week trial was conducted to study the performance of twenty-four Holstein cows during the transition period (3-wk prepartum and 4-wk postpartum). Cows were assigned to either a control or liquid-flavored (0.52 ml/kg of feed) TMR in a randomized complete block design. The TMR contained corn silage, alfalfa haylage, cottonseed and a grain mix based on ground corn and soybean meal. Cows were fed to ensure 10% orts and the diet provided (on a DM basis) 13% CP, 32% ADF, 44% NDF and 1.54 Mcal/kg prepartum and 17.5% CP, 30% ADF, 40% NDF and 1.54 Mcal/kg postpartum. An additional 2.3kg of alfalfa hay was fed the first 5 d postpartum. Weekly means of DMI, milk yield, milk protein, milk fat, SNF, SCC and BW were analyzed using a repeated measures procedure. There was no effect of treatment on these variables ($P > 0.10$), and least-squares means were 16.9 and 15.7 kg/d, 38 and 35.3 kg/d, 3.10 and 3.11%, 3.69 and 3.74%, 8.37 and 8.16%, 1.99 x 105 and 4.33 x 105, and 631 and 651 kg for cows on control and flavored diets, respectively. Individual cow postpartum DMI data were fitted with an exponential model [$DMI = a + b * e^{(-c*DIM)}$, where DMI in kg, 'a' asymptotic DMI, 'b' potential for increase in DMI, 'c' rate of increase in DMI]. Rates of increase in DMI were similar, 0.139 and 0.123 for control and flavored diets, respectively. Data for both groups were separately analyzed using multiple regression with FCM as the dependent variable, and BW and DMI as independent variables. More BW was mobilized per unit increase in FCM in cows fed the control than in cows fed the flavor diet. Cows fed control diet were in more negative energy balance during early lactation (especially during wk 1 and 2 postpartum) than cows fed flavored diets ($P < 0.10$). It was concluded that, feeding flavor improved energy balance of cows in early lactation and may reduce the risk of health or reproductive problems.

Key Words: feed flavor, early lactation, prediction model

342 Effects of day relative to parturition and dietary crude protein levels on rumen fermentation in prefresh transition cows. M. E. Dorshorst*, S. J. Bertics, and R. R. Grummer, *University of Wisconsin, Madison*.

Eight nulliparous and 12 first parity or greater Holstein cows were used in a randomized block design to examine changes in rumen fermentation as cows fed 10 or 12% CP diets approach parturition. Cows were blocked according to expected calving date and parity. Diets were isocaloric (1.56 Mcal/kg DM) and the difference in CP was achieved by the addition of urea. Diets were fed as a TMR for ad libitum intake. All cows were fed the 10% CP diet starting at d -35 prior to expected parturition. At d -28, one-half of the cows were randomly assigned to the 12% CP diet until parturition. Dry matter intake was measured daily. Rumen fluid samples and estimates of ruminal fiber degradation via in situ dacron bags were obtained at 7 d intervals until d -7 when they were obtained every other day until parturition. There was no effect of treatment or day on rumen pH and total VFA. As cows approached calving, DMI decreased. Rumen NH_3 concentration was significantly increased by feeding the 12% CP diet. Disappearance of NDF after 8 h from dacron bags was affected by day, but not by dietary CP level. Disappearance of NDF after 24 h of incubation tended to be affected by day and was significantly increased by feeding 12% CP. It appears that feeding less then 12% CP to prefresh transition cows may limit fiber degradation in the rumen.

	Day						
Parameter	d -21	d -14	d -7	d -5	d -3	d -1	SEM
DMI, kg/d[1]	12.1	11.9	11.5	10.7	10.0	9.0	0.51
NH_3, mg/dl^{A,2}							
10% CP	0.8	2.6	1.4	1.1	1.9	3.4	1.5
12% CP	3.5	3.2	5.0	3.0	3.8	5.1	1.6
8 h NDF^{B,1}							
10% CP	25.5	25.6	31.8	27.6	27.8	21.8	3.3
12% CP	26.1	26.1	28.6	28.3	27.6	24.8	3.2
24 h NDF^{B,3,4}							
10% CP	35.5	35.9	37.5	40.2	37.1	33.6	3.2

[1] Day ($P < .0001$), [2] Treatment ($P < .05$), [3] Treatment ($P < .01$), [4] Day ($P < .10$), [A] 4 h Post feeding, [B] % Disappearance

Key Words: protein, fiber degradation, transition cows

343 Metabolic measures around parturition for late gestation cows supplemented with moderate and high dietary calcium during hot weather. P. S. Chan*, J. W. West, and J. K. Bernard, *University of Georgia, Tifton, GA/USA*.

Nine multiparous and 12 primiparous Holstein cows were fed diets containing moderate Ca (100g/d) or high Ca (170g/d) for 21d prepartum to determine the effects of dietary Ca fed with diets containing anionic salts. Cows were monitored on day 21 to 1 prepartum (PRE), day 0, 1 and 2 (CALVING) and day 3 to 21 postpartum (POST). Dietary cation-anion difference (DCAD) for prepartum diets was - 6.43 meq/100g DM (Na + K - Cl - S). Cows were fed positive DCAD diets with 0.88% Ca postpartum. The study was conducted from August 10 to November 16 and mean maximum and minimum ambient temperature and relative humidity were 27.3 and 17.4°C, and 91.7 and 50.7% respectively. There was a 28% decrease in DMI the final week prepartum. No treatment effects on DMI were noted. Mean serum Ca for PRE, CALVING and POST were 9.72, 8.43 and 9.40 mg/dl and there were no treatment effects. Mean serum Ca was higher ($P<0.06$) for primiparous than multiparous cows (9.47 vs 9.19 mg/dl) for the trial. Mean urine Ca (mg/dl) during PRE, CALVING and POST were 43.07, 4.14 and 2.21 (moderate Ca) and 53.70, 6.19 and 2.33 (high Ca) with no treatment effects. Mean HCO_3^- (mmol/L) for PRE, CALVING and POST were 20.10, 25.86 and 26.01 (serum) and 0.36, 45.25 and 109.20 (urine). Mean urine pH for PRE, CALVING and POST were 5.66, 7.45 and 8.24. No dietary treatment effects were noted for all HCO_3^- and pH measures. The correlation coefficient for urine pH and urine HCO_3^- was 0.85 ($P<0.0001$). Milk yield was 15.9, 23.8 and 26.2 kg/d for 1, 2 and 3wk postpartum, and there was no difference in mean milk yield for moderate and high Ca treatments (22.3 and 20.1 kg/d). Cows maintained adequate serum Ca levels during the periparturient period for both treatments. Primiparous cows had higher serum Ca compared with multiparous cows. Results suggest 100g/d Ca is adequate to maintain acceptable blood Ca around parturition during warm weather.

Key Words: Hypocalcemia, DCAD, Heat stress

344 Peripartum responses of Holstein cows and heifers fed graded concentrations of calcium (calcium carbonate) and anion (chloride) 3 weeks before calving. D. K. Beede*, T. E. Pilbeam, S. M. Puffenbarger, and R. J. Tempelman, *Michigan State University, East Lansing, Michigan, USA*.

Objective was to determine the effects on peripartum metabolic and health responses, and lactation performance of feeding graded concentrations of Ca without or with supplemental chloride for 3 wk before calving. Pregnant animals (n=420) in two research farms were blocked by parity and assigned randomly to one of five dietary treatments (trt). Postpartum parities were: 164 1st; 82 2nd; and, 174 3rd and greater. Prepartum basal diet fed once daily was 18% alfalfa haylage: 42% corn silage: 40% concentrate. A mixture (16.7% of dietary DM) of HCl-treated, heat-extruded soybean meal (HCl-HESBM) and non-HCl-treated-HESBM was used to vary cation-anion difference (CAD; meq[(Na + K) - (Cl + S)]/100 g of dietary DM). Graded amounts of calcium carbonate were used to vary dietary Ca content. For the entire experiment, average analyzed Ca (%) and CAD of each trt were: (A) 0.47, +18; (B) 0.47, -4; (C) 0.98, -4; (D) 1.52, -4; and (E) 1.95, -4. Weekly urine pH measurements were used to adjust proportions of HCl-HESBM and non-HCl-treated-HESBM to maintain pH between 6.0 and 6.7 for B, C, D, and E. Urine pH the week before calving was 8.1 vs. 6.4, 6.6, 6.6, and 6.6 for A vs. B, C, D, and E ($P<0.01$). Prepartum DMI was greater for A, B, and C than for D and E ($P=0.01$). Caudal vein blood was collected within 24 h after parturition. Plasma ionized Ca (iCa) was: 4.29 vs. 4.39, 4.43, 4.53, and 4.52 mg/dl for A vs. B, C, D, and E ($P=0.02$). Plasma Cl was higher for cows fed B, C, D, and E compared with A throughout the prepartum period ($P<0.01$). Pre- or postpartum body condition and udder edema scores, cow BW, calf birth weight, and colostrum score were not affected by trt. Overall incidence rates (all parturitions) of ketosis (16.7%), retained placenta (12.2%), milk fever (7.7%), hypocalcemia (16.8%), abomasal displacement (10.3%), and mastitis (7.2%) were not affected by trt. Incidences of clinical milk fever and hypocalcemia (plasma iCa <4 mg/dl) were greater in 3rd and greater parity cows in A vs. B, C, D, and E ($P<0.03$). Average postpartum DMI (19.8 kg/d) and milk yield (35.7 kg/d) through 70 DIM were not affected by trt. Overall, peripartum health and performance responses were optimum when the anion-supplemented diet (CAD = -4 meq/100 g of dietary DM) contained 0.98% Ca when supplemental Ca was from calcium carbonate.

Key Words: Calcium, Anion, Dietary cation-anion difference

345 Subacute Ruminal Acidosis in Dairy Cows, an Experimental Model. S.E. Ives*, T.G. Nagaraja, A.F. Park, and J.E. Shirley, *Kansas State University*.

Five ruminally fistulated lactating Holsteins, 492 days in milk, producing 32.6 kg/d were used to compare ruminal acidosis induced with a challenge diet deficient in effective neutral detergent fiber (eNDF) or with greater starch availability. The experiment was a crossover design with 15 d periods. Cows were fed a basal diet containing (% DM) chopped alfalfa hay (50), ground corn (35), whole cottonseed (11), Soybest (1), molasses (1), and vitamins and minerals (2). The basal diet was fed ad libitum twice daily. On d 8 to 11, cows were fed on a % of BW equal to the lowest intake for the period. Diets were provided at 2.5% of BW for period 1 and 2.8% for period 2. On d 12, ruminal samples were taken prior to feeding and p.m. feeding was skipped. On d 13 to 15, cows were challenged with dietary treatments of AP (alfalfa pellets replaced chopped alfalfa 1:1 DM basis, reduced eNDF) and SFC (steam-flaked corn replaced ground corn 1:1 DM basis, increased starch availability) to induce subacute ruminal acidosis. Cows were offered the entire daily allotment in the a.m. and feed not consumed in 2 h was placed in the rumen via the cannula. Ruminal samples were taken 3, 6, 9, 12, and 24 h relative to feeding each day and analyzed for pH, total volatile fatty acids (TVFA), and lactate. Cows were considered acidotic when ruminal pH was below 5.6 after feeding and maintained until the next feeding. Acidosis was not evident until d 15 and only AP induced acidosis (pH; diet × h, $P < 0.01$). On d 14, cows receiving AP had ruminal pH below 5.6 from h 6 to 12. By h 3 of d 15, cows challenged with AP had ruminal pH below 5.6 and it remained below 5.6 through the end of the

d. Cows receiving SFC experienced a ruminal pH below 5.6 on h 6 to 12 on d 14 and h 6 to 9 of d 15. Overall, reducing the effective NDF of a lactation diet appeared to provide a model for induction of subacute ruminal acidosis in dairy cows.

Key Words: Acidosis, Dairy Cows

346 The effect of Tasco^{TM} inclusion in the prepartum diet on the proportion among bovine leukocyte populations in blood and mammary gland secretions. T. J. Wistuba*, E. B. Kegley, T. K. Bersi, and G. F. Erf, *University of Arkansas, Fayetteville AR/USA*.

The effects of Tasco^{TM} inclusion in the diet during the last 21 d of gestation on the proportion among bovine leukocyte populations in blood (WBC) and mammary gland secretions (MGS) was investigated using flow cytometric analysis. Thirty Holstein cows were stratified by parity and randomly assigned to the Tasco^{TM} (170 g/d) supplemented group or control diet. Tasco^{TM} is a product derived from Ascophyllum nodosum, a brown seaweed that grows along the coast of Nova Scotia. Treatments were initiated 21 d prior to expected parturition and fed until calving. Blood samples from cows and calves, as well as MGS samples were obtained at parturition and at d 1 post partum. In cows, supplementation of Tasco^{TM} increased the proportion of granulocytes (P = 0.03) in the WBC suspension. Tasco^{TM} did not affect the percentage of lymphocytes, but tended to increase the proportions of B cells (P = 0.08) and decrease the proportions of TCR1+ T cells (P = 0.10) within the lymphocyte population. Supplementation of Tasco^{TM} also tended to decrease the T:B lymphocyte ratio (P = 0.11). Proportions of bovine leukocyte populations in the MGS were affected by time of sampling, but not dietary treatment. The proportion of granulocytes and macrophages/monocytes increased from parturition to d 1 (P < 0.05). The percentage of total (P = 0.03) and B (P = 0.04) lymphocytes increased from parturition to d 1. Proportions of granulocytes and monocytes/macrophages in the WBC suspension from calves tended to increase (P = 0.13 and P = 0.08, respectively) due to Tasco^{TM} supplementation. Proportion of granulocytes in the WBC suspensions of calves increased from parturition to d 1 (P = 0.03). The proportions of CD8+ lymphocytes and B lymphocytes tended to increase in the blood of calves from birth to d 1 (P = 0.15 and P = 0.07, respectively). Dietary supplementation with Tasco^{TM} altered proportions of bovine leukocyte populations. The impact of Tasco^{TM} supplementation on cow and calf health requires further investigation.

Key Words: Immune response, Periparturient, Dairy

347 Forage alone pre-calving is sufficient for forage-fed cows post-calving. J.R. Roche, M.J. de Veth, and E.S. Kolver, *Dexcel (formerly Dairying Research Corporation), Hamilton, New Zealand*.

This study investigated the effect of diet and genotype on metabolic indicators of energy status in the periparturient cow. Fifty-six Holstein-Friesian dairy cows of two different genotypes (Northern-Hemisphere (NH) and New Zealand (NZ)) were compared. Half of each genotype group received a diet of pasture/pasture silage pre-calving and pasture post-calving (Grass). The other half received a pre- and post-calving TMR of corn silage, grass silage and concentrates. Treatments were balanced for age and genetic merit. Blood samples were collected by coccygeal venipuncture on d -14, -7, -4, -3, -2, -1, 0, 1, 2, 3, 4, 14 and 30 relative to calving. Body weight was measured weekly. NH cows were heavier at calving and lost more body weight in the first 4 weeks of lactation. This greater loss is mirrored in greater plasma non-esterified fatty acid (NEFA) concentrations 30 d post-calving. Although, Grass cows had greater (P<0.05) B-hydroxybutyrate (BHBA) concentrations pre-calving, diet did not affect the concentration of NEFA in plasma. This increased BHBA is probably due to a greater hepatic demand for gluconeogenesis as a result of poor glucose absorption in Grass cows. Plasma BHBA and glucose concentrations were unaffected by genotype. NZ cows had greater plasma cholesterol concentrations. In summary, a pre-calving TMR did not improve the energy status of the cow pre-calving. An all-forage diet pre-calving is sufficient for dairy cows fed forage post-calving.

	NZ	NH	Grass	TMR	SED	Genotype *P*	Feed *P*
Bodyweight[1], kg	503	590	529	563	21.0	0.001	0.111
Bodyweight[2], kg	26	40	35	30	7.8	0.086	0.485
NEFA[3], mmol/l	0.90	0.89	0.89	0.90	0.153	0.697	0.424
NEFA[4], mmol/l	0.39	0.54	0.55	0.45	0.137	0.018	0.248
BHBA[3], mmol/l	0.72	0.60	0.64	0.68	0.105	0.161	0.439
BHBA[4], mmol/l	0.62	0.62	0.73	0.52	0.177	0.935	0.079
Glucose[3], mmol/l	4.06	4.10	4.14	4.01	0.260	0.569	0.112
Glucose[4], mmol/l	3.59	3.50	3.37	3.57	0.196	0.081	0.142
Cholesterol[3], mmol/l	2.28	1.91	2.01	2.18	0.160	0.003	0.150
Cholesterol[4], mmol/l	3.87	3.60	3.03	4.03	0.290	0.001	<0.001

[1]1^{st} weighing post-calving [2]bodyweight lost between d 0 and 30 [3]Average d 0-4 [4]d 30

Key Words: Transition period, Periparturient cow, Metabolic indicators

348 All forage diet pre-calving improves calcium status. J.R. Roche* and E.S. Kolver, *Dexcel Ltd. (formerly Dairying Research Corporation), Hamilton, New Zealand*.

This study investigated the effect of diet and genotype on the calcium status of periparturient cows. Fifty-six Holstein-Friesian (HF) dairy cows of two different genotypes (Northern-Hemisphere (NH) and New Zealand (NZ)) were compared. Half of each genotype group received a diet of pasture/pasture silage pre-calving and pasture post-calving (Grass). The other half received a pre- and post-calving TMR of corn silage, grass silage and concentrates. Treatments were balanced for age and genetic merit. Blood samples for calcium (Ca) analysis were collected by coccygeal venipuncture on d -14, -7, -4, -3, -2, -1, 0, 1, 2, 3, 4, 14 and 30 relative to calving. Milk yields were recorded daily for 30 d post-calving. Multiparous cows fed TMR produced more milk and colostrum than Grass cows. However, colostrum yields of primiparous cows were not affected by pre-calving diet, and milk yields were greater (P=0.06) for grazing cows. This suggests that it is not the transition feeding of TMR per se that increased milk production but rather the effect of TMR during previous lactations on mammary development. NHHF had lower (P<0.05) plasma Ca concentrations post-calving than NZHF. It is possible that the lower plasma calcium concentration in TMR cows was due to a greater demand placed on the plasma pool of Ca by greater milk yields. However, plasma Ca concentration at calving also tended (P=0.08) to be lower in heifers fed TMR pre-calving, even though milk yields were lower. In summary, herds with a high proportion of NH genetics are at an increased risk of hypocalcaemia, as are cows receiving TMR pre-calving.

	NZ	NH	Grass	TMR	SED	Genotype *P*	Diet *P*
Colostrum yield, kg/day	21.1	23.2	19.1	24.9	2.05	0.317	0.006
Milk yield[1], kg/day	26.9	29.9	24.7	31.8	1.82	0.109	0.001
Milkfat yield[1], kg/day	1.34	1.37	1.23	1.47	0.097	0.732	0.016
Milk protein yield[1], kg/day	0.94	1.07	0.89	1.11	0.079	0.088	0.010
Plasma Ca[2], mmol/l	2.16	2.23	2.26	2.13	0.068	0.332	0.028

[1]Average 5-30 d post-calving [2]Day of calving

Key Words: Hypocalcaemia, periparturient cow, transition period