were estimated as (100 - effective degradability [%]). Water-soluble fractions of CP (11.1 versus 16.7%) and starch (18.2 versus 18.4%) and lag phases before the commencement of degradation (all values < 0.5 h) were not different ($P > 0.15$) between wheat and WeiPass®. The sizes of the insoluble but degradable CP and starch fractions and their rates of degradation were higher ($P < 0.05$) for wheat than for WeiPass®, and wheat was more extensively degraded ruminally than WeiPass®, resulting in higher ($P < 0.01$) effective degradability values of CP (72 vs. 42% at 8%/h outflow) and starch (82 vs. 64% at 8%/h outflow) for wheat than for WeiPass®. Consequently, WeiPass® had RUP values which were 20 to 30 percentage units higher ($P < 0.01$) than those of ground wheat, depending on the assumed rumen outflow rate. An increase in RUS values for WeiPass® compared to wheat was also observed, though not as pronounced numerically as for RUP. The RUS values of WeiPass® were between 10 and 20 percentage units higher than the respective values for the wheat. If the increase in RUP and RUS for WeiPass® above the wheat values is expressed relative to the wheat values, proportions of RUP and RUS of WeiPass® at an assumed rumen outflow rate of 8%/h had doubled compared with the wheat, i.e., it increased from 28 to 58% of CP for RUP and from 18 to 36% of starch for RUS.

Key Words: Rumen, Starch, Protein

Ruminant Nutrition: Dairy - Transition Cows

844 Altered feeding behavior occurs in both primiparous and multiparous Holsteins during the periparturient period. M. A. DeGroot* and P. D. French, *Oregon State University, Corvallis*.

The objective of the following experiment was to describe changes in feeding behavior during the periparturient period. Twenty-four multiparous and 18 primiparous Holstein cows were group housed and fed individually via Calan® doors for the three weeks before and after parturition. Behind each door was a feed tub that rested on a digital scale. Scales were connected to a computer that collected date, time, and tub weight during feeding bouts. Data were analyzed using the MIXED procedure of SAS and differences were declared significant at $P<0.05$. During the prepartum period, total daily mealtime decreased from 227 min/d at 21 d prepartum to 130 min/d 1 d prepartum. In addition, meal duration decreased from 31 to 18 min/d, DMI decreased from 14.0 to 9.0 kg/d, and meal DMI decreased from 1.93 to 1.21 kg/meal. Meals (8.1/d) and feeding rate (81.9 g DM/min) were similar during the prepartum period. Prepartum total daily mealtime (213 and 187 min/d) and meal duration (27.2 and 24.2 min/meal) were greater for primiparous cows. Feeding rate was greater for multiparous compared to primiparous cows, 95.1 and 66.6 g DM/min, respectively. During the postpartum period, total daily mealtime and meal duration increased from 98 to 251 min/d and 15 to 29 min/meal, respectively, the day of parturition compared to 21 d postpartum. In addition, daily DMI and DMI/meal increased from 8.6 to 17.7 kg/d and 1.29 to 2.15 kg/meal, respectively. Except for the day of parturition (6.7 meals/d), meals (8.8/d) was similar during the postpartum period. Postpartum feeding rate decreased from 112.4 g DM/min the day of parturition to 85.5 g DM/min 21 d postpartum. Feeding rate was greater for multiparous compared to primiparous cows, 106.7 and 78.0 g DM/min, respectively. Results show that the depression in DMI that occurs around the time of parturition coincides with a decrease in feeding time. Therefore, strategies that increase feeding time during this critical period may be useful in increasing DMI.

Key Words: Feeding Behavior, Feed Intake, Periparturient

845 Effects of increased exposure to pre-calving diets containing BioChlor: Reproductive performance. P. J. DeGaris[1], I. J. Lean*[1], D. M. McNeill[2], and A. R. Rabiee[1], [1]*Bovine Research Australasia, NSW, Australia,* [2]*University of Sydney, NSW, Australia*.

Holstein and Holstein × Jersey cows (n=993) in three herds, entered a prospective study to examine the effects of increased exposure to pre-calving transition diets on reproductive performance over the first 150 days of lactation. Pre-transition dry cow diets consisted of ad libitum access to ryegrass hays and pastures. Transition diets included, on a DM basis 2.8 kg ryegrass pasture, 4.2 kg ryegrass silage or creal hay, 3 kg grain or grain by-product, 0.1 kg canola or cottonseed meal, 0.6 kg BioChlor, 250 mg sodium monensin and 200 mg virginiamycin or 150 mg tylosin per day, $MgSO_4$ and trace elements. The transition diets contained on a DM basis (±SE), 16.0 (±1.08)% crude protein, 4.2 (±0.66)% rumen undegradable protein, 6.9 (±0.23) MJ NE_L, 0.4 (±0.06)% calcium and provided a metabolisable protein balance of 286 (±182.2) g/day and a dietary cation anion balance of -15.0 (±5.50) meq/100g. Of 158 cows excluded from analysis: 55 had gestation periods <269 or > 299 days, 58 had data missing or outside analytic limits and 45 died or were culled prior to mating start date. Cox's Proportional Hazards Model was appropriate to describe time to submission for first mating and time to conception. The probability of submission per day increased (P = 0.021) by 1.012 (95% Confidence Interval 1.002 to 1.023) and that of conception per day increased (P = 0.001) by 1.019 (95% Confidence Interval 1.008 to 1.030) for each day of exposure to the transition diet. Increasing exposure to transition diets did not significantly increase the proportion of cows that conceived at first mating as assessed by logistic regression (P= 0.241). The statistical model used included farm, age, calving order and breed where significant ($P < 0.05$). The results indicate that increasing exposure to a pre-calving transition diet containing BioChlor is positively associated with improved submission of cows for breeding, a shorter time to conception, but not a significantly higher conception rate at first breeding after calving.

Key Words: Transition Diet, Sodium Monensin, BioChlor

846 Effects of increased exposure to pre-calving diets containing BioChlor: Milk production. P. J. DeGaris[1], I. J. Lean*[1], D. M. McNeill[2], and A. R. Rabiee[1], [1]*Bovine Research Australasia, NSW, Australia,* [2]*University of Sydney, NSW, Australia*.

Holstein and Holstein x Jersey cows (n = 993) in three herds, entered a prospective study to examine the effects of increased exposure to pre-calving transition diets on milk production over the first 150 days of lactation. Pre-transition dry cow diets consisted of ad libitum access to ryegrass hays and pastures. Transition diets included, on a DM basis, 2.8 kg ryegrass pasture, 4.2 kg ryegrass silage or cereal hay, 3 kg grain or grain byproduct, 0.1 kg canola or cottonseed meal, 0.6 kg BioChlor, 250 mg sodium monensin and 200 mg virginiamycin or 150 mg tylosin per day, $MgSO_4$ and trace elements. The transition diets contained on a DM basis (±SE), 16.0(±1.08)% crude protein, 4.2 (±0.66)% rumen undegradable protein, 6.9 (±0.23) MJ NE_L, 0.40 (±0.06)% calcium and provided a metabolisable protein balance of 286 (±182.2) g/day and a dietary cation anion balance of -15.0 (±5.50) meq/100g. Of 182 cows excluded from analysis: 55 had gestation periods <269 or > 299 days; 82 had < six herd recordings and 45 had missing data. Cows were grouped by exposure to the pre-calving transition diet into 0 to 10, 11 to 20 and > 20 days exposure. Statistical models evaluating the association between exposure group and production variable controlled for farm, calving order, breed and age where significant ($P < 0.05$). Mean milk, protein yield, protein and fat percentage (±SE) and P values for exposure groups are tabulated below. Fat yield and individual somatic cell count did not vary significantly with exposure group. The results indicate that increasing exposure to a pre-calving transition diet containing BioChlor is negatively associated with fat and protein percentage but positively associated with milk and milk protein yields.

Exposure (days)	Milk yield (L/day)	Protein yield (kg/day)	Protein %	Fat %
0-10	28.3±0.25	0.96±0.007	3.43±0.014	3.89±0.035
11-20	28.8±0.23	0.97±0.006	3.40±0.013	3.85±0.032
>20	30.4±0.40	1.01±0.011	3.33±0.022	3.67±0.056
P value	0.001	0.003	0.004	0.008

Key Words: Transition Diet, Sodium Monensin, BioChlor

847 Effects of increased exposure to pre-calving diets containing BioChlor: Cow health. P. J. DeGaris[1], I. J. Lean*[1], D. M. McNeill[2], and A. R. Rabiee[1], [1]*Bovine Research Australasia, NSW, Australia,* [2]*University of Sydney, NSW, Australia.*

Holstein and Holstein x Jersey cows (n = 993) in three herds, entered a prospective study to examine the effects of increased exposure to pre-calving transition diets on milk production over the first 150 days of lactation. Pre-transition dry cow diets consisted of ad libitum access to ryegrass hays and pastures. Transition diets included, on a DM basis, 2.8 kg ryegrass pasture, 4.2 kg ryegrass silage or cereal hay, 3 kg grain or grain by-product, 0.1 kg canola or cottonseed meal, 0.6 kg BioChlor, 250 mg sodium monensin and 200 mg virginiamycin or 150 mg tylosin per day, $MgSO_4$ and trace elements. The transition diets contained on a DM basis (±SE), 16.0 (±1.08)% crude protein, 4.2 (±0.66)% rumen undegradable protein, 6.9 (±0.23) MJ NE_L, 0.4 (±0.06)% calcium and provided a metabolisable protein balance of 286 (±182.2) g/day and a dietary cation anion balance of 15.0 (±5.50) meq/100g. Of 103 cows excluded from analysis: 55 had gestation periods < 269 or > 299 days, 58 had data missing or outside analytic limits. Logistic regression modelling was used to describe the risk of retained foetal membranes (RFM), clinical mastitis, lameness, CIDR use and removal from the herds, by 150 days of lactation with farm, calving order and age used as covariates where significant ($P < 0.05$). Increasing exposure to the pre calving transition diet did not affect the risk of lameness ($P = 0.98$), clinical mastitis ($P = 0.16$), CIDR use ($P = 0.93$) or RFM ($P = 0.98$) but did reduce the risk of removal from the herd by 150 days of lactation (odds ratio = 0.95, 95% confidence interval = 0.920 to 0.985, $P = 0.004$). However, time to removal was not significant ($P = 0.428$)
The results indicate that increasing exposure to a pre-calving transition diet containing BioChlor is positively associated with improved cow survival to 150 days of lactation, but did not significantly affect other specific measures of cattle health.

Key Words: Transition Diet, Sodium Monensin, BioChlor

848 Effect of a dry propylene glycol product for postpartum Holstein dairy cows on health and performance. Y.-H. Chung*[1], K. S. Heyler[1], T. W. Cassidy[1], S. L. Ward[1], I. D. Girard[2], and G. A. Varga[1], [1]*Department of Dairy and Animal Science, The Pennsylvania State University, University Park,* [2]*Probiotech International Inc., Saint-Hyacinthe, Quebec, Canada.*

Thirty-nine Holstein dairy cattle (primiparous=20 and multiparous=19) were paired by parity and previous 305ME and assigned to one of three treatments: (1) control: no propylene glycol (PG) supplementation, (2) TMR: PG supplemented in the TMR, and (3) top-dressed (TD): PG top-dressed on the TMR. Propylene glycol was supplemented at a level of 250 g/cow/d. Supplementation of PG was started after parturition and continued for three weeks after calving. Cows were fed once and milked twice daily. Dry matter intake and milk yield were recorded daily and milk was sampled weekly. Blood was sampled at 4, 7, 14, and 21 days relative to calving. Body condition score (BCS) and body weight were also recorded before and after the experiment. Supplementation of PG lowered ($P<.08$) blood concentration of β-hydroxybutyrate (BHBA) compared to the control. Blood concentration of BHBA for the TMR group tended ($P=0.07$) to be lower than the control (976.12 vs. 1627.88 umol/L, respectively) and was not different between the TMR and TD. Blood concentrations of glucose, non-esterified fatty acid, insulin, cholesterol, urea, and aspartate amino transferase did not differ across treatments. Dry matter intake (DMI), milk yield, % of milk fat and protein, and yield of milk fat and protein were also not affected by PG treatments. However, there was a treatment by week interaction observed on DMI ($P<.01$) and milk yield ($P<.05$) indicating that DMI for the TMR increased at a more rapid rate than the control and TD and increases in milk yield for both PG treatments were greater over time as compared to the control. There was no PG effect observed on BCS and body weight change across treatments. Supplementation of PG significantly reduced blood BHBA when added to the TMR and numerically decreased blood BHBA when TD suggesting a positive benefit of providing dry PG in reducing ketosis after calving.

Key Words: Beta-hydroxybutyrate, Blood Metabolites

849 Effects of method of delivery of glycerol on performance of dairy cows during the transition period. K. L. Ogborn*[1], R. Paratte[1], K. L. Smith[1], P. W. Jardon[2], and T. R. Overton[1], [1]*Cornell University, Ithaca, NY,* [2]*West Central Soy, Ralston, IA.*

Holstein cows (n=48) entering second or greater lactation were utilized to determine the effects of method of delivery of glycerol on performance of dairy cows during the transition period. Beginning 21 d before expected parturition, cows were fed either a control diet or a diet containing glycerol (5% of DM). After parturition, cows were assigned to one of four treatments in a 2 (dietary glycerol; 3.3% of DM) X 2 (glycerol drench; 500 ml/d for 5 d) factorial arrangement. From d 22 through 63 of lactation, cows were fed the same diet. Feeding glycerol during the prepartum period increased prepartum DMI (14.8 vs. 13.2 kg/d; $P < 0.001$). Feeding glycerol during the postpartum period tended to decrease postpartum DMI (20.9 vs. 21.9 kg/d; $P < 0.08$) and drenching glycerol for the first 5 d of lactation decreased postpartum DMI (20.6 vs. 22.2 kg/d; $P < 0.01$). Milk yield averaged 42.1 kg/d during the experiment and was not affected ($P > 0.15$) by feeding glycerol during either the prepartum or postpartum periods or drenching glycerol during the first 5 d of lactation. Percentages and yields of milk fat and true protein were not affected ($P > 0.15$) by feeding glycerol during either the prepartum or postpartum periods; however, drenching glycerol tended to decrease milk protein content (2.82 vs. 2.94%; $P < 0.15$) and decreased milk lactose content (4.63 vs. 4.73%; $P < 0.05$). Overall, feeding glycerol during the prepartum period increased prepartum DMI; however, feeding or drenching glycerol during the postpartum period decreased postpartum DMI. Milk yield during the first 63 d of lactation was not affected by either prepartum or postpartum glycerol administration.

Key Words: Transition Cow, Glycerol

850 Effects of feeding propionate and calcium salts of long-chain fatty acids on transition dairy cow performance. J. M. DeFrain*, A. R. Hippen, K. F. Kalscheur, and R. S. Patton, *South Dakota State University, Brookings.*

Multiparous Holstein cows (n = 40) were used in a randomized complete block design to determine the effects of feeding Ca and Na salts (1:1, wt/wt) of propionate and Ca salts of long-chain fatty acids (LCFA) on transition performance. All cows were fed the same basal diet once daily for ad libitum intake. Treatments (kg/d) were 0.36 corn starch (C), 0.23 propionate + 0.14 corn starch (P), 0.23 propionate + 0.14 LCFA (PF1), and 0.34 propionate + 0.20 LCFA (PF2). Treatments were hand-mixed into the upper 1/3 of the TMR from 2 wk pre- through 3 wk postpartum. Intakes were recorded from 21 d pre- through 21 d postpartum. Energy density and CP were 1.54 and 1.65 Mcal/kg and 14.4 and 18.8% for pre- and postpartum diets, respectively. All cows received a common diet from 22 to 70 DIM. Milk composition was analyzed on d 7, 14, and 21. Blood was sampled at 14, 7, and 2 d prepartum and 2, 7, 14, and 21 DIM. Pre- and postpartum DMI averaged 11.9 and 16.4 kg/d, respectively, and did not differ among treatments. There was a tendency ($P = 0.08$) for a diet by week interaction for postpartum DMI as cows fed PF2 consumed 2 kg/d less DM during wk 2 relative to other treatments. Milk yields from 22 to 70 DIM were 48.8, 48.5, 47.8, and 51.3 kg/d for C, P, PF1, and PF2, respectively, and were not significantly affected by treatments. Milk true protein (3.32 vs. 3.16%, $P = 0.05$) was increased and MUN (12.5 vs. 14.4 mg/dl, $P = 0.04$) was decreased for C relative to other treatments. Milk fat yield from cows fed P tended to be greater than those fed PF1 (1.58 vs. 1.29 kg/d, $P = 0.10$). Plasma glucose, insulin, and BHBA were not affected by treatments. The PF2 treatment tended to decrease overall NEFA in plasma relative to PF1 (492 and 670 μEq/L, $P = 0.08$) and postpartum plasma NEFA relative to those fed PF1 (623 and 875 μEq/L, $P = 0.03$). Relative to PF1, feeding propionate and LCFA at the greater level in this experiment improved postpartum energy balance as evidenced by decreased concentrations of plasma NEFA.

Key Words: Propionate, Fat, Transition Dairy Cow

851 The effect of prepartum monensin supplementation on milk production in dairy cows. A. Arieli* and U. Dicken, *Hebrew University, Rehovot, Israel.*

It is commonly assumed that the effect of monensin on increasing milk yield is higher in dairy cows fed a forage based diet. A trial was conducted using 140 cows (110 multiparous and 30 primiparous) to evaluate the effect of prepartum (-30 d) administration of a monensin controlled release capsule (CRC) on production and composition of milk, and metabolites of high yielding dairy cows fed with a concentrate diet. Cows were evenly assigned, based on former yield, parity, and BCS at drying into two groups: control (CON) and CRC, supplying 300 mg monensin/d for 100 d. Primiparous cows were allocated according to BCS on -60 d. The prepartum and postpartum diets contained 14.5% crude protein and 1.55 Mcal NEL/kg of DM, and 16.5% crude protein (RUP 35% of CP), 29% NDF (forage NDF 58% of NDF), and 1.76 Mcal NEL/kg of DM, respectively. The concentrations of beta hydroxybutyric acid (BHBA) was lower and glucose concentration was higher in the CRC group, during 2 wks to +1 wk. Highest BHBA and lowest glucose concentrations were detected in +1 wk: 10.3 and 8.3 mg/dl for BHBA, and 49 and 53 mg/dl for glucose in CON and CRC, respectively ($P<0.01$). The proportion of ketotic multiparous cows treated with a drench of propylene glycol was 11 and 34% in CRC and CON ($P<0.05$). Milk production in multiparous cows during the first three months postpartum was 40.5 and 42.6 kg/d in CON and CRC, respectively ($P<0.05$). Milk fat and protein concentrations were similar among treatments averaging 3.80 and 3.07% (mo 1), 3.39 and 2.88% (mo 2), 3.17 and 2.82% (mo 3), respectively. Results of the current study are in line with improved energy balance due to CRC supplementation indicating that monensin provided prepartum can be beneficial in terms of health and production when supplied to dairy cows maintained on high concentrate diets.

Key Words: Monensin, Transition Cow, Ketosis

852 Effect of lowered prepartum DCAD on urinary pH: A meta-analysis. E. Charbonneau*[1], D. Pellerin[1], and G.R. Oetzel[2], [1]*Université Laval, Quebec, Canada,* [2]*University of Wisconsin, Madison.*

Lowered prepartum dietary cation-anion difference (DCAD) reduces milk fever at parturition. Urinary pH has been used to directly monitor dairy cow response to lowered DCAD. A meta-analysis of previously published studies was performed to evaluate the relationship between prepartum DCAD and urinary pH. Twenty-two published studies containing 48 treatment groups met criteria for inclusion in the meta-analysis. The relationship between DCAD and urinary pH was nonlinear and fit well with a symmetric logistic curve. In the nonlinear model, treatment group mean urinary pH decreased from 8.28 to 5.99 as DCAD [(Na+K) (Cl+S)] decreased from about +100 to 150 meq/kg dry matter. Urinary pH did not change if DCAD was increased above +100 or below 150 meq/kg. Five different equations to calculate DCAD were compared to urinary pH using mixed models. The DCAD formula (Na+K) (Cl+S) was the most highly associated with urinary pH. Concentrations of dietary minerals Ca, P, Mg, Na, K, Cl and S (meq/kg basis) were also compared to urinary pH. Among these minerals, only Na, K and Cl were significant in the final model for urinary pH. Both K (0.00376) and Na (0.00339) had similar coefficients, but the coefficient for Cl (-0.00624) was about twice the magnitude. These results validate the DCAD equation (Na+K) (Cl+S) for predicting urinary pH and demonstrate the importance of Cl in lowering urinary pH of prepartum dairy cows.

Key Words: Prepartum Dairy Cows, DCAD, Urinary PH

853 Direct-fed microbial supplementation on ruminal digestion, health And performance of pre- and postpartum dairy cattle. J. E. Nocek*[1] and W. P. Kautz[2], [1]*Spruce Haven Farm and Research Center, Auburn, NY* [2]*Chr Hansen BioSystems, Milwaukee, WI.*

Effects of direct-fed microbial (DFM) supplementation to dairy cows during the transition period were evaluated. Forty-four Holstein cows were fed close-up and lactating diets either with or without 2 g/cow/d of DFM. The DFM contained approximately $5x10^9$ cfu of bacteria (two specific Enterococcus faecium strains) and $5x10^9$ cfu of yeast and was incorporated into the diets via a cornmeal carrier. Supplemented cows were fed the DFM 21 days prior to expected calving date and continued through 10 wk postpartum. Cows supplemented with DFM had higher ($P<.01$) 24h ruminal DM digestibility for both corn silage and haylage than nonsupplemented cows. Supplemented cows consumed more DM during the pre- ($P< .10$) and postpartum ($P<.01$) period. In addition, those supplemented with DFM produced 2.3 kg more ($P<.01$) milk/cow/d than nonsupplemented cows. There was no difference in the 3.5 % FCM. Milk fat percentage was lower ($P<.01$), but not depressed (4.50%) for cows receiving DFM. There was no difference in milk fat or protein yield, milk protein percent and postpartum health. Cows consuming DFM had higher ($P<.05$) blood glucose postpartum, as well as lower beta-hydroxy butyric acid levels both pre- and day 1 postpartum. Plasma nonesterified fatty acid concentration was not affected by DFM supplementation. The results of this study indicate that targeted DFM supplementation positively influenced ruminal digestion of forage DM and transition cow performance.

Key Words: Direct-Fed Microbial, Ruminal Digestion, Production

854 Production and blood metabolites in multiparous Holstein and Jersey cows fed rumen-protected choline during the periparturient period. N. A. Janovick*[1], D. B. Carlson[1], J. E. Garrett[2], and J. K. Drackley[1], [1]*University of Illinois, Urbana,* [2]*Balchem Encapsulates, Slate Hill, NY.*

Choline is proposed to facilitate export of triglyceride from liver as VLDL, however, production responses to supplemental choline have varied. To better understand effects of choline on peripartal metabolism, our study characterized blood metabolite profiles of cows fed rumen-protected choline (RPC) pre- and postpartum. Thirty-two multiparous Holstein and 10 multiparous Jersey cows were randomly assigned to control (CON) or RPC dietary treatments. A close-up diet (1.64 Mcal NE_l/kg; 15.5% CP) was fed from 25 d before until parturition, followed by a lactation diet (1.75 Mcal NE_l/kg; 17.2% CP) from calving through 49 d postpartum. For RPC, diets were topdressed once daily with 60 g rumen-protected choline from 21 d before expected parturition through 21 d postpartum. Blood samples obtained on d -22, -19, -16, -13, -10 through 10, 13, 16, 19, 21, 28, 35, 42, and 49 relative to parturition were analyzed for urea N, total protein, BHBA, cholesterol (CH), glucose, and triglyceride in serum, and NEFA and phospholipid (PL) in plasma. RPC did not affect weekly DMI either pre- (12.1 kg; $P = .99$) or postpartum (15.3 kg; $P = .41$). Yields of milk, fat, and protein were unaffected by RPC (34.1 kg/d, $P = .39$; 1.42 kg/d, $P = .34$; and 1.07 kg/d, $P = .60$). RPC cows had lower ($P = .02$) plasma PL than CON cows at parturition (65.2 and 78.1 mg/dL). Breed*treatment (b*trt) interactions affected plasma NEFA concentration d 1 to 10 postpartum ($P = .03$), urea N prepartum ($P = .05$), and BHBA postpartum ($P = .05$). A b*trt*d interaction affected CH postpartum ($P < .01$). Other metabolites were unaffected by RPC both pre- and postpartum ($P > .15$). Because milk production was not affected, cows were not overconditioned to begin the study (BCS = 3.3), and did not lose excessive condition by 3 wk postpartum (BCS loss = 0.5), we hypothesize cows were not at great risk for accumulating fat in the liver; therefore, no effects of RPC were observed.

Key Words: Choline, Transition Period, Lipid Metabolism

855 Feeding soybeans and rumen-protected choline to dairy cows during the periparturient period and early lactation: effects on plasma lipid balance. W.A. Oelrichs*, M.C. Lucy, M.S. Kerley, and J.N. Spain, *University of Missouri - Columbia.*

This study was designed to investigate the effects of soybeans (SB) and rumen-protected choline (RPC; ReashureTM Choline; Balchem, Slate Hill, NY) fed during the periparturient period and early lactation on plasma lipid balance of dairy cows. Sixty-four Holsteins were blocked by parity and expected calving date and randomly assigned within block to one of six experimental diets. Dietary treatments were fed from 28 days prepartum to 100 days in milk. Cows were assigned to treatments in a 3 x 2 factorial arrangement. Cows received no SB, SB beginning at calving, or SB for the duration of the study. The SB were fed as raw, cracked beans at feeding rates of 1.9 and 2.8 kg DM per cow per day during pre- and postpartum periods, respectively. The RPC was top-dressed at a rate of 0 or 15 g dietary choline per cow per day. Cows were individually fed diets as total mixed rations using electronic feeding gates. Blood

samples were collected once weekly prepartum, at days 3, 0, and +3 relative to calving, and twice weekly postpartum. Plasma were analyzed for triglycerides (TG), total cholesterol, lipoprotein cholesterol and fatty acids. Changes in plasma lipid concentrations during the periparturient period were characterized for the first time. Plasma lipid concentrations were not affected by feeding rumen-protected choline. Cows fed SB beginning at 28 days prepartum had higher plasma TG, cholesterol, lipoprotein cholesterol, and fatty acid concentrations than cows fed the control diets during the prepartum period. By 14 days postpartum, cows fed SB beginning at parturition had similar plasma lipid concentrations as cows fed SB prepartum. If increased plasma lipid concentrations have reproductive advantages, feeding SB beginning 28 days prepartum as well as at parturition are equally effective in improving lipid balance during early lactation.

Key Words: Transition Cows, Lipid Profiles, Rumen-Protected Choline

856 Effects of physiological state, prepartum dietary carbohydrate source, and chromium supplementation on dynamics of insulin, glucose, and fatty acid metabolism in dairy cows. K. L. Smith*[1], M. R. Waldron[1], T. R. Overton[1], J. K. Drackley[2], R. C. Boston[3], and M. T. Socha[4], [1]*Cornell University, Ithaca, NY,* [2]*University of Illinois, Urbana,* [3]*University of Pennsylvania, Kennett Square,* [4]*Zinpro Corporation, Eden Prairie, MN.*

Holstein cows (n=72) entering second or later lactation were used to determine whether glucose tolerance test (GTT) indices were affected by source of carbohydrate in the prepartum diet, chromium-L-methionine (Cr-Met) supplementation throughout the periparturient period, and physiological state. Cows were fed a TMR with concentrates consisting of either starch-based cereals (high NFC; 40.3% NFC) or nonforage fiber sources (low NFC; 33.6% NFC) from 21 d before expected parturition until parturition; cows were fed a common diet postpartum. The Cr-Met was supplemented once daily via gelatin capsule at dosages of 0, 0.03, or 0.06 mg of Cr per kilogram of $BW^{0.75}$. Thus, treatments were in a 2 (carbohydrate source) x 3 (Cr-Met) factorial arrangement. The GTT were conducted on d 10 prior to expected parturition and d 28 postpartum and on a subset (n = 13) of cows on d 5 postpartum. The GTT indices were derived using the Minimal Model and other indices were calculated using Stata. The SI (insulin sensitivity), SG (glucose effectiveness), and DI (disposition index) were lower ($P < 0.001$) and AIRg (acute insulin response to glucose) was higher ($P < 0.001$) during the prepartum period compared to the postpartum period. The lipolysis rate (FFAslope) was lower ($P < 0.001$) during the prepartum period. Feeding diets containing low or high concentrations of NFC during the prepartum period resulted in no significant effects on any of the kinetic indices derived from the GTT. Administering increasing amounts of Cr-Met linearly increased ($P < 0.001$) AIRg. These data support the concept that increased insulin resistance during late pregnancy is mediated through decreased insulin sensitivity, and that effects of prepartum dietary carbohydrate source and Cr-Met on tissue responsiveness to insulin are modest.

Key Words: Periparturient Cow, Chromium, Glucose Tolerance Test

857 Inducing hypocalcemia in rumen fistulated steers to determine effectiveness of anionic salt treatments for transition dairy cattle. M. A. Froetschel*[1], D. Kumar[1], P. G. Smith[1], and S. N. Nichols[2], [1]*The University of Georgia, Athens,* [2]*West Central Soy, Ralston, IA.*

Eight rumen-fistulated Holstein steers, 4 yearling (Y: 417 ± 10.4 kg) and 4 mature (M: 632.8 ± 54.6 kg), were fed a control diet (C) or three cation-anion difference (DCAD) products: Soy-Chlor 16-7 (S), Bio-Chlor (B) or Animate (A) in a replicated 4 X 4 Latin Square. Sodium bicarbonate (1%) was added to C to make it positive in DCAD. Total mixed rations, 65% concentrate and 35% chopped Bermudagrass Hay, were fed 1X/d. During experimental periods. steers were fed C for 3 d and experimental diets for 11 days. On d 13 and d 14, Y and M steers, respectively, were fit with 2 indwelling jugular catheters. In one, Na-EDTA was infused (5% wt/wt at 6.5ml/min for 5-7 h) and in the other, blood was sampled (at 30 min intervals, 2 before and 12 during EDTA infusion). Intake and urine pH (UPH) were measured daily and reticuloruminal motility (RRM), UPH, urine and blood ionizable-calcium (UCA and BCA) were measured before and during IV Na- EDTA infusion. Intake (DMI) and UPH decreased by feeding DCAD. DMI was 29.0, 23.9, 25.2 and 25.4 ± 1.22 kg/d, and UPH was 8.10, 6.62, 6.61 and 6.98 ± .14 for steers fed C, S, B and A. DMI as a % of BW was 2.55, 2.09, 2.25 and 2.28 ± .1. DCAD effects on BCA during EDTA infusion depended on maturity. BCA was 5.54, 5.94, 6.89 and 6.67 mg/dL ± .22 and was 57.6, 62.6, 66.1 and 65.8 ± 1.0 % of pre-infusion BCA (10.1 ± .15 mg/dL) during EDTA (2 to 5 h), for Y steers fed C, S, B and A. BCA averaged 7.17, 6.87, 5.92 and 6.58 ±mg/dL, during EDTA (2 to 5 h), for M steers and was 70.9 % of pre-infusion BCA (9.24 ± .22 mg/dL). During EDTA infusion, frequency of RRM increased in Y but decreased in M steers fed DCAD. Prior to EDTA infusion, UCA was higher in steers fed DCAD (4.38, 29.0, 29.1 and 9.41 ± 2.4 mg/dL for C, S, B and A). During the first 2 h of EDTA, UCA decreased but was still higher in DCAD steers. After 1 h of EDTA, UCA was .4, 18.8, 13.1 and .4 ± 2.4 mg/dL for steers fed C, S, B and A. After 3 h of EDTA, UCA was not detectable. Inducing hypocalcemia with EDTA, especially in yearling steers, was useful to demonstrate efficacy of DCAD products.

Key Words: Hypocalcemia, DCAD, Calcium

Swine Species

858 Gilt selection for improved lifetime productivity. J. L. Patterson*[1], G. R. Foxcroft[1], M. J. Pettitt[2], and E. Beltranena[1], [1]*Swine Research & Technology Centre, Edmonton, AB, Canada,* [2]*Prairie Swine Centre Inc., Saskatoon, SK, Canada.*

In a study of 509 pre-pubertal C22 and L42 (PIC Canada) gilts given direct daily boar contact from 140.1 ± 5.1 d of age, and classified with respect to age at first estrus as Early (148.0 ± 0.5 d), Intermediate (159.8 ± 0.4 d) or Late (175.7 ± 0.5 d) responders, or as Non-Responsive (NR; not cyclic by 180 d), earlier responding gilts accumulated less non-productive days (NPD) in the gilt pool (J. Anim. Sci. Vol 81, Suppl 1). Data on reproductive performance of these gilts until either culling or farrowing as third parity sows is now available to evaluate longer-term productivity. The main differences detected were between any gilt recorded as initially responding to boar contact (R) compared to NR gilts. Analyzed on the basis of overall performance of gilts originally on inventory, R were more productive than NR gilts (P #8804 0.01), as measured by the percentage of gilts successfully bred (R = 96.2 vs. NR = 75.2 %), farrowing one (R = 85.0 vs. NR = 64.2 %), two (R = 72.2 vs. NR = 49.5 %), or three litters (R = 57.6 vs. NR = 37.0 %), and as the average litters produced per gilt on inventory (R = 2.5 ± 0.1 vs. NR = 1.7 ± 0.1 litters), reflecting a lower retention rate of NR gilts in the breeding herd. When different gilt categories were compared on the basis of productivity of sows that actually produced litters, sow NPD were higher (P #8804 0.05) in NR compared to R females, as measured by average weaning-to-estrus interval (6.4 ± 0.4 vs. 5.6 ± 0.2 d, respectively) and weaning-to-conception interval (11.2 ± 1.3 vs. 7.5 ± 0.6 d, respectively). In contrast, mean total pigs born per litter at first, second and third parity was not different (P #8805 0.05) between R(10.7 ± 0.4, 11.2 ± 0.4 and 12.5 ± 0.5, respectively) and NR (10.9 ± 0.2, 11.3 ± 0.2 and 12.1 ± 0.2, respectively) gilts. Gilt selection based on recorded first estrous during periods of good boar contact (heat-no-serve) is therefore predictive of better lifetime reproductive performance.

Key Words: Gilts, Selection, Lifetime Productivity

859 Efficient sows are good mothers. R. Bergsma*, *IPG, Institute for Pig Genetics, AA Beuningen, The Netherlands.*

Feed intake of sows during lactation is often too low. Increasing feed intake capacity of sows is one solution, increasing feed efficiency another. The aim of this study was to investigate the sources of variation in feed efficiency during lactation. Specifically, the ratio between output (energy gain of weaned and died piglets during lactation) and input (energy from feed intake and body tissue losses corrected for maintenance) was examined. Data were collected on the experimental farm of IPG in Beilen, The Netherlands. Sows were weighed and backfat was measured ultrasonically when sows entered the farrowing house and again at weaning. Piglets were weighed at birth and at weaning. Cross fostering, mortality of piglets and lactation feed intake of sows was recorded. Lactations of three sow genetic lines (CROSS) of different parities were