

rice diets are used, which indicates the need of a minimum of fiber in broiler diets.

Key Words: Rice, Fiber Source, Early Nutrition

Ruminant Nutrition: Beef - Digestibility & Production

836 Site and extent of digestion in beef cattle consuming restricted amounts of forage and supplemental ruminally undegradable protein. E. J. Scholljegerdes*, T. R. Weston, F. S. D'Angieri, P. A. Ludden, and B. W. Hess, *Department of Animal Science, University of Wyoming, Laramie.*

Twelve Angus-cross cattle (avg. initial BW = 594 kg \pm 44.4 kg) fitted with ruminal and duodenal cannulae were used in a 4 \times 4 Latin square double cross-over designed experiment to determine site and extent of digestion in beef cattle consuming restricted amounts of forage plus a ruminally undegradable protein (RUP) supplement. Heifers were fed chopped (2.54 cm) bromegrass hay (11.4% CP, 57% NDF) at 30, 55, 80, or 105% of maintenance. Cattle fed below maintenance were given increasing amounts of RUP supplement (6.8% blood meal, 24.5% feather meal, and 68.7% menhaden fish meal; DM basis) in an effort to equalize duodenal essential AA flow to that of the 105% of maintenance diet. Experimental periods were 21 d in length with 17 d of adaptation followed by 4 d of intensive sample collection. Total OM intake and duodenal OM flow decreased ($P < 0.001$) proportionally in cattle consuming 105 to 30% of the forage intake required for maintenance. Therefore, OM truly fermented (% of intake) did not differ ($P = 0.43$) as intake declined. True ruminal N digestibility (% of intake) tended to decrease linearly ($P = 0.07$); however true ruminal N digested (g/d) increased as intake decreased from 105 to 30%. Duodenal N flow was equal ($P = 0.33$) across intake level, even though microbial N flow declined ($P < 0.001$) as forage OM intake decreased. Due to the low ruminal degradability of the RUP supplement, non-ammonia non-microbial N flow increased ($P < 0.001$) with RUP supplementation. Post-ruminal N digested tended to increase ($P = 0.06$) with increasing levels of RUP in the diet. The increased ruminal N digested associated with supplemental RUP and restricted forage intake increased ruminal molar proportions of branched chain VFA ($P = 0.02$) and millimolar concentrations of ruminal NH_3 ($P < 0.001$). Therefore, when beef cattle consume restricted amounts of bromegrass hay, supplemental RUP can boost the supply of highly digestible N presented to the small intestine for absorption.

Key Words: Nutrient digestion, Restricted intake, Ruminal undegradable protein

837 Digestion of barley-based high-grain diets supplemented with rumen degradable and undegradable protein in steers. - digestion trial. B. W. Pamp*, M. L. Bauer, G. P. Lardy, and S. A. Soto-Navarro, *Department of Animal and Range Sciences, North Dakota State University, Fargo.*

Fifteen Holstein steers (398.2 \pm 7.3 kg initial BW) were allotted by weight to one of four dietary treatments in a completely randomized design. Objectives of this trial were to determine effects of rumen degradable (RDP) and undegradable protein (RUP) on site and extent of digestion, microbial efficiency, and ruminal fermentation. Dietary treatments were arranged in a 2 \times 2 factorial. Factors were RDP (+/-) and RUP (+/-). RDP source was urea and RUP was a combination of hydrolyzed feather meal and blood meal (80:20 on N basis). The basal diet was formulated to contain (DM basis) 83% barley, 5% alfalfa hay, 5% corn silage, 5% de-sugared molasses, 27.5 mg/kg monensin, and 11.0 mg/kg tylosin. The control diet (without added RDP and RUP) was formulated to contain a minimum of 12.5% CP, 0.7% calcium, and 0.3% phosphorus. Diets were formulated such that +RDP added 1% CP from urea and +RUP added 1% CP from the feather meal/blood meal combination. Steers were adapted to the experimental diets for 29 d before collection. Average DMI during trial period was 11.5 kg/d. Apparent ruminal OM digestibility decreased ($P = 0.05$) with RUP (41.4 vs. 35.1 \pm 2.2%). Digestibility of OM in the small intestine tended ($P = 0.09$) to increase with the inclusion of RUP (2.8 vs. 9.8 \pm 2.3%). Intake and ruminal digestibility of NDF decreased ($P = 0.01$) with the dietary addition of RUP (2.98 vs. 2.64 \pm 1.20 kg/d and 17.1 vs. 0.2 \pm 5.8%, respectively). The inclusion of RDP increased duodenal NDF flow ($P = 0.08$; 2.45 vs. 2.87 \pm 2.06 kg/d) and decreased NDF ruminal digestion

($P = 0.06$; 17.1 vs. 4.5 \pm 5.8%). The addition of RUP alone in the diet increased CP intake over control and RDP diets ($P = 0.02$; 1.62 vs. 1.79 \pm 0.07 kg/d). Total tract OM, CP, ADF, and NDF digestibilities were unaffected by RDP and RUP supplementation. These results suggest protein supplementation decreased ruminal fiber digestion and did not improve digestion of other feed fractions.

Key Words: Barley, Digestion, Ruminal Fermentation

838 Effect of choice-select spread on carcass value and profitability in early-weaned Simmental steers. N. A. Pyatt*¹, L. L. Berger¹, D. B. Faulkner¹, and P. M. Walker², ¹University of Illinois at Urbana-Champaign, Urbana, ²Illinois State University, Normal.

Early-weaned steers (n = 192, ³/₄ Simmental or greater) of known genetics were individually fed in a four-year study to determine the influence of Choice-Select (Ch-Se) spread (\$4, \$8, \$12 or \$16 per 45.4 kg) on performance and carcass factors explaining variation in carcass value and profitability. Steers were weaned at 88.0 \pm 1.1 d and fed a high concentrate diet for 334.2 \pm 0.7 d. Five-year price data were collected for feedstuffs, dressed beef, and grid premiums and discounts. Input costs included annual cow costs, veterinary, labor, feed markup, yardage and interest. Independent variables included growth and carcass EPDs, daily intake (DMI), daily gain (ADG), hot carcass weight (HCW), calculated yield grade (YG) and marbling score (MS). At \$4 Ch-Se spread, HCW (57%), YG (17%) and MS (4%) accounted for nearly 78% of the variation in carcass value among steers. ADG (27%), YG (19%), HCW (16%), MS (7%) and DMI (5%) accounted for nearly 74% of the variation in profit with a \$4 Ch-Se spread. At \$8 Ch-Se spread, HCW (55%), YG (13%) and MS (9%) accounted for over 77% of the variation in carcass value among steers. ADG (22%), MS (19%), YG (16%), HCW (11%) and DMI (4%) accounted for nearly 72% of the variation in profit with an \$8 Ch-Se spread. At \$12 Ch-Se spread, HCW (38%), MS (27%) and YG (11%) accounted for over 76% of the variation in carcass value among steers. Marbling score (26%), ADG (19%), YG (14%), HCW (8%) and DMI (4%) accounted for 71% of the variation in profit with a \$12 Ch-Se spread. At \$16 Ch-Se spread, MS (37%), ADG (16%), YG (12%) and HCW (7%) accounted for over 73% of the variation in carcass value among steers. Marbling score (33%), ADG (15%), YG (12%), HCW (6%) and DMI (4%) accounted for over 70% of the variation in profit with a \$16 Ch-Se spread. When estimating carcass value, the importance of marbling score increased while carcass weight decreased with rising Ch-Se spread. When assessing profitability, the importance of marbling score increased while ADG, carcass weight and YG diminished with increasing Ch-Se spread.

Key Words: Carcass Value, Profitability, Early-Weaning

839 Effect of dressed price on carcass value and profitability in early-weaned Simmental steers. N. A. Pyatt*¹, L. L. Berger¹, D. B. Faulkner¹, and P. M. Walker², ¹University of Illinois at Urbana-Champaign, Urbana, ²Illinois State University, Normal.

Early-weaned steers (n = 192, ³/₄ Simmental or greater) of known genetics were individually fed in a four-year study to determine the influence of base price for dressed beef (\$96, \$108, \$120 or \$132 per 45.4 kg) on performance and carcass factors explaining variation in carcass value and profitability. Steers were weaned at 88.0 \pm 1.1 d and fed a high concentrate diet for 334.2 \pm 0.7 d. Five-year price data were collected for feedstuffs and grid premiums and discounts. Input costs included annual cow costs, veterinary, labor, feed markup, yardage and interest. Independent variables included growth and carcass EPDs, daily intake (DMI), daily gain (ADG), hot carcass weight (HCW), calculated yield grade (YG) and marbling score (MS). At \$96 per 45.4 kg, MS (25%), ADG (19%), YG (18%) and HCW (10%) accounted for nearly 72% of the variation in carcass value among steers. Marbling score (19%), YG

(16%), ADG (14%) and DMI (12%) accounted for over 61% of the variation in profit when base price was \$96 per 45.4 kg. At \$108 per 45.4 kg, ADG (26%), MS (23%), YG (15%) and HCW (11%) accounted for nearly 75% of the variation in carcass value among steers. Daily gain (21%), MS (20%), YG (15%), HCW (10%) and DMI (5%) accounted for over 71% of the variation in profit when base price was \$108 per 45.4 kg. At \$120 per 45.4 kg, HCW (59%), YG (11%) and MS (10%) accounted for over 79% of the variation in carcass value among steers. Daily gain (21%), MS (20%), YG (14%), HCW (13%) and DMI (7%) accounted for over 75% of the variation in profit when base price was \$120 per 45.4 kg. At \$132 per 45.4 kg, HCW (54%), YG (9%) and MS (8%) accounted for nearly 82% of the variation in carcass value among steers. Carcass weight (52%), YG (10%), MS (9%) and DMI (7%) accounted for nearly 78% of the variation in profit when base price was \$132 per 45.4 kg. When estimating carcass value, the importance of carcass weight increased while marbling score decreased with rising base price. When assessing profit, the importance of carcass weight increased with increasing base price for dressed beef.

Key Words: Carcass Value, Profitability, Early-Weaning

840 Effects of carbohydrate source and forage level in the diet on nitrogen balance, digestibility and portal nutrient flux in sheep. A. F. Branco*, G. F. Mouro, F. J. Maia, T. F. Minella, L. P. Rigolon, and S. M. Coneglian, *Universidade Estadual de Maringa*.

The objectives of this experiment was to evaluate the effects of two carbohydrate sources (soybean hulls and corn) and two forage level (40% and 70%) in the diet on nitrogen balance, nutrient digestibility and portal nutrient flux in sheep. Were used four Corriedale wethers with 45 kg of live weight in a 4 x 4 Latin square. The wethers were fitted with catheter in mesenteric and portal veins and mesenteric artery. Digestibility and nitrogen balance were determined using total collection of feces and urine. Portal plasma flow was determined by continuous infusion of *P*-aminohippurate, and net nutrient flux was calculated as the difference between venous and arterial concentration times blood flow. There was no difference among treatments for dry matter intake, and dry matter digestibility was higher ($P < .01$) for corn diets. Intake, digestion and digestibility of neutral fiber detergent (NDF) was higher ($P < .05$) for soybean hulls diets. Corn diets showed higher ($P < .01$) ether extract intake, digestion and digestibility. There was higher ($P < .01$) non fiber carbohydrates intake and digestion in diets with 40% forage and corn diets. Energy concentration expressed as total digestible nutrients (TDN) was higher ($P < .02$) for corn diets. Diets with 40% forage showed higher nitrogen utilization as result of lower ($P < .01$) fecal and urinary losses and higher ($P < .01$) digestibility and nitrogen retention. Carbohydrate source and forage level did not influence portal plasma flow. Portal and arterial glucose concentration were higher ($P < .01$) for corn and 40% forage diets. Carbohydrate source and forage level did not affect variables related to alpha-amino-nitrogen. Portal ammonia and urea concentration, venous-arterial difference and portal ammonia flux were lower ($P < .01$) for 40% forage diets.

Key Words: Portal Nutrient Flux, Metabolism, Carbohydrate

841 Digestion characteristics of corn plus cottonseed meal compared to whole cottonseed plus de-oiled rice bran as supplements for beef cattle and the effects of extrusion. M. S. Gadberry*¹, P. A. Beck², S. A. Gunter², and D. W. Kellogg³, ¹Cooperative Extension Service, University of Arkansas, Little Rock, ²Southwest Research and Extension Center, University of Arkansas, Hope, ³Department of Animal Science, University of Arkansas, Fayetteville.

A 3 x 3 Latin-square design was used to evaluate ruminal digestion characteristics of a conventional versus co-product based supplement for growing beef cattle. Treatments included free choice hay and either 1) corn and cottonseed meal (71:29, wt:wt; CCSM) supplement, 2) de-oiled rice bran and whole cottonseed (62:38, wt:wt; DRCS), or 3) extrusion processed de-oiled rice bran plus whole cottonseed (EXT) offered at 1% BW (DM basis). Contrasts were used to compare supplement type, CCSM vs. DRCS plus EXT, and the effects of processing, DRCS vs. EXT. Neither supplement type nor processing affected marker predicted hay, supplement, or total DM intake ($P > 0.20$). Supplement DM degradation rate did not differ between type ($P = 0.82$) or processing ($P = 0.23$). Rate of passage of the CCSM (5.8%/h) supplement was higher

($P = 0.01$) than the DRCS (4.4%/h) and EXT (4.5%/h) supplements, and EXT tended to be higher than DRCS ($P = 0.08$). Supplement type ($P = 0.09$) and processing ($P = 0.08$) tended to affect supplement rumen degradable DM, 49.0, 50.4, and 52.7%, for CCSM, DRCS, and EXT, respectively. Supplement type or processing did not affect hay DM degradation rate, passage rate, or rumen degradable DM ($P > 0.10$). Supplement type tended to differ ($P = 0.06$) in rumen degradable N to rumen degradable OM (g/kg, RDN:RDOM); however, supplement type or processing did not affect ($P > 0.20$) overall diet RDN:RDOM. The total tract DM digestibility was not affected by supplement type ($P = 0.74$) or processing ($P = 0.67$) and was 68.9, 70.5, and 69.1% for the CCSM, DRCS, and EXT treatments, respectively. Co-product based supplements can effectively be used in place of conventional feedstuffs, and extrusion processing had minor effects on digestion characteristics.

Key Words: Beef Cattle, De-Oiled Rice Bran, Extrusion

842 Using a dynamic mechanistic ruminant model to estimate the effect of large changes in starch fermentation rates and site of digestion on cattle growth. B. N. Nagorcka*¹ and S. Bird², ¹CSIRO Livestock Industries, Canberra, Australia, ²University of New England, NSW, Australia.

We have observed *in vitro* fermentation rates in a range of sorghum grains and processed grains to vary over a 3-fold range. To assess the effect on cattle growth of a 2-fold change in fermentation rate, achieved by steam flaking sorghum (SF), we have used a dynamic, mechanistic model (AusBeef, supported by CSIRO) to predict feed intakes, body growth rates, body protein/fat growth rates and feed conversion ratios (FCR) in an example where a 70:30 sorghum:forage mix is fed to Angus steers at a starting body weight (BW) of 300 kg. The predictions of rumen and whole tract digestibility of starch for dry-rolled sorghum (DR) are 59% and 82%, and for SF the predictions are 78% and 97%, i.e., similar to published observations. Although 18% of the starch is predicted to be lost using DR, the cattle are also predicted (table) to eat more, and have higher BW gains in the early stages of the feeding relative to SF (found to be consistent with recent observations) because there is a shift in the site of digestion to post-rumen causing protein synthesis to be favoured. As a consequence steam flaking produces only a small reduction in the FCR relative to DR. However the FCR for SF is 10% higher (less efficient) than is predicted if all the starch escaping digestion in the rumen using DR is digested post rumen (DR+PR in the table), i.e. maximising the shift in site of digestion. It is concluded that the full commercial potential of sorghum is not achieved in SF.

		Feeding period (d)				
		1-30	31-60	61-90	91-120	1-120
DM intake (Kg/d)	SF	8.35	8.88	9.37	9.66	9.07
	DR	8.78	9.70	10.28	10.64	9.85
	DR+PR	7.91	8.41	8.94	9.39	8.66
BW gain (Kg/d)	SF	1.30	1.39	1.31	1.21	1.30
	DR	1.40	1.51	1.36	1.24	1.38
	DR+PR	1.36	1.48	1.35	1.25	1.36
Feed/gain (FCR)	SF	6.13	6.10	6.83	7.62	6.66
	DR	5.99	6.13	7.22	8.19	6.81
	DR+PR	5.55	5.42	6.32	7.17	6.08

Key Words: Cattle, Fermentation Rate, Site of Digestion

843 Ruminal nutrient degradation of untreated and chemically treated wheat grain. K.-H. Suedekum*¹, M. Klein¹, M. Paschke-Beese¹, and O. Schade², ¹University of Kiel, Germany, ²Raiffeisen HaGe Nord, Rendsburg, Germany.

This study compared ruminal nutrient degradation of untreated wheat grain (dry matter basis: 67.2% starch, 13.4% crude protein [CP]) with a wheat grain that was chemically treated with xylose in aqueous Ca-Mg lignosulphonate solution at elevated temperatures (WeiPass[®]; 55.6% starch, 14.8% CP). A standardized *in situ* procedure was applied using three ruminally cannulated steers. Feed samples were incubated in the rumens for 0, 2, 4, 8, 16, 24, 48, 72, and 336 h to estimate rate and extent (effective degradability at assumed rumen outflow rates of 2, 5 and 8%/h) of ruminal degradation of CP and starch. The proportions of ruminally undegraded CP (RUP) and ruminally undegraded starch (RUS)

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. DeGaris¹, I. J. Lean*¹, D. M. McNeill², and A. R. Rabiee¹, 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 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, MgSO₄ 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. DeGaris¹, I. J. Lean*¹, D. M. McNeill², and A. R. Rabiee¹, 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, MgSO₄ 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