This study aimed to evaluate the effects of intensive whole milk feeding in calves on subsequent feeding behavior of 58 Holstein-Gyr females. Up to 56 d of age, calves received 6 L/d of 4 different liquid diets consisting of whole milk with the increasing addition of milk replacer (Sprayfo Violet SSP) to adjust the concentration of total solids (TS) to 13.5 (n = 15), 16.1 (n = 15), 18.2 (n = 13), 20.4% (n = 15). After weaning, animals were randomly housed in 4 paddocks, each one equipped with 3 electronic feed bins and one electronic water bin (INTERGADO, Brazil) in Embrapa Dairy Cattle facilities, Brazil. The diet (70% corn silage and 30% concentrate, 195 g of CP/kg, DM basis) was fed ad libitum, twice a day, until 210 d of age. Only events with registered intake were used, and the following results were calculated: Ingestion rate (IR, g/s), average bunk visit duration (AVD, min), daily visit duration (DVD, h) and daily visit frequency (VF, events). Due to the natural right skewness of IR and AVD distributions, their daily median, instead of mean, were used to represent their trends across study period. All variables were analyzed as a completely randomized design with repeated measures using linear mixed model approach. Age and TS were evaluated as fixed effects, while animals as random. The necessity to model error dependence and heteroscedasticity was evaluated by monitoring Schwarz criterion. The effect of TS was decomposed into orthogonal polynomials of linear and quadratic degrees. Significance was declared at $P < 0.05$. All variables were consistently influenced by animal's age, where IR was increased as animals become older (0.837 ± 0.075 g/s at 100 d old versus 1.617 ± 0.072 g/s at 210 d old). An interaction effect between TS and age was detected for IR, where TS linear increased IR for animals older than 190 d of age. None of visit variables were affected by TS levels (AVD = 3.70 ± 0.37 min, DVD = 2.50 ± 0.12 h, VF = 35.16 ± 3.21 events). Intensive whole-milk feeding in calves caused minor effects on subsequent feeding behavior of dairy heifers.

Key Words: milk replacer, intake, precision farming

M385 Comparison of the RQUICKI estimate of insulin sensitivity with glucose and insulin tolerance in periparturient dairy cows. Sina Saed Samii*, J. Eduardo Rico, Alice T. Mathews, Cassandra L. Orndorff, Amanda N. Davis, and Joseph W. McFadden, *West Virginia University, Morgantown, WV.*

The revised quantitative insulin sensitivity check index (RQUICKI) has been utilized to evaluate insulin resistance in dairy cows; however, discrepancies between RQUICKI and direct measurements of insulin sensitivity are documented. Our objective was to compare RQUICKI with glucose and insulin tolerance in non-fasted peripartal dairy cows. Multiparous Holstein cows were grouped by BCS at d −28 prepartum: lean (BCS 2.91 ± 0.13; n = 7) or overweight (OVER; BCS 4.03 ± 0.21; n = 7). Diets were formulated to meet nutrient requirements. An intravenous insulin challenge (0.1 IU/kg BW; ITT) was performed on d −26 and −13, relative to expected calving, and 5 DIM. An intravenous glucose challenge (0.3 g/kg BW; GTT) was performed 24 h post- ITT . Blood and milk were collected routinely. Data were analyzed using a mixed model with repeated measures (fixed effects of BCS and day). Effects are presented as changes relative to lean cows, unless described otherwise. OVER had lower DMI, and lost more BCS and BW postpartum ($P < 0.05$). Adiposity had no effect on milk yield, milk protein yield, and SCC; however, milk fat yield was greater in OVER ($P < 0.05$). OVER had increased plasma NEFA and BHBA ($P < 0.05$). Prepartum plasma insulin levels were higher in OVER ($P < 0.05$). Although plasma glucose levels declined with time ($P < 0.01$), BCS did not modify plasma glucose. RQUICKI values were lower for OVER pre- and postpartum ($P < 0.05$). Postpartum cows had lower insulin-stimulated glucose disposal, relative to prepartum cows ($P < 0.01$). Following insulin-stimulated glucose disappearance, return to basal glucose in OVER was delayed by 60 min ($P < 0.05$). BCS had no effects on GTT; however, post-glucose challenge area under the curve (AUC) for 180 min and clearance rate (%/min) for the first 30 min were lower for postpartum cows, relative to prepartum cows ($P < 0.05$). Before and after calving, OVER experienced greater glucose-stimulated reductions in NEFA and AUC for 180 min following glucose challenge ($P < 0.05$). Observed inconsistencies between RQUICKI and tolerance testing may be due to direct measurements in the fed state.

Key Words: glucose tolerance, insulin resistance, transition cow

M386 Evolving the plasma free AA dose-response technique to determine bioavailability of Met in RP-Met supplements. Devan L. Chirgwin*[1], Nancy L. Whitehouse[1], Andre F. Brito[1], Charles G. Schwab[2], and Brian K. Sloan[3], *[1]University of New Hampshire, Durham, NH, [2]Schwab Consulting, LLC, Boscobel, WI, [3]Adisseo, Alpharetta, GA.*

The plasma free AA dose-response technique has been proposed as the standard approach for arriving at estimates of efficacy for rumen-protected Lys supplements. Results of the first replicate of a 5 × 5 Latin square study, reported last year [J. Dairy. Sci. (97(E-Suppl. 1):763], confirmed that a positive relationship also exists between increasing amounts of absorbed Met and plasma Met and total sulfur AA (TSAA) concentrations. The objective of adding a second replicate was to complete the study, and using the combined data set, to determine if using plasma Met or TSAA concentrations (μM) is the more precise response parameter and whether expressing either as a % of total AA (TAA) or total essential AA (TEAA) would reduce the error of calculated estimates of Met-bioavailability. Experimental protocol was as previously described: namely, 5 rumen-cannulated Holstein cows (74–222 DIM) were fed a Met-deficient basal diet with identical treatments. Combined data were analyzed using PROC MIXED and PROC REG of SAS. Outlier analysis, using ± 2.0 SD away from the mean for plasma Met and TSAA concentrations, resulted in removal of all data for one cow. Plasma Met and TSAA concentrations (μ*M*), and both expressed as %TAA and %EAA, were regressed on 0, 12, and 24 g of infused Met and 0, 15, and 30 g of fed Met. Slopes (and associated CV, %) for infused and fed Met were 1.40 and 1.04 (3.68 and 1.85) for Met, 0.067 and 0.048 (4.92 and 3.18) for Met as %TAA, and 0.152 and 0.112 (4.48 and 3.22) for Met as %TEAA. Corresponding values for total TSAA were 2.00 and 1.64 (1.58 and 2.57) for μ*M* concentrations, 0.108 and 0.079 (2.79 and 2.48) for %TAA, and 0.234 and 0.184 (2.67 and 3.48) for %TEAA, respectively. Estimates of bioavailability (and 95% CI) of the RP-Met supplement for the 6 respective methods of expression were 74.4 (2.1), 71.6 (1.9), 73.7 (1.3), 81.8 (3.3), 72.7 (1.3) and 78.6 (2.3). We conclude the plasma free AA dose-response technique is precise, and because Met is a precursor to other sulfur AA, TSAA (μ*M*) is the most appropriate response parameter for estimating Met bioavailability of RP-Met supplements.

Key Words: methodology, methionine, bioavailability

M387 Effects of intensive whole-milk feeding in calves on subsequent performance and feed efficiency of crossbred dairy heifers. Camila Flávia de Assis Lage[1], Mariana Magalhães Campos[2], Fernanda Samarini Machado[2], Paulo Campos Martins[1], Luigi Francis Lima Cavalcanti[3], Marcelo Neves Ribas[3], Luiz Gustavo Ribeiro Pereira[2], Thierry Ribeiro Tomich[2], Rafael Alves de Azevedo*[1], and Sandra Gesteira Coelho[1], *[1]Federal University of Minas Gerais, Belo Horizonte, MG, Brazil, [2]EMBRAPA Dairy Cattle, Coronel Pacheco,*

MG, Brazil, [3]CNPq, RHAE – SEVA Engenharia, Projeto Intergado, Contagem, MG, Brazil.

This study aimed to evaluate the effects of intensive whole-milk feeding in calves on subsequent performance and feed efficiency in growing heifers. Up to 56 d of age, Holstein-Gyr calves received 6 L/d of 4 different liquid diets consisting of whole milk with the increasing addition of milk replacer (Sprayfo Violet SSP) to adjust the concentration of total solids (TS) to 13.5 (n = 15), 16.1 (n = 15), 18.2 (n = 13), 20.4% (n = 15). After weaning, animals were housed in 4 paddocks, each one equipped with 3 electronic feed bins and one electronic water bin (Intergado, Brazil) in the experimental farm of Embrapa Dairy Cattle, Brazil. The same diet (70% corn silage and 30% concentrate, dry matter basis; 195 g of CP/kg of DM) was fed in ad libitum, twice a day, until 210 d of age. Daily feed intake (DFI) and water intake (WI) were registered by the electronic system. Average daily gain (ADG) was determined from regression of weekly BW measurements so feed conversion (FC) could be calculated. Longitudinal data was analyzed as a completely randomized design with repeated measures using linear mixed models, where animal's age and TS were fixed effects while animal was considered a random effect. The necessity to add random components to model error dependence and heteroscedasticity was evaluated based on Akaike's Information Criterion. Initial body weight, air temperature and humidity were added as co-variables. Average and cumulative results were analyzed by linear regression, where only the fixed effect of TS was evaluated ($\alpha = 0.05$). DFI and WI were only influenced by age, however in both cases an interaction effect was observed, although none supplementation level caused a steady superiority across period for any variable. This result was corroborated by cumulative DFI and WI that were not influenced by TS. ADG was decreased by increasing nutritional management (e.g., 916 ± 30 and 833 ± 29 g/d for animals with 13.5 and 20.4%, respectively), what also reflected in a higher FC to animals in higher TS (13.19 ± 0.45 vs 14.55 ± 0.44 in animals that received 13.5 and 20.4% of FD, respectively).

Key Words: milk replacer, feeding, performance

M388 Immediate and long-term effects of niacin feeding to fresh dairy cows: 1. Ketosis and fertility. J. M. Havlin*[1], P. H. Robsinson[1], and J. E. Garrett[2], *[1]University of California, Davis, Davis, CA, [2]Qualitech, Chaska, MN.*

During the fresh period after calving through ~21 d postpartum, dairy cows are often in negative energy balance (NEB) due to high energy demands to support rapidly rising milk output at a time of relatively low dry matter intake (DMI). This NEB makes cows susceptible to ketosis, fatty liver, metritis, and displaced abomasum, which can lead to decreased performance and eventual culling. A possibility to reduce the extent of NEB is to feed niacin (Ni) as nicotinic acid (NA) to reduce milk fat production, thereby minimizing body weight loss to reduce ketogenesis, all to reduce the extent of NEB thereby creating a more successful lactation. Multiparity Holstein cows (672) on a California dairy farm were used from 14 d pre-calving through 150 d in milk (DIM). While in the close-up dry pen (−14 to 1 DIM), cows were comingled and fed the same total mixed ration (TMR), in the fresh pens (1 to ~22 DIM) cows were fed the same TMR, except for inclusion of ruminally protected (RP) Ni (rumen escape estimate = 66%), in separate pens at 0, 3.5, 7 or 14 g NA/cow/d. Cows were comingled in the high pen (~23 to 150 DIM) and fed the same TMR. DMI was tabulated by treatment in the fresh pens, blood samples were collected for NEFA and BHBA analysis during the dry and fresh periods, and fertility data was tabulated through 150 DIM. Feeding 3.5 g/d RPNi increased DMI from 19.3 to 21.5 kg/d in the fresh period, but RPNi at 14 g/d reduced it to below Control cows (Quadratic $P = 0.07$). Ketosis prevalence (% cows with BHBA ≥ 1.44 mg/dl) decreased from 36 to 20% in the fresh period with 3.5 g/d, but RPNi at 14 g/d did not differ from levels of Control cows (Quadratic $P = 0.06$). Niacin feeding had no effect on any fertility measure, with averages for 1st service conception (%) being 44.6 ± 4.38, pregnancy (%) being 76.2 ± 3.70 and services/conception being 1.58 ± 0.082. Short-term fresh period RPNi feeding at the 3.5 g/d level reduced the incidence of ketosis caused by NEB, but feeding higher levels removed those benefits. No RPNi feeding level during the fresh period affected fertility parameters through 150 DIM.

Key Words: niacin, ketosis, fertility

M389 Effects of supplementation with a rumen-protected lysine product on production in high-producing dairy cows. Meagan Cooney*[1] and Izuru Shinzato[2], *[1]phdR&D, East Troy, WI, [2]Ajinomoto Heartland, Chicago, IL.*

The objective of this study was to determine the effects of supplementation and withdrawal of a rumen-protected lysine product, AjiPro-L 2nd generation (2G), on production performance of high-producing dairy cows. Ninety-six multiparous Holstein cows averaging 2.9 ± 1.3 lactations and 83.6 ± 36.7 DIM at the commencement of the trial were assigned at random to one of 12 pens that received either a negative control ration (n = 4), positive control ration with added metabolizable lysine from an animal protein (n = 4), or AjiPro-L 2G added metabolizable lysine from a rumen-protected amino acid (n = 4). The 8wk experimental period consisted of 2 periods; a 4-wk treatment period followed by a 4-wk carryover period. During the treatment period, animals received negative, positive or AjiPro-L 2G treatments, whereas during the carryover period all animals received the positive control treatment. Milk yield, energy-corrected milk yield, water consumption and DMI were recorded daily and milk composition was measured weekly. Data from only cows that completed the entire duration of the study were used in the analysis. Days in milk categories of either high (114 ± 17.7) or low (53 ± 21.3) were also analyzed. Results showed that water consumption and DMI was significantly increased compared with baseline *(*$P < 0.05$) and MUN levels were significantly decreased compared with baseline ($P < 0.01$) for animals receiving AjiPro-L 2G during the treatment period. When comparing DIM categories, results revealed a significant difference ($P < 0.05$) in change of milk production, ECM, pounds of fat and pounds of lactose in comparison to baseline across treatments. For these parameters, high DIM animals receiving AjiPro-L 2G had greater milk yield, and the least reduction of ECM, pounds of fat, and pounds of lactose from baseline compared with the positive and negative treatments. During the carryover period all parameters measured, except for MUN ($P < 0.05$), were not different between treatments compared with baseline. Under the conditions of this experiment, supplementation of AjiPro-L 2G had the greatest effect on cows averaging 114 DIM in which milk production and milk components were maintained in post-peak cows.

Key Words: rumen-protected lysine, dairy cow, production performance

M390 Immediate and long-term effects of niacin feeding to fresh dairy cows. 2. Body condition and milk production. J. M. Havlin*[1], P. H. Robsinson[1], and J. E. Garrett[2], *[1]University of California, Davis, Davis, CA, [2]Qualitech, Chaska, MN.*

During the fresh period after calving through ~21 d postpartum, dairy cows are often in negative energy balance (NEB) due to high energy