1051 Productivity of lactating dairy cows as impacted by feeding lysine in a ruminally protected form. P. H. Robinson*[1], S. Juchem[1], and I. Shinzato[2], [1]*University of California*, *Davis,* [2]*Ajinomoto Co. Inc.*, *Tokyo, Japan*.

Increased milk production requires high intakes of crude protein in the diet, and/or improved supply and ratios of amino acids delivered to the duodenum to meet animal needs for milk and milk component synthesis. Our objective was to estimate the rumen escape potential of a ruminally protected Lys product (RPL) and to determine effects of feeding this product on feed intake and digestibility, as well as milk production and composition, of high producing dairy cows. The experiment was designed as a double (early and mid-lactation dairy cows) 2 × 2 factorial with 28 d experimental periods. All cows were fed the same total mixed ration (TMR), calculated to be first limiting in Lys, with treatment pens receiving 17 kg/pen/d of RPL (to deliver 38 g of Lys/cow/d) mixed into the TMR. Evaluation of the RPL suggested that this feeding level delivered between 18 and 22 g/cow/d of intestinally absorbable Lys. Control cows were fed the RPL without Lys (i.e., the fat matrix) at the same level as the fat matrix was fed in the RPL. Feeding the RPL did not influence dry matter (DM) intake in early lactation cows (26.3 kg/cow/d), but output of milk (48.0 vs. 50.0 kg/cow/d), as well as milk fat, true protein and lactose, and energy, were higher ($P < 0.05$) in lysine supplemented cows. In addition, the extent of body condition score (BCS) loss was lower ($P < 0.05$) with Lys supplementation (−0.069 vs. −0.0.035 units/28 d). In mid lactation cows, DM intake was also not influenced, and only milk fat and energy outputs increased ($P < 0.05$) with RPL feeding. BCS change was not influenced. Plasma Lys levels in cows of both parities were not impacted by RPL feeding, suggesting that Lys needs may not have been met at this level of supplementation. The contrast to an earlier study by our group, wherein milk fat synthesis was suppressed with Lys supplementation at an estimated 9 to 10 g/cow/d at the intestinal absorptive site in similar cows fed a very similar TMR, supports the hypothesis advanced in that study that body protein turnover is the first priority in early lactation cows followed by milk component synthesis.

Key Words: lysine, rumen protection, lactation

1052 The application of reliable wireless sensor provides better understanding of the rumen environment. J. Laporte-Uribe*, F. Brooks, M. Steer, P. Fernley, and M. Eivers, *Kahne Limited*, *Level 1, 64 Cook street, Auckland*.

During the last few years several techniques have evolved to obtain real-time information of the rumen environment. Kahne Limited has developed a wireless rumen bolus that does not required fistulated animals. Information such as pH, temperature, pressure is acquired telemetrically and in real-time. An experiment was designed to measure the reliability of the current sensors over time. Four fistulated and dry dairy cattle were placed in a 4 × 4 Latin-square design. Animals were fed fresh grass (ryegrass/clover) and in free range conditions, no attempt was made to manipulate the diet or the daily management practices. Measurement of pH, temperature and pressure were taken continuously for 7 d period, after which the probes were randomly changed. The sensors were calibrated at the beginning of the each run and at the end of the run, the drifting of probes was estimated by immersing the sensors in a battery of standard buffers solutions. Results were tabulated in a paired-*t*-test to observed differences between recordings. A linear mixed model (REML) was fitted to the results to evaluate the variance associated to the measurement of rumen variables; each single component of variability was taken into account and included in the model, date of sampling, time within date, animals effect, sensors and interactions of these factors. The drift of the pH electrodes at the end of each run (7 d) was minimal, less than 0.04 points of pH. The accuracy of temperature (0.20 oC) and pressure (1.50 mbar) sensors remained unchanged during the period of investigation. This experiment suggested that the Kahne sensors accounted for a very small amount of the variance associated to the recording of rumen environmental conditions, and supports the use of the wireless Kahne sensor technology as a reliable method to measure changes in the rumen environment.

Key Words: rumen pH, wireless sensor, continuous recording

1053 Top-dressing soybean meal in fresh cow, an end to the risks of dry matter intake decreases: Dry matter intake, milk production and nitrogen metabolism. M. Ghelich Khan*, H. Amanlou, and E. Mahjoubi, *Zanjan University*, *Zanjan, Iran*.

The objective of this study was to investigate the effects of high dietary crude protein (CP) levels on dry matter intake (DMI), milk production and nitrogen metabolism in fresh cows. As it has been proved in early lactation dairy cows there are negative energy and nitrogen balances. These shortages should be compensated for by adding a suitable feed stuff, since the produced colostrum contains high amounts of protein. Solvent-extracted soybean meal (SSBM) containing high energy and CP was selected for this purpose and the top-dressing method was employed to facilitate the task. Twenty-one Holstein fresh cows, free of clinically diagnosed transition disorders, were used in this experiment. The cows were randomly assigned to 1) basal diet (CP = 20.3%), 2) basal diet + 1 kg of top-dressing SSBM (CP = 21.8%) and 3) basal diet + 2 kg of top-dressing SSBM (CP = 24.4%). The cows were individually fed from immediately after parturition until wk 4 and were milked 6 times a day. DMI increased noticeably from treatment group 1 to 3 (17.53, 18.02 and 20.58 kg/d, respectively; $P < 0.05$). Average raw milk yields were 35.98, 36.87 and 42.27 kg/d, respectively, and tended to be significant ($P = 0.11$). Milk fat percentage decreased significantly (4.65, 4.51 and 3.86%, respectively; $P < 0.01$). 3.5% fat corrected milk yield increased while the treatments did not have noticeable differences (42.35, 42.52 and 45.24 kg/d, respectively). Milk protein and fat yields were not affected by treatments. Ruminal concentration of NH3-N and total VFA increased as dietary CP level increased but the differences in treatments were not significant. The treatments did not influence uric acid concentration, though a tendency was detected ($P < 0.15$). Urinary urea excretion increased by adding dietary CP causing noticeable differences in treatments (11.01, 16.01 and 19.72 mg/dl, respectively; $P < 0.01$). These results demonstrate that by adding top-dressing SSBM and using high levels of CP, DMI and milk production increase and at the same time ruminal condition and feces score stay in a desirable level.

Key Words: soybean meal (SSBM), top-dress, fresh cow

1054 Leucine had the highest regulatory effects on protein synthesis in bovine mammary epithelial cells when added to media deprived of other essential amino acids. N. A. Knoebel*[1], J. A. D. R. N. Appuhamy[1], J. Escobar[2], and M. D. Hanigan[1], [1]*Department of Dairy Science, Virginia Polytechnic Institute and State University*, *Blacksburg,* [2]*Department of Animal and Poultry Sciences, Virginia Polytechnic Institute and State University*, *Blacksburg*.

Protein synthesis responds to amino acid supply through several signaling proteins such as mammalian target of rapamycin (mTOR), ribosomal protein S6 (rpS6), eukaryotic initiation factor 4E binding protein 1 (4EBP1), and eukaryotic elongation factor 2 (eEF2). Increasing phosphorylation of mTOR, rpS6, and 4EBP1, and decreasing PS of eEF2 positively signal protein synthesis. Previous experiments in our laboratory showed that omission of Arg, Ile, Leu, Met, Thr, and Trp from media reduced casein synthesis rates in bovine mammary tissue slices. This study investigated the effects of the addition of essential amino acids (EAA) to media devoid of other EAA on phosphorylation state (PhS) of mTOR, rpS6, 4EBP1, and eEF2 in MAC-T cells to test the hypothesis that EAA can independently affect the PhS of key signaling proteins when media are deficient in other EAA. Cells were deprived of serum and EAA for 6 h and then cultured with media containing 3.5 m*M* all EAA (+EAA), no EAA (-EAA), Arg, Ile, Leu, Met, Thr, or Trp for 1 h. Cell lysates were analyzed by Western immunoblotting with antibodies against phosphorylated mTOR (Ser2448), rpS6 (Ser235/236), eEF2 (Thr56), and 4EBP1 (Thr37/46). The +EAA treatment significantly increased PhS of rpS6 by 1900% ($P < 0.0001$) and decreased PhS of eEF2 by 35% ($P = 0.016$) compared with that of -EAA. Addition of Leu alone significantly increased PhS of rpS6 by 785% ($P = 0.003$) and decreased PhS of eEF2 by 23% ($P = 0.033$) besides its association with 21% increase in mTOR PhS and 150% increase in 4EBP1 PhS. Addition of Ile and Met increased PhS of mTOR (25% each), 4EBP1 (138 and 127%), and rpS6 (273 and 134%) and decreased PhS of eEF2 (15 and 8%). Of the 6 EAA tested, Leu had the greatest signaling effects on PhS. Essential amino acids can independently affect PhS of key regulatory proteins regardless of the supply of other EAA.

Key Words: essential amino acids, protein synthesis, signaling proteins

1055 Hypophagic effects of propionate relative to acetate decrease as days in milk increase and plasma NEFA concentration decreases. S. E. Stebulis* and M. S. Allen, *Michigan State University*, *East Lansing*.

Thirty-one multiparous lactating dairy cows were used in a crossover experiment to evaluate factors related to responses to propionic acid infusion among cows. Cows between 3 and 40 DIM at the start of the experiment were blocked by calving date and randomly assigned to treatment sequence. Cows ranged from 23.4 to 49.5 kg/d milk yield, 513 to 760 kg body weight and 1.5 to 4.1 body condition score at the start of the experiment. Treatments were 1.0 *M* propionic acid (P) or 1.0 *M* acetic acid (A, control) adjusted to pH 6 with sodium hydroxide and infused intraruminally at 8.33 mmol/min from 6 h before feeding until 12 h after feeding. Feeding behavior was monitored for 12 h after feeding. The diet was formulated to contain 33.9% NDF and the primary starch source was coarsely ground corn. A preliminary period was used to measure factors potentially related to hypophagia from propionate. Propionate decreased dry matter intake (14.0 vs. 15.4 kg/12 h; $P < 0.001$) by decreasing meal size (2.18 vs. 2.63 kg; $P = 0.03$) and meal length (34.6 vs. 40.0 min; $P < 0.01$). Meal frequency and intermeal interval were not affected by treatment ($P > 0.20$). Propionate affected meal patterns following feeding; there was no difference in DMI in the first 6 h after feeding (9.1 kg, $P = 1.00$), but DMI was lower for P than A during the second 6 h after feeding (5.2 vs. 6.2 kg; $P < 0.01$). An interaction was detected between plasma NEFA concentration and treatment for DMI ($P = 0.09$); there was no difference in DMI for P vs. A at the lowest plasma NEFA concentration of 103 μEq/L (14.9 kg/12 h) but DMI was 1.8 kg greater for A compared with P at the highest plasma NEFA concentration of 1330 μEq/L (17.2 vs. 15.4 kg/12 h). There was a tendency for an interaction between treatment and DIM for DMI ($P = 0.11$) with a greater difference in DMI for P vs. A at 3 DIM (13.8 vs. 15.1 kg/12 h) than at 40 DIM (15.8 vs. 15.9 kg/12 h). Hypophagic effects of propionate relative to acetate decrease as DIM increase and plasma NEFA concentration decreases.

Key Words: propionic acid, feeding behavior, dry matter intake

1056 Effects of genetic improvements on efficiency of energy utilization in dairy cows. A. B. Strathe*[1], J. Dijkstra[2], J. France[3], and E. Kebreab[1], [1]*University of California*, *Davis*, [2]*Wageningen University*, *Wageningen, the Netherlands*, [3]*University of Guelph*, *Guelph, Ontario, Canada*.

In the last 3 decades, much progress in genetic improvements in milk production has taken place and numerous studies have been conducted on energy metabolism in dairy cows. This study investigated the effects of these improvements on key parameters of ME systems. These are net energy for maintenance (NE_M), efficiency of utilization of ME for milk production (k_l), growth (k_g) and efficiency of utilization of body stores for milk production (k_t). A large data set was collated by Kebreab et al. (2003) [J. Dairy Sci. 86:2904–2913] and further updated with data from the Netherlands. The data set contained a total of 701 individual cow observations from 38 calorimetry studies on Holstein-Friesian dairy cows. All energy related variables were selected for the study. Kebreab et al. (2003) estimated the 4 key parameters by deriving a function based on a linear relationship between milk energy and ME intake and correcting for tissue energy loss or gain. The function served as the basis of a full Bayesian hierarchical model where the between study variability in the 4 parameters was modeled by a multivariate normal distribution and the within study variability by a student t-distribution. The time trend was included as categorical variable with 3 levels differentiating the cows in experiments conducted before 1990, 1990–1995 and after 1995. In the analysis, an informative prior was introduced for the population parameter (NE_M ~N(0.45, 0.04)). The deviance information criterion (DIC) was used to compare models with varying complexity. There was a difference of 5 DIC units between the 2 models, favoring the simple model. Based on the data and an informative prior, the posterior distribution of NE_M, ME_M, k_l, k_g and k_t were estimated to be 0.34 (0.028) MJ/($kg^{0.75}$ BW d), 0.58 (0.034) MJ/($kg^{0.75}$ BW d), 0.58 (0.021), 0.89 (0.056), and 0.69 (0.047), respectively. The analysis does not support the hypothesis that genetic improvements in milk production from 1986 to 2007 have significantly altered key parameters. However, the ME_M value was higher than NRC recommendations (based on older data) and may reflect higher requirements in modern cattle.

Key Words: energy metabolism, lactation, meta-analysis

1057 Carbon dioxide, a greenhouse gas, is sequestered by dairy cattle. D. P. Casper*[1] and D. R. Mertens[2], [1]*Agri-King, Inc.*, *Fulton, IL,* [2]*USDA-ARS Dairy Forage Research Center*, *Madison, WI.*

The impact of dairy cattle on the environment is receiving considerable attention. Carbon dioxide (CO_2) is a greenhouse gas (GHG), which contributes to global warming in theory. When conducting whole body respiration calorimetry trials, CO_2 is measured to calculate the heat production of dairy cows. The objective of this study was to estimate the release of carbon (C) as CO_2 by dairy cattle when fed a wide range of diets. Data from 1,252 individual metabolism trials in the compiled Energy Metabolism Database by lactating dairy cows of different breeds and stages of lactation with milk >5 kg/d were used in the data analysis. Cows were fed diets that varied in forage types, grain sources, protein sources, and fat supplements. During the energy and nitrogen balance

trials, a 24 h composite of respired air was collected for 3 consecutive days and analyzed for CO_2, methane, and O_2 (adjusted to standard temperature and pressure). Data were analyzed using the means and linear regression procedures of SAS. Dry matter intake ranged from 3.9 to 29.4 kg/d with an average of 16.3 kg/d, while milk production ranged from 5.1 to 56.6 kg/d with an average of 23.0 kg/d. Carbon released as CO_2 ranged from 0.96 to 4.65 kg/d with an average of 2.82 kg/d. When related to milk yield only, the amount of CO_2 C kg released per kg of milk decreased curvilinearly with increasing milk yield: CO_2 g C/d = 0.369-.015*milk, (kg/d) + 0.00021*milk^2 (kg/d), R^2 = 0.76, SER = 0.03, $P < 0.01$. At a given level of milk production, improving feed efficiency by decreasing DMI will decrease the release of C as CO_2: CO_2 g C/d = 821.3 + 126.0*DMI, (kg/d) −1.18*milk, (kg/d), R^2 = 0.86, SER = 217.7, $P < 0.01$, while at a given DMI, improving milk yield will decrease the release of C as CO_2 by sequestering more C in the milk. The release of C as CO_2 by lactating dairy cows is dependent on the nutrient intake and the efficiency of conversion to milk. Dairy cows can sequester carbon in milk and reduce the effect of their CO_2 emissions on global warming.

Key Words: carbon dioxide, carbon sequestration, feed efficiency

1058 The variation in milk production by lactating dairy cows in a whole herd compared to groups within that herd. D. P. Casper*, K. E. Lanka, D. F. Jones, G. P. Gengelbach, D. H. Kleinschmit, and D. J. Schauff, *Agri-King, Inc.*, *Fulton, IL.*

The variation in milk production needs to be accounted for when formulating rations to meet the nutrient requirements of lactating dairy cows. The grouping strategy used on the dairy should allow for the development of rations that can closely match the nutrient requirements of each group. However, little information exists for factoring variation into ration formulation for single or multiple group TMR′s. The purpose of this study was to determine the variation in milk production by lactating dairy cows when expressed as the whole herd versus groups within that herd. Data for milk production and composition during the months of December 2009 and January 2010 were collected from 10 dairy herds based on monthly DHIA test. Cows producing less than 9.1 kg/cow/d were eliminated, which resulted in milk production and composition data from 7,178 cows (2,904 primiparous and 4,274 multiparous) in herds ranging from 59 to 3,533 lactating cows with 1 to 15 groups/herd. Overall, mean milk production was 34.4 kg and ranged from 9.1 to 73.1 kg/cow/d with a SD of 9.75 kg/cow/d and a CV of 28.4%. The difference in the CV and SD between the whole herd and groups within that herd were evaluated using the *t*-test procedure of SAS. The CV of milk production was significantly ($t < 0.01$) lower when cows were grouped compared with the whole herd CV, but this difference was small (3.03%). The SD of milk production was significantly ($t < 0.01$) lower when cows were grouped compared with the whole herd, but the difference was small (1.35 kg/cow/d). This study suggests that dairy farms are not grouping cows based on milk production; but, more likely, cows are being grouped based on reproductive status. Therefore, the variation in milk production within a group is approaching the variation across the entire herd. This variation in milk production has implications on ration formulation to meet the nutrient requirements of high producing dairy cows.

Key Words: milk variation, grouping strategy, lead feeding

1059 Reduced protein responses to sugar feeding may be due to microbial glycogen production. M. B. Hall*, *US Dairy Forage Research Center, USDA-ARS*, *Madison, WI.*

The goal of this in vitro study was to determine the influence of Isotrich spp. protozoa on the conversion of glucose (Glc) to glycogen (Glyc). In a 2 × 2 factorial, treatments were 1) ruminal inoculum mechanically processed to destroy Isotrich spp. (M+, verified microscopically) or not mechanically processed (M-), and 2) measurement of microbial Glyc accumulated by 3 h of fermentation with (L+; protozoa + bacteria) or without (L-; predominantly protozoa) lysis of the fermentation solids with 0.2 N NaOH for 15 min in a boiling water bath before Glyc analysis. Two 3 h in vitro fermentations were performed using Goering–Van Soest medium in batch culture vessels supplemented with 3 g Glc L^{-1}. Rumen inocula from 2 cannulated cows filtered through 4 layers of cheesecloth were combined, and maintained under CO_2 for all procedures. Fermentation vessel contents were transferred to centrifuge tubes using 0.9% NaCl, centrifuged twice at 13,000 × *g* for 45 min at 5°C, with pellet resuspended in 0.9% NaCl after the first centrifugation and supernatant decanted each time. Pellets were analyzed for Glyc using a Na acetate buffer, heat-stable α-amylase and measurement of released Glc. Values for samples at 3 h of fermentation were corrected for 0 h values representing α-glucan introduced with inocula. Microbial Glyc detected at 3 h of fermentation were 3.32 (4.69%), −1.42 (−2.01%), 6.45 (9.10%), and 3.65 (5.15%) mg (% of added Glc) for M-L-, M+L-, M-L+ and M+L+, respectively (SED = 0.50). M+ gave lower Glyc values than M- ($P < 0.01$), and L+ gave greater values than L- ($P < 0.01$); there was an interaction of L and M ($P = 0.02$). M+L- showed net utilization of α-glucan initially in the fermentation with no net Glyc production. Estimated bacterial Glyc was lower for M- (3.12 mg) than M+ (3.65 mg; $P < 0.01$). Although destruction of Glyc-accumulating protozoa decreased detected Glyc by ~40%, sequestration of Glc by bacteria accounted for 4–5% of dosed Glc, with Glyc synthesis also representing an energetic cost. Potential decreases in microbial growth related to Glyc could require changes in protein supplementation to maintain protein supply to the ruminant host.

Key Words: sugars, glycogen, rumen fermentation

1060 Liver transcriptomics in Holstein cows fed lipid supplements during the peripartal period. M. J. Khan*[1], E. Schmitt[1], M. A. Ballou[2], E. J. DePeters[3], S. L. Rodriguez-Zas[1], R. E. Everts[1], H. A. Lewin[1], J. K. Drackley[1], and J. J. Loor[1], [1]*University of Illinois*, *Urbana,* [2]*Texas Tech University*, *Lubbock,* [3]*University of California*, *Davis*.

Our objective was to determine the effects of saturated or marine oil supplementation on peripartal liver transcriptomics and relate these to blood metabolites and liver tissue composition. Treatments (n = 6/diet) were no supplemental lipid (control) or supplemental lipid from either Energy Booster (mainly 16:0 and 18:0) or fish oil. Treatment diets were fed from −21 d until 10 d relative to parturition. The doses of lipid used were 250 g/d prepartum or 1% of the previous day feed intake postpartum. Percutaneous liver biopsies were harvested at −10, 1, and 14 d relative to parturition. A 13,257 bovine oligonucleotide (70-mers) array was used for transcript profiling. Pre and postpartum feed intake, milk production, or body condition score were not affected by lipid supplementation. Blood NEFA ($P = 0.06$) and BHBA ($P < 0.05$) were lower postpartum in cows fed either lipid source but postpartal liver triacylglycerol did not differ in these cows (ca. 4% wet weight) relative to controls (4.5%). Initial ANOVA of data from d 1 postpartum comparing fish oil vs. control revealed 50 differentially expressed genes (DEG, $P < 0.01$) of which 13 were upregulated and 13 were downregulated by fish oil. Among downregulated genes were several metabolic enzymes including stearoyl-CoA desaturase (SCD), fatty acid binding protein 1 (FABP1), acyl-CoA synthase medium-chain 1 (ACSM1), and cAMP-dependent protein kinase type II-β regulatory chain (PRKAR2B).

In addition, genes associated with apoptosis/cellular stress (GADD45B) and cellular response to hypoxia (HIF1A) also were downregulated by fish oil. Preliminary results suggest that peripartal lipid supplementation affected blood metabolites and liver transcript profiles and did not hamper production or feed intake.

Key Words: transition cow, metabolism, gene expression

1061 Cattle differ in ability to adapt to small intestinal digestion of starch. H. A. Bissell[1] and M. B. Hall*[2], [1]*University of Wisconsin, Madison,* [2]*US Dairy Forage Research Center, USDA-ARS, Madison, WI.*

The objective of this study was to evaluate the impact of post-ruminal starch digestion on inflammatory response in dairy cattle. Six cull, nonpregnant, nonlactating, multiparous cannulated Holstein dairy cows (BW 804 ± 101 kg) were fed a high forage diet ad libitum starting 15 d before the infusion period. Cows were infused abomasally 12 h per day for 3 d with approximately 8 L d^{-1} of 0.9% saline solution (CTRL; 2 cows) or a 0.9% saline suspension of 4 kg of corn starch with 4 g xanthan gum (ST; 4 cows) using peristaltic pumps. Fecal samples, blood samples, and other measures were taken every 4 h (offset daily by 1 h). Data were analyzed as repeated measures with cow within treatment as a random variable. Fecal pH data showed 2 distinct responses to ST (ST1 and ST2). Fecal pH of all cows averaged 6.90 before infusion. During infusion days, fecal pH remained at 7.0 ± 0.25 for CTRL, but declined in ST cows to 5.1 (ST1) and 4.9 (ST2) by the end of d 2, and diverged to 5.3 (ST1) and 4.6 (ST2) by the end of d 3. The increase in fecal pH for ST1 cows during d 3 suggests an increase in small intestinal digestion of starch, whereas a continuing decline in fecal pH for ST2 cows suggests that they did not adapt similarly. Fecal pH differed among CTRL, ST1, and ST2 ($P < 0.01$). Blood values for haptoglobin decreased for CTRL and ST1 with day of infusion, but increased for ST2 with d 3 values of 12.3, 7.8, and 24.5 mg dL^{-1}, respectively ($P = 0.04$). Fibrinogen mg dL^{-1} tended to differ by treatment x infusion day, rising from 109 to 198, 143 to 188, and 221 to 250 between d 1 and 3 of infusion for CTRL, ST1, and ST2, respectively ($P = 0.11$). Neither ceruloplasmin ($P = 0.38$) nor α-acid glycoprotein ($P = 0.46$) differed by treatment. Hematocrit tended to be greater for CTRL than ST (32.9 v 29.1%; $P = 0.08$). Rectal temperature showed treatment x day effects with increases from d 1 to 3 of 38.5 to 38.7, 38.4 to 39.0, and 38.9 to 39.1°C for CTRL, ST1, and ST2, respectively ($P < 0.01$); CTRL tended to be less than ST ($P = 0.09$). Respiration rates did not differ ($P = 0.46$). The basis for differing cow responses to post-ruminal starch load requires further evaluation.

Key Words: starch, digestion, dairy cattle

1062 Physiological effects of season and parity on production and nutritional quality of milk in camel (*Camelus dromedarius*) under pastoral environment of Pakistan. S. Ahmad*[1], M. Yaqoob[1], M. Q. Biilal[1], G. Muhammad[1,2], M. Younas[1], and J. I. Sultan[1,3], [1]*University of Agriculture, Faisalabad-Pakistan*, *Department of Livestock Management*, [2]*University of Agriculture, Faisalabad-Pakistan*, *Department of Clinical And Medicine*, [3]*University of Agriculture, Faisalabad-Pakistan*, *Institute of Animal Nutrition And Feed Technology*.

Relatively little is known about the actual situation of milk production and quality in the Thal area of Pakistan, particularly when regarding seasonal variation in milk composition and with different parities. Therefore, this study was planned to evaluate the effect of season and parity on milk production and compositional quality of camels kept under pastoral environment of Pakistan. Based on purposive sampling method, 200 she-camels were selected in thal area (District Jhang) and their composite milk samples were collected. The research was carried out in 2 periods. The first period was the summer period covering May–June–July months and the second one was the winter period covering December–January–February months. The collected milk samples were analyzed through standard procedures to determine the percentages of milk fat, protein, lactose, acidity and solids not fat (SNF). Mean daily milk production and mean percentages of fat, protein, lactose, acidity and SNF were found to be 5.50 ± 0.18L and 3.40 ± 0.19%, 3.30 ± 0.11%, 4.67 ± 0.13%, 0.20 ± 0.01% and 9.56 ± 0.18%, respectively. Season of the year and parity imparted significant effect ($P < 0.05$) on daily milk production. The values for milk production (6.20 ± 0.20L), fat (3.98 ± 0.23%), protein (3.43 ± 0.16%), lactose (4.92 ± 0.21%) and SNF (9.14 ± 0.39%) were significantly higher ($P < 0.05$) during winter season compared with summer. In 3rd parity, significantly highest ($P < 0.05$) daily milk production (6.59 ± 0.30 L) and percentages of fat (4.00 ± 0.27%), protein (4.61 ± 0.41%), lactose (5.50 ± 0.36%) and SNF (11.33 ± 0.39%) was observed whereas she-camels in 6th parity produced significantly lower ($P < 0.01$) milk volume (2.90 ± 0.56 L) and percentages of fat (2.70 ± 0.30%), protein (1.69 ± 0.68%), lactose (3.79 ± 0.39%) and SNF (8.02 ± 0.48%). However, acidity of camel's milk was not influenced by season and parity. Efficient feeding strategies during scarcity periods and culling after 5th parity are imperative measures for getting maximum milk of high nutritive value from this novel animal.

Key Words: season, parity, Pakistan