= 0.94), ACC (P = 0.93), SCD (P = 0.98), and FAS (P = 0.86) did not differ in adipose tissue of calves suckling cows fed the various dietary treatments. We conclude that neither maternal BCS nor milk fat compositional changes occurring from 5% of DMI as fat from oil seeds during the first 60 d of lactation in beef cows was great enough to impact lipogenic enzyme mRNA abundance in adipose tissue of their suckling calves.

Key Words: Lipid supplementation, Beef cattle, Milk

Ruminant Nutrition: Metabolism and Immunology

M201 Is OmniGen-AF capable of augmenting markers of immune health when blended into a nutritional block? N. Forsberg*, Y. Wang, and S. Puntenney, *Oregon State University*, *Corvallis*.

Previous studies have shown that addition of OmniGen-AF to diets of ruminant livestock and laboratory animals increases expression of markers of innate immune health. Markers which respond to the presence of OmniGen-AF have included neutrophil L-selectin, interleukin-1-beta (IL1B) and interleukin 8-receptor. The goal of this study was to evaluate whether similar responses in immunity were detected when OmniGen-AF was mixed into a nutritional block. The rationale for completing this experiment was that block formation requires high temperature processing and we were concerned that heat may thereby inactivate the product. Fourteen growing sheep were assigned to two treatments: control block and Omnigen-AF-supplemented block. Concentration of the OmniGen product in the block was 9% which was expected to deliver an approximate daily intake of 4g OmniGen/animal/d. All animals on the study were immunosuppressed via twice daily injection of Azium (0.1 mg/kg twice/day). Duration of the study was 28 d. On day 28, blood samples were taken via the jugular and neutrophils were isolated. The RNA was prepared from neutrophils using Trizol. Concentrations of L-selectin mRNA and beta-actin mRNA were then determined using selectin- and actin-specific primers and quantitative RT-PCR. Animals on the 2 treatments gained similar weight during the study (P>0.05). Control-fed sheep gained 0.17 kg/d and OmniGen-AF-fed sheep gained 0.19 kg/d. Quantitative RT-PCR revealed that feeding OmniGen-AF increased expression of L-selectin in neutrophils of immunosuppressed sheep by 3.75-fold (P<0.05). This increase is similar to effects of OmniGen-AF on L-selectin expression when provided outside of a nutritional block formulation. Therefore, the high temperatures associated with nutritional block formulation do not inactivate OmniGen-AF. OmniGen-AF is capable of enhancing expression of immune genes in immunosuppressed sheep when included in a nutritional block.

Key Words: OmniGen-AF, Immunity, L-selectin

M202 Effect of feeding blends of feedstuffs naturally contaminated with Fusarium mycotoxins on performance, metabolism and immunological parameters of dairy cattle. S. Korosteleva* and T. Smith, *University of Guelph*, *Guelph, Ontario, Canada*.

There is little known about the effect of Fusarium mycotoxins on performance, metabolism and immunity of dairy cattle. A blend of naturally contaminated feedstuffs was fed to 18 mid-lactation Holstein cows with average milk production of 30-35 kg/day. Diets included: (1) control (2) contaminated and (3) contaminated + 0.2% glucomannan mycotoxin adsorbent (GMA) for a period of 56 days. Wheat, corn and hay were the contaminated feedstuffs. Deoxynivalenol (DON) was the major contaminant and was found in TMR at up to 3.6 ppm dry matter. Body weight, body condition score, milk production, milk composition, SCC, blood serum chemistry, hematology, total Ig count and coagulation profile were measured. Data were analyzed by analysis of covariance using the mixed model of SAS as a completely randomized design with repeated measures (P<0.05). Zero point (befor experiment) measurements were used as a covariate. Multiple comparisons at each time point were performed. Experimental groups were compared to control. Milk production, milk composition and SCC were not affected by diet (P>0.05). Globulin (P=0.0016) and total protein (P=0.0130) levels increased significantly in cows fed contaminated TMR compared to controls after 42 days, while albumin:globulin ratio decreased (P=0.0074). Serum urea concentrations were significantly elevated (P=0.0121) throughout the experiment when cows fed the contaminated diet were compared to controls. Serum IgA concentrations decreased significantly in cows fed contaminated TMR after 36 days of feeding (P=0.0095). The feeding of GMA prevented these effects (P>0.05). It was concluded that feed naturally contaminated with Fusarium mycotoxins, even in low concentrations, can affect metabolic parameters and immunity of dairy cows and GMA can prevent some of these effects.

Key Words: Dairy cows, Fusarium mycotoxins, Deoxynivalenol

M203 Effect of feeding whole soybeans on hepatic gene expression in lactating dairy cows. J. D. Sampson*[1], R. P. Rhoads[1], R. J. Tempelman[2], S. S. Sipkovsky[2], P. M. Coussens[2], M. C. Lucy[1], J. N. Spain[1], and D. E. Spiers[1], [1]*University of Missouri*, *Columbia*, [2]*Michigan State University*, *East Lansing*.

The purpose of this study was to determine hepatic gene expression in the dairy cow supplemented with whole soybeans during adaptation to chronic heat stress (HS) using microarray analysis. Twenty-four Holstein dairy cows were randomly assigned to either control diet (LC) or a whole soybean (LSB) diet and acclimated to thermoneutral conditions (TN; 19°C) for 2 weeks prior to exposure to HS conditions (cycling daily temperature; minimum ~24°C, maximum ~32°C). During the study, individual feed intake (FI) and milk production (MP) were measured on a daily basis. Rectal temperature (Tre) and respiration rate (RR) were measured at four hour intervals and milk components were analyzed weekly. Liver biopsies were obtained after one week of TN conditions and again after two weeks of HS exposure. Hepatic total RNA was reverse transcribed to cDNA. LC and LSB paired samples were sequentially labeled with Cy3 or Cy5 prior to hybridization to an 18,263 member NBFGC microarray. Gene expression data were normalized and analyzed using a two-stage mixed effects model in SAS. During HS, the profile of Tre and RR mirrored the cycling temperature, reaching daily maximums of 41°C and 95 breaths per minute, respectively. FI and MY steadily declined and reached stable reductions of 25% and 20%, respectively, for both dietary treatment groups by day 5 of HS. Microarray analysis revealed no diet by temperature interactions. However, there were 11 differentially expressed genes (P≤0.001) due to diet with an approximately equal number of up and down-regulated genes. In conclusion, feeding whole soybeans alters hepatic gene expression.

Key Words: Liver, Microarray, Whole soybeans

M204 Effects of feeding Tasco® *Ascophyllum nodosum* to large and small dairy cows during summer months in central Arkansas. D. W. Kellogg*[1], J. A. Pennington[2], Z. B. Johnson[1], K. S. Anschutz[1], D. P. Colling[3], and A. B. Johnson[4], [1]*University of Arkansas*, *Fayetteville*, [2]*University of Arkansas*, *Little Rock*, [3]*Acadian Agritech*, *Dartmouth, Nova Scotia, Canada*, [4]*Bio-Ingenuity, LLC*, *Chanhassen, MN*.

A trial was conducted in central Arkansas from July 1 to September 30 (2005) to evaluate the effects of feeding Tasco® *Ascophyllum nodosum* to lactating dairy cows during hot weather. The 540 cows were divided in 4 free-stall barns to achieve 2 similar groups of large cows and small cows. Milk yield of cows averaged 28.8 kg/d for control and treatment groups during June, the preliminary period. All cows received a total mixed ration containing either 0 or 0.25% Tasco. Respirations were counted on 60 cows weekly. Cow fed Tasco had fewer respirations per minute on August 3 (77.3 compared to 88.5 for control cows; $P < 0.05$), on August 10 (80.0 compared to 91.4 for control cows; $P < 0.01$), on August 31 (66.6 compared to 71.5 for control cows; $P < 0.05$), and on September 7 (60.6 compared to 68.1 for control cows; $P < 0.01$). Cows fed Tasco produced more ($P < 0.01$) milk during July, August, and September; however, there was a significant interaction with size of cows during August ($P < 0.01$) and September ($P < 0.05$) caused by 2.3-kg/d more milk for the larger cows fed Tasco compared to similar yield for smaller cows. Cows were bred, but the number of pregnancies from the larger breeds was very low (3 of 50) for control cows. With Tasco in the diet, the pregnancy rate was enhanced ($P < 0.01$) dramatically (20 of 55). The number of inseminations per conception and the days open before first service did not vary ($P > 0.05$) among treatment groups. With Tasco in the diet, respiration rates were reduced for both large and small cows, although the effect appeared dependent upon time. Tasco reduced the steep decline in milk yield of the larger cows and dramatically enhanced the pregnancy rate of the larger cows, but smaller cows were not affected.

Key Words: Heat stress, Respiration rate, Conception rate

M205 Effects of feeding adsorbents on lactating dairy cows hematology and milk yield during summer. F. Abeni, L. Migliorati, F. Calza, and G. Pirlo*, *CRA Istituto Sperimentale per la Zootecnia*, *Cremona, Italy*.

The objective of this study was to evaluate the effects of a 12-wk inclusion of adsorbents (ADS) in the diet on hematology and milk yield of lactating dairy cows. In June 2005, 28 Italian Friesian cows were randomly assigned by parity, DIM, and previous milk yield to either be supplemented with 160 g/d per cow of adsorbents (80% clinoptilolite + 20% sepiolite) or to consume only the basal lactation diet (CON). Cows were milked in an automatic milking system that allowed daily milk recording. Blood samples were taken before TMR distribution (0730 h) before the trial start, and at 2, 4, 6, 8, 10, and 12 weeks of trial, to be analyzed for hematological parameters. Statistical analysis was performed by a randomized block design, with adsorbent supplementation (ADS vs. CON), milk yield level (high vs. low), and week of trial as main factors, with cow repeated in time. Cows fed ADS yield more milk than cows fed CON (27.6 vs. 25.1 kg/d respectively; $P = 0.02$). Adsorbents *per se* did not affect erythrocytes count, hemoglobin concentration (HGB), hematocrit, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration, whereas week of trial did ($P<0.001$). There were no interactions between adsorbents and productive level ($P>0.05$) on erythrocyte features. There was interaction between adsorbents and week of trial for MCV ($P<0.05$), MCH ($P<0.05$), and also a trend was evidenced for HGB ($P<0.10$). The increase of MCV and HGB observed at the 2 final samplings in cows fed CON, and not observed in ADS cows, suggest a relative reduction in erythrocyte function. Considering the selectivity of the adsorbents used, a decreased availability of Fe or other micronutrients can be hypothesized. Our results can not be exhaustive concerning long term response of cow hematology to adsorbent inclusion in the diet; further research on micronutrients involved in erythrocyte functions (Fe and Cu) will be necessary.

Acknowledgements: Italian Ministry of Agricultural and Forestry Politics, AFLARID Project

Key Words: Adsorbents, Dairy cow, Hematology

M206 Effects of dietary antioxidant plant extracts on udder health and milk quality. T. Doriana*, G. Sara, M. Marina, and B. Valerio, *University of Milan*, *Milan, Italy*.

Increasing evidence presents a relationship between dietary antioxidants and udder health and resistance to infection. Aim of this trial was to evaluate the effects of plant extracts with antioxidant properties on milk quality and udder health parameters. Twenty Holstein cows selected according to parity, milk production (33.7±2.21 kg/d), DIM (112±29) and SCC (<100,000), were divided into two groups. The treated group received a 10 g/d of a natural extracts mixture (*Lonicera* spp, *Vitis* spp., Indena S.p.A.) by oral drench for 15 d. Milk production was recorded and samples aseptically collected on 0, 7, 14, 21 and 28d after the start of the treatment. Composition (protein, fat, lactose and urea), bacteriological analysis (FIL-IDF methods), and SCC (fluoro-optical-electronic counter) were assessed on milk samples. Phagocytic activity evaluation was performed on PMNs by chemiluminescence luminol enhanced assay while macrophages activity was read by Lucigenin enhancement both vs Zymosan as stimulus, properly opsonized with omologous serum. Nitric Oxide was assessed with a Griess modified assay. Statistical analysis was performed using PROC MIXED of SAS. Treatment didn't affect milk production and composition. A decrease in milk yield was found both in control and treated group due to the physiological descending phase in the lactation curve. SCC was unaffected by treatment. The treated animals showed a reduction in mammary gland infections. The percentage of quarters infected over the entire trial was 53.5 in the control group and 39.5 in the treated group. Pathogens isolated most frequently were coagulase-negative staphylococci and coliforms. Treatment didn't affect the phagocytic activity of macrofages and PMNs. Nitric oxide in milk was also unaffected by treatment. In conclusion treatment with this natural mixture does not affect milk production and composition, but can reduce mammary infection.

Key Words: Antioxidant plant extract, Udder health, Milk quality

M207 A simulation model to integrate ruminal volatile fatty acids (VFA) and blood glucose metabolism in transition dairy cows under steady state conditions. X. Markantonatos*[1], Y. Aharoni[3], T. Cassidy[1], R. K. McGuffey[2], L. F. Richardson[2], and G. A. Varga[1], [1]*The Pennsylvania State University*, [2]*Elanco Animal Health*, [3]*Newe Ya'ar Research Center*, *Israel*.

Eight multiparous transition Holstein cows in a completely randomized design were used to evaluate the effects of monensin (M) on ruminal VFA and plasma glucose (Glu) metabolism. Cows received the same diet consisting of 58:42 or of 51:49 (forage:concentrate) prepartum (Pre) or postpartum (Post), respectively. Diets were supplemented with 300 mg/d of M or without M. VFA isotopic tracers [Na-1-^{13}C-acetate (Ac), -propionate (Pr), or -butyrate (Bu)] were used as markers to

describe VFA kinetics in the rumen. U-^{13}C-Glu was injected into the jugular vein for Glu kinetic determination. WinSAAM was used to develop a steady state VFA and blood Glu model. A 14-compartment model was used to describe ruminal VFA and blood Glu metabolism. The main VFA compartments consisted of Ac, Pr, and Bu. Interconversions between Ac and Bu were estimated by assigning virtual compartments which accumulate carbons from the donor compartment, e.g. Ac, before they are delivered to the recipient compartment, e.g., Bu. Plasma Glu was comprised of two comparments; the compartment into which U-^{13}C-Glu was infused, and a virtual compartment-acceptor of Pr originated Glu. The model described VFA and plasma Glu kinetics. The model estimated lower Bu and Ac interconversions with M, Pre (Bu to Ac; 14% vs 12%; P=0.04, and Ac to Bu; 32% vs 25%; P=0.11). Glu input from other sources than Pr decreased with M, Post (2.26 g/min vs 1.09 g/min). Gluconeogenesis, expressed as Pr contribution to plasma Glu pool was higher (P=0.06; 22% vs 31%), but the Glu disposal rate decreased in M cows (P=0.001; 1.67 g/min vs 0.92 g/min). The proposed model described and integrated ruminal VFA and blood Glu kinetics, resulting in quantification of VFA and Glu metabolism. Results suggest that M affects interconversions of ruminal VFA, increases Pr originated gluconeogenesis, and reduces Glu disposal rate in transition cows.

Key Words: Simulation model, VFA Interconversions, Gluconeogenesis

M208 Splanchnic metabolism of [U-13C]glucose in lactating dairy cows. N. B. Kristensen*, B. M. L. Raun, and B. A. Røjen, *Danish Institute of Agricultural Sciences*, *Tjele, Denmark*.

Three lactating Holstein cows (20 ± 1 kg milk/d; 315 ± 13 DIM) implanted with permanent indwelling catheters in the mesenteric artery, hepatic portal vein, hepatic vein and mesenteric vein were used to investigate splanchnic glucose metabolism with two levels of starch intake. Two diets were formulated to supply different amounts of starch from corn silage (4% of DM, LS; 16% of DM, HS). Artificially dried hay was substituted for corn silage with the LS treatment. Supplement was based on sugar beet pulp and rape seed cake to ensure minimal starch supply from supplement. Treatment periods were 14 days with sampling on the last day of each period. Continuous infusion of pAH (32 ± 2 mmol/h) into the mesenteric vein and primed continuous infusion of [U-13C]glucose (0.95 ± 0.05 mmol/h) into the jugular vein were initiated 1 h before first blood sampling. Ten sets of blood samples were obtained simultaneously from the artery, portal vein, and hepatic vein during the 12-h collection period. Data was analyzed as a split-plot design using Proc Mixed in SAS. Dry matter intake was numerically higher with HS (16 ± 2 kg/d) compared with LS (12 ± 2 kg/d). The net hepatic flux of glucose increased (P < 0.01) with HS compared with LS (544 and 432 ± 6 mmol/h, respectively) and the irreversible loss rate of glucose increased (P < 0.05) with HS compared with LS (438 and 352 ± 10 mmol/h). The net portal flux of glucose (-50 ± 5 mmol/h) and portal-drained visceral extraction of arterial [U-13C]glucose (1.6 ± 0.2 %) were not affected (P > 0.10) by treatment. Glucose extraction in the liver was not different from zero (P > 0.10) and did not differ between treatments (0.08 ± 0.2 %). Glucose absorption to the portal blood corrected for portal-drained visceral extraction of arterial [U-13C]glucose was not affected by treatment (P > 0.10) and not different from zero (P > 0.10; 4.6 ± 9.7 mmol/h). Data show that increased intake of starch from corn silage was not followed by any detectable increase in glucose absorption to the portal blood or changes in the portal-drained visceral metabolism of glucose.

Key Words: Glucose, Metabolism, Stable isotope

M209 Feeding a high energy diet on a restricted basis during the dry period does not negatively affect postpartum milk yield or dry matter intake. L. A. Winkelman* and C. K. Reynolds, *The Ohio State University*, *Columbus*.

Meeting the energy demands of the transition dairy cow is challenging. Cows often decrease DMI before calving, causing negative energy balance (EB). Limit feeding dry cows a high energy diet may enable adequate DM and energy intake and reduce the extent of negative EB at calving. Multiparous Holstein cows (n = 18), dried off 45 d before expected calving and paired by expected calving date, parity, and previous milk yield, were randomly assigned to dry period diets formulated to meet nutrient requirements at ad libitum (AL) or restricted (R) DMI. All cows had ad libitum access to the same diet after calving. Blood samples were taken weekly from the coccygeal vein. Data were statistically analyzed as repeated measures within cows. Prepartum DMI for R cows was 9.4 kg/d, vs. 13.7 kg/d for AL cows ($P < 0.01$). Prepartum EB (0.02 vs. 6.37 Mcal/d, $P < 0.01$) and BW (756 vs. 773 kg, $P < 0.10$) were higher for AL cows, but BCS did not differ (3.58, $P = 0.56$). For 4 wk after calving, prepartum diet did not affect DMI (19.4 kg/d, $P = 0.36$), BW (678 kg, $P = 0.77$), BCS (3.21, $P = 0.40$), milk yield (41.5 kg/d, $P = 0.75$), milk protein concentration (3.26 %, $P = 0.42$) or milk lactose concentration (4.55 %, $P = 0.24$). Cows fed R had higher EB during week 1 after calving (-10.9 vs. -17.7 Mcal/d, $P < 0.10$). Milk fat concentration and yield were greater in the first week after calving for AL vs. R (6.63 vs. 4.39 %; 1.22 vs. 1.90 kg/day), but were lower for AL during wk 2 and 3 after calving ($P < 0.01$). Prepartum plasma glucose was lower ($P = 0.08$) for R vs. AL (3.5 vs. 3.7 mM), but prepartum insulin (0.22 nM) did not differ by treatment ($P = 0.38$). After calving, both insulin and glucose concentrations decreased ($P < 0.01$) and glucose was lower ($P = 0.03$) for R vs. AL (2.5 vs. 2.9). Postpartum insulin (0.08) did not differ by dry-period diet ($P = 0.55$). In conclusion, restricted intake of a high energy diet during a 45 d dry period does not adversely affect the milk production or intake of the postpartum dairy cow.

Key Words: Transition, Restricted intake, Production

M210 Systemic metabolic and endocrine changes and net portal flux in dairy cows fed a fat-based diet (FBD) compared to a starch-based diet (SBD). H. M. Hammon*[1], C. C. Metges[1], F. Becker[1], O. Bellmann[1], F. Schneider[1], P. Junghans[1], P. Dubreuil[2], M. C. Thivierge[3], and H. Lapierre[4], [1]*Research Institute for the Biology of Farm Animals (FBN)*, *Dummerstorf, Germany*, [2]*University of Montreal*, *St-Hyacinthe, QC, Canada*, [3]*Département des sciences animales, Université Laval*, *Québec, QC, Canada*, [4]*Dairy and Swine Research and Development Centre*, *Lennoxville, QC, Canada*.

Feeding rumen-protected fat (RPF) is an alternative to increase energy density of the diet and therefore energy intake in dairy cows. To investigate metabolic and endocrine changes in dairy cows fed either FBD or SBD, 3 Holstein cows (83 ± 1 DIM) were fitted with catheters in the portal vein, a mesenteric artery (A) and two mesenteric veins (MV). Cows were fed SBD and FBD (17.2% CP; 7.2 MJ NEL) for 3 wks, resp. In FBD, corn starch (92 g/kg DM) was replaced by 50 g/kg DM RPF (mainly C16:0 and C18:1). At d 18 of each period, blood was taken to measure concentrations of glucose (GLU), lactate, short-chain fatty acids, NEFA, triglycerides, insulin, and glucagon. Concomitantly, para-aminohippurate was infused into MV for measurement of portal plasma flow and estimation of net portal fluxes. Plasma A GLU enrichment was measured during the last 2h of a 4h infusion of D-[U-$^{13}C_6$]GLU to calculate whole body GLU irreversible loss rate (ILR). Diet effects were tested using the Mixed Model of SAS. Intakes of

CP and NEL were not affected by diets. Milk and lactose yields were higher ($P < 0.05$) in FBD than SBD. GLU A concentrations were lower ($P < 0.01$) in FBD than SBD. Net portal utilization of GLU and whole body ILR were not affected by diets. NEFA and triglyceride A concentrations were higher ($P < 0.05$) in FBD. Portal absorption of propionate tended to be higher ($P < 0.1$) in FBD than SBD. Glucagon concentrations and glucagon to insulin ratios were higher ($P < 0.05$) in FBD. Greater milk yield in FBD were linked to lower GLU plasma concentrations, an elevated lipid status, and higher glucagon concentrations, but were not associated with differences in whole body GLU ILR or GLU net portal flux. Lower glucose concentrations, but a greater lactose output indicates a glucose saving effect after RPF feeding.

Key Words: Dairy cow, Glucose metabolism, Portal-drained viscera

M211 Effects of postpartum drenching on acute and chronic responses of blood metabolites in primiparous Holstein cows. J. W. McFadden*, R. L. Wallace, and J. K. Drackley, *University of Illinois*, *Urbana*.

We evaluated the effects of large-volume drenches with propylene glycol or a drinkable drench product on acute and chronic responses of blood metabolites. Primiparous Holstein dairy cows (n=30) were utilized in a completely randomized design with three drench treatments: 37.85 L of water (control), 37.85 L of water plus 355 ml of propylene glycol (PG), and 37.85 L of water plus 900 g of a commercial drinkable drench product (DDP). The PG and DDP treatments provided similar amounts of glucose precursors. Drenches were administered 9 to 11 h after parturition. All cows were fed the same postpartum diet from parturition until d 10. Blood was sampled at 0, 2, 4, 6, 8, and 10 h after drench administration to determine acute responses and once daily from d 1 until 10 d postpartum to determine chronic responses to the single drench administration. Treatments did not affect postpartum dry matter intake (18.4, 18.5, and 19.6 for control, PG, and DDP, respectively; SEM = 1.6). Treatment did not affect serum glucose concentrations during the acute response period; however, a trend for a treatment by time interaction ($P=0.10$) showed that both PG and DPP tended to maintain higher serum glucose after treatment relative to controls. Both PG and DDP treatments significantly decreased acute serum nonesterified fatty acid (NEFA; $P<0.05$) and β-hydroxybutyrate (BHBA; $P<0.01$) concentrations compared to controls. Serum glucose, NEFA, and BHBA concentrations were not affected during the first 10 d following postpartum administration of PG or DDP ($P>0.34$). We conclude that administration of DDP or PG immediately after parturition were equally effective in decreasing serum NEFA and BHBA concentrations and increasing serum glucose concentrations within hours after drenching; however, the effects were not maintained during the first 10 d postpartum. (Experiment partially supported by MSC Co., Dundee, IL).

Key Words: Primiparous cow, Propylene glycol, Transition cow

M212 Plasma aflatoxin concentrations over time in bolus fed lactating dairy cows. M. Moschini[1], F. Mosoero[1], D. E. Diaz[2], A. Gallo[1], A. Pietri[1], and G. Piva*[1], [1]*Catholic University of Piacenza*, *Piacenza, Italy*, [2]*Utah State University*, *Logan, UT*.

The aflatoxins (AF) are a group of mycotoxin produced primarily by Aspergillus flavus and A. parasiticus. Aflatoxin B1 (AFB1), the most frequently occurring and most studied of the AF is a Group 1 carcinogen and a potent hepatotoxin. Aflatoxin M1, a direct metabolite of AFB1, appears in milk of lactating dairy cows soon after consumption of AFB1 contaminated diets. The objective of this experiment was to monitor plasma levels of aflatoxin B1 (AFB1) aflatoxin B2 (AFB2), aflatoxin G1 (AFG1), aflatoxin G2 (AFG2) and aflatoxin M1 (AFM1) in lactating dairy cows consuming AF. Seven lactating Holstein cows were given a bolus of a naturally contaminated corn meal (97.9±1.41 ppm AFB1, 20.2±0.5 ppm AFB2, 212.6±0.6 ppm AFG1, 17.7±0.3 ppm AFG2) for a total of 4.9 mg AFB1, 1.01 mg AFB2, 10.63 mg AFG1 and 0.89 mg AFG2. Vitamin A, at 1,000,000 IU, was added as a biomarker of intestinal absorption. Blood samples were collected at 0, 15, 30, 60, 120, 180, 270 and 330 min after bolus consumption. Plasma was analyzed by HPLC for AFB1, AFB2, AFG1, AFG2 and AFM1 concentration. Within the considered time points, peak plasma AFB1 concentration was obtained at 15 min. Plasma AFM1 concentrations where significant as soon as the first collection (15 min) and peaked at 270 min indicating both a rapid absorption of AFB1 through the rumen wall and a rapid metabolization into AFM1. The palmitate plasma level suggests the intestinal contribution to the aflatoxin plasma level begins after 120 min. Results suggest a rapid absorption of AF possibly through a passive transport through the rumen wall (Funded by AFLARID).

Table 1.

	Time (min)							
Item	0	15	30	60	120	180	270	360
AFB1, ng/L	n.d.	49.5±20.6	42.2±28.5	37.8±26.7	33.0±25.5	19.2±10.3	17.4±5.3	27.2±31.7
AFB2, ng/L	n.d.	9.0±6.5	8.0±7.5	6.8±4.5	9.2±8.3	5.5±3.1	4.4±2.9	7.2±7.6
AFG1, ng/L	n.d.	24.2±16.6	20.2±13.6	24.1±20.8	48.0±82.0	14.6±9.5	12.5±6.8	43.8±83.9
AFG2, ng/L	n.d.	3.6±2.8	3.2±2.6	3.6±1.9	8.5±9.8	2.8±1.7	2.7±1.7	7.8±10.0
AFM1, ng/L	n.d.	45.1±13.0	35.3±18.5	51.0±14.9	53.2±11.0	55.1±9.3	58.7±21.5	58.7±11.9
Retinol palmitate, µ/L	n.d.	n.d.	n.d.	12.4±2.2	23.8±6.1	43.9±6.6	86.8±49.1	109.3±60.6

n.d. = not detected

Key Words: Mycotoxins, Aflatoxin, Milk

M213 Milk production as a function of nutrient supply follows a Michaelis-Menten relationship. J. J. O. Pimentel*[1,3], R. P. Lana[1,2], B. Zamperline[1], M. F. Paulino[1,2], S. C. Valadares Filho[1,2], R. M. A. Teixeira[1,3], and D. C. Abreu[1,2], [1]*Universidade Federal de Viçosa*, *Viçosa, MG, Brazil*, [2]*CNPq*, *Brasília, DF, Brazil*, [3]*FAPEMIG*, *Belo Horizonte, MG, Brazil*.

Two experiments aimed to evaluate the effects of supplement type and amount on milk production in Brazil. In each experiment, eight Holstein cows (517±40 kg) were allotted in two 4 x 4 Latin squares, in four periods of 14 days. The Exp. 1 was conducted on pasture of Elephant grass (*Pennisetum purpureum*, Schum) in the rainy season, and the treatments included a control (mineral mixture - MM) and supplements with 24% CP in dry matter at levels of 1.25, 2.5, and 5.0 kg/animal/day, based on corn meal, soybean meal, urea and MM. The Exp. 2 happened in the dry season, in which the cows received 40 kg/day of chopped sugarcane plus 0.25% urea as fed basis and the treatments consisted of a control (MM) and supplement levels of 1.25, 2.5, and 5.0 kg/animal/day, based on MM (12.5, 5.7, and 2.9%, respectively), urea (11.6, 5.9, and 2.9%, respectively), corn meal and soybean meal, in which the protein sources were used to reach 12.2% CP in the total diet. The experiments were analyzed as Latin square design including effects of treatments, Latin square, animal within Latin square and period. There was no treatment effect ($P>.05$) on both experiments due to high coefficient of variation. In spite of that, the milk responses to supplementation were curvilinear in both experiments, following a Michaelis-Menten relationship of enzymatic systems and were explained by equations of Lineweaver-Burk as seen bellow:

Exp. 1: 1/Milk = 0.0125*(1/Suppl) + 0.0826 r^2 = 1.00

Exp. 2: 1/Milk = 0.0199*(1/Suppl) + 0.1032 r^2 = 0.96

The theoretical maximum milk production (1/a) were 12.1 and 9.7 kg/animal/day, respectively, and the half maximum milk production (b/a) was verified with 5.2% of the supplementation necessary to reach 95% maximum response. Therefore, the marginal increase in milk production reduces with increasing supplementation, different of the 2001 dairy NRC that consider linear responses for both energy and protein supplies.

Key Words: Dairy cattle, Lineweaver-Burk, Supplement

M214 Physiological responses to heat stress in steers following ruminal administration of ground endophyte-infected tall fescue seed. L. E. Wax*, G. Rottinghaus, and D. E. Spiers, *University of Missouri*, *Columbia*.

Cattle from Southeast to Midwest regions of the US often experience fescue toxicosis during summer months following intake of tall fescue infected with the endophyte Neotyphodium coenophialum (E+). Recent studies in our lab have attempted to enhance this condition by feeding cattle a diet containing ground E+ seed under heat stress conditions, which resulted in a large reduction in feed intake. The objectives of the present study were to separate out the oral effect of ground E+ seed by using ruminal administration, and determine a dose-response to ergovaline (i.e., a primary toxin found in E+ seed). Steers (n=6, 350kg avg. BW) were housed in the Brody Environmental Center at the University of Missouri and used in four trials over a 5 month period to ultimately expose each animal to each of the four treatments. All animals were originally housed at 19C for seven days and received endophyte-free ground seed (E-; Miller Seed Company, MO) in the diet. This was followed by 11 days of cycling heat stress (i.e., 26 to 36C). After this time, steers either continued on the E- supplementation or switched to E+ seed (Seed Research of Oregon, OR) at 5, 10 or 20µg ergovaline/kg BW for five days. Respiration rate, skin, and rectal temperatures were taken six times daily, along with daily measurement of feed intake. Fescue seed was mixed directly into the rumen four times daily to ensure the animal received the entire dose. Results were analyzed using ANOVA. Only the highest dose resulted in a significant change in performance. Treatment at this level resulted in a 30% rapid reduction in feed intake (P=0.02) below E- level. In contrast, hyperthermia associated with the highest dose developed gradually over four days of treatment to peak at 0.85C above E- level (P=0.01). Feed intake is more responsive to fescue toxicosis than indicators of thermal stress, which develop gradually. These results also suggest that the reduction in feed intake is not a taste issue, since bypassing the mouth still results in decreased intake.

Key Words: Cattle, Heat stress, Endophyte

M215 Assessment of blended sorbitol and mannitol as a prepartum glucogenic supplement for periparturient dairy cows. J. W. McFadden*[1], S. S. Block[2], and J. K. Drackley[1], [1]*University of Illinois*, *Urbana*, [2]*ADM Alliance Nutrition, Inc.*, *Decatur, IN*.

We evaluated the effects of prepartum sugar alcohol supplementation on metabolic status and milk production in a commercial herd setting. Primiparous (n=66) and multiparous (n=101) Holstein dairy cows were utilized in a completely randomized design with two prepartum treatments: control (unsupplemented) or 100 g/d of sorbitol-mannitol blend (SMB) incorporated into the total mixed ration. Treatments were initiated 3 wk before expected calving and terminated at parturition. Cows were housed in group pens corresponding to treatment during the prepartum period then released into the herd after parturition. Milk production and composition was determined until 98 DIM. Blood metabolite response was measured at 1 d and 7 d postpartum. A single liver biopsy was obtained between 5 d and 8 d postpartum. Body condition score was documented prior to treatment and at parturition. Frequency of health disorders was recorded. Data was analyzed using the PROC MIXED procedure of SAS with repeated measures. Treatment with SMB tended to increase milk yield (P=0.10) in multiparous cows (44.3 and 46.3 kg/d for the control and SMB, respectively; SEM = 0.9). Milk yield in primiparous cows was not affected by SMB. Milk protein content was significantly lower (P=0.03) for the SMB treatment, however milk protein yield was not affected. Milk fat content and yield, SCC, and MUN concentrations were not affected by treatment. Serum glucose, β-hydroxybutyrate, and nonesterified fatty acid concentrations were not affected by prepartum supplementation of SMB. Hepatic concentrations of total lipid, triacylglycerol, and glycogen were not affected by treatment. Neither body condition score nor frequency of health disorders was affected by treatment. We conclude that prepartum supplementation of SMB may increase milk yield in multiparous Holstein dairy cows, but did not alter metabolic characteristics during the periparturient period. (Experiment supported by ADM Alliance Nutrition, Inc., Decatur, IN).

Key Words: Milk yield, Sorbitol, Transition cow

Ruminant Nutrition: Nitrogen Metabolism/Amino Acids - Dairy

M216 Effects of the isopropylester of the hydroxylated analogue of methionine (HMBi) on production performance of dairy cows in early lactation. S. Jurjanz*[1], J. C. Robert[2], and F. Laurent[1], [1]*INRA-ENSAIA, Laboratoire de Sciences Animales*, *Vandoeuvre, France*, [2]*Adisseo France SAS*, *Commentry, France*.

Thirty six Holstein cows (26 multiparous, 10 primiparous) were assigned to one of two treatments 17 to 24 days after calving. A basal diet consisting of (DM basis) 61.5 % corn silage, 6.7% wheat straw, 14.9% cracked wheat, 15.6% soybean meal, 1.3 % minerals was fed for 17 weeks as a control diet (treatment 1: T1), or was supplemented with 0.12 % of diet DM with HMBi (treatment 2: T2). The control diet contained an estimated (per kg DM) 1.61 Mcal Net Energy, 100g metabolizable protein (MP), 46g digestible undegraded protein (PDIA from PDI system), 6.91 metabolizable lysine (%MP) and 1.78 metabolizable methionine (%MP). Treatment 2 contained 2.25 metabolizable methionine (%MP), HMBi supplying 0.47 metabolizable methionine (%MP). Results were analysed through an ANOVA using the mixed procedure of SAS with the repeated time option. The covariance structure between the different weekly averages was defined as compound symmetric. No significant differences were observed between treatment groups for DMI, milk yield, milk fat (content and yield) and body weight variations. Milk protein content was higher for T2 vs T1 (%3.36 vs 3.24, $p<0.10$) and lactose content increased significantly for T2 vs T1 (% 5.13 vs 5.02, $p<0.01$). Total nitrogen content in milk did not vary significantly (g/L, 5.37 and 5.20 respectively for T2 and T1). Protein nitrogen and casein nitrogen