

challenges and environments. During the HEC, plasma insulin levels increased (>20-fold) and stabilized after 1h. The rate of glucose infusion was similar between TN and HS steers during the first 3 h of the HEC, but increased (152 vs 119 g/h) in HS steers during the 4th h of the HEC. Overall, these data indicate that glucose utilization appears to increase during HS. Moreover, combined environmental stresses (HS and LPS challenge) alter glucose homeostasis to a greater extent than LPS challenge alone. Taken together, this suggests the contribution of glucose in support of whole-body energetics increases when steers experience a thermal load alone or when coupled with an LPS challenge.

Key Words: heat stress, endotoxin, insulin

M245 Impact of unsaturated fatty acid supply on the regulation of CLA-induced milk fat depression in lactating cows. M. J. de Veth¹, J. M. Griinari², V. Toivonen³, and K. J. Shingfield*³, ¹BASF-AG, Offenbach/Queich, Germany, ²University of Helsinki, Helsinki, Finland, ³MTT Agrifood Research Finland, Jokionen, Finland.

Trans-10, *cis*-12 conjugated linoleic acid (CLA) reduces milk fat synthesis in a predictable and dose dependent manner in the lactating cow. In some situations the decrease in milk fat to CLA supplements is less than predicted, with evidence that the supply of fatty acids to the mammary gland may be an important determinant of the overall response. In this experiment, the impact of unsaturated fatty acid (oleic and linoleic acid)

supply on milk fat responses to *trans*-10, *cis*-12 CLA was examined. Four rumen-fistulated cows in mid-lactation were used in a 4 x 4 Latin square design. Treatments were 1) control, 2) 3.65 g/d of *trans*-10, *cis*-12 CLA alone (CA), 3) 3.65 g/d of *trans*-10, *cis*-12 CLA and a mixture of methyl esters supplying 239 g/d of *cis*-9 18:1 (CO), and 4) 3.65 g/d of *trans*-10, *cis*-12 CLA and a mixture of ethyl esters supplying 247 g/d of 18:2n-6 (CL). All treatments were abomasally infused four-times/d over a 7 d period with a 7 d interval between infusions. All CLA treatments reduced ($P < 0.01$) milk fat yield compared to the control, with CA reducing milk fat yield by 26.4%. The decrease in milk fat yield was less with treatments CO and CL (13.5 and 13.3%, respectively). Reductions in the synthesis of fatty acids *de novo* were comparable across CLA treatments; whilst the incorporation of preformed fatty acids was lower ($P < 0.05$) for CA compared to CO and CL and accounted for the differences in the extent of the milk fat depression. Milk fatty acid content of *trans*-10, *cis*-12 CLA (g/100g fatty acids) increased ($P < 0.01$) from < 0.01 for the control to 0.11, 0.10, and 0.11 for CA, CO, and CL respectively. Results indicate that despite the comparable transfer and incorporation of *trans*-10, *cis*-12 CLA into milk fat, the extent of reductions in milk fat synthesis may, at least in part, be regulated by the availability of unsaturated fatty acids at the mammary gland. In conclusion, altering either oleic acid or linoleic acid supply available for absorption at the small intestine may alter the magnitude of decreases in milk fat synthesis to *trans*-10, *cis*-12 CLA in the lactating cow.

Key Words: conjugated linoleic acid, unsaturated fatty acids, mammary lipogenesis

Production, Management and the Environment: Beef and Dairy

M246 Sexed-biased semen for nulliparous heifers: Effects on reproductive and lactational performances. F. Guagnini¹, J. E. P. Santos², J. R. Lima¹, J. Fetrow³, and R. C. Chebel*¹, ¹Veterinary Medicine Cooperative Extension, University of California Davis, Tulare, ²Department of Animal Science, University of Florida, Gainesville, ³Department of Veterinary Population Medicine, University of Minnesota, Saint Paul.

Objectives were to evaluate the effects of using sexed-biased semen for first AI of heifers on reproductive and economic performances during first lactation. Holstein heifers (herd A=227 and herd B=1,144) received first AI with sexed-biased semen (SS, n=343) or conventional semen (CS=1,028). Heifers that displayed estrus following first AI were re-inseminated with conventional semen. In herd A, age at first AI were SS=13.1±0.1 and CS=13.8±0.1 mo ($P < 0.01$), and, in herd B, 12.9±0.1 mo for both groups ($P = 0.44$). Pregnancy per AI after first AI was greater for CS heifers (51.8 vs. 40.2%; $P < 0.01$), but risk of pregnancy was not different. From heifers initially enrolled, 70.2% calved in herds A (n=188) and B (n=774) and first lactation data were collected. Interval from first AI to calving was not different in herd A (10.1±0.1 mo), but, in herd B, SS heifers had longer ($P < 0.01$) interval than CS heifers (10.3±0.1 vs. 9.8±0.1 mo). In herd A, SS heifers were younger ($P < 0.01$) at calving (22.8±0.1 vs. 23.5±0.2 mo), but in herd B there was no difference (22.8±0.1 mo). Among heifers conceiving to first AI, SS heifers were ($P < 0.01$) more likely to have a female calf (85.7 vs. 47.7%) and, overall, 64.6% of SS heifers and 51.0% of CS heifers had a female calf ($P < 0.01$). More SS heifers conceiving to first AI had stillbirths (8.8 vs. 3.4%; $P < 0.01$), but among heifers conceiving to later AI there was no difference. Among heifers conceiving to first AI, gestation length of SS heifers delivering female calves was ($P < 0.01$) longer than those delivering males (277.3±0.8 vs. 267.8±1.7 d), but CS heifers delivering females had ($P = 0.02$) shorter gestation than those delivering males (275.2±0.6 vs. 276.6±0.6 d). No differences in incidence of disease, risk

of pregnancy, and risk of culling were observed. In herd A there was no difference in rearing cost from first AI to calving (\$764.9±7.5), but, in herd B, rearing cost of SS heifers was ($P < 0.01$) greater (\$778.8±8.7 vs. 740.8±4.3). Calf revenue (\$288.0±7.5), milk yield (9,245.5±84.7 Kg), income over feed cost (\$832.1±7.6), and overall economic return (\$78.1±34.1) did not differ between SS and CS heifers.

Key Words: sexed-biased semen, dairy heifer, economics

M247 Use of sex-sorted semen in superovulated Holstein cows and heifers: A case study. S. R. Potter¹, B. J. Paus¹, J. M. DeJarnette², and R. L. Nebel*², ¹Spruce Haven Farm, LLC, Union Springs, NY, ²Select Sires, Inc., Plain City, OH.

Data from use of commercially available, flow-cytometrically sex-sorted semen (SS) in superovulated (SO) Holstein cows (n=10) and heifers (n=34) were compared to SO results using conventional semen (CS) in cows (n=255) and heifers (n=104) in the same herd. Procedures for AI were identical for SS and CS with 1 straw administered at 36, 48, and 60 h after SO treatment. Preferential use of SS in females responding to SO resulted in more ($P < 0.05$) total embryos/ova recovered per flush than CS (14.2±1.6 vs. 10.4±0.4). Across all ova, the percentage fertilized was lower ($P < 0.05$) in cows (73%, n=2963) than in heifers (86%, n=1471) but was not influenced ($P > 0.05$) by semen type. Across all flushes, the distribution of embryo quality was influenced ($P < 0.05$) by semen source in both cows and heifers. The embryo quality distribution of cows for SS (n=148) and CS (n=2815) was: Grade 1, 17 vs. 36%; Grade 2, 17 vs. 16%; Grade 3, 6 vs. 10%; fertile-dead (FD), 27 vs. 15%; and unfertilized ova (UFO), 33 vs. 23%, respectively. The embryo quality distribution within heifers for SS (n=464) and CS (n=1007) was: Grade 1, 33 vs. 42%; Grade 2, 22 vs. 24%; Grade 3, 10 vs. 9%; FD, 21

vs. 15%; and UFO, 14 vs. 10%, respectively. In each case, SS resulted in a shift towards a greater percentage of FD and UFO at the expense of Grade 1 embryos. Among Grade 1 & 2 embryos, conception rates were greater ($P < 0.05$) for fresh (65%, $n = 855$) than for frozen-thawed (43%, $n = 148$) transfers. Among fresh embryo transfers, conception rates of Grade 1 & 2 embryos (66%, $n = 855$) were greater ($P < 0.05$) than those of Grade 3 (33%, $n = 147$) embryos. Within embryo quality grade, semen type had no effect ($P > 0.05$) on conception rates of fresh or frozen-thawed transfers. In conclusion, although these data tend to imply SS may possess a disproportionate percentage of uncompensable sperm defects as reflected by altered embryo quality distributions, it is not possible to determine if this observation is a direct effect of the sorting procedure per se or perhaps an indirect effect as a function of lower sperm dosages for SS and thereby reduced sperm competition at the time of fertilization.

Key Words: sexed semen, superovulation, embryo transfer

M248 What percentage of Nelore (*Bos indicus*) bulls exhibit fertility-associated antigen on sperm membranes? J. C. Dalton^{*1}, L. Deragon², and J. L. M. Vasconcelos³, ¹University of Idaho, Caldwell, ²Alta Genetics Brazil, Uberaba, MG, Brazil, ³FMVZ-UNESP, Botucatu, SP, Brazil.

During ejaculation, the seminal vesicles, prostate, and Cowper's glands secrete heparin-binding proteins (HBP) which coat the sperm (Miller et al., 1990, Biol. Reprod. 42:899–915). Bulls with sperm that exhibited a 31-kDa molecular weight HBP, called fertility-associated antigen (FAA), were 7 to 9 percentage points more fertile following AI than bulls producing sperm lacking FAA (Sprott et al., 2006, Prof. Anim. Sci., 22:353–357). Unfortunately, on average, 12% of bulls tested (predominantly *Bos taurus* or *Bos taurus* × *Bos indicus*) have been reported to be FAA-negative (Bellin et al., 1998, J. Anim. Sci. 76:2032–2039), while the percentage of Nelore (*Bos indicus*) bulls with or without FAA on sperm is not currently known. Consequently, the objective was to determine the percentage of FAA-positive and FAA-negative Nelore bulls. Ejaculates from Nelore bulls ($n = 49$; range in age: 2 yr 8 mo to 11 yr) housed at Alta Genetics Brazil were collected by artificial vagina. Immediately following semen collection, 2.0 mL of neat semen was removed from the collection vial for use in a lateral flow cassette which facilitated rapid on-site determination of FAA in semen. Presence of FAA in the sample was shown by binding of FAA and labeled antibody to immobilized antibody, resulting in a visible colored band at the test position. Visualization of a colored control band verified that the cassette performed correctly, regardless of the presence or absence of FAA in the sample. Fifty tests were conducted on ejaculates from 49 bulls. Forty-seven tests (on ejaculates from 47 bulls) provided a distinct determination of FAA status, while three tests on ejaculates from two bulls were inconclusive (due to failure of the test, as evidenced by lack of a visible control band on the cassette). Five bulls (10.6%; 5/47) were FAA-negative, while 42 bulls (89.4%; 42/47) were FAA-positive. The FAA status of Nelore (*Bos indicus*) bulls is similar to *Bos taurus* and *Bos taurus* × *Bos indicus* bulls.

Key Words: bulls, proteins, sperm

M249 Effect of dry period length on productive and reproductive parameters at subsequent lactation period of Holstein cows. D. R. Lozano¹ and C. F. Aréchiga^{*2}, ¹Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias, Aguascalientes, Aguascalientes,

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The objective of present study was to evaluate effect of dry periods length on productive and reproductive parameters at subsequent lactation period of Holstein cows. During the first replicate, Holstein cows ($n = 30$) were assigned at random to different dry-period length treatments: 1) 60 d ($n = 10$; 58.8 ± 3.8 d); 2) 45 d ($n = 10$; 43.9 ± 5.32 d), and 3) 30 d ($n = 10$; 29.2 ± 2.6). Secondly, Holstein cows ($n = 74$) were randomly assigned to different dry-period length treatments: 1) 60 d ($n = 40$; 61.8 ± 1.07 d) and 2) 40 d ($n = 10$; 38.5 ± 1.16 d). During the first experimental period, blood samples were collected weekly from d 0 - 42 postpartum (PP) to evaluate serum concentrations of glucose (mg/DL), nonesterified fatty acids (NEFA; mmol/L), urea (mmol/L) and beta-hydroxybutyrate (mmol/L). Weekly milk production was registered. Differences in body condition score (BCS) of the cow and the interval calving to conception were registered and analyzed by covariance. Metabolites concentrations and milk production were analyzed by nested models with repeated measurements. By the time of calving, serum concentration of glucose was greater for cows having a dry period length of 60 days (91.7 ± 3.4 ; $P < 0.05$), compared to 45 d (77.0 ± 3.5) and 30 d (65.7 ± 3.7). However, from 7 to 42 d PP, glucose concentration was similar among treatments ($P > 0.05$). At the day of calving, cows with a dry-period length of 30 days had an increased concentration of NEFA (99.1 ± 0.06 ; $P < 0.05$) compared to cows having a dry-period length of 45 d (75.2 ± 0.06) and 60 d (76.0 ± 0.06). Serum concentrations of urea and beta-hydroxybutyrate during the period of study, BCS losses at 30 d PP, milk production and interval from calving to conception were similar among treatments ($P > 0.05$). In conclusion, a short dry-period length did not compromise productive and reproductive parameters during the subsequent lactation period of Holstein cows.

Key Words: dry period length, milk yield, reproduction

M250 Effect of total dissolved solids and sulfates in drinking water on growing heifers fed sorghum silage. J. I. Arroquy^{*1,2}, M. Avila¹, J. Saravia¹, R. Ibañez¹, and P. Fisoló¹, ¹INTA Santiago del Estero, Santiago del Estero, Argentina, ²Univ. Nacional de Santiago del Estero - Fac. Agronomía y Agroindustrias, Santiago del Estero, Argentina, ³CONICET, Santiago del Estero, Argentina.

In north-western Argentina drinking water for cattle often exhibit high levels of total dissolved solids (TDS) and sulfates. Sorghum silage has more than 65% of water, thus in this study was speculated that cattle could get enough volume of water from silage reducing the problems of saline water. The objective was to evaluate the effect of increasing levels of TDS and sulfates in drinking water on weight gain, dry matter intake, and feed efficiency on growing heifers fed sorghum silage. Seventy five heifers (Bradford, and Braford × Criollo; initial BW = 156 ± 20 kg) without previous adaptation to saline water were blocked by weight and randomly assigned to one of 10 pens (7 or 8 heifers/pen). Each pen was randomly assigned to five water treatments based on TDS-sulfates concentrations (g/L): 1) 2 (0.65 sulfates); 2) 5 (1.70 sulfates); 3) 8 (3.00 sulfates); 4) 11 (3.70 sulfates); 5) 14 (4.70 sulfates). Heifers were fed once daily. Ration had on DM basis: 88% sorghum silage and 12% supplement (cottonseed, mineral mix, and vitamins). Average daily gain (ADG; $P < 0.05$), DM intake (DMI; $P < 0.05$), total water intake (water from feed plus drinking water; $P < 0.05$) lineally decrease in response to increasing levels of TDS and sulfates in water. However ADG and DMI for treatment 1 (2 g/L) was only statically different from treatment 5 (14 g/L of TDS). ADG were 411, 330, 339, 306, and 263 g/d (SEM = 38) for treatments 1, 2, 3, 4, and 5 respectively. DMI means were

25.00, 21.85, 21.90, 19.25, and 17.40 g/kg BW (SEM = 2.65) for 1, 2, 3, 4, and 5 respectively. In contrast feed efficiency did not differ among treatments. On average feed efficiencies were 11.0 kg of feed to weight gain (SEM = 1.8). Total water intake to DMI ratio (TWI: DMI ratio) was similar among treatments. Overall TWI: DMI ratio was 5.12 kg of water intake per kg of DMI (SEM = 0.67). In conclusion, within the range of TDS and sulfates evaluated in this experiment liveweight gain linearly decreased in response to increasing levels of salt and sulphur, whereas feed efficiency was not affected all across levels of TDS and sulfates in drinking water.

Key Words: water quality, liveweight gain, sorghum silage

M251 Non genetics effects on reproductive traits in Nellore female: I. Gestation length. D. H. Vieira¹, V. C. Rodrigues², L. F. D. Medeiros², C. G. Barbosa², J. P. F. Silveira³, V. L. Tierzo³, J. L. C. B. Reis^{*4}, and R. S. B. Pinheiro³, ¹Center of Creation of A, Rio de Janeiro, RJ, Brazil, ²Rural Federal university of Rio de Janeiro, Seropedica, RJ, Brazil, ³São Paulo State University, Botucatu, SP, Brazil, ⁴University of Agrarian Sciences - University of Marília, Marília, SP, Brazil.

This study was aimed at evaluating the reproductive performance of Nellore cattle herd, raised in pasture, with no supplementation in dry season, in Baixada Litorânea region, Rio de Janeiro state, between 1980 and 2004. The gestation length (GL) average was 293.30 ± 0.13 days. The GL varied from 275 to 305 days, with a higher concentration (67.08%) between 287 and 299 days. The GL was significantly influenced by year (P<0.05), month (P<0.01) and sex of calf (P<0.05). The parturition order was not significant (P>0.05). The average for GL is considered normal for the species and breed.

Key Words: beef cattle, extensive system, Nellore

M252 Effects of differing levels of rumen degradable protein on nitrogen metabolism in dairy cows and environmental pollution. H. Rafiee*, University of Tehran, Tehran, Iran.

Nine midlactation Holstein cows averaging 171±17 days in milk and 24.1±3.2 Kg of milk/d were assigned to a replicated 3×3 Latin square design to study the effects of three levels of rumen degradable protein (RDP) on nitrogen metabolism. RDP and Crude protein (CP) contents were 9.8 and 14.3, 10.8 and 15.3, and 11.8 and 16.3% DM respectively. Diets consisted of 45% forage DM including 25% alfalfa hay and 20% corn silage. The concentrate contained cottonseed meal and urea as protein sources. Each period lasted 21 days with the last 7 days for sampling. Results were analyzed by MIXED models with effect of cow(square) as a random and days of sampling in each period as repeated measures. Differences declared as significant where P<0.05. Increasing dietary RDP resulted in linearly increased nitrogen (N) intake (P < 0.01), N apparently absorbed (P < 0.01), and urine N (P < 0.05). Pollution N tended to be significant between treatments (P = 0.05), and increased linearly from diet 1 to 3. Results indicate that as nitrogen (N) intake increases, excretion of N in urine increases and it becomes the principal route of N excretion from ruminants. Balancing rations to further improve the nitrogen utilization efficiency may be of higher priority value. Decreasing dietary CP from 16.3 to 15.3% of DM did not affect cow production but reduced estimated excretion of the environmentally labile urinary N, and increased estimated N efficiency. Therefore, the recommended level of dietary CP will depend on the criteria used to define optimum N use.

Table 1. Effect of dietary RDP on nitrogen balance measurements

Items	RDP level			SEM	P <	linear contrast
	9.8	10.8	11.8			
N intake, g/d	432.2	466.3	489.3	16.55	0.003	0.008
Fecal N	104.3	102.3	104.1	6.28	0.96	0.98
Absorbed N	318.8	363.9	385.1	13.59	0.005	0.002
Urine N	200.6	227.2	245.6	9.96	0.01	0.004
Milk N	109.8	114.5	117.4	4.37	0.14	0.21
Pollution N	305.0	329.6	349.7	12.39	0.05	0.01
N efficiency, %	25.9	24.8	24.1	0.87	0.36	0.16

N: nitrogen

Key Words: rumen degradable protein, nitrogen, environment

M253 PGF2α analog on uterine health and reproductive performance of dairy cattle. R. M. Santos^{*1}, D. G. B. Demétrio², C. C. Dias², and J. L. M. Vasconcelos², ¹FAMEV-UFU, Uberlandia, MG, Brazil, ²FMVZ-UNESP, Botucatu, SP, Brazil.

Cows with a normal or abnormal puerperium treated with PGF2α early postpartum had improved fertility, and these effects were independent of plasma P4 at the time of treatment (Bonnet et al., 1990). Prostaglandins and other arachidonic acid metabolites might be important mediators of resistance or susceptibility to uterine infections (Lewis, 1997). The objective was to evaluate the effect of two injections of different PGF2α analogs at 2nd and 4th week postpartum (WPP) on uterine health and reproductive performance. Holstein cows (n=106), calving at summer and maintained in free-stall barn, were divided into three treatment groups: G1=0.530mg Cloprostenol sodium, G2=25mg Dinoprost tromethamine, or G3=control (no treatment). The injections were given at 2nd and 4th WPP. Samples for endometrial cytology (low-volume uterine lavage) were obtained at 6th and 8th WPP. Endometritis was defined as presence of 5% of neutrophils on endometrial cytology, 40 to 60 DIM (Gilbert et al., 2005). The variables endometritis, conception at first AI and pregnancy by 200 DIM were analyzed by the binary logistic regression and the calving to conception interval was evaluated by GLM. Treatment, BCS, retained placenta, milk yield, body temperature, cyclicity (P4≥1ng/ml) recorded at 2nd; 4th; 6th and 8th WPP, and all possible interactions were included in the model. Treatment had no effect on endometritis (65.7% at 6th WPP; 62% at 8th WPP) and reproductive performance (8.4% conception at first AI; 189.4 d calving to conception; 29.2% pregnancy by 200 DIM). Cycling cows at 8th WPP had lower endometritis at this time (P<0.05; 72 vs. 50%). The endometritis at 6th WPP had no effect on reproductive performance, however at 8th WPP had a negative effect on pregnancy by 200 DIM (P<0.05; 42.1 vs. 20.9%) and calving to conception interval (P<0.05; 168.3 vs. 210.4d). The endometritis at 8th WPP had a negative impact on reproductive performance, and this time is probably the best for endometritis diagnosis and treatment. Some spontaneous recovery may occur before 8th WPP.

Key Words: endometritis, prostaglandin, dairy cattle

M254 Effects of GnRH treatment 7 days prior to resynchronization on conception rates to previous and repeat inseminations. R. L. Nebel*¹, J. M. DeJarnette¹, and B. A. Meek², ¹Select Sires, Inc., Plain City, OH, ²Cache Valley/Select Sires, Logan, UT.

Lactating Holstein (n=1870) in 3 herds were used to determine the effects of GnRH administered 7 days prior to resynchronization on conception rates to previous and repeat AI. Cows that had not been detected in estrus by 25 to 32 d post AI (Mean = 29±0.08 d) were assigned by odd and even ID number to receive either no further treatment (Control, n=912) or GnRH (100 µg, im; n=958). Cows not detected in estrus in the next 7 d were presented for pregnancy diagnosis (32 to 39 d post-AI) and open cows in the Control (n=408) and GnRH groups (n=435) were submitted for resynchronization (100 µg GnRH, 7d, 25 mg PGF_{2α}, 72 h, 100 µg GnRH and fixed-time AI). Data were analyzed for the effects of treatment on the percentage of cows detected in estrus within 16 d post treatment, and on conception rate at both previous and repeat inseminations. Repeat inseminations were analyzed separately for estrus-based and fixed-timed AI. Treatment had no effect (P>0.05) on conception rate at previous AI (52%, n=912 vs. 51%, n=958 for Control vs. GnRH, respectively). The percentage of open cows detected in estrus from treatment d 0 to 16 was greater (P<0.05) for Control (31%, n=408) than in GnRH treated cows (21%, n=435), however conception rate at estrus (23%, n=128 vs. 21%, n=90) and fixed-time inseminations (21%, n=280 vs. 25%, n=345) were not influenced (P>0.05) by treatment for Control vs. GnRH-treated cows, respectively. The cumulative percent pregnant after initial and repeat AI was not influenced by treatment (65%, n=912 vs. 66%, n=958 for Control vs. GnRH-treated respectively). Conception rates at initial AI were influenced (P<0.05) by herd and by postpartum interval. Cows <100 d postpartum at first AI had greater (P>0.05) conception rates those ≥100 d postpartum. In conclusion, GnRH administered 7 d prior to resynchronization had no effect on reproductive performance in these herds wherein both estrus detection and resynchronization are used to manage intervals to re-insemination. These results may not apply in herds that rely more exclusively on resynchronization to manage repeat insemination interval.

Key Words: resynchronization, GnRH, fixed-time AI

M255 Tasco alleviation of heat stress in dairy cows. L. B. Pompeu*¹, J. E. Williams¹, D. E. Spiers¹, R. L. Weaver¹, M. R. Ellersieck¹, K. M. Sargent¹, N. P. Feyerabend¹, H. L. Vellios¹, and F. Evans², ¹University of Missouri, Columbia, ²Acadian Seaplants, Dartmouth, NS, Canada.

The present study determined if Tasco-14, *Ascophyllum nodosum*, supplementation reduces heat stress in cows. Cows (n=32) were assigned to treatments (trt) using a randomized complete block design, with 8 cows per trt. The study was divided into 3 periods. In Period 1 (7 d), cows adapted to the Calan gate system. In Period 2 (28 d) the following trt began: Control-1 (C-1); Control-2 (C-2); .25% Tasco (.25T); .50% Tasco (.5T). In Period 3 (28 d), C-2 was changed to 0.50% Tasco (C-.5T) in order to evaluate duration of feeding Tasco. Ambient temperature (T_a) and humidity were continuously recorded using Onset “Hobo” dataloggers. Respiration rate (RR), rump (T_{rump}) and ear (T_{ear}) skin temperatures were measured daily at 0700, 1600, and 1900 h. Milk production and composition data were collected. In Period 2, no differences (P > .10) were found between C-1 and C-2 for any parameter, so they were combined for this period (C). The average daily values for max and mean T_a were 28.0 and 23.2°C, respectively, and the mean RH was 77%. A trt x d interaction (P < .05) revealed DM intake (DMI) of .25T was lower than C for 3 d and lower than .5T for 1 d. For DMI per body weight, .25T was lower than C for 4 d and lower than .5T for

1 d (P < .05). A trt x h interaction (P < .10 and P < .01, respectively) revealed lower T_{ear} for .25T vs. .5T and lower T_{rump} for .25T vs. other trt, at 1600 and 1900 h. In Period 3, the average daily values for max and mean T_a were 31.0 and 26.2°C, respectively, and the mean RH was 81%. No differences in DMI or DMI per body weight were noted (P > .10). A trt x d interaction (P < .05) revealed higher T_{rump} for C-1 than .25T (4 d), than .5T (2 d) and than C-.5T (1 d). T_{rump} was higher (P < .06) for C-.5T vs. .25T (7 d) and vs. .5T (2 d). For 1 d, .5T had higher (P < .05) T_{rump} than C-1 and C-.5T. No differences (P > .10) were observed for RR, milk production, milk fat, and milk protein yield among trt. From the results, it suggests the inclusion of 0.25% Tasco may reduce heat strain of cows and maintain milk production, even with a reduction in DMI; however, no progressive benefit was seen with Tasco. The length of feeding Tasco did not have an effect.

Key Words: Tasco, heat stress, dairy cows

M256 Evaluation of the nitrogen balance module of the AminoCow ration evaluator. R. A. Patton*¹, W. Heimbeck², and J. R. Patton¹, ¹Nit-tany Dairy Nutrition, Inc., Mifflinburg, PA, ²Evonik Degussa GmbH, Health & Nutrition, Hanau, Germany.

AminoCow (AC) is a semi-mechanistic, nutritional model used to evaluate and balance rations for all classes of dairy cattle. Version 3.5.2 has added an environmental module to track the effect of ration changes on the loss of nutrients into the environment. A major part of this module predicts the movement of nitrogen (N) through the cow in response to amino acid balance and provides a prediction of milk urea nitrogen (MUN). In order to determine the accuracy of this model, 37 papers representing 45 separate studies and 155 individual diets that reported N intake, N in milk, N retention, N excreted in manure, N excreted in urine, urine volume, manure dry matter, and MUN were compared against predictions by the AC model. Not all studies reported all variables. Accuracy of prediction was judged by simple regression and by use of the mean square predicted error (MSPE) technique. With the exception of N retained, N in urine and urine volume, predictions were reasonably close to observed. AC predicted a mean of 8.9 g of N retained while the reported mean was 41.1 g. This observed retention would equate to a growth rate of approximately 1 kg/day, a rate not observed in practice. This suggests that there were large inaccuracies in measuring urine N. We conclude that with the exception of N retained and N lost in urine, the model generally predicts the magnitude and direction of N partitioning. Prediction of MUN also appears reasonable; however, prediction of urine volume lacks accuracy.

Table 1.

Item	Number of diets	Predicted Mean	Observed Mean	RMSPE*		% Error due to	
				% of Mean	R ²	Central Tendency	Regression
N intake, g	155	590.0	592.0	30.4	0.90	0.3	1.9
N milk, g	155	149.6	153.5	8.3	0.89	9.2	0.7
N retained, g	108	8.9	41.1	169.2	0.03	21.5	36.4
N manure, g	147	222.3	209.0	56.5	0.42	5.6	0.3
N urine, g	133	232.6	205.0	88.9	0.06	9.63	42.1
Urine vol, L	50	28.5	28.0	35.9	0.02	0.0	41.0
Manure DM, kg	98	8.0	7.8	23.8	0.40	0.0	38.4
MUN, mg/dl	108	13.3	13.4	16.3	0.53	0.0	0.0

*Root Mean Square Predicted Error = square root of MSPE

Key Words: model, N loss, MUN

M257 Validation of right ruminal artery and vein as models of bovine foregut vasculature. J. L. Klotz*¹, L. P. Bush², and J. R. Strickland¹, ¹USDA-ARS, FAPRU, Lexington, KY, ²University of Kentucky, Lexington.

Endophyte-infected (*Neotyphodium coenophialum*) tall fescue (*Lolium arundinaceum*) produces alkaloids that have been associated with peripheral vasoconstriction in grazing animals and ingestion of these alkaloids may effect splanchnic vasculature. Because of significant differences in morphological and functional characteristics between vasculature supporting digestive and peripheral tissues, the implementation of a bovine foregut vascular model required validation. Experiments were conducted, using dose-responses to norepinephrine (NE) and serotonin (5HT), to evaluate the responses of vessels equilibrated at different tensions and determination of a reference compound. Segments of a branch of right ruminal artery and vein were collected from the ventral coronary groove of healthy mixed breed and gender cattle (n=7) at local abattoirs. Tissues were placed in Krebs-Henseleit buffer and kept on ice until they were trimmed of excess fat and connective tissue, sliced into 2-3 mm sections and suspended on luminal supports in a chamber of a multi-myograph containing continuously oxygenated Krebs-Henseleit buffer (95% O₂/5% CO₂; pH=7.4; 37°C). Vessels were allowed to equilibrate at either 0.5 or 1.0 g of tension for 1.5 h prior to additions of either NE or 5HT. Increasing doses of each compound were administered in 15-min intervals following buffer replacement. Data were normalized as a percent of contractile response induced by the maximal dose (1×10⁻⁴ M) of NE or 5HT for each tension. Ruminal artery and vein both contracted in a dose-dependent manner (P<0.05) to both NE and 5HT treatments. Tension did not affect contractile response of the vein, but 0.5 g tension resulted in a greater arterial response (P<0.05) than 1.0 g. Contractile response to NE was greater than 5HT for both the artery and the vein (P<0.05). These results enable future experiments to separate the effects tall fescue alkaloids have on both the right ruminal artery and vein as representative vessels that support tissues functioning in nutrient absorption.

Key Words: bovine, ruminal artery and vein, tall fescue

M258 Effects of a commercial product containing *Morinda citrifolia* extract on growth performance and health of calves with a high risk of developing bovine respiratory disease. M. S. Brown*¹, R. Godbee², B. Coufal¹, C. L. Maxwell¹, J. O. Wallace¹, and C. H. Ponce¹, ¹Feedlot Research Group, West Texas A&M University, Canyon, ²Morinda Agriculture, Provo, UT.

Continuing development of technologies to improve health and performance of high-risk calves are needed to improve beef production efficiency. Crossbred male calves (n = 139, initial weight = 222 kg) were purchased at auction barns in the Southeast US and used in a 45-day pilot receiving study to evaluate the influence of a product containing *Morinda citrifolia* extract (MorindaMax, Morinda Agriculture, Provo, UT) on growth performance and health. Treatments included a basal 65% concentrate diet based on steam-flaked corn that was supplemented with a top dress of 0 or 0.55 g of MorindaMax/kg of BW from days 1 through 10 and days 28 through 32. Calves were processed on arrival, including metaphylaxis with ceftiofur crystalline free acid and castration by knife (91% bulls on arrival), and randomized to pens (5 pens/treatment, 13 to 14 cattle/pen). Calves fed *Morinda citrifolia* extract consumed more feed (P = 0.01; 10.2%) and gained weight more rapidly (P = 0.09; 22.9%) during the first 28 d than calves fed the control treatment, but feed efficiency did not differ (P = 0.32). The improvement in performance was associated with a tendency (P = 0.14) for fewer calves to be treated for respiratory disease during the first 28 d (20.5% and 10.0% for 0 and 0.55 g/kg). Overall DMI was also greater (P = 0.03; 6.1%) for calves fed *Morinda citrifolia* extract than for calves fed the control treatment. However, overall ADG and feed efficiency were not influenced by treatment (P > 0.31). Over the entire trial, the number of calves treated once and the total number treated for respiratory disease did not differ (P > 0.66) among treatments. Feeding *Morinda citrifolia* extract tended (P = 0.17) to reduce mortality over the entire trial (7.4% and 1.4% for 0 and 0.55 g/kg), perhaps due to the numeric reduction in the number of cattle retreated for respiratory disease during the first 28 d. *Morinda citrifolia* extract fed at 0.55 g/kg of BW for days 1 through 10 and days 28 through 32 increased feed intake and tended to reduce death loss in high-risk calves.

Key Words: morbidity, growth performance, plant extract

Ruminant Nutrition: By-product Feeds

M259 Nature of fermentation in stored wet distillers grains. A. R. Geis*, P. J. Kononoff, A. M. Gehman, and C. S. Heine, *University of Nebraska, Lincoln.*

Wet distillers grains are commonly stored in polyethylene silo bags until needed for feeding. The preservation of this feed is different from traditional methods of forage preservation through ensiling because the amount of fermentable carbohydrate is limited. The objective of this experiment was to evaluate the nature of ensiling wet distillers grains (WDGS) alone or in combination with other feeds. A 3 x 3 x 4 factorial experiment was conducted in which three loads of distillers grains were co-ensiled with three feeds (corn silage, ground corn, and brome hay) at four levels (0, 50, 75, 100% DM). Approximately 2.4 L of each mix was vacuum-sealed in plastic bags measuring 35 x 40cm. Following a 60-d storage period, a water extraction was used to determine pH, lactic acid, butyrate, and ammonia levels as potential indicators of fermentation. The addition of feeds to WDGS increased (P < 0.01) the pH of stored material. Specifically, when mixed with WDGS at 0, 50, 75 and 100% DM, the pH of corn was 3.78, 4.58, 4.99, 6.29 ± 0.19, 3.86, 4.0, 4.31, 6.42 ± 0.19 for hay, and 3.80, 3.75, 3.93, 4.13 ± 0.19 for corn silage.

Small but significant (P < 0.01) reductions in both butyrate and ammonia were observed when the proportion of ground corn and hay increased. As corn inclusion increased, butyrate decreased from 0.62 to 0.05 ± 0.12% DM and ammonia decreased from 0.15 to 0.002 ± 0.03% DM. As hay inclusion increased, butyrate was reduced from 0.58 to 0.07 ± 0.12% DM and ammonia was reduced from 0.14 to 0.008 ± 0.03% DM. Mixes with corn silage resulted in a reduction (P < 0.01) in butyrate from 0.6 to 0.14 ± 0.12% DM when the percent of silage increased. The addition of corn silage did not decrease ammonia, which averaged 0.20 ± 0.03% DM across levels. These results suggest the low pH of WDGS limits fermentation activity in stored WDGS, but the inclusion of other feeds increases pH. In addition, the low pH, butyrate, and ammonia suggest fermentation by clostridia was limited.

Key Words: wet distillers grains, fermentation, pH

M260 The effect of ensilage storage duration and proportion of wet distillers grains and straw on in situ dry matter disappearance. K.