W170 Factors affecting pregnancy rate of recipient mares to embryo transfer. L. D. Wallace*, K. J. Stutts, and D. W. Ricks, *Sam Houston State University*, *Huntsville, TX*.

The objective of this study was to determine the effects of age of mare and degree of asynchrony between donor and recipient on pregnancy rate (PR) to embryo transfer in recipient mares. Light-horse mares (n = 34) between 3 and 16 yr of age were used as recipients. Mares were subjected to an artificial photoperiod. Cyclic recipients were examined by palpation and ultrasound at regular intervals and daily during estrus. Reproductive tracts of recipients were examined for follicular activity, ovulation, presence of a corpus luteum, uterine edema, and fluid in the uterine lumen. When necessary, ovulation was hastened by administration of hCG. Fresh, cooled, or frozen semen from various stallions was used to inseminate donors. Embryos were recovered 7 to 8 d after ovulation by non-surgical uterine lavage. Embryos were transferred non-surgically to recipient mares between 5 and 9 d post ovulation. Recipients were examined for pregnancy by ultrasound on d 25 and 110. PR was analyzed by chi-squared analysis using the frequency procedure. Pearson correlation coefficients were used to determine the relationship between PR and level of asynchrony. Age of recipient had a significant effect on PR to embryo transfer. Mares age 3–9 yr (76.0%) had a higher ($P < 0.02$) PR at d 25 of pregnancy than mares age 10–16 yr (33.3%). Mares age 3–9 yr also had a numerically higher PR at d 110; however this difference was not significant. A negative relationship ($P < 0.03$) existed between asynchrony and PR at d 25 ($r = -0.51$) and d 100 ($r = -0.39$) indicating a decrease in pregnancy rate as asynchrony between the estrous cycle of the donor and the recipient increased in terms of days. Level of asynchrony ranged from 0 to 6 d. Results of this study indicate that PR to embryo transfer is lower in older recipient mares (age 10–16 yr) compared with younger mares (age 3–9 yr) and PR is decreased as asynchrony between the donor and recipient increases from 0 to 6 d.

Key Words: equine, embryo transfer, recipients

W171 Growth models for horses differ based on date of birth. A. L. Graeff* and W. B. Staniar, *The Pennsylvania State University*, *University Park*.

Understanding growth patterns may be critical in balancing the economic and perceived athletic benefits of large size against the associated risk of skeletal abnormalities. Thoroughbred growth data indicate that models of growth should be different depending on the time of year an animal is born. Our objective was to compare parameter estimates of a sigmoidal (Richards) growth model fit to a large database of Thoroughbred weight and wither height measurements. Data for this study consisted of 35,285 weight measurements and 26,063 height measurements from 2,184 horses. Data were collected from 1977 to 2007 on farms located in the United Kingdom, Ireland, and the United States. Data were divided into consecutive 30 d periods approximating month of birth as January (J30), February (F60), March (M90), April (A120) and May (M150). Growth curves were fit to each data set using a nonlinear mixed model with fixed effects associated with the main parameters (A, b, k, M), and random effects associated with individual horses added to the A and M parameters. Differences in parameter estimates between data sets were evaluated by ANOVA with Bonferroni corrected multiple comparisons and considered significant at $P < 0.05$. There were differences in parameter estimates between all 5 data sets defining specific growth curves for each. Most striking were differences in the b, k, and M parameters, each representing shape characteristics of the growth curve over time. An overall representation of these may be described as a sequential change moving from relatively slow early and moderate later growth in the J30 and F60 to rapid early and slow later growth in the M150. The M90 and A120 data sets were intermediate. Little emphasis should be placed on the A parameter as it represents mature size and 99% of the data for this study is from horses < 4 years of age. The growth models developed in this study confirm the influence of month of birth on growth patterns demonstrated in previous Thoroughbred growth studies. Further, these models of growth will be useful in investigating hypotheses related to the impact of the environment, and more specifically management on modifying equine growth.

Key Words: equine, growth model, Thoroughbred

W172 The impact of molasses-based blocks versus sweet feed on blood glucose in horses. C. D. Gunkel*, J. S. Drouillard, L. W. Murray, and T. L. Slough, *Kansas State University*, *Manhattan*.

This study compared circulating blood glucose concentrations (GLC) in horses fed molasses-based blocks or a textured sweet feed. Six 4-yr-old Quarter horse geldings (488 ± 20 kg BW) equipped with continuous glucose monitors (Dexcom, San Diego, CA) were used in a switch back experiment conducted over 2 6-d periods with a 4-d washout phase between periods. Treatments consisted of a sweet feed concentrate (SF) fed twice daily or ad libitum access to a molasses-based block (BL) supplement. Long-stemmed prairie hay and salt blocks were offered ad libitum. SF was fed at 700 and 1400 h, gradually increasing meal size to 0.82-kg over the first 3 feedings. Motion-sensing cameras were placed above each block feeder, generating time-stamped photographs to document time and duration of BL usage. Horses consumed 1.2 kg/d of BL and had GLC of 75.4 ± 2.3 mg/dL. Horses consumed 1.46 kg/d SF and had mean GLC of 53.4 ± 4.2 mg/dL. In the BL group, daily min to max GLC values varied by 74.2 mg/dL, while the SF group varied by 86.7 mg/dL. Technical difficulties with glucose monitors resulted in large blocks of missing data for 2 animals, so 4 of 6 animals were modeled. The ARIMA procedure of SAS Version 9.1 was used to examine cross-correlations between min spent at BL and GLC per 15-min period, providing information on the delay between BL intake and glucose appearance in blood. No significant correlation was detected in one horse, while 3 horses showed significant correlation ($P \leq 0.05$). Lag patterns varied from an instantaneous effect to delays of 15 min to 4.5 h. The ARIMA procedure was used to obtain a Box-Jenkins model of GLC measurements and GLC per 15-min period with a SEM that accounted for serial correlation (non-independence) among GLC readings over time, and a 95% confidence interval was calculated. Mean, min, and max GLC values and SEM were highly variable among horses, thus no significant treatment effects were detected.

Key Words: low-moisture block, glucose, molasses

W173 Short-term selenium depletion and oxidative stress in the horse. M. Brummer*, S. H. Hayes, J. E. Earing, S. M. McCown, and L. M. Lawrence, *University of Kentucky*, *Lexington*.

Various compounds such as vitamin A, E and C, catalase, superoxide dismutase and the seleno-enzyme, glutathione peroxidase (GSH-Px) contribute to the total antioxidant capacity (TAC) of the body. Our objec-

tive was to investigate the relationship between Se status and indicators of antioxidant defense and oxidative damage in adult, idle horses. We hypothesized that low Se status would result in lower TAC and more oxidative damage. Serum malondialdehyde (MDA) concentration was used as indicator of oxidative damage. Twenty 4 mature horses were kept on low Se pasture (0.04 ppm Se; DM) with access to salt. Sixteen of these horses received no supplementation (P), while 8 horses (PC) received 1.8 kg concentrate per day (0.3 ppm Se; DM). Blood samples were obtained from all horses after 4 mo on their respective diets. Data were analyzed using the PROC CORR and PROC TTEST procedures of SAS 9.1. Serum Se concentration ranged from 69 – 193 ng/mL and were higher for horses in PC ($P < 0.0001$). A serum Se concentration above 130 ng/mL is indicative of adequate Se status. All horses in P had serum Se concentration below 130 ng/ml and were considered to have low Se status. Serum GSH-Px activity was not correlated with serum Se and no difference existed between P and PC. TAC was not correlated with serum Se or serum GSH-Px activity and did not differ between P (mean ± SE; 1.011 ± 0.43 m*M* Trolox equivalents) and PC (0.981 ± 0.45 m*M* Trolox equivalents). No correlation was found between MDA concentration and serum GSH-Px activity or serum Se concentration. A trend existed ($P = 0.078$) for higher MDA concentration in PC (28.89 ± 0.041 μMol MDA) than P (27.59 ± 0.021 μMol MDA). It has been suggested that GSH-Px may play a small role in the total cellular antioxidant system, and based on these results, the same may be true for the extracellular total antioxidant system. In addition Se status did not affect the measure of oxidative damage used in this study, possibly because the horses were not challenged by an oxidative stressor such as exercise or infection.

Key Words: glutathione peroxidase, TBARS, antioxidant

W174 In vivo digestibility and mean retention time estimates of young and mature horses receiving the same diet. J. E. Earing*, S. H. Hayes, M. Brummer, S. M. McCown, A. G. Parks, and L. M. Lawrence, *University of Kentucky*, *Lexington*.

Forages are important sources of nutrients for mature horses, however little research has been conducted to evaluate fiber utilization in young, growing horses. This study compared in vivo digestibility and mean retention time (MRT) estimates in yearling and mature horses fed the same diet. Six yearling colts and 6 mature geldings (average age, 14 y) were used. Horses received a 75%:25% forage: concentrate diet consisting of timothy cubes (9.8% CP, 63.7% NDF, 38.0% ADF), sweet feed (20.9% CP, 19.7% NDF, 9.7% ADF), and supplement pellet (35.0% CP, 13.5% NDF, 7.9% ADF). Yearlings and geldings were offered the same amount of feed on a metabolic body weight (MBW; $BW^{0.75}$) basis. All animals were dosed with Yb-labeled hay and CoEDTA. Feces were collected in a collection harness every 4 h for 3 d. Each 4 h subsample was analyzed for Yb and Co content. The remaining fecal material was compiled daily by horse; a subsample was retained for dry matter digestibility (DMD), NDF digestibility (NDFD), and organic matter digestibility (OMD) analysis. The MRT was estimated using the equation of Blaxter et al. (1956). The effect of age on digestibility and passage was determined using Proc GLM of SAS; each pair of animals was treated as a block. Feed refusals were minimal and marker dose was completely consumed. Feed intake (as % MBW) was similar between the yearlings and geldings. Mean in vivo DMD, NDFD, and OMD were 62.7% and 55.6% ($P = 0.019$), 47.7% and 36.9% ($P = 0.014$), 65.6% and 57.6% ($P = 0.031$) for the yearlings and geldings, respectively. The MRT of the fluid phase of digesta was 23.5 h for the yearlings and 21.4 h for the geldings ($P = 0.149$). The MRT of the particulate phase was 26.2 h and 22.7 h for the yearlings and geldings, respectively ($P = 0.019$). Yearlings in this experiment were better able to digest the forage-based diet than the geldings. This difference may be due to the longer MRT for the particulate phase in the yearlings and may be a biological mechanism which allows for increased nutrient digestion during growth.

Key Words: yearlings, markers, passage rate

W175 Effect of grazing fall pasture on indicators of hindgut pH and fermentation characteristics in horses. A. C. Pearson, P. D. Siciliano*, S. J. McLeod, and V. Fellner, *North Carolina State University*, *Raleigh*.

Six stock-type geldings ranging in age from 5 to 8 yr and weighing 553 ± 37 kg (mean ± SD) were used in a completely randomized 2-period switch-back design to determine the effect of grazing fall pasture having moderate non-structural carbohydrate concentration (NSC; 11.3 ± 1.4%), or fed hay made from the same pasture having lower NSC concentration (6.8%), on parameters reflecting hindgut pH and fermentation characteristics. Horses were initially assigned to one of 2 dietary treatments: pasture fed (PF; n = 3) or hay fed (HF; n = 3). The PF horses had access to tall fescue pasture from 1300 to 700 the following day, followed by stall confinement from 700 to 1300 each day for 14 d. The HF horses were fed tall fescue hay at a rate of 2% of body weight (as-fed) one time per d at 1300 each day for 14 d. Following the first 14-d period treatments were switched for an additional 14 d period so that all horses receive all treatments. At 700 on d-7 of each period pH was measured in feces of individual horses and individual batch cultures using each horse's fresh feces as inoculum and alfalfa meal as substrate were performed. Acetate, propionate and butyrate concentrations were measured in culture media following 48 h of incubation. Differences in response variables between treatments within horses were analyzed using a paired *t*-test and results are expressed as the mean of differences between treatments within horses (±SE). Fecal pH was 0.30 ± 0.14 pH units lower ($P = 0.042$) when horses consumed pasture compared with hay. Batch culture media acetate and butyrate concentration, expressed as a molar percent, did not differ between treatments. Batch culture media propionate concentration decreased ($P = 0.002$) by 5.1 ± 1.1 molar % and the acetate:propionate ratio increased ($P = 0.02$) by 0.55 ± 0.21 when horses were fed pasture compared with hay. These results suggest pasture containing moderate amounts of NSC can alter indicators of hindgut pH and some fermentation characteristics. The implications of these findings on hindgut health requires further investigation.

Key Words: horse, non-structural carbohydrates, pasture

W176 Summary of equine pastures utilizing a line point transect to measure vegetative cover to reduce sediment and nutrient losses, enhancing pasture quality. A. Swinker*[1], D. Foulk[1], J. Malot[2], S. Truax[2], J. Weld[1], and M. Harper[1], [1]*Pennsylvania State University*, [2]*USDA Natural Resources Conservation Service, Harrisburg, PA*.

Twenty horse farms representative of the industry (7 to 99 horses) from Pennsylvania, northern Virginia and Maryland were surveyed. Farm surveys were conducted to quantify equine pasture quality, to analyze the pasture conditions under the management systems and the "efficiency" of those practices. Data were recorded using an Excel spread sheet; SPSS was used to determine frequencies. Existing pasture condition tools used for conservation and sediment loads were evaluated. None of the surveyed horse farms utilized an intensive grazing system, 2 (10%) of the farms used a pasture grazing system that grazed 24 h 7 d /week and were overstocked; 80% of the farms limited grazing or restricted the horse's grazing times. Only 3 farms rested pastures for at least 2 weeks before re-grazing. Equine pasture data were obtained using the

"Line Point Transect" and "Pasture Condition Scoring" methods. Percent vegetative canopy cover, % basal stem cover, % pasture forage, % forage canopy, number of forage species and the Pasture Condition Score were recorded. Overall, surveyed farms averaged 87% canopy cover (range 53–100%), 45% basal stem cover (69–21%), 56% good quality forage (89–11%), 63% canopy from good forage (97–13%), 19 plant species including weeds (range 35–12), 5 forage species (7–2) and averaged 25.5 on Pasture Condition Score with a range of 5–40. Past studies report soil loss reduction will be greater if the initial canopy cover is less than 70%. One of the surveyed farm's pastures contained 53% cover; this contributed to a loss of 30 tons of sediment per hectare per year; a second farm with a 75% canopy had a 10-ton loss; and there were 7 farms with percent canopy in the 80s resulting in a 5-ton loss. The remaining 9 farms had over 90% vegetative canopy. Eighty percent of the surveyed horse farms maintained acceptable vegetative cover of desirable and weed species reducing nutrient and sediment loss. More strategies are needed to preserve vegetative cover to enhance pasture quality and help to reduce sediment and nutrient loss.

Key Words: equine pasture, condition, sediment loss

W177 Segregation of AB_098561: c.1470G>A SNP of the serotonin transporter gene (*SLC6A4*) in Mangalarga Brazilian horses. L. Arneiro*[1,2], M. Mota[1,2], and R. Curi[2], [1]*Universida Estadual Paulista*, *Jaboticabal, São Paulo, Brasil*, [2]*Universidade Estadual Paulista*, *Botucatu, São Paulo, Brasil*.

In equines (*Equus caballus*), behavioral changes are important because of the uses of these animals in different modalities such as jumping, running, dressage, etc. It is considered that the gene coder of serotonin transporter has influence on behavioral traits in animals, controlling the serotonin reabsortion in the synaptic gaps. The aim of this study was to evaluate the segregation of SNP AB_098561: c.1470G > A of gene SLC6A4 in a representative sample of Mangalarga bred in São Paulo state. The idea was to determine if there is application potential of the association studies between molecular markers and economic interest traits for this breed. Thus, 151 animals of both sexes were genotyped by PCR-RFLP from the amplification of 359-bp gene fragment and digestion with *Hha*I restriction enzyme. Using PopGene 1.32 program, allele frequencies (0.079 for the A allele and 0.921 for the G allele), chi-squared (1.075), observed (0.159) and expected heterozygosity (0.147), Shannon gene diversity index (0.277), fixation index F (−0.086) and Ewens-Watterson selective neutrality (0.853), were estimated. From the results it was concluded that the studied population is in Hardy Weinberg equilibrium for the locus in question, showing the absence of selection in favor of one allele. However, the observed value for the selective neutrality test is near the superior limit (0,99), not excluding the possibility of using the marker in association studies with behavioral traits. However, it must be emphasized that due to the extremely low frequency of allele A, studies involving a larger sample of animals should be done.

Financial support: Fundunesp and CNPq

Key Words: equine, gene, serotonin

W178 The use of equine blood parameters to identify chronic exposure to feed-borne *Fusarium* mycotoxins: A field study. M. Mortson*, C. K. Girish, and T. K. Smith, *University of Guelph*, *Guelph, Ontario, Canada*.

Feed-borne mycotoxins consumed at low levels over an extended period of time may have an effect on equine performance and breeding ability and may potentially cause immunosuppression. An equine biomarker that indicates an exposure to a wide range of *Fusarium* mycotoxins including deoxynivalenol (DON, vomitoxin), zearalenone, and T-2 toxin has not yet been identified. A field study was conducted to identify a potential biomarker in equine blood that reflects chronic exposure to low levels of feed-borne *Fusarium* mycotoxins. This was done by identifying any correlation between serum gamma-glutamyltransferase (GGT), urea, and immunoglobulin A (IgA), and the presence of naturally occurring *Fusarium* mycotoxins in forages and concentrates. A total of 30 horses from 18 Ontario horse farms and 1 New Jersey horse farm participated in the study. Blood samples were collected from each horse as well as a sample of hay and concentrate. Serum GGT, urea, and IgA were measured and a correlation analysis was completed. Mycotoxin concentrations were determined by a combination of HPLC and GC/MS methodology. DON was present in feed samples collected at 18 farms with an average concentration of 0.48 mg/kg. The range was from 0.13 mg/kg to 1.5 mg/kg. 15-acetyl DON was the second most prevalent *Fusarium* mycotoxin in feed samples (n = 6) followed by zearalenone (n = 5). No significant correlations were identified between the concentrations of *Fusarium* mycotoxins in the samples collected and the equine blood parameters analyzed. It can be concluded that feed-borne mycotoxins are present in many horse feeds on farms in Eastern North America. Biomarkers for chronic *Fusarium* mycotoxicoses, however, remain to be identified.

Key Words: *Fusarium*, mycotoxins, equine

W179 Influence of velocity on stride variables of the Wilbur-Cruce Mission horse intermediate gait. M. Nicodemus*[1] and J. Beranger[2], [1]*Mississippi State University*, *Mississippi State,* [2]*American Livestock Breeds Conservancy*, *Pittsboro, NC*.

Wilbur-Cruce Mission horse (WCM) is a strain of Spanish Colonial horse that originated from the Arizona mountains. Due to the breed's sure-footedness, the WCM is assumed to be gaited like other Spanish Colonial breeds. Study objectives were to determine the relationship between trotting velocities and the WCM stride variables and whether at trotting velocities the WCM can perform a 4-beat stepping gait. Nine WCM were worked from the ground along the arena railing at both a slow (3.0 ± 0.3 m/s) and fast (4.7 ± 0.4 m/s) trotting velocity. Horses were filmed along the long side of the arena. Frame-by-frame analysis was performed documenting hoof contact and lift-off for 10 strides for both velocities. Stride variables were given as a % of stride duration. Student's paired *t*-tests were performed to determine gait symmetry and differences between stride variables at the slow and fast velocity ($P < 0.05$). Stance durations between left and right variables were not significantly different indicating gait symmetry, and thus, left and right stride variables were collapsed ($P < 0.05$). At the fast velocity the WCM performed a shorter stride duration and suspension, while demonstrating a longer stride length and diagonal bipedal support ($P < 0.05$, Table 1). Stance durations, stride rate, and diagonal advanced placement (DAP) and completion (DAC) remained consistent between velocities. While other Spanish Colonial horses were found to perform 4-beat stepping gaits at similar velocities, the WCM performed at both velocities a trot. Although similarities can be found between this study and other trotting studies, velocity changes for the WCM, unlike that of other trotting studies, did not impact stance durations, DAP, and DAC. With less than 100 horses representing the breed, these stride variables can be applied in distinguishing the WCM from other Spanish Colonial breeds and assist in further breed development.

Table 1. Means ± SD for WCM stride variables at a slow and fast trotting velocity

	Slow Velocity	Fast Velocity
Stride Duration (ms)	783 ± 25[a]	689 ± 26[a]
Stride Length (m)	2.3 ± 0.2[b]	3.2 ± 0.2[b]
Stride Rate (strides/s)	1.3 ± 0.1	1.4 ± 0.1
Fore Stance (%)	43 ± 3	42 ± 3
Hind Stance (%)	43 ± 3	42 ± 3
DAP (%)	0 ± 0	0 ± 0
DAC (%)	0 ± 0	0 ± 0
Diagonal Bipedal Support (%)	85 ± 1[c]	83 ± 1[c]
Suspension (%)	15 ± 1[d]	17 ± 1[d]

Similar superscripts indicate significant differences ($P < 0.05$) between velocities.

Key Words: Spanish Colonial horse, stride variables

W180 Nutraceutical extracts affect oxidative stress and antioxidant status in intensely exercising horses. D. Smarsh*, N. Liburt, J. Streltsova, K. McKeever, and C. Williams, *Rutgers, The State University of New Jersey*, *New Brunswick*.

Many nutraceuticals are used as equine supplements without their efficacy having been scientifically tested. Black tea, cranberries, orange peel and ginger are a few of those nutraceuticals that warrant further study. The objective of this study was to test the effects of single doses of black tea, cranberry, orange peel and ginger extract on markers of oxidative stress and antioxidant status following exercise in horses. Study 1: Nine mature, healthy unfit Standardbred mares were administered 2 L of either placebo (water; W), orange peel extract (O; 30g extract), or decaffeinated black tea extract (T; 28g extract). Study 2: the same mares were administered 2 L of either placebo (water; W), cranberry extract (C; 30g extract), or ginger extract (G; 30g extract). In each study mares were given the extracts via nasogastric tube 1 h before performing a graded exercise test (GXT), in a randomized crossover design with at least 7 d between GXTs. Blood samples were collected at rest, at fatigue, 1, and 24-h post-exercise and analyzed for lipid hydroperoxides (LPO), total glutathione (GSH-T), glutathione peroxidase (GPx), α-tocopherol (TOC), β-carotene (BC), and retinol. Data was statistically analyzed using a repeated measures ANOVA. Study 1: There was no effect ($P > 0.05$) of treatment for LPO, GSH-T, GPx, TOC or BC. Retinol was higher for both T ($P = 0.0006$) and W ($P = 0.004$) than for O. Study 2: There was no treatment effect ($P > 0.05$) for LPO, GPx, GSH-T, RET, BC or TOC. These results show that a single dose of black tea may be beneficial in increasing antioxidant status in exercising horses, however, effects on oxidative stress were not found with any of the nutraceuticals. Further investigation is needed as to whether long-term supplementation would enhance these effects.

Key Words: antioxidant, black tea, equine

W181 Whole farm balance of nitrogen and phosphorus on horse farms in the Chesapeake Bay watershed. M. T. Harper*, A. Swinker, and K. B. Kephart, *Pennsylvania State University*, *University Park*.

Whole farm nutrient balances of inputs and outputs can be used to assess the risk of non-point source pollution and identify pollution reduction strategies. Many nutrient balance studies have been conducted on livestock and poultry farms. To our knowledge this is the first study to characterize nitrogen (N) and phosphorus (P) balance on horse farms. Nitrogen and P inputs and outputs on 13 horse farms in the Chesapeake Bay watershed were estimated to determine the risk of non-point source pollution. Annual amounts of imported fertilizer, hay, concentrate, and bedding were recorded for each of the farms based on estimates reported by farm managers. Samples of hay, concentrate, and bedding from each farm were analyzed for N and P. Small square bales were weighed and multiplied by the number of bales received. Bedding volumes were multiplied by respective nutrient concentrations to estimate mass values. Manure nutrient exports but not the sale of horses were included in the calculation of nutrient output. Four of the 13 farms did not export manure. Four farms exported a portion of their manure estimated by the farm owner. Five farms exported all collected manure which was estimated to be (24 kg/d/head) × (% time in a stall). Nutrient exports were estimated by multiplying the manure amount by the analyzed nutrient value of the composite manure samples or fecal samples from each farm. The mean farm balance ((import-export/import) × 100) of N and P for all farms was 75 ± 7.9% and 52 ± 17%, for farms exporting some manure was 87 ± 11% and 80 ± 17%, and for farms exporting all manure was 46 ± 6.8% and −8 ± 23.3%, respectively. The overall mean balance per animal unit was 42.8 ± 6.7 kg for N and 7.3 ± 2.7 kg for P. The overall mean balance per hectare was 118.7 ± 21.7 kg for N and 17.2 ± 5.7 kg for P. No farms achieved N balance. Only farms exporting all collected manure were able to be in P balance. Manure must be exported and/or fewer nutrients must be imported to approach nutrient balance. It appears that to achieve whole farm nutrient balance, horse operations must export a large proportion of the manure generated by the farm.

Key Words: nitrogen and phosphorus, horse, nutrient balance

W182 Effect of dietary energy manipulation on mares and their foals: Foaling parameters. K. N. Winsco[1], J. L. Lucia*[1], C. J. Hammer[2,3], and J. A. Coverdale[1], [1]*Department of Animal Science, Texas A&M University*, *College Station,* [2]*Department of Animal Sciences, North Dakota State University*, *Fargo,* [3]*Center for Nutrition and Pregnancy*, *Fargo, ND*.

To determine the effect of dietary DE manipulation on foaling parameters, 30 Quarter Horse mares (538 to 695 kg of BW and 4 to 19 yrs of age) were blocked by expected foaling date. All mares were allowed ad libitum access to coastal bermudagrass pasture and randomly assigned within block to 1 of 2 dietary treatments: pasture (P) or pasture + concentrate (PC; concentrate fed at 0.75% BW on an as-fed basis). Dietary treatments began 110 d before expected foaling date and were terminated at parturition. When parturition was observed, the following foaling parameters were recorded: time of water break to birth, time to stand, and time of birth to placenta expulsion. Total length of gestation was calculated and placenta weight was recorded. Additionally, total volume, specific gravity, and Brix % of colostrum were measured. Physical measurements were also obtained which included mare BW, foal BW, foal wither and hip height, and foal body length. All data were analyzed using PROC GLM of SAS. There was no influence of dietary treatment on foaling parameters; however, time from birth to placenta expulsion tended ($P = 0.06$) to be longer in P mares. There was also no effect of treatment ($P \geq 0.46$) on foal physical measurements obtained following parturition, although foals from P mares tended ($P = 0.06$) to exhibit greater hip height compared with foals from PC mares. Ratio of placenta to mare BW, placenta to foal BW, and the ratio of foal BW to mare BW were not affected by treatment ($P \geq 0.16$). There was no influence of dietary treatment on total colostrum volume ($P \geq 0.56$). There was an influence of DE manipulation on colostrum quality indicated by greater specific gravity and refractometer values (Brix %; $P \leq 0.01$) in P mares compared with PC. In summary, these data indicate that dietary

DE manipulation of mares in late gestation affects colostrum quality, but not volume. Furthermore, maternal DE manipulation did not influence foaling parameters or foal physical characteristics.

Key Words: mares, energy, foaling

W183 Comparison of a commercially available glucometer to a standardized laboratory method for glucose analysis in healthy horses. K. O'Diam*[1], J. Sylvester[2], and K. Cole[1], [1]*The Ohio State University*, *Columbus*, [2]*MARS Horsecare US, Inc.*, *Dalton, OH*.

Extremes in blood glucose concentrations can be detrimental to a horse's health. Elevated blood glucose and insulin levels for extended periods of time are associated with equine metabolic syndrome and laminitis while decreased blood glucose concentrations may result in seizures. The ability to quickly and accurately determine blood glucose levels in the field can facilitate important management decisions. Blood samples (n = 432) obtained from 6 healthy horses for use in a separate study were used to determine the accuracy of a commercially available hand-held point-of-care (POC) glucometer in comparison to a standard laboratory method for glucose analysis. Blood samples were collected via jugular catheter into heparinized tubes and 0.6 μL of whole blood was immediately analyzed by a POC glucometer (POC/WB). Plasma was separated by centrifugation and analyzed using an automated biochemistry analyzer (CHEM). In addition, plasma glucose concentrations were also determined using the POC glucometer (POC/PL), although the POC glucometer was designed for use with whole blood. Statistical analyses were performed on paired data using correlation and mixed procedures of SAS. Overall, mean glucose concentrations determined by POC/PL, CHEM and POC/WB were 101.4mg/dL, 97.0 mg/dL and 95.5 mg/dL, respectively. Both POC/PL and POC/WB were positively correlated with the standard laboratory method (CHEM; r = 0.78 and 0.73, respectively; $P < 0.0001$). A positive correlation was also observed, to a lesser extent, between POC glucometry using whole blood (POC/WB) and plasma (POC/PL; r = 0.59; $P < 0.0001$). These data suggest that hand-held POC glucometers may be useful in the field for determining blood glucose levels in horses.

Key Words: glucose, glucometer, horse