

and September (hot season) were used in a randomized design experiment, and received similar treatments as in experiment 1 (GnRH-A, n=70; and control, n=62). In experiment 1, farrowing was between March and June. GnRH-A application had no effect on the number of total piglets born (11.35 vs. 11.44) or the number of liveborn piglets (10.73 vs. 10.78). Fertility was similar (P>0.10) across treatments (90% vs. 85.71%). In experiment 2, farrowing was between October and January. GnRH-A injection had no effect (P>0.10) on the num-

ber of total piglets born (11.25 vs 11.20) or number liveborn (10.14 vs 10.22). Fertility of gilts receiving GnRH-A (91.43%, 64/70) and control gilts (85.48%, 53/62) was not different (P>0.10). It is concluded that injection of GnRH-A at service time does not affect the reproductive performance of gilts.

Key Words: GnRH, Reproduction, Gilts

ASAS Horse Species

1889 Temporal variables of the flat walk of the Tennessee Walking Horse weanling. K.M. Holt*¹ and M.C. Nicodemus¹, ¹Mississippi State University, Mississippi State, MS/USA.

Limited research has been done on gaited horses, particularly concerning gaited weanlings. During the first few years, proper gait development for the gaited horse is very critical. This study describes the stride variables of the flat walk for 4 Tennessee Walking Horse weanlings. Frame-by-frame analysis was done to measure the following stride variables: stride duration, fore and hind stance durations, diagonal and lateral step intervals, and percentage of limb support. Four strides of a natural, consistent flat walk were measured for each weanling. The flat walk was determined to be a symmetrical, four-beat stepping gait that alternated between periods of tripedal and bipedal limb support. The majority of the stride was spent in a stance phase with a similar percent of stance for both the fore and hind limbs. Weanlings 3 and 4 had a longer diagonal than lateral step interval and longer lateral than diagonal bipedal support indicating these gaits had an irregular rhythm with lateral couplets. Weanling 2 had the most even gait by demonstrating similar lateral and diagonal step intervals, lateral and diagonal bipedal supports and fore and hind stance durations. These stride variables will assist in the better understanding of how the gaits of the gaited horse develop with age. The temporal variables of these weanlings will be measured throughout aging and training to track the development of the flat walk.

Table 1. Mean values (SD) for the stride variables in the individual weanlings and group mean (SD) values.

	Wean- ling 1	Wean- ling 2	Wean- ling 3	Wean- ling 4	Ave.
Stride Duration (ms)	908(42)	1133(96)	1150(72)	1133(64)	1081(121)
Fore Stance (ms)	542(42)	696(40)	708(57)	688(61)	659(78)
Hind Stance (ms)	546(32)	696(59)	696(69)	708(64)	662(80)
Lateral Step Interval (ms)	425(35)	584(99)	392(43)	409(66)	453(79)
Diagonal Step Interval (ms)	464(62)	534(50)	742(97)	709(92)	613(92)
Lateral Bipedal Support (%)	35(4)	27(6)	43(6)	43(6)	37(8)
Diagonal Bipedal Support (%)	25(2)	27(3)	13(1)	11(3)	19(6)
Tripedal Support-2 Hind (%)	20(4)	23(1)	21(2)	25(3)	22(3)
Tripedal Support-2 Fore (%)	19(3)	23(5)	23(3)	21(6)	22(4)

Key Words: Gaited weanlings, Equine locomotion, Temporal variables

1890 In vitro fermentation characteristics of vegetative and mature grasses by equine fecal inoculum. H. S. Hussein*, H. Han, J. P. Tanner, and A. A. Cirelli, University of Nevada - Reno.

The objective of this study was to determine the effects of forage species and stage of maturity on digestibility of DM and OM and on VFA production after in vitro incubation of .5 g DM of each substrate with equine fecal inoculum. Three horses (replications) were maintained on a diet containing oat-alfalfa cubes (i.e., 70% alfalfa hay and 30% oat hay) and were used as donors of fecal inocula for the in vitro fermentation. In a completely randomized design, the treatments were arranged as a 4 × 2 × 4 factorial. The main factors were 4 forage species (bromegrass [BG; *Bromus inermis*], orchardgrass [OG; *Dactylis glomerata*], ryegrass [RG; *Lolium perenne*], and tall fescue [TF; *Festuca arundinacea*]), 2 stages of maturity (vegetative [V] or mature [M]), and 4 incubation times (i.e., 6, 12, 24, and 48 h). Interactions (P < .05) were only detected between forage species and stage of maturity for DM and OM digestibilities. Digestibility of DM (across incubation times) was highest (35.0%; P < .05) for OG-V and lowest (29.9%; P < .05) for RG-M. Digestibility of OM (across incubation times) was highest (41.0%; P < .05) for BG-V and lowest (33.3%; P < .05) for RG-M. With the exception of acetate, forage species had no effect (P > .05) on individual or total VFA concentrations. Acetate concentration was highest (9.32 mM; P < .05) for RG and lowest (8.03 mM; P < .05) for TF. Concentrations of acetate, propionate, butyrate, and total VFA were higher (P < .05) for vegetative (9.14, 2.64, .50, and 12.98 mM, respectively) than for mature (8.13, 2.25, .30, and 11.26 mM, respectively) forages. Evaluation of the 4 forage species indicated that OM digestibility was lowest (P < .05) for RG than for BG, OG, or TF (36.4, 39.8, 39.6, and 38.5%, respectively). The corresponding values for total VFA (12.7, 11.7, 12.7, and 11.5 mM, respectively), however, were not different (P > .05). Therefore, horses may be able to utilize BG, OG, and TF more efficiently than RG.

Key Words: Horses, Forages, In vitro digestibility

1891 Environmental factors affecting racing time in Brazilian Thoroughbred horses in Cristal hippodrome. Rodrigo Taveira* and Marcilio Mota, ^{Unesp}Universidade Estadual Paulista.

The aim was to study environmental factors that affect the racing time of Thoroughbred that won races in the classical calendar at the Cristal hippodrome, State of Rio Grande do Sul, Brazil. The data used in this study were provided by the Study Book from the Brazilian Association of Race Horse Breeders (ABCCC) and included 1139 finishing times from 420 animals that won 100 different kinds of races taken place from 1974 to 1998. The analyses of informations was carried out using the GLM procedure of the Statistical Analyses Systems (SAS, 1996). Race year (1974 to 1998), track condition, grade (5 levels), condition (sex and age combination) and distance (700 to 3000 meters) were the fixed effects considered in the linear model. The fastest time have been provided by the animals that was running on light turf and group I (the most important of the grades). There are not significative difference between the different kinds of sex and age combination and year of race. The quadratic regression of time on distance has shown decrease in average speed of 0.92 m/s, when racing distance goes from 1000 m (16.69 m/s) to 2000 m (15.77 m/s), and 0.49 m/s from 2000 m to 3000 m (15.28 m/s).

Key Words: Thoroughbred, Race, Time

1892 Environmental factors affecting the racing time of Quarter Horses in Brazil. Marcilio Mota and Rodrigo Taveira*, *Unesp Universidade Estadual Paulista*.

The aim of this paper was to study the environmental factors affecting the racing time of Quarter Horses which participated in races held in Sorocaba and Ribeirao Preto racetracks, Sao Paulo state, Brazil. The data consisted of 4684 performances evaluated based on the 1428 animals final time (630 females and 798 males) that have run from 1983 to 1997. The analytical methods involved the GLM procedure of the Statistical Analysis System, SAS (1996). Age of animals (2,3,4 e >4 Years), jockey's weight (44-62 Kg), race year (1983-1997), sex (male, female), origin (national, imported), racetracks (Sorocaba and Ribeirao Preto) and distance (301,320, 365,402 and 503 meters) were the fixed effects considered in the linear model. Racetrack and origin have presented no significative effects ($p>0.05$). Animal age equal or over 4 years old and

jockey's weight at 59 Kg were the fastest ($p<0.001$), while those at 2 years old and jockeys at 62 Kg have shown the worst performances. Males and females had no significant difference ($p>0.05$). The linear regression of the time on the race year has pointed out an animal decrease annual next to 0,16 second, about 2 seconds in the studied period. The decrease occurred, may be, in part, due to improvements in veterinary, nutritional and training features as well as gains obtained by selection. The quadratic regression of the time on distance ($y = -0,077 + 0,0617X - 11E-6X^2$) has shown that when the 402 and 301 distances (101 meters difference) have been compared, a 0,31 m/s increase in the animal speed has occurred (17,51 m/s and 17,2 m/s respectively). In the same way when 503 and 402 distances have been compared (also 101 m difference), a lightly higher increase in the 0,34 m/s speed has been observed.

Key Words: Quarter Horse, race, time

ASAS/ADSA Forages and Pastures: Grazing and Alternative Forages

1893 Growth performance of stocker calves backgrounded on sod-seeded winter annuals or hay and grain. K. P. Coffey^{*1}, W. K. Coblenz¹, T. G. Montgomery², J. D. Shockey², K. J. Bryant², P. B. Francis², and C. F. Rosenkrans, Jr.¹, ¹University of Arkansas, Fayetteville, AR, USA, ²Univ. of Ar. SE Research and Extension Center, Monticello, AR, USA.

Winter annual forages have the potential to provide a lower-cost, rapid-gain option for retaining ownership of fall-weaned calves. A study was conducted during the winters of 1998, 1999, and 2000 using 180 crossbred calves (261 kg BW) to compare winter backgrounding programs in southeastern Arkansas. Calves were fed bermudagrass hay (ad libitum) and a grain sorghum-based supplement (1% of BW) in drylot (HS) or were grazed on pastures of bermudagrass/dallisgrass overseeded with 1) annual ryegrass (RG), 2) wheat and RG (WRG), or 3) rye and RG (RRG). Calves grazed from mid-December until mid-April, but were fed hay during times of low available forage. During the first two years, calves fed HS gained less ($P < 0.05$) BW (73.2 kg) than calves that grazed winter annual forages (113.9 kg); gains did not differ ($P > 0.10$) among RG, RRG, and WRG (121.4, 111.3, and 109.0 kg, respectively). During the third year, undesirable environmental conditions limited growth of the winter annual forages; total gain did not differ ($P > 0.10$) among the four treatments (65.7, 58.3, 57.0, and 55.0 kg for HS, RG, RRG, and WRG, respectively). Mean CP and IVDMD concentrations were 19.0 and 71.1%, respectively across sampling dates and winter annual forages, but three-way interactions among forage treatments, year, and sampling date were detected ($P < 0.01$) for available forage, and concentrations of CP, NDF, and IVDMD. Available forage did not differ ($P > 0.10$) among RG, RRG, or WRG on any sampling date. The IVDMD of RRG was greater ($P < 0.05$) than that of RG in the 1999. A treatment by sampling date interaction was detected for forage CP in 1998 ($P < 0.05$) and 1999 ($P = 0.05$) but not in 2000 ($P > 0.10$). Winter annual forages offer potential to provide high quality forage for calves retained until spring, but consistent forage production is a concern when sod-seeding techniques are used.

Key Words: Stocker cattle, Winter annuals, Forage quality

1894 Steer grazing behavior on endophyte-free, toxic endophyte-infected, and non-toxic endophyte-infected (Max QTM) tall fescue. J. A. Bondurant*, M. A. McCann, J. S. McCann, J. H. Bouton, C. S. Hoveland, R. H. Watson, and J. G. Andrae, *The University of Georgia, Athens, GA*.

Fescue toxicosis decreases grazing time and depresses performance in cattle as they alter grazing behavior to cope with the toxicosis. In an attempt to capitalize on improved animal performance and health as well as agronomic benefits, non-toxic endophytes that enhance plant persistence have been inserted into tall fescue. The objectives of the present study were to assess grazing behavior in stocker steers grazing endophyte-free (EF) and toxic endophyte-infected (EI) Jesup tall fescue versus endophyte-free (EF) and toxic endophyte-infected (EI) Jesup tall fescue. Hereford steers weighing approximately 270 kg were stocked at 3.71 hd/ha on replicated (n=2) .809-ha tall fescue paddocks at the Central GA Branch Station for 69 days commencing October 11, 2000. Computerized grazing behavior recorders and jaw movement sensors were fitted to 12 steers for two 5-d collection periods from October 11-16

and December 4-9. Jaw movement data was collected for a minimum of 20 h/hd/d and was analyzed with GRAZETM software. Mean available forage was approximately 3100 kg DM/ha. Steers on all treatments spent less ($P<.05$) time grazing, a similar ($P>.05$) amount of time ruminating, and more ($P<.05$) time in other activities in October. Numbers of grass boli swallowed/h were not different ($P>.05$) among treatments or periods. Fewer ($P<.05$) mastications/h and fewer ($P<.05$) prehensions/h were observed during October versus December. In addition to the period differences, treatments affected grazing behavior. On the toxic EI paddocks, steers had more ($P<.05$) mastications/h than the cattle on the EF and MaxQTM treatments during October. In December the number of prehensions/h were lower ($P\leq.05$) on the toxic EI paddocks. Time spent neither grazing nor ruminating was lower for cattle on MaxQTM paddocks in December than for cattle on toxic EI or EF treatments. Data from two cool-season periods demonstrates no adverse effects of MaxQTM tall fescue on steer grazing behavior.

Key Words: grazing behavior, tall fescue, MaxQTM

1895 Use of *Ascophyllum nodosum* for alleviation of fescue toxicosis in cattle. J.E. Williams^{*1}, A. Rodriquez², E. Navarro¹, and D.P. Colling³, ¹University of Missouri, Columbia, MO, ²University of Puerto Rico, Mayaguez, PR, ³Land O'Lakes Farmland Feed, Kansas City, MO.

Cattle grazing endophyte-infected tall fescue (EIF) sprayed with seaweed extract *Ascophyllum nodosum* show reduced fescue toxicosis and improved immune function as compared to untreated animals. In order to evaluate the impact of Tascotm seaweed extract (SWE) and Tascotm seaweed meal (SWM) on fescue toxicosis, a feedlot study was conducted with measures of ADG, DM intake, rectal temperature, and respiration rate. Eighty continental crossbred yearling steers (avg. 291 kg) were assigned to one of four treatments (5 pens per treatment and 4 steers per pen): 1) endophyte-free tall fescue (EFF) seed; 2) EIF seed; 3) EIF seed + 2.0 % SWM; 4) EIF seed + 0.5 % SWE. The EIF seed provided 10 ug ergovaline / kg BW. The EFF seed, EIF seed, and EIF seed with SWE or SWM were fed daily prior to the morning feeding. The SWE and SWM were fed from 0 to 14 d, while the EFF seed and EIF seed were fed from 0 to 42 d. The diet consisted of cottonseed hulls and cracked corn based diet to provide 0.92 Mcal/ kg Neg and 11.2 % CP. Rectal temperatures were recorded 7 times while respiration rates were recorded 13 times throughout the 42 d study. The air temperature (Ta) and % relative humidity (RH) were recorded continuously. During 0 to 14 d, the average Ta was 27.1 C and RH was 71%; for d 14 to 42, the Ta was 27.5 C and RH was 66.7%. During the first 14 d and 14 to 42 d period, respiration rates were not affected ($P > 0.30$) by treatment. During the first 14 d period, there was a treatment X time ($P = 0.10$) interaction for respiration rates. Rectal temperature was not affected ($P > 0.50$) by treatment for either period. ADG, DM intake, and feed / gain ratio were not affected ($P > 0.40$) by treatment. The moderate Ta conditions were responsible for the lack of an effect of SWE and SWM on reducing respiration rates and rectal temperatures in cattle. Additional studies are warranted to determine the effects of SWE and SWM on reducing signs of fescue toxicosis in cattle.

Key Words: Heat stress, Cattle, Seaweed