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A SUMMARY OF GROWTH RATES OF THOROUGHBREDS IN KENTUCKY

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Summary

Over a three year period (1993, 1994, and 1995), a total of 350 Thoroughbred colts and 350 Thoroughbred fillies in Central Kentucky were weighed monthly on a portable electronic scale through 18 months of age. Wither height and condition score were also measured in about half of the foals. In order to estimate mature body size in these horses, 472 brood mares were weighed 60 to 90 days after foaling. In addition, 25 Thoroughbred breeding stallions were also weighed. The average body weight of the brood mares equaled 570 kg and the average weight of the stallions equaled 580 kg. At 14 days of age, colts and fillies weighed an average of 77.7 and 76.1 kg and had average heights of 107.3 and 106.3 cm, respectively. Colts were heavier and taller than fillies throughout the study and at 490 days averaged 9.9 kg heavier (427.8 kg vs 418.0 kg) and 1.6 cm taller (153.4 cm vs 151.8 cm). The greatest difference in condition score between sexes occurred at four months of age when the fillies had an average score of 6.48 and the colts had a score of 6.0. Compared to March foals, foals born in January and February were 6.8 kg lighter at 14 days of age. They remained smaller, by as much as 15.3 kg at 72 days of age, until about 9 months of age when they averaged about the same as the March foals. April and May foals were larger at 14 days of age than March foals, and remained slightly heavier until 6 months of age. Average daily gain among the four groups was similar until about 7 months of age. ADG averaged 1.5-1.7 kg/d during the first month and declined linearly to about 0.70-0.80 kg/d at 7 months of age. After 7 months of age, ADG tended to be more variable and by 12 months, ADG was very different among the different months of birth. Foal growth rates were reduced during the winter months regardless of when the foals were born and increased during April and May of the foal's yearling year. Growth rate in these yearlings was more a function of season of the year than age.

Introduction

Nutrient requirements for growing horses are usually based on age, body weight, mature body size and growth rate (average daily gain). For instance, the 1989 NRC calculates the digestible energy (DE) requirement of growing horses using a regression equation that incorporates age, body weight and average daily gain. Other nutrients are then calculated based on either the DE requirement, the foal's body weight, average daily gain or estimated dry matter intake which is based on body weight. Ideally, to accurately determine the nutrient requirements of an individual, its body weight and growth rate should be measured. Unfortunately, most young growing horses are not weighed on a regular basis and their body weights must be estimated based on their age and predicted mature body size.

Hintz *et al* (1979) summarized growth data from 1,992 Thoroughbred foals raised at a single Canadian farm over an 18 year period. The effect of age of dam, year and month of birth and sex of foal were evaluated. These data have been accepted universally as the typical growth patterns for Thoroughbred foals. It has not been adequately established, however, whether these growth rates are representative for Thoroughbred foals raised in other areas. Therefore, the following growth data were compiled for a large number of Thoroughbred foals raised under commercial conditions in Kentucky.

Methods

Over a three year period (1993, 1994, and 1995), a total of 350 Thoroughbred colts and 350 Thoroughbred fillies in Central Kentucky were weighed monthly on a portable electronic scale (Equimetrics, Inc., Redfield, AR) through 18 months of age. Wither height and condition score were also measured in about half of the foals. Condition score was based on the system developed by Henneke *et al* (1981) for mature horses using a scoring system of 1 through 9 to estimate fat deposition. In order to estimate mature body size in these horses, 472 brood mares were weighed 60 to 90 days after foaling. In addition, 25 Thoroughbred breeding stallions were also weighed.

Results and discussion

Growth rates of Kentucky colts and fillies are shown in table 1. Fillies were 1.6 kg lighter and 1 cm shorter than colts at 14 days of age. By 127 days of age fillies were on average 3.4 kg lighter and 0.2 cm shorter than the colts. By 350 days of age, colts averaged 14.0 kg heavier and 1.5 cm taller than fillies. By 490 days, the difference in body weight between colts and fillies in the present study had been reduced to 9.9 kg.

Condition score

The average condition score of the foals at 1-18 months of age is summarized in figure 1. Fillies tended to have higher condition scores throughout this time period.

Table 1. GROWTH RATES OF FILLIES AND COLTS IN CENTRAL KENTUCKY

Average days of age	*Colts bw (kg)*	*Fillies bw (kg)*	*Colts adg (kg/d)*	*Fillies adg (kg/d)*	*Colts ht (cm)*	*Fillies ht (cm)*	*Colts condition score*	*Fillies condition score*
14	77.7	76.1	--	--	107.3	106.3	5.7	6.0
43	116.3	115.1	1.38	1.34	115.7	115.5	6.2	6.4
72	149.5	148.5	1.20	1.19	122.6	121.8	6.2	6.3
99	182.1	178.6	1.14	1.11	127.3	127.1	6.0	6.5
127	208.8	207.9	1.01	1.01	129.8	130.3	5.8	5.9
155	233.6	230.2	0.89	0.84	133.5	132.5	5.5	5.7
183	255.9	250.7	0.80	0.75	135.8	134.7	5.4	5.6
212	277.1	271.0	0.75	0.71	138.2	137.4	5.5	5.5
240	295.1	287.3	0.68	0.60	140.0	139.4	5.4	5.5
267	309.1	300.6	0.55	0.48	141.8	140.7	5.4	5.4
296	322.0	311.0	0.43	0.40	144.2	142.5	5.3	5.4
323	335.1	322.5	0.40	0.35	145.4	144.0	5.4	5.4
350	349.2	335.2	0.43	0.39	147.0	145.5	5.3	5.4
378	362.5	350.1	0.45	0.51	148.3	146.7	5.4	5.5
406	378.9	367.9	0.52	0.60	150.2	148.2	5.5	5.7
435	396.2	388.9	0.62	0.65	150.8	149.6	5.5	5.8
462	414.2	407.9	0.59	0.60	152.5	151.5	5.6	5.8
490	427.8	418.0	0.55	0.54	153.4	151.8	5.7	5.8

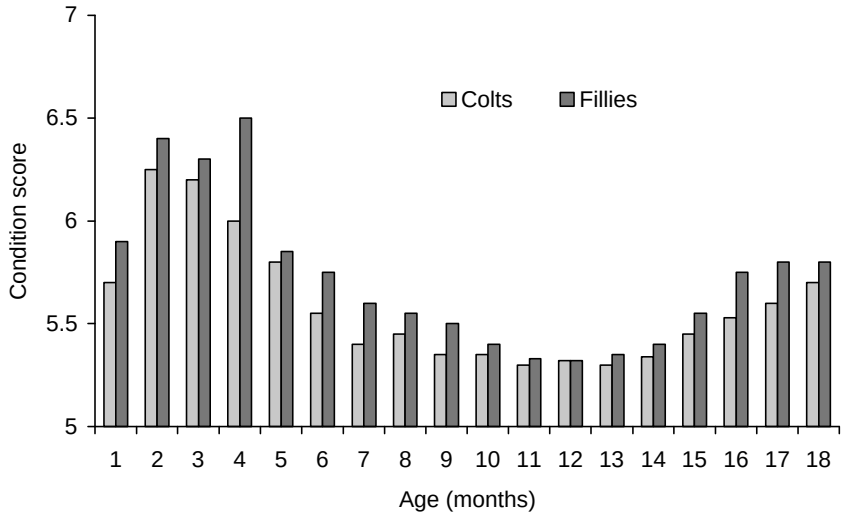

Figure 1. Condition score in Thoroughbred foals

The greatest difference in condition score between sexes occurred at four months of age when the fillies had an average score of 6.48 and the colts had a score of 6.0. These condition scores are considered moderate to fleshy according to the Henneke scoring system. By twelve months of age the condition scores of the colts and fillies had dropped to 5.3 and 5.4, respectively. Both sexes increased condition score slightly from 14 to 18 months.

Effect of month of birth

The foals were divided into 4 groups based on the month that they were born. These groups consisted of January and February foals (16.9%), March foals (35.7%), April foals (32.5%) and May and June foals (21.4%). Compared to March foals, foals born in January and February were 6.8 kg lighter at 14 days of age. They remained smaller, by as much as 15.3 kg at 72 days of age, until about 9 months of age when they averaged about the same as the March foals.

April and May foals were larger at 14 days of age than March foals, and remained slightly heavier until 6 months of age. Figure 2 summarizes average daily gain (kg/d) in the different groups as a function of age. Average daily gain among the four groups was similar until about 7 months of age. ADG averaged 1.5-1.7 kg/d during the first month and declined linearly to about 0.70-0.80 kg/d at 7 months of age. After 7 months of age, ADG tended to be more variable and by 12 months, ADG was very different among the different groups. This variability can be explained, however, by the season of the year in which each group reached a particular age. ADG has been regraphed in figure 3 as a function of the month in which a weight was taken rather than as a function of days of age. Foal growth rates were reduced during the winter months regardless of when the foals were born and increased during April and May of the foal's yearling year. Growth rates during these months were remarkably similar regardless of age. Each group of foals experienced their slowest growth during January, February and March. During the spring months of April and May, each group of foals increased their ADG with peak gains occurring in May.

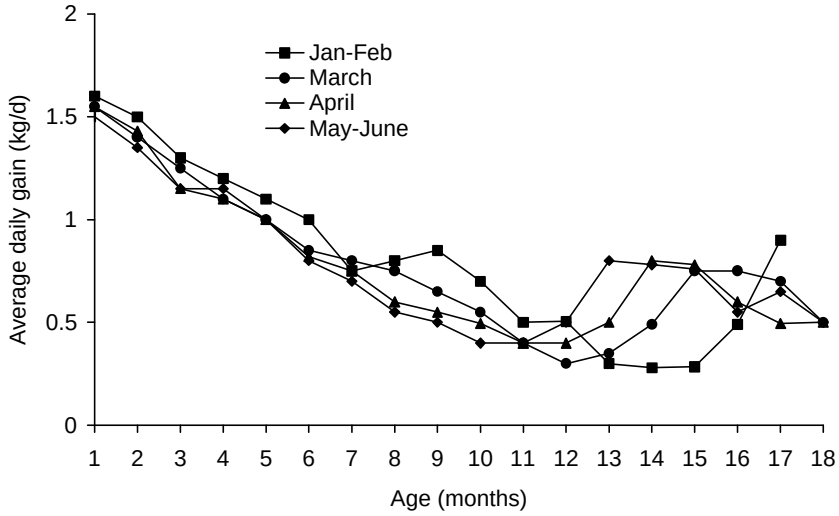

Figure 2. Growth rate of foals (effect of month of birth)

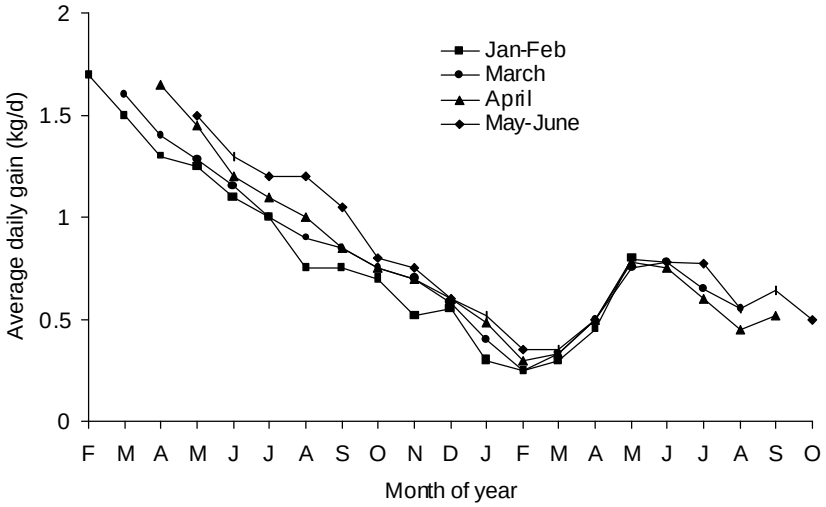

Figure 3. Growth rates of foals (effect of season)

These data clearly demonstrate that growth rate in these yearlings is more a function of season of the year than age. These changes in growth rate closely follow changes in temperature and pasture growth in Kentucky. Most foals in Kentucky are raised in large paddocks with a great deal of available forage. During April and May, pasture growth is quite rapid. Supplemental grain intake is generally not greatly reduced during this time and growth rate accelerates as a result of increased caloric intake from forage. Assuming that grain intake remains constant and pasture contains about 9.2 MJ DE/kg DM, then these yearlings would need to consume about 3.25 additional kg of pasture DM per day in May to increase their ADG from 0.35 kg during the winter to about 0.8 kg/d. This increase in dry matter intake would equal about 0.75%-1.0% of BW per day.

A comparison of body weight and height between Kentucky foals and Canadian foals born in March is shown in figures 4, 5 and 6. In figure 4 the Kentucky foals' weights and heights are shown as a percentage of the Canadian foals. Kentucky foals were slightly taller (101.2) and heavier (102.0 %) at 14 days of age. From 6 to 9 months of age, the Kentucky foals grew from 1.7 to 3.0 cm taller. These foals were also heavier from 4 to 10 months of age. At 6 months of age, the Kentucky foals averaged 107.2 % of the Canadian body weight. By 12 months of age, the two groups had similar heights and weights. The Kentucky foals became heavier at 15 and 16 months, the age that coincided with rapid spring pasture growth in Kentucky.

The difference in body weights seen between these two groups of March foals could be the result of several factors. First, the foals in Canada were weaned at 3 months of age while Kentucky foals are not usually weaned until they are 5-6 months old. These foals therefore had access to milk as well as grain and pasture for a longer

period of time. At 6 months of age, March foals in Kentucky have access to high quality fall pasture. This forage remained lush and abundant until November when the foals are 10 months of age. Fall pasture in Ontario is not as abundant and temperatures begin to drop much earlier than in Kentucky.

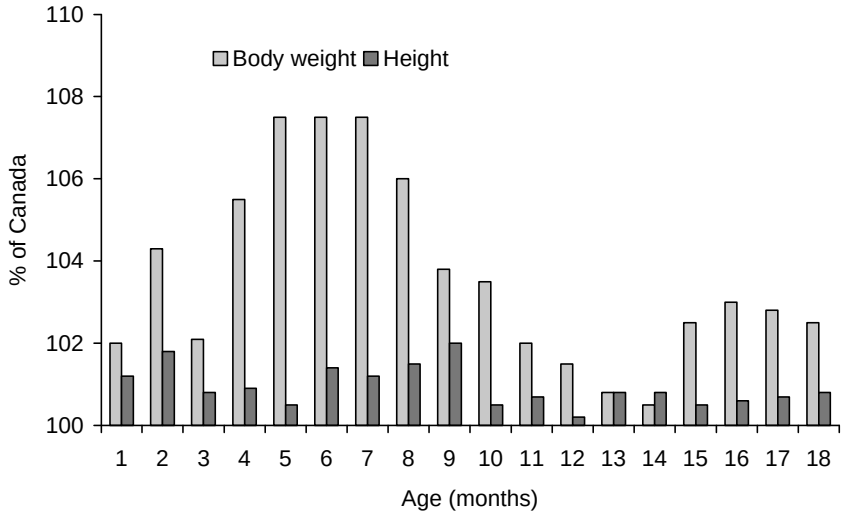

Figure 4. Comparison of body weight and height of Kentucky and Canadian foals (as a % of Canadian average)

Mature body weights

The average body weight of 472 brood mares 70 days post foaling equaled 570 kg. The average weight of 25 breeding stallions equaled 580 kg. From these data, an average mature weight of 575 kg seems reasonable. The 1989 NRC provides tables of nutrient requirements for horses with 500 and 600 kg mature body weights. Interpolating between these tables, weanlings with a mature BW of 575 kg would be expected to weigh 194 and 238 kg at 4 and 6 months of age, respectively. Four month old foals are expected to gain 0.96 kg/d and 6 month old foals are expected to gain between 0.725 kg/d and 0.925 kg/d. The Kentucky foals averaged 7 kg heavier (201 kg) and gained 1.0 kg/d at 4 months of age and weighed 12 kg more (250 kg) and gained 0.77 kg/d at 6 months of age. Thus, ADG was similar to values given by the NRC while body weight was 3-5% heavier.

At 12 and 18 months of age, the NRC would estimate that yearlings with a mature BW of 575 kg would equal 362.5 kg and 456 kg, respectively. These yearlings would be expected to gain between 0.62-0.71 kg/d at 12 months and 0.42 kg/d at 18 months of age. Kentucky yearlings weighed an average of 348 kg and had an ADG of 0.41 kg/d at 12 months and weighed 445 kg and gained an average of 0.425 kg/d at 18

months of age. The Kentucky yearlings were 96% and 98% of the weights estimated by the NRC for 12 and 18 month yearlings and their 12 month ADG was only about 61% of that estimated by the NRC. It should be noted, however, that 12 months of age was before the average age at which rapid growth occurred in response to spring pasture growth. During this time (at about 14 months of age), ADG equaled about 0.75 kg/d.

Conclusion

Thoroughbred foals raised in Kentucky grew faster from 4 to 9 months of age than foals raised in Ontario, Canada. These differences in growth were probably related to a later weaning time and abundant fall pasture in Kentucky compared to Canada. By 12 months of age, height and weight differences between the two groups had disappeared. Since rapid growth and excess body weight have been implicated as possible causes of skeletal disorders in foals, this extra growth in the Kentucky foals during the fall months is probably not desirable. Extra weight gain could be controlled by earlier weaning and by reducing supplemental grain intake as pasture becomes more available. Monthly weight monitoring can be used to signal the onset of this excessive weight gain. Average daily gain in yearlings was affected more by season than age. All of the foals experienced accelerated growth in the spring as pasture growth increased. Again, this accelerated growth can be identified by regular weighing and controlled by reductions in supplemental grain intake.

The weights and growth rates used by the NRC to calculate nutrient requirements for foals are generally accurate for Thoroughbred foals when seasonal variations in growth rate are taken into consideration.

References

Henneke, D.R., G.D. Potter and J.L. Kreider. 1981. A condition score relationship to body fat content of mares during gestation and lactation. In: Proc. 7th ENPS, Warrenton, Va pp 105-110.

Hintz, H.F., R.L. Hintz, and L.D. Van Vleck. 1979. Growth rate of Thoroughbreds: Effect of age of dam, year and month of birth, and sex of foal. J. Anim. Sci. 48:480.

NRC. 1989. Nutrient Requirements of Horses (5th Revised Ed.)
Nutrient Requirements of Domestic Animals. National Research Council. National Academy Press. Washington, D.C.


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