

## Growth Rate of Thoroughbred Horses during First Six Months of Life

### Short Communication

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### ABSTRACT

The aim of this study was to analyze the effect of sex, season and year of birth on growth rate of biometric measurements and body weight gain of Thoroughbred foals during first six months of life. 103 Thoroughbred foals (53 colts and 50 fillies) from Golejewko Stud born between 2006 and 2008, were used in this study. Thoroughbred foals born in winter months were characterized by significantly higher ( $P \leq 0.01$ ) growth rate of height at withers, cannon circumference and body weight gain compared to foals born in spring months. The effect of year of birth on growth rate of height at withers was significant ( $P \leq 0.01$ ), but differential and it was difficult to show a clear dependence. No significant effect of sex was observed on studied parameters except for body weight gain between 4 and 6 months of life.

**KEY WORDS** foals, growth rate, season of birth, sex, Thoroughbreds, year of birth.

### INTRODUCTION

Issues concerning growth rate of Thoroughbred foals have become very important due to very short period of time between foals birth and beginning of their racing careers. Foal level of development at birth is higher in comparison with other domestic animals (Martin-Rosset, 1983). During first 6 months of life, Thoroughbred foal obtains about 80% of height at withers of 4-year-old horse (Kulisa and Luszczynski, 2000). After this period, growth rate decreases and at the end of 12 month of life height at withers constitutes about 90% of the adult horse height (Jelan *et al.* 1996; Pagan *et al.* 1996; Luszczynski *et al.* 2001).

Knowledge of dynamic changes of young animal's biometric measurements could help to predict their further usability predispositions. Luszczynski *et al.* (2001a) show that there is a significant relationship between growth rate of biometric measurements during first 6 months of life and racing performance of two- and three-year-old Thoroughbred horses. Recent studies also show that obtaining

the highest body measurements at young age is beneficial. Pagan *et al.* (2005) and Brown-Douglas and Pagan (2006) observed that the highest and the heaviest Thoroughbred horses were the most expensive ones at yearlings sales and also were the most successful at racetrack; winning most of the highest range races. Detailed analysis of growth rate of foals, from birth till the weaning time, is extremely important due to the fact that the most intensive development of the foal takes place during this time. Therefore, the aim of this study was to analyze the effect of sex, season and year of birth on growth rate of biometric measurements and body weight gain of Thoroughbred foals during first six months of life.

### MATERIALS AND METHODS

About 103 Thoroughbred foals (53 colts and 50 fillies) from Golejewko Stud born between years 2006 and 2008, were used in this experiment. All foals were healthily born and properly develop. After birth, they were kept together

with their mothers in individual boxes. Foals were fed with mothers' milk, and from fourth week of life, additionally, with pressed oats seeds and good meadow hay. In winter, they were taken for short walks at paddocks near the stables and in summer they were kept on pastures. Biometrical data, including height at withers, girth circumference, cannon circumference and body weight, were collected. All measurements for each horse were collected on the first day after birth and in the 2<sup>nd</sup>, 4<sup>th</sup> and 6<sup>th</sup> month of age. Height at withers was measured using a measuring stick with 1 cm precision. Horses stood on hard ground with front limbs in parallel and perpendicularly to the ground. Circumferences were obtained using a measuring tape with 1 cm precision for girth, and 0.25 cm precision for the cannon circumference. Foals were weighed using weigh-bridge. On the basis of these measurements, growth rate in the periods, from birth to 2<sup>nd</sup> month, from 2<sup>nd</sup> to 4<sup>th</sup> month and from 4<sup>th</sup> to 6<sup>th</sup> month of life was estimated for each measurement according to the following model described by Maciejewski and Zięba (1982):

$$T = ((W_2 - W_1) / ((W_2 + W_1) / 2)) \times 100$$

Where,  $T$ ; is growth rate at specified time (%),  $W_1$ ; is initial measurement (cm),  $W_2$ ; is final measurement (cm).

This model enables comparison of growth among animals regardless of their body size.

Statistical analysis of growth rate was carried out using GLM procedure. Sex, season and year of birth were treated as main effects in the statistical models. Tukey's test was used to estimate differences among factors within main effects. Winter season of birth included January, February and March, and spring season (April and May).

## RESULTS AND DISCUSSION

During first six months of life body weight increased most rapidly, whereas, the lowest growth rate was observed for height at withers and cannon circumference. The highest growth rate of body measurements and body weight gain was observed during first two months of life. Following months were characterized by rapid decrease in growth rate. Between fourth and sixth month of life growth rate of cannon circumference was twice as low, growth rate of height at withers and girth circumference three times as low, and body weight gain four times as low as during first two months after birth (Table 1). Green (1969) and Nogueira *et al.* (1997) showed that the most rapid growth of Thoroughbreds occurs during their first three months of life and then decreases till 15<sup>th</sup> month after birth. Similar to our work, Łuszczynski *et al.* (2001) observed the highest mean values of body weight gain and then for girth circumference

and cannon circumference, whereas the lowest values for height at withers.

Except for only one case, no significant effect of sex on growth rate of Thoroughbred foals was observed. Only between fourth and sixth month of life, body weight gain of studied fillies was significantly ( $P \leq 0.05$ ) higher in comparison to colts (Table 1). According to Green (1969), McCarthy and Mitchell (1974) and Thompson (1995), sex does not significantly affect body measurements. On the contrary, results obtained by Hintz *et al.* (1979) showed differences in body measurements depending on sex, which become more significant as the foals get older. Yamamoto *et al.* (1993) observed that colts were characterized by significantly higher body measurements than fillies, especially height at withers and cannon circumference. Also, Pagan *et al.* (1996) showed that growth rate was higher for colts compared to fillies but it depended more on season of the year than on foals age or sex. However, Morel *et al.* (2007) observed that body weight and its gain from birth to weaning was not significantly different between fillies and colts.

Birth season significantly affected growth rate of height at withers, cannon circumference and body weight gain (Table 1). Foals born in winter season were characterized by significantly ( $P \leq 0.01$ ) higher growth rate of height at withers from birth to second month of life ( $17.1 \pm 4.0\%$ ) and between fourth and sixth month of life ( $5.6 \pm 1.8\%$ ) than foals born in spring season ( $14.3 \pm 2.2$  and  $4.4 \pm 1.6\%$ , respectively). On the contrary, between second and fourth month of life studied parameter was higher ( $P \leq 0.05$ ) for foals born in April and May than for foals from winter season. Cannon circumference in foals born in winter season was increasing more rapidly between second and fourth and then between fourth and sixth month of life, comparing to foals born in spring, and the differences were significant ( $2.8\%$ ;  $P \leq 0.01$  and  $2.0\%$ ;  $P \leq 0.05$ , respectively). During the last two studied months of life, significantly ( $P \leq 0.01$ ) higher by  $7.6\%$  body weight gain was observed for foals born in January, February and March than for those born in April and May. No significant effect of birth season on growth rate of girth circumference was found. However, it was observed that during studied time this parameter was always higher for foals born in winter sometimes with different results. Heusner (1992), similar to our study shows that body measurements and body weight of foals born in winter are significantly high-months, than in spring months. Significant effect of birth season on foals' growth was shown in numerous studies, sometimes with different results. Heusner (1992), similar to our study shows that body measurements and body weight of foals born in winter are significantly higher, compared to foals born in spring, and these differences are also observed in yearlings. On the contrary, Hintz *et al.* (1979) show that foals born in April,

**Table 1** Growth rate of body measurements and weight gain of Thoroughbred foals during first six months of life\*

Month of life	Sex		Season of birth		Year of birth			Total
	Colts n=53 ±SEM $\bar{x}$	Fillies n=50 ±SEM $\bar{x}$	zimowy n=81 ±SEM $\bar{x}$	wiosenny n=22 ±SEM $\bar{x}$	2006 n=35 ±SEM $\bar{x}$	2007 n=32 ±SEM $\bar{x}$	2008 n=36 ±SEM $\bar{x}$	n=103 ±SEM $\bar{x}$
Growth rate of height at withers (%)								
0-2	16.2±0.5	16.8±0.6	17.1±0.4 <sup>A</sup>	14.3±0.5 <sup>A</sup>	15.2±0.5 <sup>ab</sup>	17.2±0.8 <sup>a</sup>	17.1±3.8 <sup>b</sup>	16.5±0.4
2-4	8.8±0.3	8.7±0.4	8.6±0.3 <sup>a</sup>	9.6±0.5 <sup>a</sup>	9.4±0.4 <sup>A</sup>	7.7±0.3 <sup>Ab</sup>	9.1±0.4 <sup>b</sup>	8.8±0.2
4-6	5.3±0.2	5.4±0.3	5.6±0.2 <sup>A</sup>	4.4±0.3 <sup>A</sup>	5.4±0.3	5.8±0.3 <sup>a</sup>	4.9±0.3 <sup>a</sup>	5.4±0.2
Growth rate of girth circumference (%)								
0-2	26.6±0.7	27.5±0.7	27.2±0.6	26.3±0.8	27.7±0.8	26.9±1.1	26.4±0.8	27.0±0.5
2-4	15.0±0.5	13.8±0.5	14.6±0.4	13.9±0.6	14.4±0.7	13.9±0.7	15.0±0.6	14.4±0.4
4-6	8.5±0.5	9.2±0.5	9.1±0.4	7.8±0.7	8.5±0.4	8.9±0.7	9.0±0.6	8.8±0.3
Growth rate of cannon circumference (%)								
0-2	15.9±0.8	15.2±0.7	15.2±0.6	17.0±0.9	15.7±0.6	16.4±1.0	14.7±1.1	15.6±0.5
2-4	11.1±0.6	11.5±0.5	11.9±0.5 <sup>A</sup>	9.1±0.6 <sup>A</sup>	11.4±0.6	11.1±0.8	11.5±0.7	11.3±0.4
4-6	7.9±0.5	7.7±0.5	8.2±0.4 <sup>a</sup>	6.2±0.7 <sup>a</sup>	7.3±0.4	8.1±0.7	8.1±0.7	7.8±0.4
Growth rate of body weight (%)								
0-2	80.0±1.6	81.3±2.0	80.3±1.5	81.7±2.2	82.1±2.1	78.9±2.6	80.7±1.9	80.6±1.3
2-4	46.1±1.7	42.6±1.4	44.6±1.2	43.6±2.7	42.5±2.0	43.2±2.3	47.4±1.4	44.4±1.1
4-6	19.6±1.5 <sup>a</sup>	24.2±1.5 <sup>a</sup>	23.4±1.1 <sup>A</sup>	15.8±2.8 <sup>A</sup>	21.5±1.8	21.3±2.5	22.7±1.3	21.9±1.1

a, b - The means that have at least one common letter, do not have significant difference ( $P>0.05$ ).

A, B - The means that have at least one common letter, do not have significant difference ( $P>0.05$ ).

May and June are heavier, higher and with higher cannon circumference than those born in January, February and March. Similar dependencies were found by Yamamoto *et al.* (1993) in the first month after birth of Thoroughbred foals, whereas, Brown-Douglas *et al.* (2005) demonstrated that despite differences in body weight at birth between foals born in autumn and spring, there were no significant differences in growth rate of body weight during first six months of life.

Year of birth significantly affected only growth rate of height at withers (Table 1) but a clear dependence was not observed. From birth to second month of life significantly lower ( $P\leq 0.05$ ) growth rate of height at withers was observed for foals born in 2006, compared to those born in 2007 and 2008. Next time was characterized by lower growth rate of foals born in 2007, compared to foals born in 2006 ( $P\leq 0.01$ ) and in 2008 ( $P\leq 0.05$ ). Between fourth and sixth month after birth significantly lower ( $P\leq 0.05$ ) values of studied parameter were observed for foals born in 2008, compared to foals born in 2007. Significant relationship be-

tween year of birth and body weight was observed by Hintz *et al.* (1979). This factor according to Lojek (1993) significantly influenced growth rate of horses in racetraining.

## CONCLUSION

Among all studied factors, the most significant effect on growth rate of body measurements and body weight gain was observed for season of birth. The effect of year of birth on growth rate of height at withers was significant but differential and it was difficult to show a clear dependence.

On the basis of obtained results it is possible to conclude that Thoroughbred foals born in winter season were characterized by higher growth rate of height at withers, cannon circumference and body weight gain, compared to foals born in spring months.

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