

ENVIRONMENT FACTORS AFFECTING TIME IN QUARTER HORSES RACES

FATORES AMBIENTAIS AFETANDO O TEMPO EM CORRIDAS DE CAVALOS
QUARTO DE MILHA

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INTRODUCTION

The time is a trait normally registered in every kind of race. With horses, specially, the study of environmental factors that influence in race time of the animals have been described by various authors (Buttran *et al.*, 1988; Wilson, 1990; Leroy *et al.*, 1991; Mota *et al.*, 1998), most of them with animals Thoroughbred and trotters.

In Brazil some studies of this nature were made with animals of the breeds Thoroughbred (Mota *et al.*, 1998; Taveira e Mota, 2002) and Quarter Horses (Mota *et al.*, 1999 e Villella *et al.*, 2002). With Thoroughbred, although the number of races is very great and the number of competitors in each one is high, normally only the time of the winners is registered, limiting the interpretation of these studies in the population as a whole. In Quarter Horses races, on the other side, even though all the competitors of one race do have the time registered, the yearly total of races is low and the number of horses by race small. In this breed, lonely the works, considering only races in the Paulistian Hipodrome of Sorocaba, were done in Brazil. Thus,

the present research has the objective of better understanding the environmental factors that influence the time in Quarter Horse races, in the principal national hippodromes of this breed.

MATERIALS AND METHODS

The original file of data provided by the Sorocaba Jockey Club was compound of 17,479 registers about 3,518 races runned by 4,068 animals. Since the concern was to study the time, were excluded initially 2,302 registers in which there wasn't notes about that trait. Following were the only separated observations of races runned in the towns of Sorocaba, Ribeirão Preto and Jaú, which composed 91 percent of the total of races. From this file, were being excluded what was considered as mistakes of annotation and types of fixed effects with low number of observations, summarizing one file with 13,477 registers of time submitted to analyses.

Preliminary analyses were made as to verify which fixed effects were

included in the analyses and their interactions. The linear model used for evaluation of the information was:

$$\gamma_{ijklmno} = \mu + C_i + I_j + S_k + O_l + A_m + M_n + b_1 (X_{ijklmno} + \bar{X}) + b_2 (P_{ijklmno} - \bar{P}) + e_{ijklmno}$$

Where:

$\gamma_{ijklmno}$ = race time (s) observed for each animal; C_i = fixed effect of i -th city (Sorocaba, Ribeirão Preto and Jaú); I_j = fixed effect of j -th age (2, 3 e >4 year); S_k = fixed effect of k -th sex (male and female); O_l = fixed effect of l -th origin (national e imported); A_m = fixed effect of m -th year of the race (1983, ..., 2002); M_n = fixed effect of n -th month of the race (1, ..., 12); b_1 e b_2 = linear regression coefficients of the $\gamma_{ijklmno}$ variable in relation to distance (meters) and jockey weight (kg), respectively; b_3 = quadratic regression coefficient of the $\gamma_{ijklmno}$ variable in relation to jockey weight (kg), $(X_{ijklmno} + \bar{X})$ = difference between the distance when the time was observed and the overall mean racing distance; $(P_{ijklmno} - \bar{P})$ = difference between the jockey weight when the time was observed and the overall mean jockey weight; and $e_{ijklmno}$ = random error associated with each observation.

The data were analysed based on the statistical program SAS (1996), using the procedure GLM (general linear model). Contrast test were done, at the level of 5 percent of significance, for certain classes of fixed effects considered relevant.

RESULTS AND DISCUSSION

The average observed for time in

racers was 21.35 s, with coefficient of variation of 2.56 percent, and the effects included in the model formed a R^2 of 96.02 percent. A summary of the analysis of variance is showed in the following **table I**.

Various authors have reported significant differences of time in races, depending on the animal sex (Mota *et al.*, 1998; Taveira e Mota, 2002; Villela *et al.*, 2002), normally with superiority of the males, as it happened with the present work (males 2 hundredth seconds more fast). This result is similar to the described by Villela *et al.* (2000), also with Quarters Horses, that reported average superiority of 0.025 seconds of the males, and slightly inferior to the related by Mota *et al.* (1998) 0.13 s with Thoroughbred.

The significant effect of the local of the race agree with the ones observed by Leroy *et al.* (1991) Buttran *et al.* (1988), Mota *et al.* (1998), Taveira e Mota (2002), and normally is due to the different constructions, different maintenance programs, surface of the ground, climate, etc. The hippodrome of Sorocaba was the local where the times were significantly ($p < 0.05$) more rapid (20.83 s *versus* 21.73 s and 21.56 s of Ribeirão Preto e Jaú, respectively). In part, this may be explained by the fact that, since middle the years 90, Sorocaba was transformed in the principal center of races of Quarter Horse in Brazil, attracting a higher number of animals with superior performance, and making greater, consequently, the possibility of differences between hippodromes to happen.

The significant influence of the origin of the animal on the time, with superiority of the imported ones, was

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Table I. Analyses of variance for race time. (Análise de variância para tempo em corrida).

Source of variation	D.F.	M.S.	Pr > F
Distance	1	65408.6146	0.0001
Age	2	33.8096	0.0001
City	2	20.9831	0.0001
Origin	1	28.0634	0.0001
Sex	1	1.7878	0.0134
Month	11	3.4964	0.0001
Weight of the Jockey	1	21.0306	0.0001
Year	19	58.5053	0.0001

already verified by Villela *et al.* (2002) in the Sorocaba hippodrome. These authors found differences of 0.14 s between both, value lightly inferior to the reported in this research (0.17 s).

Animals with 4 years of age or more were significantly faster than the ones 2 and 3 years old (0.3 s and 0.11 s respectively). It is interesting notice that, although this happens, animals with 4 years of age are considered *old* inside the national breeding of the Quarter Horse runners. Only the outstanding animals reach this age in activity. The breeders concentrate in animals 2 years old, mostly, due to the more important races and awards being offered to animals of this age.

The effects of the year on the time in races are very variable, and normally are accredited to the different climate conditions, timing and training system, besides the gain due to the selection. The years of 1998 and 2001 show averages of time significantly smaller than others. The months from February and November were the ones in which the time was significantly better than others, although no particular reason has been proposed to explain that fact.

The average distance in races was 364.47 meters, with coefficient of variation equal to 12.86 percent. The behavior of time (s) in relation to the distance (m) of the race showed that the times grow nearly 0.55 s each 10 meters of the race, value greater than related by Mota *et al.* (1998) with Thoroughbred (0.022 s).

The weight of the jockey presented average equal to 52.98 kg, with coefficient of variation of 3.04 percent. The evaluation of this covariable showed an increase in race times as jockey's weight becomes higher, up to 53 kg (mode), an occasion in which they begin to improve with a weight increase. At first, that may look odd, once one would expect a worsening in time as jockey's weight increases. However, such behavior may, in part, be related to the way Quarter-Horse races are organized in Brazil. Animals with a better race history, more victories, more prizes, better times) may encounter difficulty in participating in races, once most breeders do not want their animals to race with better specimens, owing to the fact that winning chances are slim. Consequently, in order to make the same chance of winning possible for all animals in a race, horses considered superior by the Race Commission must compete showing a minimum weight of 53 kg. That means that weights higher than 53 kg normally refer to animals with a better performance, and that the strategy used by Quarter-Horse race organizers in Brazil to offset this superiority has not proved very efficient, once animals carrying more than 53 kg show higher chances of winning (lower race times).

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