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The effect of selected factors on length of racing career in Thoroughbred racehorses in Poland

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The aim of the study was to develop a profile, and to examine factors affecting the length of the racing career of 1759 Thoroughbreds (872 males and 887 females) in Poland. Product-limit survival analysis and Cox proportional hazards model was used to determine whether sex, age at first race, month of birth, trainer and performance at first season (money earned and number of starts) were associated with racing career duration. Comparison of the survival curves for males and females revealed a difference in career length between the two sexes, with males having a significantly higher survival probability than females (hazard ratio = 0.66). Age at first start and performance during the first year of racing were significant predictors of length of racing life while those that first started at two years of age were less likely to cease racing than horses that first started at the age of three years (hazard ratio = 4.49). Females, which had a smaller number of starts during their first racing season had longer careers. Since overlapping age at first start, racing performance and effect of the trainer it is difficult to assess the latter effect. The effect of month of birth on subsequent length of racing life was not found significant.

KEY WORDS: longevity / racing performance / Thoroughbred horse

Horse races are organized in accordance with racing rules, which are developed by Polish Jockey Club. Results of racing competition are used for performance evaluation of Thoroughbreds and Arab horses and serve selection purposes. Comparison of all horses competing in the same year is very important, particularly for Thoroughbreds, because racing ability is the main selection criterion in the breed. In racing horses in Poland, we faced a situation when the system of advancing the horses cause that they predominantly race in only a certain quality of races, and hence, they race predominantly against a certain quality of competitors [Sobczyńska and Łukaszewicz 2004]. An accurate assessment of the horse performance is possible when horses have

a chance to start frequently at different environmental conditions and compete against different horses. The first racing season does not fulfill these conditions due to small number of races and focusing the training methods not on the highest performance but rather on racing ability in general. As more prestigious and high-status races (called "selection races") are carried out after the first racing season an adequate performance evaluation of a horse is possible at later racing seasons. Hence, longevity is of economic importance in Thoroughbreds because of expenses and time invested in breeding and training. In spite of the high costs invested in racing horses, on average only 50% of horses continue racing for at least two years after their first start. As reasons for culling are seldom recorded, the aggregated trait, *i.e*. length of racing life was studied as measure of physical stamina and endurance. The current study was conducted to examine some factors that can affect length of racing careers of horses competing at Polish racecourses. Knowledge of factors that influence longevity is crucial for optimization the training methods aiming at reducing wastage which refers to losses that occur at racing industry. An understanding of the role of some factors under Polish conditions may help owners, trainers and other equine professionals to optimize the performance of the horses under their care.

Material and methods

Length of racing career of Polish Thoroughbreds was examined using standard methods of survival analysis. The data included information of 872 males and 887 females born after 1996 and racing in Poland on three racing tracks in the period 1998-2005. As careers of females are interrupted by reproductive activity, the data were analysed in gender groups too. According to competition rules, racing may start from 2 years of age and continue for a long period of time. Different measures of the length of competitive life might be used. Because of arbitrary decisions of the date of commencing and terminating of racing seasons, number of years in racing was considered as the most appropriate criterion. To avoid left censoring, data of horses born before 1996 were not considered. For horses still racing in the last year of the study (2005) the length of career was treated as right censored. The same was true for horses continuing their racing career at obstacle races. The Kaplan-Meier product-limit survival curves were constructed to evaluate the effects of gender:

$$\hat{S}(t_i) = \prod_{j=1}^{i} \left(1 - d_j / n_j\right)$$

where:

$\hat{S}(t_i)$ – estimated survivor function;

n_i – the number of surviving units;

d_i – the number of units that fail at t_i.

The association between career length and a range of independent variables was assessed by calculating the log rank and Wilcoxon statistic. The independent variables were age at first start (horses that first raced as 2- and 3-year-olds), month of birth (from January to May and later), racing performance (log of earnings and number of starts) during the first year of racing, trainer class (four classes were considered according to the number of horses trained by each trainer: below 5, 5-20, 21-50 and more than 50 horses). For gender the animal status at birth was recorded and categorized as male or female, because the records did not indicate when colts had been castrated. Variables were investigated further using a proportional hazards regression model. Cox proportional hazards model assumes a parametric form for the effects of the explanatory variables and it allows an unspecified form for the underlying survivor function. The survival time of each horse was assumed to follow its own hazard function $\lambda_i(t)$, expressed as:

$$\lambda_i(t)=\lambda\,(t;Z_i) = \lambda_0(t)\exp(\,Z_i'\,\beta\,)$$

where:

$\lambda_0(t)$ – unspecified baseline hazard function;

Z_i – design vector of explanatory variables for i-th horse;

β – vector of unknown regression parametres associated with the explanatory variables.

The vector β was assumed to be the same for all individuals. With this model, the ratio hazards for two horses at any time depend only on covariates.

Results and discussion

The data for male and female horses contained the same proportion of censored observations (12%). Out of 1759 horses within the study that first raced as two- or three-year-olds only 72% continued to race for at least one, 46% for at least two and 18% for at least three years after their first start (figures not tabulated). These results have confirmed a high level of premature culling of horses from racing. Similar proportion of horses removed from racing was reported by More [1999] for Australian Thoroughbreds. Near the same proportion of males and females (28% on the average) ended their careers after the first racing season, whereas as much as 60% females and 48% males ended their racing life after the second season. Two times more males than females were continuing their racing careers after three years (25 *vs* 11%) – figures not tabulated.

Descriptive information about horses examined is presented in Table 1. Eighty-eight per cent of them had their first start as two-year-olds, whereas the rest (12%) begun starts as three-year-olds, the latter share being three times higher as compared to UK [Wilsher *et al*. 2006]. The most of horses were born in March (27%), February (24%) and April (22%), the least in January (18%), May and later (10%). The majority was trained by trainers which have more than 21 horses under their care. The similar proportion of sexes was observed at different trainer classes, age at first start and month of birth.

Table 1. Distribution of Thoroughbreds across independent variables

Variable	Males		Females		Total	
	n	%	n	%	n	%
Sex	872	49.6	887	50.4	1759	
Age at first start						
2-year-olds	754	86.5	800	90.2	1554	88.3
3-year-olds	118	13.5	87	9.8	205	11.7
Month of birth						
January	143	16.4	170	19.2	313	17.8
February	216	24.8	201	22.6	417	23.7
March	247	28.3	227	25.6	474	26.9
April	167	19.2	213	24.0	380	21.6
May and later	99	11.3	76	8.6	175	10.0
Trainer						
< 5 horses in training	23	2.6	15	1.7	38	2.2
5-20 horses in training	92	10.6	83	9.3	175	10.0
21-50 horses in training	253	29.0	288	32.5	541	30.7
>50 horses in training	504	57.8	501	56.5	1005	57.1

Comparison of the survival curves for males and females revealed a difference in career length between sexes. Males had a significantly higher survival probability than females. The rank tests of homogeneity indicated a difference at larger survival times, because the log rank test, which places more weight on larger survival times, was more significant than the Wilcoxon test, which places more weight on early survival times. In the majority of racing horse populations females show shorter racing life than males [Physick-Sheard 1986, Herzog *et al*. 1993, Bailey 1998, Bailey *et al*. 1999, More 1999].

All considered variables except for the month of birth were associated with career duration (Tab. 2). Differences between sexes could be observed when levels of statistical relationships of covariates were compared (Tab. 3 and 4). Age at first start as well as level of earnings were the only variables that affected length of racing career in males (Tab. 3). Additional risk factors associated with length of racing life in females were number of starts and trainer class which nearly reached a level of significance (P=0.062) – Table 4.

Table 2. Association between career length of all examined Thoroughbreds (sexes pooled) and covariates ordered according to the level of statistical relationship (log rank test)

Variable	Test statistic	Standard deviation	Chi-square	P>chi-square
Age at first start	-81.84	9.99	67.04	<0.0001
Earnings (log)*	556.70	108.5	26.31	<0.0001
Sex	-53.04	19.42	7.4	0.006
No. of starts*	-171.40	74.48	5.29	0.021
Trainer	62.08	29.27	4.49	0.033
Month of birth	10.67	48.17	0.05	0.82

*At the first racing season.

Table 3. Association between career length of Thoroughbred males and covariates ordered according to the level of statistical relationship (log rank test)

Variable	Test statistic	Standard deviation	Chi-square	P>chi-square
Age at first start	-40.51	7.74	27.40	<0.0001
Earnings (log)*	232.7	81.34	8.18	0.0042
Trainer	25.16	21.02	1.43	0.231
No. of starts*	-43.07	55.60	0.60	0.438
Month of birth	3.29	33.77	0.01	0.922

*At the first racing season.

Table 4. Association between career length of Thoroughbred females and covariates ordered according to the level of statistical relationship (log rank test)

Variable	Test statistic	Standard deviation	Chi-square	P>chi-square
Age at first start	-42.79	6.17	48.00	<0.0001
Earnings (log)*	345.80	70.52	24.05	<0.0001
No. of starts*	-134.80	48.85	7.61	0.0058
Trainer	37.90	20.29	3.48	0.062
Month of birth	4.46	34.30	0.01	0.896

*At the first racing season.

The hazard ratios for two sexes obtained by proportional hazards regression model are presented in Tables 5, 6 and 7.

Table 5. Risk factors as associated with career length for examined Thoroughbreds (sexes pooled), ordered according to the level of statistical relationship

Variable	β coefficient	Standard error (β)	Chi-square	P>chi-square	Hazard ratio
Age at first start (3-year-olds *vs* 2-year-olds)	1.502	0.16	83.40	<0.0001	4.49
Earnings (log)*	-0.110	0.01	49.23	<0.0001	0.89
Sex (males *vs* females)	-0.416	0.07	27.67	<0.0001	0.66
Trainer	-0.101	0.05	3.59	0.058	0.90
Month of birth	-0.056	0.03	3.08	0.079	0.94
No. of starts*	0.037	0.02	2.23	0.135	1.04

*At the first racing season.

Table 6. Risk factors as associated with career length for Thoroughbred males, ordered according to the level of statistical relationship

Variable	β coefficient	Standard error (β)	Chi-square	P>chi-square	Hazard ratio
Age at first start (3-year-olds *vs* 2-year-olds)	1.285	0.20	40.95	<0.0001	3.62
Earnings(log)*	-0.068	0.02	11.04	0.0009	0.93
Month of birth	-0.062	0.04	1.97	0.160	0.94
Trainer	-0.077	0.07	1.19	0.275	0.92
No. of starts*	-0.003	0.03	0.01	0.906	0.99

*At the first racing season.

Table 7. Risk factors as associated with career length for Thoroughbred females, ordered according to the level of statistical relationship

Variable	β coefficient	Standard error (β)	Chi-square	P>chi-square	Hazard ratio
Earnings (log)*	-0.170	0.02	47.05	<0.0001	0.84
Age at first start (3-year-olds *vs* 2-year-olds)	1.842	0.29	39.93	<0.0001	6.31
No. of starts*	0.089	0.04	4.59	0.032	1.09
Trainer	-0.139	0.08	2.92	0.087	0.87
Month of birth	-0.044	0.04	0.87	0.351	0.96

*At the first racing season.

Sex

Sex had a significant impact on career longevity. The hazard ratio for career duration in males *vs* females (0.66) confirmed that males had a higher probability of a long racing career. Bailey *et al*. [1999] found that female racehorses were less likely to race and this may be because females tend to win less money (males are faster). However, under Polish conditions females can race in prestigious races competing with females only and winnings are comparable to those in males. Other factors could, therefore, affect the length of racing career of females. Females are more likely to be withdrawn from training and used for breeding purposes especially when training or health problems occur. Type of competition among horses during the race can be associated with performance of Thoroughbreds and revealed psycho-physiological differences between sexes. Harkins *et al.* [1992] demonstrated that males showed no significant difference between competitive and single run times, whereas females were consistently slower during competition. This difference reflects distinct psychological traits (willingness to compete and win) of the sexes at racing and may be the reason for worse racing performance in females than in males.

Age at first start

Age at first start had a significant impact on career longevity. The hazard ratio for career duration of three-year-old *vs* two-year-old horses (4.49) confirmed that those that began their career at earlier age had a higher probability of a long racing life. This factor was more significant in females (hazard ratio = 6.31) than in males (hazard ratio = 3.62). Age at first start reflects time needed to reach maturity, but also health and soundness, which are important traits affecting the ability to race. The ability to begin the career early is a desirable feature of racing [Physick-Sheard 1986, More 1999] and jumping [Ricard and Fournet-Hanocq 1997] horses. In this study about 12% of the horses had their first start at the age of three years. One can suppose that they were more likely to have been born in later months during the year. However, those animals did not differ in this respect from horses that began their career at an earlier age – the proportion of horses born in different months was almost the same. The delay in the first start of three-year-olds was probably caused by health problems or skeletal immaturity. Horses that began their careers early have a superiority of being better developed physically, healthier, as well as of better trainability. Bourke [1995] and Henley *et al*. [2006] found that risk of fatal injury increased with age and decreased with racing intensity, but starting to compete at an older age has a negative impact on career duration. According to Mader and Price [1980] age is negatively correlated with rate of learning which in turn is positively correlated with trainability. On the other hand Mason and Bourke [1973] have reported that many two-year-old horses show evidence of skeletal immaturity for at least first part of their first racing season. This has been evidenced by number of injuries that occur commonly in two-year-olds. Bailey *et al*. [1999] found that males that had their first race at a younger age and a greater mean number of days passing between races have longer careers. It

seems that two-year-olds need more time for recovery after a race. Oppositely to older horses, musculoskeletal injuries in two-year-olds are less likely to be reported during the training preparation than on the day of a race [Perkins *et al*. 2005]. This trend was confirmed by Physick-Sheard and Russel [1986] who reported that temporary absence from racing has favourable effect on the length of racing life. However, long pauses in the training and racing are associated with risk of serious injuries [Carrier *et al.* 1998]. Despite the mentioned doubts, younger age at the first start seems to be beneficial from the point of view of the economy of horse breeding as the maintenance costs of animals are reduced.

Racing performance

There was an unequivocal relation between the racing performance of the horse and the duration of its racing career. There is a greater chance for better horses to have a racing career longer. Both the log rank test and Wilcoxon test provide evidence that career length of horses positively related to the log of their earnings and negatively to the number of starts. Performance during the first year of racing (measured by earnings) was a significant predictor of length of racing life for both sexes, but more important for females (hazard ratio = 0.93 *vs* 0.84 for males and females respectively). The racing performance measured as earnings was clustered at the level of the trainer: horses within a single stable were much alike in terms of earnings than horses from other stables. The largest differences were observed between extreme classes of the trainer: horses trained by trainers that took care of up to 5 horses earned only half of prizes earned by horses trained by trainers who trained more than 50 horses. A question arises whether worse racing performance is a result of poorer skills of trainers or these trainers got worse horses for the training because their reputation is low. Probably both possibilities are true. The interactions between trainer and performance create difficulties in assessing the effect of correlated factors.

Intersex differences can also be observed when performance measured by number of starts during the first racing season is compared. Whereas the number of starts has a significant impact on career longevity for females, it was not found significant and had an opposite effect. Females that were raced less intensively were more likely to have long racing careers. The present results are in accordance with those reported for male Thoroughbreds by Bailey *et al.* [1999], but are opposite to the results published by More [1999].

Month of birth

No significant effects of month of birth were identified on racing life for males and females. However, there was a tendency for foals born later in a year to have a longer racing career. The effect of date of birth on subsequent length of racing life has previously been described by More [1999] who found that late births were more favourable than early births. Physick-Sheard [1986] has also reported that Canadian Standardbred foals born in April had longer racing career than those born in January.

Birth month may affect the growth and development of foals [Hintz *at al*. 1979] and hence may be a predictor of an early beginning of racing and longer career. This influence is likely to be associated with the nutritional status of the young horse. The present result contradicts the empirical assumption that late birth in a year is disadvantageous. It can be suggested that advantage due to early births is overestimated, and growth rate, development, and environmental effects as well as response to training, have a greater impact on long racing life.

Trainer

When males and females were pooled the effect of the trainer on career longevity was found significant, namely an increased professional experience of the trainer, as expressed by the greater number of horses in training, was associated with longer racing career of the horses trained. However, when considering sexes separately, the significant effect of the trainer was not identified, probably due to smaller sizes of the first trainer class 1 (up to 5 horses in training). Trainers who train a small number of horses are frequently their owners. Owners who trained their horses themselves wanted perhaps to delay competing in order to save horses for a longer career: proportion of horses that began starting as three-year-olds was three times greater in this group of trainers compared to others (30% and 10%, respectively). This result may be affected by the overlapping between age at first start and trainer. Moreover, as mentioned earlier, trainer effect was partly confused with the level of racing performance and then it would be risky to attribute most of the similarity in length of career to the effects of trainers. Influence of the trainer on career longevity comprises different components of racing ability. According to Mason and Bourke [1973] trainers had a significant effect on the soundness of two year old horses. Training alters the proportion of muscle fibres, which are considered to be appropriate adaptation to running distances at high speed [Yamano *et al.* 2002]. Rogers *et al*. [2005] reported the training methods to affect the changes in linear and temporal kinetic parametres of the gaits improving the horses ability to run at higher speed. After all, training has been found to have a significant impact on the risk of injury and thus on career longevity, as injuries are the major culling causes in Thoroughbred racehorse. Training regimen for young Thoroughbreds is responsible for musculoskeletal injuries particularly during the early stages of training [Verheyen *et al*. 2005].

The results of this study provide insight into the career of average Thoroughbred horses racing in Poland. The length of racing career has been found to be associated with horses sex, age at first start, earnings and number of starts at the first racing season. Similar risk factors were associated with career length in males and females except number of starts in the first racing season – females that were raced less intensively were more likely to have long racing careers. From a genetic improvement point of view the duration of racing career is difficult to be included in the selection programme. Estimated heritability of longevity is low [Burns *et al*. 2006] and the time needed to obtain enough information is long. Moreover, genetic evaluation of

the length of racing career is difficult by non-reporting or censoring of performance records. Nevertheless understanding of factors that affect the racehorse career length may reduce the expenses for breeding and training and make the respective decisions more objective.

REFERENCES

1. BAILEY C.J.,1998 – Wastage in the racing industry – approaches to study. Proceedings of the RIRDC Epidemiology Workshop for Equine Research Workers, Rural Industries Research and Development Corporation, Sydney, April, 43-52.
2. BAILEY C.J., REID S.W., HODGSON D.R., ROSE R.J., 1999 – Factors associated with time until first race and career duration for Thoroughbreds racehorses. ***American Journal of Veterinary Research*** 60 (10), 1196-1200.
3. BOURKE J.M., 1995 – Wastage in Thoroughbreds. Animal Seminar, Equine Branch, New Zealand Veterinary Association. Foundation for Continuing Education, no.167, 17-119.
4. BURNS E.M., ENNS R.M., GARRICK D.J., 2006 – The effect of simulated censored data on estimates of heritability of longevity in the Thoroughbred racing industry. ***Genetic Molecular Research*** 5, 7-15.
5. CARRIER T.K., ESTBERG L., STOVER S.M., GARDNER I.A., JOHNSON B.J., READ D.H., ARDANS A.A., 1998 – Association between long periods without high-speed workouts and risk of complete humeral or pelvic fracture in thoroughbred racehorses: 54 cases (1991-1994). ***Journal of American Veterinary Medicine Association*** 212 (10), 1582-1587.
6. HARKINS J.D., KAMERLING S.G., CHURCH G., 1992 – Effect of competition on performance of thoroughbred racehorses. ***Journal of Applied Physiology*** 72 (3), 836-841.
7. HENLEY W.E., ROGERS K., HARKINS L., Wood J.L., 2006 – A comparison of survival models for assessing risk of racehorse fatality. ***Preventive Veterinary Medicine*** 74(1), 3-20.
8. HERZOG B., LINDNER A., SOMMER H., 1993 – Comparison of the career profiles of racehorses over three decades. ***Berliner und Münchener Tierärztliche Wochenschrift*** 106(1), 16-17.
9. HINTZ H.F., HINTZ R.L., VAN VLECK L.D., 1979 – Growth rate of Thoroughbreds, effects of age of dam, year and month of birth. ***Journal of Animal Science*** 48 (3), 480- 487.
10. MADER D.R., Price E.O., 1980 – Discrimination learning in horses: Effect of breed, age and social dominance. ***Journal of Animal Science*** 50, 962-965.
11. MASON T.A., BURKE J.M., 1973 – Closure of the distal radial epiphysis and its relationship to unsoundness in two year old Thoroughbreds. ***Australian Veterinary Journal*** 49, 221-228.
12. MORE S.J., 1999 – A longitudinal study of Australian racing Thoroughbreds: performance during the first years of racing. ***Australian Veterinary Journal*** 77(2), 105-113.
13. PERKINS N.R., REID S.W., MORRIS R.S., 2005 – Profiling the New Zealand Thoroughbred industry. Conditions interfering with training and racing. ***New Zealand Veterinary Journal*** 53(1), 69-76.
14. PHYSICK-SHEARD P.W., RUSSEL M., 1986 – Career profile of the Canadian Standardbred. III. Influence of temporary absence from racing and season. ***Canadian Journal of Veterinary Research*** 50(4), 471-478.
15. PHYSICK-SHEARD P.W., 1986 – Career profile of the Canadian Standardbred. II. Influence of age, gait and sex upon number of races, money won and race times. ***Canadian Journal of Veterinary Research*** 50(4), 457-470.
16. RICARD A., FOURNET-HANOCQ F., 1997 – Analysis of factors affecting length of competitive life of jumping horses. ***Genetics, Selection, Evolution*** 29, 251-267.

17. ROGERS C.W., FIRTH E.C., ANDERSON B.H., 2005 – Musculoskeletal responses of 2-year-old Thoroughbred horses to early training. 5. Kinematic effects. ***New Zealand Veterinary Journal*** 53(2), 95-100.
18. SOBCZYŃSKA M., LUKASZEWICZ M., 2004 – Results of races of different status as a source of information for breeding value prediction of racehorses. ***Animal Science Papers and Reports*** 22(4), 637-643.
19. VERHEYEN K.L., HENLEY W.E., PRICE J.S., WOOD J.L., 2005 – Training-related factors associated with dorsometacarpal disease in young Thoroughbred racehorses in the UK. ***Equine Veterinary Journal*** 37(5), 442-448.
20. WILSHER S., ALLEN W.R., WOOD J.L., 2006 – Factors associated with failure of thoroughbred horses to train and race. ***Equine Veterinary Journal*** 38(2), 98-100.
21. YAMANO S., ETO D., SUGIURA T., KAI M., HIRAGA A., TOKURIKI M., MIYATA H., 2002 – Effect of growth and training on muscle adaptation in thoroughbred horses. ***American Journal of Veterinary Research*** 63(10), 1408-1412.

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Wpływ wybranych czynników na długość kariery wyścigowej koni pełnej krwi angielskiej w Polsce

S t r e s z c z e n i e

Zbadano wpływ płci, wieku rozpoczęcia kariery, trenera, miesiąca urodzenia oraz liczby startów i sumy wygranych (logarytm naturalny) w pierwszym sezonie na długość kariery wyścigowej wyrażonej liczbą sezonów wyścigowych 872 ogierów i 887 klaczy pełnej krwi, biorących udział w gonitwach płaskich w latach 1998-2005. Stosowano standardowe metody analizy przeżywalności (szacowanie funkcji przeżycia metodą Kaplana i Meiera i model proporcjonalnego hazardu Coxa). Porównanie krzywych przeżycia koni różnej płci wykazało, że kariery wyścigowe klaczy są wysoko istotnie krótsze niż kariery wyścigowe ogierów. Współczynnik hazardu dla długości kariery ogierów względem klaczy wyniósł 0,66. Analiza wpływu badanych czynników na długość kariery po uwzględnieniu płci, wykazała istotność wszystkich czynników oprócz miesiąca urodzenia. Największą wartość współczynnika hazardu uzyskano dla wieku rozpoczęcia kariery wyścigowej – w przypadku koni, które rozpoczynały rywalizację w wieku trzech lat ryzyko skrócenia kariery wyścigowej okazało się blisko 4,5 razy większe niż koni, które rozpoczynały karierę w wieku dwóch lat. Dłuższe kariery miały konie, które wygrały w pierwszym sezonie więcej pieniędzy, przy czym porównanie współczynników hazardu dla płci świadczy o większym znaczeniu wygranych dla klaczy (0,93 *vs* 0,84). W przypadku klaczy częściej startujących w pierwszym sezonie prawdopodobieństwo krótszej kariery wyścigowej okazało się większe. Odwrotna tendencja (nieistotna) wystąpiła w przypadku ogierów. Podsumowując należy stwierdzić, że spośród badanych czynników największy wpływ na długość kariery wyścigowej miał wiek jej rozpoczęcia. Opóźnienie pierwszego startu wielokrotnie zmniejsza szansę koni na dłuższą karierę, co nie pozwala na dokładną ocenę dzielności konia i zwrot kosztów związanych z jego utrzymaniem.