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**Characterization of the performance of purebred
Arabian horses in endurance riding in Poland
in the years 2005–2009**

Charakterystyka wyników uzyskiwanych przez konie czystej krwi arabskiej
w rajdach długodystansowych w Polsce w latach 2005–2009

Summary. Endurance riding is an equestrian discipline increasingly practised in Poland. In the years 2005–2009, equestrians competed 627 times on 225 purebred Arabian horses in various competitive categories. The horses came from 10 sire lines and 17 dam lines. The most frequently competing horses were from the sire lines Kuhailan Afas, Ibrahim and Saklawi I and from the dam lines Gazella and Mlecha. The greatest number of winning horses came from the sire lines Kuhailan Afas, Saklawi I and Ibrahim and from the dam lines Gazella, Mlecha and Sahara. Highly significant differences were noted between the average speeds obtained by Arabian horses during rides of different distances in competition. Distances were divided into those up to 80 km for young horses, with speed limits, and those over 80 km. In comparison with the average speeds achieved in Poland in 1991–1995, increases were observed on all distances.

Key words: Arabian horses, endurance riding

INTRODUCTION

Arabian horses are the most highly represented breed in endurance riding. They possess a great number of favourable qualities, including speed, stamina, strength, good health, ridability, agility, exceptional physiological parameters, and resistance to stress associated with prolonged exertion [Szarska 1998, 2004, Budzyński and Chmiel 1999, Pietrzak *et al.* 1999, Polak *et al.* 2005, Chmiel 2007]. Endurance riding is an equestrian discipline governed by the International Federation for Equestrian Sports (FEI). Of pri-

mary importance in this sport is the health and good condition of both a horse and a rider. In Europe, the best horses for endurance riding are bred in France, where “endurance lines” have been in existence for a long time.

It is currently too soon to speak of “endurance lines” in Poland. Nevertheless, it is unquestionably worth initiating specialized horse breeding for this equestrian sport [Szarska 1998, 2004, 2007].

The aim of this study was to present a characterization of the performance of Arabian horses taking part in endurance rides according to sire lines and dam lines, and to determine what average speeds Arabian horses obtained on various distances, applying the division into distances up to and over 80 km. An attempt was also made to determine which lines produced the most frequently winning horses, which may be useful in selecting parents for future matings aimed at producing offspring suitable for endurance riding.

MATERIAL AND METHODS

The material for the study consisted of purebred Arabian horses that took part in endurance rides in Poland between 2005 and 2009. Data were collected based on compilations of season results, including the Polish Championships, international competitions in Poland, national competitions, and regional and amateur competitions [Wyniki... 2005–2009]. The data were analysed statistically. Starts by the investigated horses were broken down by sire lines and dam lines, and it was shown which lines supplied the most frequently winning horses during the period analysed. Moreover, calculations were made of the average speeds obtained by the horses on various distances, depending on the level of the competition. The significance of the differences between these averages was analysed using one-way variance analysis and Duncan's multiple range test [Ruszczyc 1981]. Standard deviation and coefficient of variation were calculated for the average speeds obtained by the horses in particular distance ranges.

RESULTS AND DISCUSSION

As the population of Arabian horses in Poland is increasing with every year, their use in endurance riding is continually improving. In the years 2005–2009, equestrians competed on 225 purebred Arabian horses in various competitive categories and on various distances. The total number of starts by the horses during this period was 627.

Training for endurance riding begins with 4-6-year-old horses, which reach their peak after a few years. Regulations define the minimum age at which horses can take part in competitions at a particular level. A properly utilized endurance horse can achieve very good results even at the age of 16–18 years. However, competing too soon can lead to the end of a horse's career [Szarska 2004].

In the period analysed, the greatest number of Arabian horses – 98 – competed in 2009, and the fewest – only 41 – in 2007. The total number was 348, which was greater than the number of Arabian horses taking part in rides, as during the period analysed many of them competed every year, or on and off for a few years. The average number of starts per horse was 1.80; the lowest was 1.78, in 2007, and the highest was 2, in 2008.

Table 1. The number of purebred horses and their starts in endurance rides in the years 2005–2009
Tabela 1. Liczba koni czystej krwi i ich startów w rajdach w latach 2005–2009

Year of competition Rok startu	2005	2006	2007	2008	2009	Total Łącznie
Number of horses Liczba koni	61	72	41	76	98	348
Number of starts Liczba startów	116	110	73	152	176	627
Average number of starts per horse Średnia liczba startów przypadająca na konia w danym roku (\bar{x})	1.90	1.53	1.78	2.00	1.80	1.80

Arabian horses competing in endurance rides in 2005–2009 came from 10 sire lines and 17 dam lines (Tables 2 and 3).

Table 2. Number of starts by purebred horses in the years 2005–2009 by sire line
Tabela 2. Liczba startów koni czystej krwi w latach 2005–2009 według przynależności do rodów męskich

Sire line Ród męski	Number of starts on distances up to 80 km Liczba startów na dystansach do 80 km		Number of starts on distances over 80 km Liczba startów na dystansach powyżej 80 km	
	number szt.	%	number szt.	%
Kuhailan Afas or.ar. 1930, imp. 1931 Gumniska	134	28.5	27	17.3
Ibrahim or.ar. 1899, imp. 1907 Antoniny	74	15.7	25	16.0
Saklawi I 1886 breeder Anazeh Ruala	61	13.0	25	16.0
Kuhailan Haifi or.ar. 1923, imp. 1931 Gumniska	50	10.6	17	11.0
Bairactar or.ar. 1813, imp. 1817 Weil	39	8.3	19	12.2
Krzyżyk or.ar. 1869, imp. 1876 Jarczowce	35	7.4	15	9.6
Ilderim or.ar. 1894, imp. 1900 Sławuta	28	5.9	3	1.9
Koheilan Adjuze or.ar. 1876, imp. 1885 Bąbolna	10	2.1	5	3.2
Latif or.ar. 1903, imp. 1845 Jarczowce	1	0.2	-	-
Other Inne	39	8.3	20	12.8
Total Łącznie	471	100.0	156	100.0

Table 3. Number of starts by purebred horses in the years 2005–2009 by dam line
 Tabela 3. Liczba startów koni czystej krwi w latach 2005–2009 według przynależności do linii żeńskich

Dam line Linia żeńska	Number of starts on distances up to 80 km Liczba startów na dystansach do 80 km		Number of starts on distances over 80 km Liczba startów na dystansach powyżej 80 km	
	number szt.	%	number szt.	%
Gazella or.ar. ~1840, imp. 1845 Jarcowce	97	20.6	38	24.4
Mlecha or.ar. ~1840, imp. 1845 Jarcowce	84	17.8	37	23.7
Milordka ~1810 bred by Sławuta	48	10.2	12	7.7
Sahara or.ar. ~1840, imp. 1845 Jarcowce	56	11.9	14	9.0
Wołoszka 1810 bred by Sławuta	40	8.5	10	6.4
Szamrajówka ~1810 bred by Biała Cerkiew	22	4.7	-	-
Rodania or.ar. ~1869, imp. 1881 Crabbet Park	16	3.4	7	4.5
Szweykowska ~1800, bred by Sławuta	19	4.0	8	5.1
Selma or.ar. 1865, breeder Abbas Pasha I	10	2.1	-	-
Scherife or.ar. 1896, imp. 1902 Bąbolna	13	2.8	4	2.6
Cherifa or.ar. 1869, imp. 1870 Tiaret	10	2.1	4	2.6
Ukrainka ~1815 bred by Sławuta	3	0.6	-	-
Adjuze or.ar. 1876, imp. 1885 Bąbolna	5	1.1	1	0.6
Ghazieh or.ar. ~1850 breeder Anazeh Ruala	4	0.9	-	-
Semrie or.ar. 1896, imp. 1902 Bąbolna	3	0.6	1	0.6
El Obeya Om Grees or.ar.	2	0.4	-	-
Other Inne	39	8.3	20	12.8
Total Łącznie	471	100.0	156	100.0

In competitions on distances both up to and over 80 km, the most frequently represented the sire lines were Kuhailan Afas, Ibrahim and Saklawi I (total up to 80 km: 269 starts – 57.5% and over 80 km: 77 starts – 49.3%). Horses from the Kuhailan Afas or.ar. line have had by far biggest number of starts (134 – 28.5% and 27 – 17.3%, respectively). Among his descendants have been numerous outstanding stallions and mares which have played an important role in horse breeding in Poland and abroad. Representatives of this line have outstanding riding predispositions, both in races and in other equestrian disciplines, good movement, and a correct build. They also combine well with other lines [Pawelec-Zawadzka *et al.* 2001]. After this line, the most frequently represented was that of the stallion Ibrahim or.ar. (up to 80 km 74 times – 15.7%, over 80 km 25 times – 16.0%), followed by the lines of Saklawi I, Kuhailan Haifi or.ar., Bairactar or.ar. and Krzyżyk or.ar. Horses from the Krzyżyk line are willing to work, gentle, and also hardy and even-tempered [Chmiel 2007]. Taking part in the fewest competitions at distances over 80 km were horses from the lines Ilderim or.ar. (3 starts – 1.9%) and Koheilan Adjuzo or.ar. (5 starts – 3.2%). Horses from the Latif or.ar. line did not compete in even one competition on the longest distances during the analysed period. The 36 Arabian horses of foreign origin from the group designated as “Other” competed 39 times on distances up to 80 km, which constituted 8.3% of starts, and 20 times on distances over 80 km – 12.8% of starts (Table 2).

Starts by purebred Arabian horses in endurance rides in Poland during the period analysed, broken down by dam lines, are presented in Table 3.

The greatest number of starts in endurance rides, both up to and over 80 km, were noted in horses from the mare lines Gazella or.ar. (97 times – 20.6% and 38 times – 24.4%) and Mlecha or.ar. (84 times – 16.9% and 37 times – 23.7%). After these, the lines most frequently represented were Sahara or.ar. (up to 80 km 56 times – 11.9% and over 80 km 14 times – 9.0%) and Milordka (up to 80 km 48 times – 10.2% and over 80 km 25 times – 7.7%). Fewer starts were noted among horses from the following lines: Wołoszka, Szamrajówka, Rodania or.ar., Szweykowska, Selma or.ar., Scherife or.ar., and Cherifa or.ar. Purebred Arabian horses of foreign origin from the group “Others” competed 39 times at distances up to do 80 km (8.3%) and 20 times at distances over 80 km (12.8%), which places them in the middle in terms of number of starts (Table 3).

The most important in endurance riding is who finishes at or near the front on the longest distances, and these lines will interest both potential breeders and those purchasing horses for endurance riding. The greatest numbers of horses finishing from first to fourth in endurance rides on distances over 80 km came from the Kuhailan Afas, Saklawi I and Ibrahim lines (13, 14 and 11, respectively). The fewest winners were noted among the Ilderim and Koheilan Adjuzo lines. Latif horses did not take part in longer-distance competitions (Table 4).

Among Arabian horses taking part in endurance rides between 2005 and 2009, the greatest number of winning horses, securing one of the first four places in rides over 80 km, were from the dam lines Gazella – 27, Mlecha – 23 and Sahara 11 (Table 5). Information about which dam lines or sire lines supply the most winning horses can be helpful in selecting future endurance horses or in selecting parents with the aim of obtaining progeny that will perform well in endurance rides.

Table 4. Number of places 1 to 4 attained by purebred Arabian horses on distances over 80 km by sire line
 Tabela 4. Liczba miejsc od I do IV uzyskanych przez konie czystej krwi arabskiej na dystansach powyżej 80 km według przynależności do rodów męskich

Sire line Ród męski	Over 80 to 120 Powyżej 80 do 120	Over 120 to 140 Powyżej 120 do 140	Over 140 Powyżej 140
	number szt.	number szt.	number szt.
Kuhailan Afas or.ar. 1930, imp. 1931 Gumniska	8	2	3
Ibrahim or.ar. 1899, imp. 1907 Antoniny	10	1	-
Saklawi I 1886 breeder Anazeh Ruala	11	3	-
Kuhailan Haifi or.ar. 1923, imp. 1931 Gumniska	8	2	-
Bairactar or.ar. 1813, imp. 1817 Weil	8	1	4
Krzyżyk or.ar. 1869, imp. 1876 Jarczowce	4	1	1
Ilderim or.ar. 1894, imp. 1900 Sławuta	3	-	-
Koheilan Adjuze or.ar. 1876, imp. 1885 Bąbolna	4	-	-
Latif or.ar. 1903, imp. 1845 Jarczowce	-	-	-
Other Inne	5	-	6

Based on the average speeds attained by the Arabian horses on distances up to 80 km, an upward trend was observed in successive distance ranges. Differences between average speeds were highly significant. The lowest average speed was noted in the 10 to 40 km range – 11.81 km/h, and the highest was noted in the over-60 to 80 km range – 14.59 km/h. The highest standard deviation was noted in the over-40 to 60 km range – 2.09, while the highest coefficient of variation, 15.57%, was observed on the shortest distances, i.e. in the 10 to 40 km range (Table 6).

The highest average speed was noted on distances from over 80 to 120 km – 14.59 km/h. In the case of the two longest distances, i.e. from over 120 km to 140 km and over 140 km, the average distances show a marked decrease (Table 7).

Based on variance analysis and Duncan's multiple range test, highly significant differences were found between average speeds at different distances. The standard deviation for all the distances was low – from 1.51 in the 140 to 160 km range to 2.09 in the over-40 to 60 km range. The coefficient of variation was also low, from 11.54% in the over-80 to 120 km range to 15.57% on distances up to 40 km. Comparison of the average speeds obtained on various distances with data from the literature [Riedler 1993] shows that average speed is lower in Poland. However, in comparison with the average speeds obtained in Poland in 1991–1995, increases were noted at all distances [Dębecka and Szarska 1997].

Table 5. Number of places 1 to 4 attained by purebred Arabian horses
on distances over 80 km by dam line

Tabela 5. Liczba zajętych miejsc od I do IV uzyskanych przez konie czystej krwi arabskiej
na dystansach powyżej 80 km według przynależności do linii żeńskich

Dam line Linia żeńska	Over 80 to 120 Powyżej 80 do 120	Over 120 to 140 Powyżej 120 do 140	Over 140 Powyżej 140
	number szt.	number szt.	number szt.
Gazella or.ar. ~1840, imp. 1845 Jarczowce	20	6	1
Mlecha or.ar. ~1840, imp. 1845 Jarczowce	20	-	3
Milordka ~1810 bred by Sławuta	7	-	-
Sahara or.ar. ~1840, imp. 1845 Jarczowce	7	1	3
Wołoszka 1810 bred by Sławuta	5	1	-
Szamrajówka ~1810 bred by Biała Cerkiew	-	-	-
Rodania or.ar. ~1869, imp. 1881 Crabbet Park	3	2	1
Szweykowska ~1800 bred by Sławuta	7	-	-
Selma or.ar. 1865 breeder Abbas Pasha I	-	-	-
Scherife or.ar. 1896, imp. 1902 Bábolna	1	-	-
Cherifa or.ar. 1869, imp. 1870 Tiaret	1	-	-
Ukrainka ~1815 bred by Sławuta	-	-	-
Adjuze or.ar. 1876, imp. 1885 Bábolna	-	-	-
Ghazieh or.ar. ~1850 breeder Anazeh Ruala	-	-	-
Semrie or.ar. 1896, imp. 1902 Bábolna	-	-	-
El Obeya Om Grees or.ar.	-	-	-
Other Inne	5		6

Table 6. Speed attained by purebred Arabian horses in endurance rides on distances up to 80 km
Tabela 6. Prędkości pokonywania tras rajdowych przez konie czystej krwi arabskiej na dystansach do 80 km

Distance (km) Dystans (km)	Number of starts Liczba startów	Speed (km/h) Prędkość			Standard deviation S Odchylenie standardowe	Coefficient of variability v (%) Współczynnik zmienności
		Mean \bar{x}	Minimum	Maximum		
10 to 40 10 do 40	198	11.81 _{AC}	7.16	20.04	1.84	15.57
over 40 to 60 powyżej 40 do 60	187	13.82 _{AB}	8.76	18.92	2.09	15.16
over 60 to 80 powyżej 60 do 80	86	14.59 _{BC}	11.32	19.02	1.94	13.31

The same capital letters next to average values indicate highly significant differences ($P < 0.01$)
Średnie oznaczone tą samą literą różnią się wysoko istotnie; duże litery ($P \leq 0,01$)

Table 7. Speed attained by purebred Arabian horses in endurance rides on distances over 80 km

Tabela 7. Prędkości pokonywania tras rajdowych przez konie czystej krwi arabskiej na dystansach powyżej 80 km

Distance (km) Dystans (km)	Number of starts	Speed (km/h) Prędkość			Standard deviation S Odchylenie standardowe	Coefficient of variability v (%) Współczynnik zmienności
		Mean \bar{x}	Minimum	Maximum		
over 80 to 120 powyżej 80 do 120	112	14.95 ^{Aa}	11.10	18.42	1.73	11.54
over 120 to 140 powyżej 120 do 140	20	14.64 ^{ab}	12.02	17.98	1.91	13.04
over 140 powyżej 140	24	14.14 ^{Ab}	11.15	16.91	1.51	10.68

The same capital letters next to average values indicate highly significant differences ($P < 0.01$), lower-case letters indicate significant differences ($P < 0.05$)

Średnie oznaczone tą samą literą różnią się: wysoko istotnie – duże litery przy ($P \leq 0,01$), istotnie – małe litery przy ($P \leq 0,05$)

CONCLUSIONS

1. The average number of starts per Arabian horse during the period analysed was 1.80.
2. Arabian horses competing between 2005 and 2009 came from 10 sire lines and 17 dam lines. In competitions at distances both up to and over 80 km, horses from the sire lines Kuhailan Afas, Ibrahim and Saklawi I and from the dam lines Gazella and Mlecha competed most frequently.
3. The greatest number of winning horses came from the sire lines Kuhailan Afas, Saklawi I and Ibrahim, and from the dam lines Gazella, Mlecha and Sahara.
4. Highly significant differences were found between the average speeds attained by Arabian horses on different distances in endurance competitions. Compared with the average speeds attained in Poland in 1991–1995, increases were noted at all distances.

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Streszczenie. Endurance – rajdy długodystansowe – to jeździectwo coraz częściej uprawiane w Polsce. W latach 2005–2009 zawodnicy startowali 627 razy na 225 koniach czystej krwi arabskiej w różnych kategoriach konkursowych. Pochodziły one z 10 rodów męskich i 17 linii żeńskich. Najwięcej razy startowały konie pochodzące z rodów Kuhailan Afas, Ibrahim i Saklawi I oraz z linii żeńskich kl. Gazella i Mlecha. Najwięcej zwycięzców pochodziło z rodów Kuhailan Afas, Saklawi I i Ibrahim oraz z następujących linii żeńskich: Gazella, Mlecha i Sahara. Wykazano wysoko istotne różnice pomiędzy średnimi prędkościami uzyskiwanymi przez konie arabskie na różnych długościach tras w konkurencjach rajdowych. Wprowadzono podział do 80 km dla niskich klas, na których są limity prędkości, oraz ponad 80 km. W porównaniu ze średnimi prędkościami uzyskiwanymi w kraju w latach 1991–1995 odnotowano wzrost prędkości na wszystkich dystansach.

Słowa kluczowe: konie arabskie, długodystansowe rajdy konne