Duration of reproductive utilization of mares from Purebred arabian and Shagya-arabian breed

Продължителност на репродуктивното използване на кобили от породите Чистокръвен арабски кон и Арабска шагия

Maya, POPOVA

1 Agricultural University – Plovdiv, * correspondence e-mail: m_popova1@abv.bg

Abstract

An analysis was made of the reproductive utilization of mares from the Purebred Arabian and Shagya-Arabian breed in the only National State Stud Farm Kabiyuk near Shumen. Stud book records and the breeding registers for a 32-year period (1980-2012) were used for the analysis. Thirty-nine Purebred Arabian mares and 52 mares from the Shagya-Arabian breed were included in the study. It was established that the average (LS) age at first covering of the mares of Purebred Arabian breed was 1584,2 ± 29,5 days (4,34 years), the average age at first fertilization was 1682,9 ± 24,1 days (4,61 years) and the average age at first foaling was 2117,7 ± 69,9 days (5,80 years). For the mares from the Shagya-Arabian breed, the average values of those traits were 1617,1 ± 18,1(4,43 years), 1673,9 ± 18,8 (4,59 years) and 2202,4 ± 53,9 days (6,03 years), respectively. The mares from the Purebred Arabian breed were used for breeding for 11,0 ± 1,04 years in average, to the age of 15,3 ± 1,06 years, and those of Shagya-Arabian breed for 12,2 ± 1,01 years to the age of 16,4 ± 1,19 years, respectively. The breed is not a significant source of variation in reproductive performance of the mares.

Keywords: Age at first covering, age at first fertilization, age at first foaling, arabian mares, reproductive utilization

Резюме

Направен е анализ на репродуктивното използване на кобилите от породите Чистокръвен арабски кон и Арабска шагия, от единствения държавен конезавод в България - „Кабиюк“ край гр. Шумен. За анализа са използвани племенните записи от заводските племенните книги и случните регистри за 32 годишен период (1980 – 2012 г). В проучването са включени 39 чистокръвни арабски кобили и 52 кобили от породата Арабска шагия. Установено е, че средната (LS) възраст на първо покриване при кобилите от Чистокръвната арабска порода е 1584,2 ± 29,5 дни, средната възраст на първо запложданe е 1682,9 ± 24,1 дни, а средната възраст на първо ожребване – 2117,7 ± 69,9 дни. При кобилите от породата Арабска шагия средните стойности на тези показатели са съответно 1617,1 ± 18,1, 1673,9 ± 18,8, 2202,4 ± 53,9 дни. Кобилите от породата Чистокръвен арабски кон са се използвали за разплод средно 11,0 ± 1,04 год.

до възраст 15,3 ± 1,06 год, а тези от породата Арабска шагия съответно 12,2 ± 1,01 год. и 16,4 ± 1,19 год. Породата не е достоверен източник на вариране на репродуктивните способности на кобилите.

Ключови думи: Арабски кобили, възраст на първо покриване, първо запложданe, първо ожребване, репродуктивно използване

Introduction

The creation of the Arabian section in the state stud Kabiyuk started in the year of its establishment (1894) by buying 10 mares and the stallion Contour from the stud farms of Count Stanislaw Dzieduszycki and Dionisi Tshetsiyak, located in Poland. Later stallions and mares were imported from Poland, Turkey and Austro-Hungary (Radautz). The genealogical structure of the breed was built up on the basis of their progeny and periodical import of breeding material. The herd was qualified as half-bred in the middle of the 20th century, when six mares and two stallions of Shagya type were used. At that time, the section was directed towards an increase in height (Sabeva, 2009).

The systematic breeding work with the Purebred Arabian breed (PAB) in Bulgaria began at the end of the 70's of the last century, when 6 purebred mares were introduced from the Michalow Stud, Poland and 2 from the Tersk Stud, Russia. Initially, the aim was to gradually replace the half-bred mares by purebred ones. The exceptional breeding and market value of half-bred Arabians, whose exterior and constitutional type was practically identical with that of purebred horses, was realized some years later. The breeding activities were directed to the maintenance of two elite breeding types – the first one of the Purebred Arabian breed, and the second one of the Shagya-Arabian breed (ShAB), (Sabeva, 2009).

Our country was officially recognized as a member of the World Arabian Horse Organization – WAHO and the Internationale Shagya-Araber Gesellschaft – ISG. That opened the doors of the Bulgarian horses from both breeds to the international market (Popova, 2013).

Over the past years, a great interest has been put in the horses from those two breeds, both at home and abroad.

The efficiency of the horse breeding process is directly related to the reproductive performance of the horses. The reproductive performance of the mares is important for reducing the generation interval and increasing the accuracy of estimation of the breeding value.

The aim of the present research was to study the reproductive performance of Purebred Arabian breed and Shagya-Arabian breed in the only National State Stud Farm Kabiyuk in Bulgaria.

Materials and Methods

The study was carried out on the population of horses from the stud farm Kabiyuk, Shumen town. It included all the mares from Purebred Arabian and Shagya-Arabian breeds used for breeding during the period 1980 – 2012. The two breeds were raised and fed under the same conditions. The stud book records and the breeding register for 39 Purebred Arabian mares and 52 mares from the Shagya-Arabian breed were

analyzed. Records for the age at first covering were available for 19 mares from PAB and 28 mares from ShAB, for the age at first fertilization – for 39 and 52 mares and for the age at first foaling – for 39 mares and 50 mares, respectively. The duration of the reproductive life (the year of entry into the breeding herd until the year of leaving because of culling or death) and the duration of usage (from birth to leaving the breeding herd) were studied for 18 mares from PAB and 20 mares from ShAP.

The multifactorial ANOVA was used for data processing, the linear model being of the following statistical form:

Yijkl=μ+YBi+MBj+Bk+eijk(l); where : Yijkl – surveillance vector; μ – overall average constant; YBi, MBj, Bk are fixed effects of the year of birth (i=14), month of birth (j=8) and the breed (k=2), respectively; eijk(l) – residual variance. For the traits duration of reproductive utilization and duration of usage, the age at first fertilization was included as an additional fixed factor. For this purpose, 7 groups were formed with a step deviation from the mean 0, 5 σ.

Results and Discussion

The age at first covering and its impact on the reproductive performance of the mare and the quality of the offspring, has been a subject of many studies. Taveira et al. (2007) reported that in Thoroughbred mares in Brazil, the average age at first covering was 4,93 years, with a standard deviation of 1,45 years, the minimum age being 2,07 years and the maximum one – 11,94. The average age at first parturition was 6,01 years, with a standard deviation of 1.53 years, the minimum age being 3,01 years and the maximum one – 12,9. In the same study, the authors cited slightly lower values for age at first covering for the Indian breeds Marwari and Katiavari – 4,25 years and 4,33 years, respectively.

The average values of the studied traits of the investigated breeds were presented in Table 1.

Table 1. Reproductive performance of mares from PAB and ShAB

табл. 1 Репродуктивни показатели на кобилите от ЧАрП и АрШП

Traits / Показатели	Total/Общо		Purebred Arabian/ Чистокръвен арабски кон		Shagya – Arabian/ Арабска - шагия	
	LS	±SE	LS	±SE	LS	±SE
Age at first covering, days/ Възраст на първо покриване, дни	1600,7	18,5	1584,2	29,5	1617,1	18,1
Age at first fertilization, days/ Възраст на първо запложданe, дни	1678,4	16,8	1682,9	24,1	1673,9	18,8
Age at first foaling, days/ Възраст на първо ожребване, в дни	2160,0	48,5	2117,7	69,9	2202,4	53,9
Reproductive life, years/ Репродуктивен живот, год.	12,2	0,69	11,0	1,04	12,2	1,01
Duration of usage, years/Стопански живот, год.	16,6	0,68	15,3	1,06	16,4	1,19

The average age at first fertilization of the mares was 1678,4 ± 16,8 days (4,59 years). The values of that characteristic were almost identical in both breeds, as the breed is not a reliable source of variation of the trait (Table 2).

Table 2. Effect of the breed, month, year of birth and age at first fertilization on the reproductive performance

табл. 2 Влияние на породата, месеца, годината на раждане и възраст на първо запложданe върху репродуктивните показатели

Traits / Показатели	F-criterion and degree of statistical significance / F-критерий и степен на достоверност			
	Breed / Порода	Month of birth / Месец на раждане	Year of birth / Година на раждане	Age at first fertilization / Година на първо запложданe
Age at first covering, days/ Възраст на първо покриване, дни	1,064	7,156***	3,095*	
Age at first fertilization, days/ Възраст на първо запложданe, дни	0,109	0,882	0,498	
Age at first foaling, days/ Възраст на първо ожребване, дни	1,162	1,67	1,136	17,616***
Reproductive life, years/ Репродуктивен живот, год.	1,588	5,195*	9,668**	4,480*
Duration of usage, years/ Стопански живот, год.	0,006	2,525	5,018*	2,27

***P<0,001, **P<0,01, *P<0,05

The first foaling of the Arabian horses in the stud farm Kabiyuk was at the average age of 2160 ± 48,5 days (5,92 years). Compared to data reported by Rastija et al. (2005) for mares from the Lipizzaner breed, where the age at first fertilization was 1157 days and at first foaling – 1489 days, it could be seen that the mares from both breeds of the present study were foaling for the first time approximately 2 years later. The possible reason for that could be the testing of the young mares even after 3 years of age, thus impeding their earlier cover. The average age at first covering in the studied populations of PAB and ShAB was 1600,7 ± 18,5 days (4,39 years), the year and month of the animal birth having a statistically significant effect on the indicator (Table 2).

Karadzhov (1997) studied the fertility and the age at first foaling in mares from the Danubian and Pleven breeds. Both breeds had similar age at first fertilization – 1600 days and at foaling – 1950. The author pointed out the reasons of the established ages, the traditional inclusion of young mares in the breeding process only during the autumn assessments. Then the mares were usually already 3,5 to 4 years old.

Transferring them to the main herd was an additional stress factor that could delay the onset of estrus.

Fig. 1 shows that the highest percentage of mares from PAB were covered in February – more than 30%, and the lowest – in the period from November to January – 5%. The highest percentage of mares from ShAB were covered in April – more than 25% and the lowest – in December – less than 5%. During the months from July to October there were not any covered mares from both breeds.

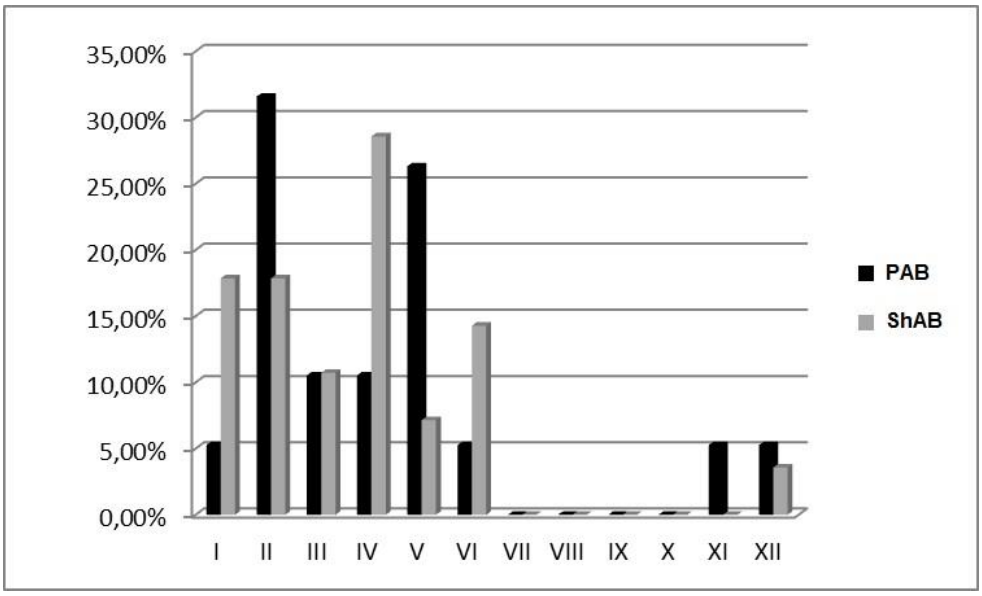

Fig. 1. Percentage distribution of first covering by months

фиг. 1 Процентно разпределение на първо покриване по месеци

In PAB the largest number of inseminated mares was reported in February and June (Fig. 2), while in ShAB the percentage of inseminated mares was the highest in March.

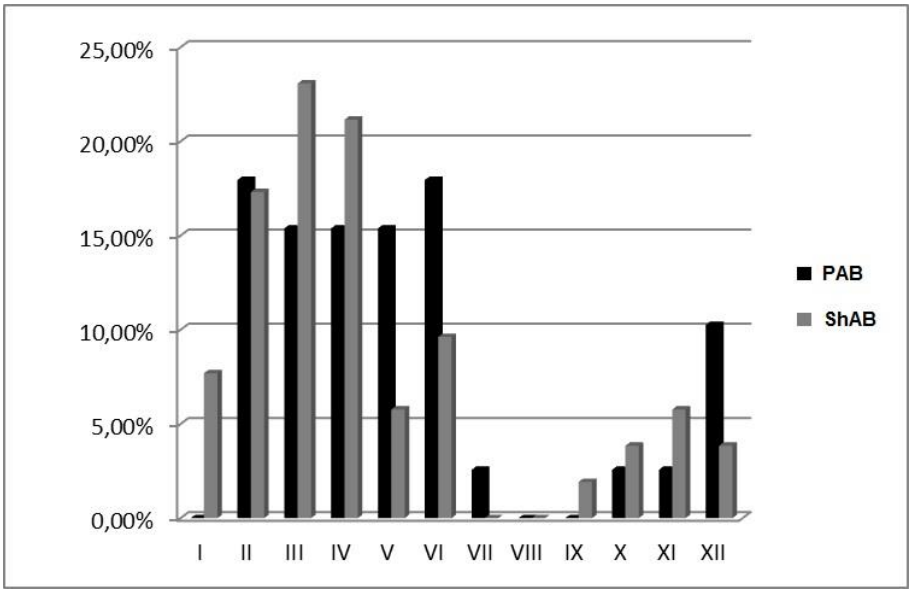

Fig. 2. Percentage distribution of first fertilization by months

фиг. 2 Процентно разпределение на първо запложданe по месеци

In both breeds a higher fertilization rate was observed in the months from February to April, while the lowest fertilization rate was in the summer and autumn months. No fertilized mares from both breeds were reported in August. The reasons might be sought both in the biological peculiarities of the breeds and in the summer temperatures. Horses are seasonally-polycyclic animals. The major factors affecting the presence or absence of reproductive activity are day length and the ambient temperature.

The age at first fertilization highly correlates (r = 0,855) with the age at first foaling, the Purebred Arabian breed having a higher correlation (r = 0,892) in comparison with the Shagya-Arabian breed (r = 0,816). For the mares of Shagya-Arabian breed the first fertilization after 4.7 to 5.1 years of age was ineffective (Fig. 3). The difference between the first fertilization and the first foaling was significant, probably due to an increase in the number of abortions. A big difference between the age at first fertilization and first foaling was also observed in that breed compared to Purebred Arabian breed in the previous period – when fertilization was performed between 1432 (3,92 years) and 1721 day (4,72 years).

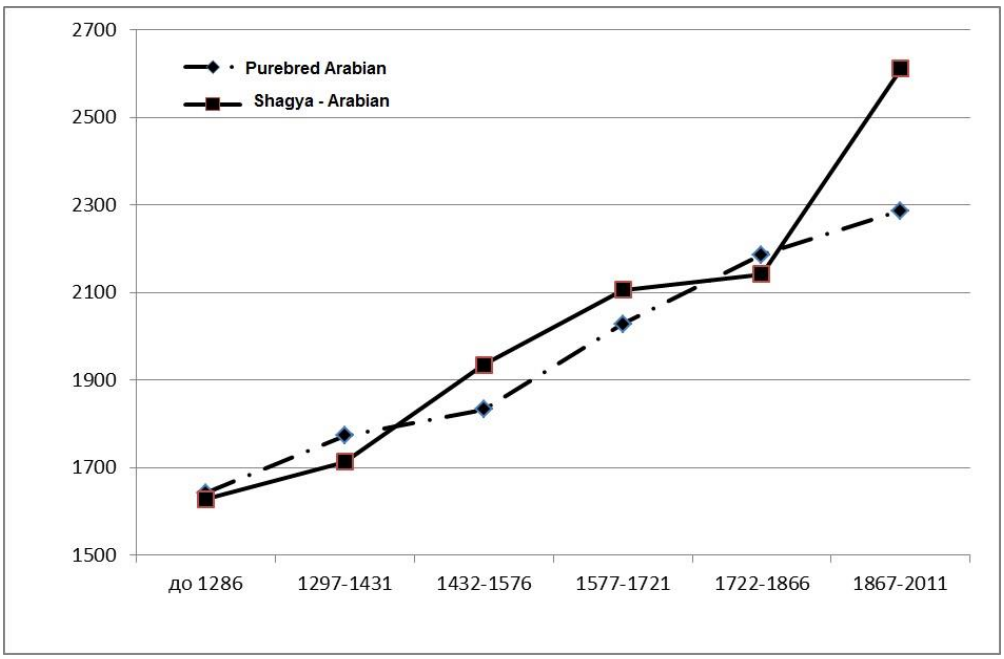

Fig. 3. Correlation between the age at first fertilization and first foaling in mares from the breeds Purebred Arabian horse and Shagya-Arabian

фиг. 3 Зависимост между възрастта на първо запложданe и първо ожребване при кобили от породите Чистокръвен арабски кон и Арабска шагия

The study of the traits duration of the reproductive life and duration of usage was carried out only for the mares, which were excluded from breeding during the studied period. Mares that had been used for breeding for a few years but were not fertilized even once, were also not included in the investigation.

The mares from Purebred Arabian breed were used for breeding for 11,0 ± 1,04 years in average and those from ShAB – about a year longer, i.e. for 12,2 ± 1,01 years. In a research study on the same trait for mares from the Danubian and Pleven breeds, Karadzhov (1997) indicated 9,5 years and 9,7 years, respectively. In a study on the duration of reproductive utilization, Sabeva (2012) found out that for the mares from ShAB it was 8,62 years in average, 29,7% of the mares being used for five years, 30,69% – for 12 years and 39,69% – over 12 years. In another study on the same trait for mares from the PAB, the author (Sabeva, 2011) reported that the duration of the reproductive life was 9,17 years. In a study in Poland, Wolc (2009) found out that the mares from the half-breeds were used for breeding for 7,3 years in average.

The duration of the reproductive life correlates highly and positively with the duration of usage. For the mares from PAB it is 15,3 ± 1,06 years in average and for the mares from ShAB – 16,4 ± 1,19 years, the breed not being a significant source of variation for the duration of use of the mares. The year of birth (P <0,01), month of birth (P <0,05) and age at first fertilization (P <0,05) had a significant influence on the duration of the reproductive life, while only the month of birth (P <0,05) had a significant effect on the duration of usage. Similar influence was also established by Karadzhov (1997), who pointed out that the year of birth had highly significant influence (p <0,001) on the traits duration of the reproductive life and duration of usage in the mares from Danubian and Pleven breeds. The author gave as a reason the feeding and raising conditions provided for the mares from the very first day after their birth, on which their further efficiency and use largely depend.

Conclusions

It was established that the average (LS) age at first covering of the mares of Purebred Arabian breed was 1584,2 ± 29,5 days (4,34 years), the average age at first fertilization was 1682,9 ± 24,1 days (4,61 years) and the average age at first foaling was 2117,7 ± 69,9 days (5,80 years). For the mares from the Shagya-Arabian breed, the average values of those traits were 1617,1 ± 18,1(4,43 years), 1673,9 ± 18,8 (4,59 years) and 2202,4 ± 53,9 days (6,03 years), respectively.

The breed is not a significant source of variation in reproductive performance of mares.

Both breeds had a higher fertilization rate in the months from February to April, while the lowest fertilization rate was established in the summer and autumn months.

The mares from the Purebred Arabian breed were used for breeding for 11,0 ± 1,04 years in average, until the age of 15,3 ± 1,06 years, and those of Shagya-Arabian breed for 12,2 ± 1,01 years, until the age of 16,4 ± 1,19 years, respectively. The year of birth, month of birth and age at first fertilization had a significant influence on the duration of the reproductive life.

Acknowledges

This article was written through project num. 02-13 to the Scientific Research Centre of the Agricultural University - Plovdiv, Bulgaria, with supervisor Prof. Dr. Vasil Nikolov and project members Prof. Dr. George Barzev, Assoc Prof. Peter Batsalov,

Assoc.Prof Iliana Sabeva, assistant Maya Popova and Zooengineer Svetozar Kaschiev.

I would like to express my sincere thanks to zooengineer Svetozar Kastchiev head of the horse breeding department at the state stud of Kabiuk and dressage-champion of Bulgaria for the provided data and support. I am extremely grateful and indebted to him for his expert, sincere and valuable encouragement extended to me.

References

Karadzhov, T., (1997). Vliyanie na nyakoi genetichni i negenetichni faktori varhu reproduktivnite pokazateli i eksteriornite izmerenia pri konete ot Plevenska i Dunavska porodi. St.Zagora 1997 Disertatsia.

Popova, M., (2013). Dynamics of the organization, management and state of the breeding process in horse breeding. Agricultural science,Vol. V, Issue 13, p. 71-75.

Rastija, T., Mirjana Baban, Z. Antunović, I. Mandić, M. Čači, (2005).Pripusna dozrelost mladih plotkinja lipicanske pasmine. Poljoprivreda (Osijek) (1330-7142) 11 (2005), 1; p. 54-56.

Sabeva, I., (2009). Proizhod i razvitie na Arabskata i Shagia porodi v Bulgaria. Kabiyuk

Sabeva, I., A. Apostolov, (2011). Longevity and life reproductive efficiency in Arabian broodmares. *Archiva Zootechnica 14:3, 66-74, 2011*

Sabeva, I., A. Apostolov, (2012). Longevity of Shagya broodmares. *Bulg. J. Agric. Sci.,* 18, p. 272-277

Taveira, R., M. S. da Mota, (2007). Genetic and quantitative evaluation of breeding traits in thoroughbred mares. REDVET: 2007, Vol. VIII Nº 5

Wolc, A., Torzynski, G. and Szwaczkowski, T. 2009. Genetic effects on reproductive traits in Warmblood horses. Can. J., Anim. Sci. 89: 215-218.