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BREEDING AGE OF MARES FROM THE HAFLINGER BREED, DURATION OF GESTATIONAL LENGTH AND THE INFLUENCE OF SOME PARATYPE FACTORS ON IT

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Abstract

A study of the gestational length (GL) in mares from the Haflinger breed and the influence of the age, mating season and sex of the foal on it was conducted. The records used for the study were from the breeding register of the breeding mares (15 mares and 49 pregnancies) from the State Stud farm "Kabiuk" near Shumen, Bulgaria, for a 9 years' period (2010-2019). It is established that the mares from the Haflinger breed are covered for the first time at average age of 3.98±0.78 years, average age at first fertilization - 4.02±0.80 years and average age at first foaling - 5.79±1.43 years. The GL is on an average 329.27±1.90 days. The mating season (P<0.05) and the sex of the foal (P<0.05) are significant sources of variation.

Key words*: covering, fertilization, Haflinger mares, horses, gestational length.*

INTRODUCTION

The gestation length in mares is about 11 months with a fluctuation from 307 to 400 days (Karaivanov and Barzev, 1994). According to the authors, it depends on the breed, but most often it is an individual peculiarity. The effect of breed on gestation length is important as a great variation can be found in the duration of pregnancy among different breeds, as reported by Allen et al. (2002). According to Macpherson and Paccamonti (2011), equine gestation ranges from 320 to 362 days, contradicting a concept that only fetuses with a gestational age of 330 days would be physiologically mature. Taveira et al. (2007) reported that the average period of first gestation in Thoroughbred mares was 337.83±9.47 days, with a fluctuation from 302 to 396 days. Aoki et al. (2013) established that the mean gestation length in heavy draft mares was 334.9±8.3 days, and according to Zuccari et al. (2002) for the Pantaneiro mares that length was 327 days. Popova et al. (2014) examined 37 mares of Purebred Arabian and 53 mares of Shagya-Arabian breeds and established that the average gestation length in purebred Arabian mares is 333.7±1.05 days and in the Shagya-Arabian mares - 333.1±0.83 days.

Studies on the gestation length and the influence of various factors on it were made by other authors (Davies-Morel et al., 2002; Zuccari et al., 2002; Perez et al., 2003; Sevinga et al., 2004; Winter et al., 2007; Cilek, 2009; Meliani, 2011; Satue et al., 2011a; 2011b; Langlois and Blouin, 2012; Walcowicz et al., 2014; Ferreira et al., 2016 etc.).

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.

In Bulgaria, purposeful studies on reproduction of Haflinger breed were not made. Such research is needed to optimize the use of the breed, which will contribute to the conservation and further development of this valuable genetic resource.

MATERIALS AND METHODS

The study was carried out in the stud farm "Kabiuk", Shumen. Stud book records and breeding registers were analyzed for all of the breeding mares from the Haflinger breed (15 mares with 49 pregnancies) during the period from 2009 to 2019. The gestation length is determined from the date of fertilization to the

date of foaling. The last cover date of the mare is used for date of fertilization. Records of age of first covering were available for 18 mares, for age of first fertilization - 18 mares and age for first foaling - 12 mares.

The multifactorial ANANOVA was used for data processing and establishment of the influence of some factors on the gestation length, the liner model being of the following statistical form:

Yijklm=μ+SZi+SXj+AGk+Bl+eijkl (m),

where: Yijklm - surveillance vector; μ- overall average constant; SZi, SXj and AGk are fixed effects of mating season (i = 3 Spring - March through May; Summer - June through August; winter - December through February); the sex of the foal (j = 2); age group of the mare (κ=7: 1- up to 4 years old; 2 - 5-7; 3 - 8-10.; 4 - 11-13; 5 - 14-16; 6 - 17-19; 7 - 20-23 years, respectively); eijkl - residual variance.

RESULTS AND DISCUSSIONS

The study indicates that the gestation length in Haflinger breed (HB) is 333.7±1.05 days (Table 1).

Table 1. Gestation length in mares of the Haflinger breed, days

Age group (in years)	LS ± SE	Min.	Max.
up to 4	323.72±5.33	312.89	334.55
5-7	332.21±2.24	327.66	336.76
8-10	325.15±3.19	318.67	331.62
11-13	334.15±2.43	329.21	339.10
14-16	328.35±3.41	321.42	335.27
17-19	326.72±5.33	315.89	337.55
20-23	334.61±5.82	322.79	346.43
Average for the breed	329.27±1.90	325.42	333.13

The results obtained are similar to those reported by Matassino (1962) for the same breed - 337.8±13 days.

Other authors reported a longer gestation length in mares from Haflinger breed such as: Bos and Van der Mey (1980) indicate an average duration of 341.3 days, and Heck et al. (2017) reported an average duration of 341.7±7.5 days for 130 mares of the same breed.

Satue. et al. (2011) have observed age differences in the gestation length in Carthusian breed, as the trait in mares between 8-12 years, gestation was 5.3 days shorter (P<0.005) than in mares between 13-17 years.

A significant influence of the age of the mare (Table 2) and a sustainable trend of variation of the gestation length with increasing age in the studied breed was not established (Table 1).

Table 2. Effect of the mating season, sex of the foal and age of the mare on the gestation length, F-criterion and degree of statistical significance

Factor	Df	Gestation Length
Age of the mare	6	1.357
Mating season	2	5.184*
Sex of the foal	1	5.223*

*P<0.05

There is a significant influence on the gestational length in HB (P<0.05) by the mating season and the sex of the foal (Table 2).

The shortest gestation length is in the mares fertilized in the summer (Figure 1) - 321.89±3.24 and the longest gestational is in mares fertilized during the winter - 335.82±3.60 days, as the differences in fertilization in summer are 13.93 days.

The average values of the age at first covering, age at first fertilization and age at first foaling were presented in Table 3.

Table 3. Mean values of the studied traits of mares from Haflinger breed in "Kabiyuk" (LS ± SD)

Traits	N	LS ± SD	Min.	Max.
Age at first covering (in years)	18	3.98±0.78	3.12	5.68
Age at first fertilization (in years)	18	4.02±0.80	3.21	5.77
Age at first foaling (in years)	12	5.79±1.43	4.11	8.34

It was established that the average age at first covering of the mares from the Haflinger breed in our country was 3.98±0.78 years, the average age at first fertilization was 4.02±0.80 years and the average age at first foaling was 5.79±1.43 years.

The age of first covering and its influence on the reproductive performance of the mares and the quality of the offspring has been a subject of a number of 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. Rastija et al. (2005) reported for mares from the Lipizzaner breed, where the age at first fertilization was 1,157 days and at first foaling - 1,489 days.

Rodrigues et al. (2020) studied breeding and parturition records collected over a period of 35 years in the Alter Real stud of Lusitano horses. The authors reported that the 1027 gestations by 209 mares mated to 60 stallions had a mean GL of 338.1±9.26 days.

Talluri et al. (2016) reported average gestation length for Marwari foals born is 344.1±0.49 days. In the same study the range of gestation lengths was found to be 315-388 days all resulting in viable foals. The length of gestation was not significantly affected by age and parity of the mare. The only factors significantly affecting gestation length were foal gender and month of foaling ($P<0.05$).

Popova (2014) found that the average (LS) age of first covering in purebred mares was 1,584.2±29.5 days, the average age of first fertilization was 1,682.9±24.1 days, and the average age of first drawing - 2,117.7±69.9 days. For the Shagya-Arabian mares, the mean values of these indicators were 1,617.1±18.1, 1,673.9±18.8, 2,202.4±53.9 days, respectively.

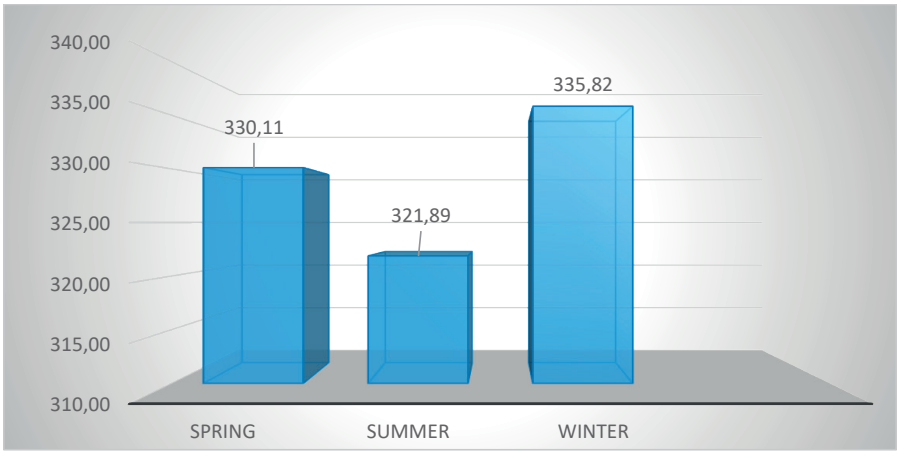

Figure 1. The average gestation length according to the season of mating, days

Data on the influence of mating season on the gestation length varies.

Bene et al. (2014) in a study of seven breeds in Hungary indicated that the mares fertilized in

March and April had the longest gestation length while the mares fertilized in later months of the year - shortest.

In Cartusian breed the gestation length in mares mated between May and July (320.3±9.7 days) was significantly (P<0.001) shorter than those mated between November and January (333.2±13.6 days) and between February and April (335.6±10.0 days) (Satue et al., 2011).

Mares from Friesian breed fertilized during the months of July through September, had 4 days shorter gestation length (329 days) from the ones fertilized earlier in the year (Sevinga et al., 2004).

In Bulgaria, Popova et al (2014) established that mares from the Purebred Arabian and Shagya-Arabian breed had the shortest gestation length when fertilized in the autumn.

Most studies report a longer period of gestation in male fetus: with 1.9 days (P<0.05) in Thoroughbred mares (Taveira et al., 2007); 5.7 days in Cartusian breed (Satue et al., 2011); 4.4 days (P<0.01) in heavy draft mares (Aoki et al., 2013); 0.81 days in Purebred Arabian breed and 1.74 days in Shagya-Arabian breed (Popova et al., 2014) etc.

The mares studied in this research are not an exception (Figure 2), as the difference being 6.89 days can be considered indisputably proven (Table 2).

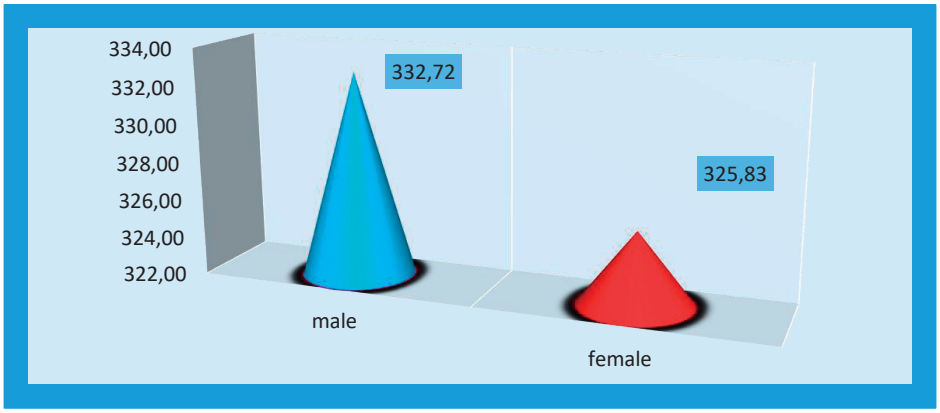

Figure 2. Average gestation length depending on the sex of the foal in mares from Haflinger breed, days

CONCLUSIONS

The average gestation length in the Haflinger breed in Bulgaria was 329.27±1.90 days.

The season of mating has a significant influence on the gestation length and for the Haflinger breed it is shortest in mares fertilized in the summer.

The mares of different ages did not differ significantly by gestation length.

The sex of the foal also has a significant influence on the gestation length, as the male foal has longer GL - 6.89 days.

It was established that the average age (LS) of first covering of the mares from Haflinger breed in our country was 3.98±0.78 years, the average age of first fertilization was 4.02±0.80 years and the average age of first foaling was 5.79±1.43 years.

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TECHNOLOGIES OF ANIMAL HUSBANDRY