

## STUDY REGARDING SOME REPRODUCTIVE PARAMETERS OF BROODMARES FROM RĂDĂUȚI STUD FARM

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### Abstract

The present paper aimed to analyze 16 broodmares from the Rădăuți stud farm (2000 generation), from the genealogical lines Dahoman (2 females), El-Sbaa (5 females), Koheilan (1 female), Shagya (4 female), and Siglavy-Bagdady (2 female); thus, we considered important to study reproductive parameters such as gestation, foaling interval and reproductive longevity of these broodmares.

The results indicated that the average gestation length was  $338.7 \pm 0.9$  days, and the variability of this character was reduced ( $V\% = 2.7\%$ ). Regarding the average duration of each genealogical line, we observed that it ranged between  $334.9 \pm 3.3$  days (Dahoman) and  $341 \pm 1.4$  days (Shagya), both of them being in limits given by the literature; in this case, the coefficient of variability had values between 1.6% (Siglavy-Bagdady genealogical line) and 3.8% (Dahoman genealogical line), which indicates that the population is very homogeneous regarding this character.

For the whole population, the foaling-interval parameter had an average value of  $503 \pm 19.9$  days, and the absolute values that ranged between 326 and 1125 days; the variability of this character was high (18.1 - 46.4%). Depending on the genealogical lines of broodmares, the average value of foaling-interval ranged from  $423 \pm 31.4$  days (Dahoman) to  $613.8 \pm 63.7$  days (Hadban).

Regarding the reproductive longevity of the mares studied, we observed that the average value of this parameter was  $5335.6 \pm 429.2$  days, the minimum being 1995.0 days, and the maximum 7339.0 days. Depending on the genealogical line, the average values of reproductive longevity were between 4457 days/12.2 years (Dahoman genealogical line) and 6600.5 days/18.1 years (Siglavy-Bagdady genealogical line).

**Key words:** gestation, foaling-interval, longevity, broodmare, reproduction

### INTRODUCTION

This paper aimed to study the reproductive activity of broodmares in the Rădăuți stud farm, in terms of gestation length, foaling-interval parameter, and the reproductive longevity. The reason for choosing the unit was that this unity was an important and continuous source of biological material from the Shagya Arabian horse breed, and the fact that the reproductive activity was pursued is related to the fact that the stud farms are made to perpetuate valuable breeds, like this amazing one.

The analyzed parameters are among those that play an important role in the analysis of reproductive activity.

Gestation length represents the time elapsed since the date of the last insemination or fertile breeding and parturition. According to some authors, its length in mare's case is between 310-412 days [2], between  $336.2 \pm 1.97$  and  $341.9 \pm 1.86$  days [5], between  $336.2 \pm 2.55$  days and  $341.9 \pm 2.55$  days [6]; its duration is influenced by diet and maintenance status (feeding and care of mares shorten the gestation period), age of the mare (those which calve for the first time and elderly females have a longer gestation), sex of products (for male products it is longer than for female), climate (the tropical one

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The manuscript was received: 05.10.2020  
Accepted for publication: 25.03.2021

makes the gestation duration shorter than in the case of the cold one). [8]

Foaling-interval represents the time interval calculated between two consecutive calving. According to some authors, its value is 337-339 days [10], and the study conducted by Pânzaru Claudia et. al, 2017, on 50 broodmares of the Shagya Arabian breed, from the Rădăuți stud farm, revealed that the FI values were between  $409.0 \pm 41.58$  days and  $539.4 \pm 66.39$  days, with an average of 472.7 days.

## MATERIAL AND METHOD

To realize our purpose we analyzed 16 mares, from the 2000 Rădăuți stud farm generation; this biological material was chosen since these broodmares had a high ranked reproductive activity. They were part of Dahoman, El-Sbaa, Koheilan, Shagya and

Siglavay-Bagdady genealogical bloodlines of Shagya Arabian horse breed and they have calved from february to december 2000.

These broodmares were analyzed regarding gestation length (difference between date of insemination and date of calving), foaling-interval (difference between two consecutive calves) and reproductive longevity (length of reproductive activity).

Data were statistically processed using the arithmetic mean ( $\bar{x}$ ), variance ( $s^2$ ), standard deviation (standard deviation of individual values - s), standard deviation of the mean ( $\pm s\bar{x}$ ), and also the coefficient of variation (V%).

## RESULTS AND DISCUSSIONS

The data obtained regarding the gestation length were statistically processed and centralized in table 1.

Table 1 Statistic data regarding the gestation length of studied broodmares

Specification	Gestation length							
	Total	I	II	III	IV	V	VI	VII
n	103	13	11	12	11	11	10	10
$\bar{X}$	338.7	332.8	341.1	341.1	343.1	338.3	339.8	343.4
$s^2$	83.2	63.4	98.9	89.9	63.7	14.6	66.2	122.7
s	9.1	8.0	9.9	9.5	8.0	3.8	8.1	11.1
$\pm s\bar{x}$	0.9	2.2	3.0	2.7	2.4	1.2	2.6	3.5
V%	2.7	2.4	2.9	2.8	2.3	1.1	2.4	3.2
MIN	313.0	320.0	323.0	325.0	330.0	333.0	324.0	333.0
MAX	366.0	344.0	357.0	357.0	358.0	344.0	352.0	366.0
	VIII	IX	X	XI	XII	XIII	XIV	XV
n	8	5	4	3	2	1	1	1
$\bar{X}$	337.5	333.4	338.0	337.0	329.5	313	331	352
$s^2$	48.3	5.3	50.7	111.0	-	-	-	-
s	6.9	2.3	7.1	10.5	-	-	-	-
$\pm s\bar{x}$	2.5	1.0	3.6	6.1	-	-	-	-
V%	2.1	0.7	2.1	3.1	-	-	-	-
MIN	325.0	330.0	328.0	326.0	318.0	313	331	352
MAX	349.0	335.0	344.0	347.0	341.0	313	331	352

The 103 cases analyzed were spread over 15 gestation periods, and we observed that in each situation the number of mares included was decreasing. The minimum average value of the length was recorded in the case of the

12<sup>th</sup> gestation (329.5 days), and the maximum in the case of the 15<sup>th</sup> period (352 days). The minimum and maximum absolute values recorded were 318 days and 352 days, respectively, all other values were close to

those recorded in the literature (average length is 335 days according to some authors [10]). The coefficient of variability indicated that the population is homogeneous in terms of gestation length ( $V\% = 0.7-3.4\%$ ).

The El-Sbaa XII-35 broodmare aborted at 267 days, during the fourth gestation, which is why it was excluded from study. One of the 12 females (Hadban XXXV-17) had an abortion at 255 days, so it was also ignored.

The 13<sup>th</sup>, 14<sup>th</sup> and 15<sup>th</sup> gestations were recorded in the case of a single mare (El-Sbaa XII-38) and lasted between 313 and 352 days.

The figure 1 highlights the dynamics of gestation length of the mares that we have studied; in this case it's obvious the evolution of the average, minimum and maximum

values in the form of a graph that illustrates very clearly the situation described above.

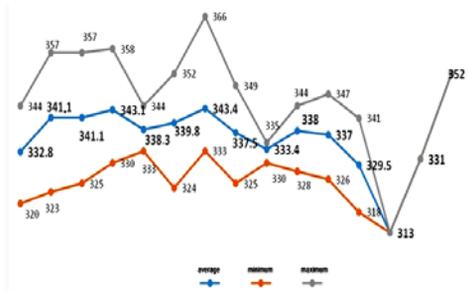


Fig. 1 The dynamics of gestation length (days)

Data of the gestation length in the case of genealogical bloodlines of the Shagya Arabian horse breed, included in the analysis, are presented in Table 2.

Table 2 Statistical data of gestation length for every genealogical bloodline

Specification	Dahoman	El-Sbaa	Hadban	Shagya	Siglavy-Bagdady
n	15	31	7	30	20
$\bar{X}$	334.9	337.5	337.4	341.0	340.3
$s^2$	162.2	95.0	103.0	58.4	30.6
s	12.7	9.7	10.1	7.6	5.5
$\pm s\bar{x}$	3.3	1.8	3.8	1.4	1.2
V%	3.8	2.9	3.0	2.2	1.6
MIN	320.0	313.0	328.0	321.0	330.0
MAX	366.0	356.0	358.0	357.0	353.0

The shortest gestation length was recorded in the case of El-Sbaa genealogical line (313 days), and the longest at the Dahoman line (366 days).

The figure 2 illustrates the situation of gestation duration in the case of studied genealogical lines.

In this representation it can be seen that the values recorded for all genealogical lines fall within those recorded in the literature, which states that the gestation length of mares varies between 310-412 days. [2, 3, 4, 9, 10]

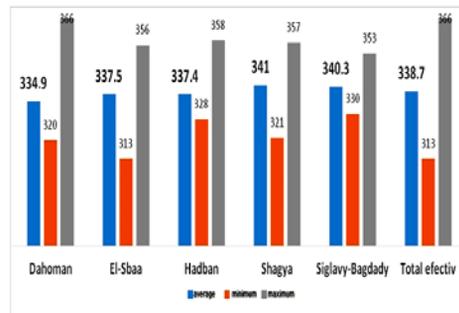


Fig. 2 Gestation length of the genealogical bloodlines (days)

The table 3 presents the situation of the values of the foaling-interval parameter, in the case of all analyzed mares.

Table 3 Statistical data regarding the foaling-interval of studied broodmares

Specification	Foaling-interval						
	I	II	III	IV	V	VI	VII
n	12	12	12	10	10	9	7
$\bar{X}$	490.5	528.7	550.2	544.4	466.4	582.0	500.4
s <sup>2</sup>	36749.9	27703.3	33634.0	63705.8	26522.9	72068.3	34964.6
s	191.7	166.4	183.4	252.4	162.9	268.5	187.0
$\pm s\bar{X}$	55.3	48.0	52.9	79.8	51.5	89.5	70.7
V%	39.1	31.5	33.3	46.4	34.9	46.1	37.4
MIN	326.0	348.0	356.0	343.0	353.0	347.0	347.0
MAX	893.0	736.0	882.0	1125.0	778.0	1106.0	811.0
	VIII	IX	X	XI	XII	XIII	XIV
n	5	4	3	2	1	1	1
$\bar{X}$	382.2	439.0	496.0	375.5	388	387	366
s <sup>2</sup>	4779.2	15670.0	35983.0	-	-	-	-
s	69.1	125.2	189.7	-	-	-	-
$\pm s\bar{X}$	30.9	62.6	109.5	-	-	-	-
V%	18.1	28.5	38.2	-	-	-	-
MIN	341.0	348.0	383.0	366	388	387	366
MAX	504.0	615.0	715.0	385	388	387	366

From the displayed information, it can be noticed that the FI had an average value of  $503 \pm 19.9$  days and absolute values that ranged between 326 and 1125 days; the variability of this character in the population was, generally speaking, very high (V% = 18.1 - 46.4%).

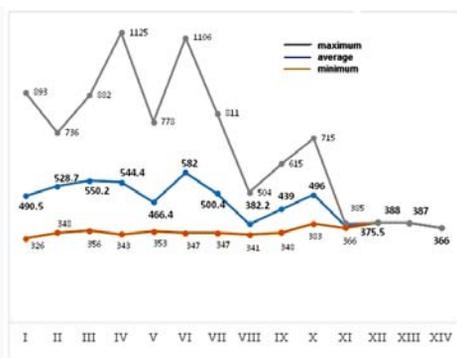


Fig. 3 Foaling-interval length of the studied broodmares (days)

Table 4 presents the situation of reproductive longevity of mares introduced in the study.

Table 4 Statistical data regarding the reproductive longevity of studied broodmares

Specification	days	years
n	16	16
$\bar{X}$	5335.6	14.6
s <sup>2</sup>	2947134.3	22.2
s	1716.7	4.7
$\pm s\bar{X}$	429.2	1.2
V%	32.2	32.2
MIN	1995.0	5.5
MAX	7339.0	20.1

The statistical data shows that the reproductive longevity of the mares was on average  $5335.6 \pm 429$ , 2 days ( $14.6 \pm 1.2$  years), with limits from 1995 and 7339 days (5.5 and 20, 1 year). The variability of this character in the studied population was high (32%) an aspect that indicates a pronounced heterogeneity.

In figure 4 there can be observed the reproductive longevity situation of the 16 mares that we have studied (values are expressed in days).

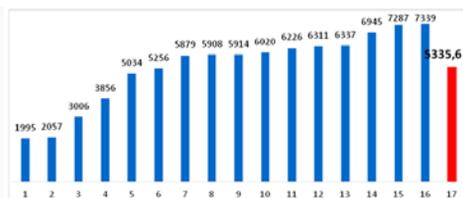


Fig. 4 Reproductive longevity of broodmares (days)

This image highlights the fact that the lowest value of reproductive longevity was 1995 days, and the highest of 7339 days, the average of this parameter being 5335.6 days. Comparing the results obtained with those mentioned in the literature where it is recommended to use mares at reproduction for less than 10 years [8] (maximum 3650 days), it can be stated that the average reproductive longevity in the study exceeded this value. However, if we take into account the fact that in some cases the value and health of the mare allow its use even up to the age of 16-20 years [8], it can be stated that both the average and the maximum value (7339 days) falls within those allowed by the literature.

## CONCLUSIONS

Following the analysis of the results, we concluded that:

- the minimum average value of the gestation length was 329.5 days, and the maximum length was 352 days; the absolute minimum and maximum values recorded were 318 days, and 352 days, respectively, all other values being close to those recorded in the literature (average duration is 335 days according to some authors [10]). The coefficient of variability indicated that the population is homogeneous in terms of gestation duration ( $V\% = 0.7-3.4\%$ );

- depending on the genealogical line of mares, the average gestation length ranged between  $334.9 \pm 3.3$  days (Dahoman) and  $341 \pm 1.4$  days (Shagya); the shortest duration was recorded in the case of the El-Sbaa line (313 days), and the longest in the case of the Dahoman line (366 days);

- considering that the literature mentions that gestation length should vary from 310-412 days for mares [2, 3, 4, 9, 10], it can be stated that the results obtained in the study fall within

the allowed limits, both in terms that concerns the entire population, as well as the genealogical lines of which it is composed;

- regarding the foaling-interval parameter, it was observed that it had an average value of  $503 \pm 19.9$  days; the absolute values of FI ranged between 326 and 1125 days, and the variability of this character was, in general, very high ( $V\% = 18.1 - 46.4\%$ ); this indicated that the group is very heterogeneous from this point of view (this aspect was caused by the very high values of the foaling-interval parameter, calculated in the cases of II, III, IV, VI and VII intervals - more than 500 days);

- the reproductive longevity of the studied broodmares was on average  $5335.6 \pm 429.2$  days ( $14.6 \pm 1.2$  years), with limits from 1995 and 7339 days (5.5 and 20.1 years), and the variability of this character in the studied population was high, of 32%, aspect that indicates a quite pronounced heterogeneity; the average values frame the results obtained in those admitted by the literature. [8].

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