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# Duration of economic use of lithuanian heavy draft stud mares

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**Abstract.** The development of milk horse breeding in Russia contributes to the high genetic potential of heavy draft stud mares. The Republic of Mari El has been breeding heavy draft horses to produce koumiss since 1977. The efficiency of heavy draft horse breeding depends on the intensity of use of the breeding stock. At the same time the duration of economic use of animals is of great importance as the duration of the use of horses provides not only economic benefits but also the breeding progress of the herd. The studies on duration of economic use of Lithuanian heavy draft stud mares and their lifetime productivity were conducted on the Koumiss farm of ZAO PZ "Semenovsky" of the Medvedevsky region of the Mari El Republic. The studies have shown that the duration of economic use of Lithuanian heavy draft stud mares on the farm is 4,195 days or 11.5 years on the average. The study of the lifetime productivity revealed that the Lithuanian heavy draft stud mares had a high lifetime milk yield. As a result of the research the significant positive correlation between the duration of use of the mares and their lifetime milk yield was found out. There is a small positive correlation between the duration of economic use and 1-day milk yield of the economic use and 1-day lactation. The analysis of duration of economic use of Lithuanian heavy draft stud mares depending on their father's genotype has showed that the longest lactation in the herd was among the daughters of stallion Sunkumas 32 – 15 years. Thus, when conducting selection and breeding work, the farms have great possibilities to increase the period of economic use of horses on this farm and increase their lifetime productivity.

## 1. Introduction

Dairy horse breeding is an important and promising area of agricultural production. The mare's milk contains large amounts of vitamins and milk sugar. The proteins of mare's milk 50% of which is albumin are of great value. Compared to other animals', the composition mare's milk is most similar to the female milk, therefore, it is the most natural food for humans and especially for children [1-7].

Currently, milk horse breeding in Russia is developing actively, which is contributed by the high genetic potential of breeds existed in the country [8].

The Mari El Republic has been developing this industry since 1977, when the Koumiss farm of the state farm "Ovoshchevod" got the first horses of the Lithuanian, Russian and Soviet heavy draft breeds. Now the breeding koumiss complex ZAO PZ "Semenovsky" breeds Lithuanian and Russian heavy draft horses. The population of Lithuanian heavy draft stud mares of the Mari El Republic formed 12 families with the number from 7 to 32 mares. Milk productivity of the leaders of the families ranged from 4.516 to 5.532 kg of milk per 210 days of lactation. Mass fraction of fat in mares' milk ranged from 1.60 % to 2.12 %, and the milking quality coefficient was 429.0-675.7 kg.



Individual heavy draft mares had very high estimated milk yield per lactation. Thus, Lithuanian heavy draft mare Flora had 8,576 kg of milk yield per lactation [7]. 20 years ago the breeding koumiss farm achieved a record productivity of 5.900 kg of milk per 210 days of lactation, which was recorded for mare Arenda 71 [8].

According to the data of E.D. Chirgin [9], in recent years, the milk productivity of mares has reached 4.516-5.532 kg of milk per 210 days of lactation. Mass fraction of fat in mares' milk ranged from 1.60 % to 2.12 %, and the milking quality coefficient was 429.0-675.7 kg.

Therefore, the breeding koumiss complex ZAO PZ "Semenovsky" of the Mari El Republic has unique genetic resources of Lithuanian heavy draft horses that shall be preserved and increased.

The efficiency of heavy draft horse breeding depends on the intensity of use of the breeding stock. At the same time the duration of economic use of animals is of great importance as the duration of the use of horses provides not only economic benefits but also the breeding progress of the herd [10].

## 2. Experimental research

The studies on duration of economic use of Lithuanian heavy draft stud mares and their lifetime productivity were conducted on the Koumiss farm of ZAO PZ "Semenovsky" of the Mari El Republic.

The aim of the research is to study the duration of economic use and lifetime productivity of Lithuanian heavy draft horses.

Tasks of the research:

- to study the productive longevity of mares in the average for the breed and depending on the genotype of the father;
- to analyze the level of milk productivity of animals in the average for the breed, depending on the age and genotype of the father;
- to analyze the lifetime productivity of mares depending on the genotype of the father;
- to calculate the mares' milk yield per 1 day of lactation and per 1 day of the duration of economic use;
- to study the variability of the peculiarities under study.

The object of research is the Lithuanian heavy draft mares dropped out from the herd (n = 86).

The study of the duration of economic use of mares was performed according to the data in the cards of the stud mares (Form No. 2-1) dropped out from the herd of the koumiss farm.

To determine the lifetime productivity of horses the analysis of the lifetime milk yield was carried out by summing up milk yield for all the lactation periods.

There was the calculation of the milk yield per 1 day of lactation and per 1 day of the duration of economic use.

The resulting data were statistically processed using standard methods of biological statistics on the PC using Microsoft Excel.

## 3. Results and considerations

Currently, the breeding koumiss complex ZAO PZ "Semenovsky" has 353 horses. There are 199 Lithuanian heavy draft horses, including: stallions – 10 animals, mares – 105 animals, filly of 2013-2015 years of birth – 58 animals, colts of 2013-2015 years of birth – 26 animals. All stallions and mares are of the elite class.

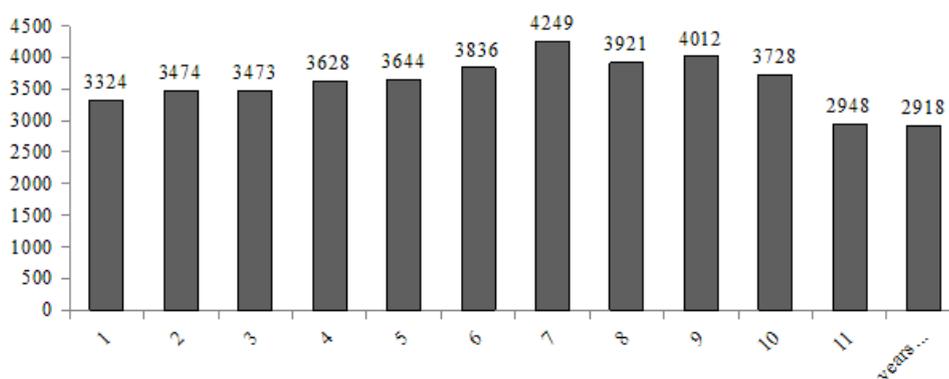
The studies have shown that the duration of economic use of Lithuanian heavy draft stud mares on the farm is 4.195 days or 11.5 years on the average (table 1). Age 1 of the foaling of Lithuanian heavy draft mares in the average is 1.392 days or 3.8 years. The average duration of the calving interval for the Lithuanian mares in the herd is 453 days.

The results of the research showed that the milk yield of mares grows with the age of the animals (figure 1). Peak milk productivity occurs at the age of 7th lactation. The average milk yield in that

lactation among mares was 4.249 kg. Since 8th lactation there is a gradual decline in milk yield with age.

By studying the lifetime productivity of mares, it was revealed that the Lithuanian heavy draft horses had a high lifetime milk yield – an average of 11.047 kg, while milk yield per 1 day of economic use was 2.7 kg and per 1 day of lactation was 13.9 kg.

The longest lifetime - 22 years or 7.860 days in the herd belongs to Lithuanian heavy draft mare Shubeika 81 the daughter of Bouquet of 63 and Shalanda 58. She was born on July 19, 1988, and dropped out from the herd on May 19, 2010, for the period she gave birth to 9 foals: 7 colts and 2 fillies. Lifetime milk yield of Shubeika 81 was 17.308 kg of milk. Her mother Shalanda 58 had the maximum lifetime milk yield, which was 47.451kg. Shalanda 58's father is Ducat 43, her mother is Shirshe 18. In addition to the maximum lifetime milk yield this mare gave birth to 15 foals: 8 colts and 7 fillies, which is the best result among the population under study. The research has showed that in the average during the lifetime 1 mare gives birth to 7 foals. Altogether the population of mares under study gave birth to 600 foals, among which 310 colts and 290 fillies, for the entire study period.



**Figure 1.** Age dynamics of milk productivity of mares.

The result of the research has found a significant positive correlation between the duration of the use of mares and their lifetime milk yield ( $r=+0.6$ ). There is a small positive correlation between the duration of economic use and 1-day milk yield of the economic use and 1 day lactation ( $r=+0.2$  and  $r=+0.15$ ).

The objectives of our research included the study of the influence of stallion on the duration of economic use and lifetime productivity of their daughters.

The analysis of duration of economic use of Lithuanian heavy draft stud mares depending on their father's genotype has showed that the longest lactation in the herd was among the daughters of Sunkumas 32 – 15 years or 5,490 days which is more in comparison with his daughters of: Arax 25 – 117 days, Baklan 38 – 2,098 days ( $P\leq 0.01$ ), Bromas 202 – 351 days ( $P\leq 0.01$ ), Bouquet 63 – 1,729 days, Voyage 61 – 1,590 days ( $P\leq 0.05$ ), Gluosnis 18 – 1,327 days ( $P\leq 0.05$ ), Kurmis 13 – 997 days, Kursantas 6 – 879 days, Laskovy 11 – 1,944 days ( $P\leq 0.01$ ), Sherkhan 9 – 2,234 days ( $P\leq 0.01$ ), Eraslas 23 – 2,043 days ( $P\leq 0.01$ ) (see the table).

The results of the study have found that the leaders in lifetime milk yield were the daughters Sunkumas 32 as well. Their average lifetime milk yield amounted to 25,935 kg, which is higher than among the daughters of Arax 25 – 14,617 kg, Baklan 38 – 16,202 kg ( $P\leq 0.01$ ), Bromas 202 – 18,426 kg ( $P\leq 0.01$ ), Bouquet 63 – 18,588 kg ( $P\leq 0.01$ ), Voyage 61 – 13,854 kg ( $P\leq 0.01$ ), Gluosnis 18 – 16,214 kg ( $P\leq 0.01$ ), Kurmis 13 – 9,567 kg, Kursantas 6 – 11,546 kg ( $P\leq 0.05$ ), Laskovy 11 – 14,188 kg ( $P\leq 0.05$ ), Sherkhan 9 – , kg ( $P\leq 0.05$ ), Eraslas 23 – 20,449 kg ( $P\leq 0.01$ ).

It should be noted that the daughters of stallion Sunkumas 32 had the advantage over the daughters of other stallions in the milk yield per one day of lactation and one day of economic use. These results of the mares in this group were, respectively, 4.6 kg and 15.7 kg, which is significantly higher than the results of the daughters of Baklan 38 – 1.7 kg ( $P\leq 0.05$ ) and 3.2 kg ( $P\leq 0.05$ ), Bromas 202 – 3.1 kg

( $P \leq 0.01$ ) and 6.1 kg ( $P \leq 0.01$ ), Bouquet 63 – 2.8 kg ( $P \leq 0.01$ ) and 3.1 kg ( $P \leq 0.05$ ), Voyage 61 – 1.9 kg ( $P \leq 0.05$ ) and 4.5 kg ( $P \leq 0.01$ ), Gluosnis 18 – 2.3 kg ( $P \leq 0.01$ ) and 4.4 kg ( $P \leq 0.01$ ), Eraslas 23 – 2.9 kg ( $P \leq 0.01$ ) and 5.3 kg ( $P \leq 0.01$ ).

**Table 1.** Duration of economic use and lifetime productivity of mares depending on the genotype of the father.

Nickname. father's number	n	Duration of economic use (DEU), days			Lifetime milk yield, kg			Milk yield per 1 day of DEU, kg			Milk yield per 1 day of lactation, kg		
		M	m	Cv.%	M	m	Cv.%	M	m	Cv.%	M	m	Cv. %
Arax 25	3	4.321	768.9	30.8	11.318	5671.2	86.8	2.4	0.8	57.7	11.8	1.3	19.8
Baklan 38	4	3.400	236.9	13.9	9.733	400.1	8.2	2.9	0.1	9.7	12.5	0.6	9.7
Bromas 202	4	5.147	376.4	14.6	7.509	1.899.5	50.6	1.5	0.3	44.4	9.6	1.0	20.6
Bouquet 63	4	3769	1.022.8	54.3	7.347	2.490.2	67.8	1.8	0.2	17.8	12.6	0.5	7.6
Voyage 61	5	3.908	381.7	21.8	12.081	3.353.3	62.1	2.7	0.7	57.3	11.2	1.4	28.5
Gluosnis 18	9	4.171	317.6	22.8	9.721	1.915.3	59.1	2.3	0.4	51.9	11.3	0.7	18.9
Kurmis 13	8	4.521	331.8	20.8	16.368	2.811	48.6	3.4	0.5	42.8	13.6	1.1	23.2
Kursantas 6	5	4.619	343.8	16.6	14.389	2.644.9	41.1	3.2	0.7	45.8	9.0	1.2	30.2
Laskovy 11	3	3.554	353.3	17.2	11.747	2.924.5	43.1	3.2	0.6	29.5	12.5	0.5	7.3
Sunkumas 32	3	5.498	286.5	9.0	25.935	4.013.1	26.8	4.6	0.6	21.7	15.7	1.1	11.9
Sherkhan 9	3	3.264	384.1	20.4	9.434	2.088.7	38.3	2.9	0.4	21.3	11.5	0.7	11.1
Eraslas 23	5	3.455	360.3	23.3	5.486	1.084.3	44.2	1.7	0.3	38.3	10.4	0.9	20.4
The average for the breed	86	4.195	128.9	28.5	11.047	704.5	58.5	2.7	0.1	51.4	13.9	0.4	27.9

The variability of the peculiarities under study ranged widely, in the average for the breed from 27.9% to 58.5%. The most variable result was the lifetime milk yield of mares. It ranged from 8.2 to 67.8%. The variability of the duration of economic use of the mares was in the range of 9% - 54.3% and the average was 28.5%, reflecting the heterogeneity of the herd according this characteristic. Therefore, when conducting selection and breeding work, the farms have great possibilities to increase the period of economic use of horses on this farm and increase their lifetime productivity.

#### 4. Conclusion

Thus, the duration of the economic use of Lithuanian heavy draft mares on the koumiss farm of the breeding plant is 11.5 years, during this period the animals give 11.047 kg of milk in the average. It should be noted that the best productive longevity and lifetime productivity belong to the daughter of stallion Sunkumas 32. The variation coefficient of the duration of the use of mares and their lifetime milk yield allow to carry out the efficient selection to increase these characteristics.

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