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BULLETIN OF NATIONAL ACADEMY OF SCIENCES
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INFLUENCE OF INCREASING THE MILK YIELD
FOR THE FIRST LACTATION OF THE LITHUANIAN
HEAVY DRAFT HORSES ON THEIR PRODUCTIVE LONGEVITY

Abstract. Horses are late-ripening animals with low fecundity and therefore should be used in dairy horse breeding for a long time to ensure the profitability of the industry. In Central Russia, mare's milk is produced from draft horse breeds, including Lithuanian heavy-draft horses. They are highly productive animals. With intensive increasing the milk yield for the first lactation, the lifetime milk yield and the period of productive use may be declined. Studies have shown that the optimal level of increased milk yield for Lithuanian draft mares is 3001-4000 kg of milk. At this level, the mares give the highest possible lifetime yield of 24,403.66 and the highest amount of milk fat and milk protein. If the increase in the milk yield for the first lactation reaches 6000 kg and above, then in mares of the studied breed the period of productive use and the lifetime yield reduce.

Keywords: increase in the milk yield, lifetime yield, a period of economic use, productive longevity.

Introduction. In the dairy horse breeding, because of the low fertility and late ripeness of horses, their period of economic use (PEU) is of great importance. In the central part of Russia, the most advanced for milk production are heavy draft horse breeds, including the Lithuanian breed [1]. The milk productivity of the mare of the Lithuanian heavy draft breed enlarges in the process of ontogenesis from the first through the fifth lactation [2]. A high level of milk yield per lactation preserves in animals of this breed till 10–12 lactations [2]. The increase in the milk productivity of mares and the extension of the terms of their economic use depends including on the level of productivity of mares for the first lactation. Intensive increasing the milk yield of mares for the first lactation may cause a reduction in the period of their economic use due to heavy loads on the developing animal body that has not fully strengthened. To a considerable degree, this applies to the Lithuanian heavy draft mares, which are world leaders in dairy productivity among all horse breeds [3, 4]. Possessing a good milk-forming system, these highly productive animals often have to use the tissue reserves of their bodies to synthesize milk that can reduce their period of economic use and lifetime milk yield in the future.

The aim of the research. The aim of our study was to determine such a level of increased milk yield for the first lactation of the Lithuanian heavy draft mares that would not reduce their productive longevity.

Materials and methods of research. The dairy productivity of the mares was studied according to the milk recording logs at the kumiss breeding complex of ZAO Semenovsky Breeding plant of the Republic of Mari El. In total, data were taken into account for 166 mares of the Lithuanian heavy draft breed, which left the dairy herd. Recording of milk yields from dairy mares was carried out by the method of control milkings, conducted twice a month, the daily milk yield was determined by the I.A. Saygin formula [5]. The period of economic use (PEU) of mares was determined from the moment of the first

foaling to rejection from the broodstock or forced slaughter of the animal. The age of the studied mares in lactation ranged from 1 to 21 lactation. Milk samples were taken according to GOST 26809-85. Fat mass fraction (FMF) in milk was determined according to GOST 5867-90 - Milk and dairy products, protein mass fraction (PMF) in mare's milk was determined according to GOST 23327-98 - Milk and dairy products.

Research results. The average estimated yield of the Lithuanian heavy draft horses for the first lactation, the average lifetime yield, the average period of economic use (PEU) of animals and the average number of lactations are given in Table 1.

The investigations have shown that the Lithuanian mares can give milk up to the 21 lactation and produce up to 88,138 kg of milk during their lifetime. According to such indicators as the period of economic use, the number of lactations and lifetime milk yield, selection has not been carried out among heavy draft breeds, therefore, according to these traits, there is a very high level of variability (74.52-84.27%), especially in terms of lifetime milk yield (84.27%).

Table 1 – Calculated average milk yield for the first lactation, average lifetime milk yield, and PEU

Indicators	M±m	Lim: min-max	б	C_v, %
Calculated average milk yield for the first lactation, kg	3456.48±94.63	940-7479	1219.21	35.27
Average PEU, lactations	6.48±0.37	1-23	4.83	74.52
Average number of lactations	5.34±0.32	1-21	4.07	76.17
Average lifetime milk yield, kg	20970.52±1371.65	940-88138	17672.57	84.27

In our studies, it became clear that more than half of the mares were rejected after the first four lactations - 53.01% - as a result of low dairy productivity and disturbances in the reproductive function. After the first lactation, 18.67% of mares were rejected, after the second - 15.06%, after the third - 10.24% and after the fourth - 9.04% of animals.

There was a slight positive correlation (r = +0.18) between the milk yield for the first lactation and the lifetime milk yield in the studied population of mares. The inheritance of lifetime milk yield was very low, almost zero.

In order to determine how the level of increased milk yield in mares affected their lifetime productivity, all animals were divided into six groups depending on the amount of milk yield for the first lactation: in the first group there were mares with milk yield from 1001 to 2000 kg, in the second group - from 2001 to 3000 kg, in the third group - from 3001 to 4000 kg, in the fourth group - from 4001 to 5000 kg, in the fifth group - from 5001 to 6000 kg, in the sixth group - more than 6000 kg of milk.

Table 2 shows the data on the average lifetime milk yield, the calculated average milk yield for the first and for the highest lactations of the Lithuanian heavy draft mares in each of the formed groups. When analyzing the period of economic use of mares with different levels of intensity of increase in milk yield for the first lactation, we took animals as control which yield for the first lactation was within 1001-2000 kg of milk or the first group mares. According to the indicators of the highest milk yield for lactation over the period of economic use in the studied livestock, it was established an advantage for mares with over 6,000 kg of the increased milk yield for the first lactation.

Table 2 – Calculated milk yield on average for lactation and the highest lactation of the Lithuanian mares

Group	n, animals	Average lifetime milk yield, kg	Average milk yield for the first lactation, kg	Average milk yield for the highest lactation, kg
1	17	10210.13±2100.01	1511.20±88.94	3595.33±501.91
2	45	20149.40±2371.52	2514.55±48.28	4067.00±191.65
3	47	24403.66±2508.56	3487.04±44.82	4739.66±156.37
4	42	23350.76±3264.32	4461.93±44.12	5121.50×145.04
5	10	14236.00±5100.78	5205.10±67.69	5432.40±135.41
6	5	23609.00±3977.68	6299.00±135.64	6299.00±135.64

They had the average milk yield for the highest lactation of 6299.00 kg, which is more than the milk yield of all other groups. In turn, the indicators of lifetime milk yield were higher in mares with increased milk yield for the first lactation from 3001 kg to 4000 kg of milk. In mares tried to obtain more milk from 4001 to 5000 kg and above 6000 kg, lifetime milk yield declined, respectively, by 1053 kg and 794 kg, or by 4.31% and 3.25%. Mares with the increased milk yield for the first lactation from 5001 to 6000 kg, had the reduced lifetime milk yield by 10,167.66 kg or 41.66%.

The fat mass fraction in milk of mares of the studied breed was 1.85%, the protein mass fraction - 2.03%. Analyzing the indices of the mass fraction of fat and protein in the milk of mares of the experimental groups (table 3), it can be noted that the highest FMF was in animals with the increased milk yield for the first lactation up to 2000 kg of milk - 3.88%, and PMF - in mares with increased milk yield to 3000 kg.

Table 3 – Fat mass fraction and the amount of milk fat obtained from mares
with different levels of the increased milk yield for the first lactation

Group	n, animals	Fat mass fraction, %	Protein mass fraction, %	Amount of milk fat, kg	Amount of milk protein, kg
1	17	1.88	2.03	191.95	207.26
2	45	1.87	2.04	376.79	411.05
3	47	1.85	2.03	451.47	495.39
4	42	1.84	2.02	429.65	471.68
5	10	1.81	2.02	257.67	287.57
6	5	1.80	2.01	424.96	474.54

At the same time, according to the amount of milk fat and milk protein produced by animals with milk for the whole period of their economic use, mares with a milk yield of 3001 to 4000 kg for the first lactation produced both fat and protein more than all other mares.

The period of economic use (PEU) of the Lithuanian heavy draft horses and the number of their lactations are presented in table 4. The longest period of economic use of the Lithuanian mares was observed in animals with the increased milk yield for the first lactation from 3001 to 4000 kg. Animals of the same group reliably milked longer than any other mare - 6.23 lactations.

Table 4 – Period of economic use of mares and the number of lactations, depending on the intensity of increasing the milk yield

Group	n, animals	PEU, years	Number of lactations, lactations
1	17	4.53±0.74	3.67±0.64
2	45	6.71±0.68	5.64±0.58
3	47	7.42±0.73	6.23±0.61
4	42	6.69±0.86	5.36±0.71
5	10	3.40±1.16	2.90±1.07
6	5	7.25±1.03	5.00±0.91

The presented data on the intensity of increasing the milk yield for the first lactation indicate significant differences in the longevity of animals of the compared groups. The shortest period of economic use of animals was observed in the group of mares with increased milk yield from 5001 to 6000 kg – 3.4 years and 2.9 lactations. And the highest period of productive use – 7.42 years and 6.23 lactations – was recorded in animals with increased milk yield from 3001 to 4000 kg of milk. The investigations have shown that animals given higher milk yield for the first lactation of more than 4001 kg to 6000 kg or more, had a slightly reduced period of economic use.

A large amount of milk secreted in the mammary glands of high productive mares initiated in the organism of these animals more intensive metabolic processes, for which their organisms, not strong enough, were not ready. As a result, such mares are in specific economic conditions not adapted for long-

term productive use, which leads to their premature reject from the broodstock. Their further stay in the milking herd depends mostly on environmental factors since in the current feeding and keeping conditions highly productive mares are susceptible to various diseases and disorders of the reproductive function more often than animals with average productivity indicators [6].

Conclusion. The optimal level of increasing the milk yield for the first lactation of the Lithuanian heavy draft horses is from 3001 to 4000 kg of milk. Intensive increasing the milk yield of mares for the first lactation of the studied breed of more than 4000 kg of milk leads to a shortening in the period of the economic use of animals and a decrease in their lifetime milk yield.

Suggestion to the production. The optimal level of increasing the milk yield of the Lithuanian heavy draft horses for the first lactation should be in the range of 3001 to 4000 kg of milk.

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БІРІНШІ ЛАКТАЦИЯ КЕЗІНДЕ САУЫНДЫ АРТТЫРУДЫҢ ЛИТВАЛЫҚ АУЫРЖҮК ТАРТАТЫН ЖЫЛҚЫЛАРДЫҢ ТҰҚЫМЫНЫҢ ӨНІМДІЛІК ҰЗАҚТЫҒЫНА ӘСЕРІ

Аннотация. Кеш дамитын жылқылар негізінен жылқы сүт шаруашылығында төмен өнімділігі бар, сондықтан олардың шаруашылықтағы қолданысы негізгі табыс болып табылады. Орталық Ресейде жылқы саумалын көбіне литвалық жүк тартатын жылқыдан өндіреді. Олар өте жоғары өнімді жылқылар. Бірінші сауын кезіндегі интенсивті сауын әсерінен олардың өнімділігі ұзақтығы және өмір сүру ұзақтығы төмендейді.

Зерттеулер көрсеткендей, Литвалық ауыр жүк тартатын жылқы үшін саудың оңтайлы деңгейі – 3001-4000 кг сүт. Оған қарамастан осындай сауын деңгейіне қармастан олардың өнімділік ұзақтылығы 24403,66 және өте жоғары сүт майы және белок алады.

Егерде бірінші лактация деңгейін 6000 кг көбейсте жылқының өмір сүру ұзақтығы мен сауын ұзақтығы төмендейді.

Түйін сөздер: сауын, өмірлік сауын, шаруашылық қолданысы, өнімділік ұзақтығы.

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ВЛИЯНИЕ РАЗДОЯ ЗА ПЕРВУЮ ЛАКТАЦИЮ КОБЫЛ ЛИТОВСКОЙ ТЯЖЕЛОВОЗНОЙ ПОРОДЫ НА ИХ ПРОДУКТИВНОЕ ДОЛГОЛЕТИЕ

Аннотация. Лошади – позднеспелые животные с невысокой плодовитостью и поэтому должны использоваться в молочном коневодстве продолжительное время, чтобы обеспечивать рентабельность отрасли. В центральной России кобылье молоко получают от тяжеловозных пород лошадей, в том числе от литовских тяжеловозов. Они являются высокопродуктивными животными. При интенсивном раздое по первой лактации у них может сокращаться пожизненный удой и снижаться продолжительность продуктивного исполь-

зования. Исследования показали, что оптимальным уровнем раздоя для кобыл литовской тяжеловозной породы является 3001-4000 кг молока. При этом уровне раздоя от кобыл получают максимально высокий пожизненный удой 24403,66 и наибольшее количество молочного жира и молочного белка. Если раздой по первой лактации увеличивается до 6000 кг молока и выше, то у кобыл исследуемой породы уменьшается возраст продуктивного использования и снижается пожизненный удой.

Ключевые слова: раздой, пожизненный удой, продолжительность хозяйственного использования, продуктивное долголетие.

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